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54 **Theater system.**

57 A theater system including apparatus for displaying before an audience a feature having a plurality of generally simultaneously occurring plot lines, audience seating apparatus including apparatus for individually orienting individual members of the audience so as to physically direct each individual member of the audience to follow a plot line selected by him, and apparatus for providing a sound track to each individual member of the audience which corresponds to the plot line selected by him.

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FIELD OF THE INVENTION

The present invention relates to entertainment systems generally and more particularly to theaters.

BACKGROUND OF THE INVENTION

There are known in the art and proposed in the patent and general literature various types of multi-media entertainment apparatus. There are known, for example, systems which provide viewer selectable simultaneous soundtracks in different languages, systems which automatically cue special effects, including visual, audio and even olfactory effects to a film being projected. Multiprojector screening systems operative with flat or curved projection surfaces are also well known.

In an article entitled "Gaze-Orchestrated Dynamic Windows" in Computer Graphics, Volume 15, Number 3, August 1981 by Richard A. Bolt there is described a large format multiple window display which is associated with eye tracking technology, for enabling the display to be responsive to the viewer's gaze, thus providing an enlarged display, with associated soundtrack of the window at which the viewer directs his eyes for at least a threshold time duration.

SUMMARY OF THE INVENTION

The present invention seeks to provide an improved theater system having capabilities which are not present in the prior art.

There is thus provided in accordance with a preferred embodiment of the invention a theater system including apparatus for displaying before an audience a feature having a plurality of generally simultaneously occurring plot lines, audience seating apparatus including apparatus for individually orienting individual members of the audience so as to physically direct each individual member of the audience to follow a plot line selected by him, and apparatus for providing a sound track to each individual member of the audience which corresponds to the plot line selected by him.

Further in accordance with a preferred embodiment of the present invention the theater system also includes apparatus for providing to each individual member of the audience special effects which correspond to the one of the simultaneously

occurring plot lines selected by him.

According to a preferred embodiment of the invention, the plurality of simultaneously occurring plot lines are intertwined.

Additionally in accordance with a preferred embodiment of the invention there is provided a central computer system governing the operation of the apparatus for displaying and the apparatus for seating.

According to one embodiment of the invention, the apparatus for displaying is operative to display the feature on a screen exceeding 180 degrees in azimuth.

Additionally in accordance with a preferred embodiment of the invention there is provided an entertainment and educational system comprising: apparatus for storing a plurality of multi-media entertainment/educational experiences, each of the plurality of multi-media entertainment/educational experiences having a plurality of streams of inter-actively associated events; viewer selectable apparatus for enabling a viewer to select one of the plurality of multi-media experiences; and

viewer selectable apparatus for enabling a viewer to select one of said plurality of streams of inter-actively associated events.

In accordance with a preferred embodiment of the invention, the entertainment and educational system also includes apparatus for providing a sound track to the viewer which corresponds to the viewer selected one the plurality of multi-media experiences and to the viewer selected one of the plurality of streams of inter-actively associated events.

Audience seating apparatus may also be provided including apparatus for individually orienting the viewer so as to physically enable the viewer to follow the viewer selected one of the multi-media experiences and the viewer selected one of the plurality of streams of inter-actively associated events.

BRIEF DESCRIPTION OF THE DRAWINGS

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

Fig. 1 is a generalized illustration of a theater system constructed and operative in accordance

with a preferred embodiment of the present invention;

Fig. 2 is a block diagram illustration of control room equipment useful in the system of Fig. 1;

Fig. 3 is a block diagram illustration of a control room computer useful in the system of Fig. 1;

Fig. 4A is a mechanical illustration of a mechanized seat useful in the system of Fig. 1;

Fig. 4B is a block diagram illustration of a viewer-operated control subsystem generally associated with the chair of Fig. 4A;

Fig. 5 is a more detailed block diagram illustration of the subsystem of Fig. 4B;

Fig. 6A is a flow chart illustrating the operation of the system of Fig. 5;

Fig. 6B is a flow chart illustrating the operation of the apparatus of Fig. 5;

Fig. 7 is an illustration of the time relationship between an address code and a video synchronization signal; and

Fig. 8 is an illustration of a typical address library useful in an embodiment of the present invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Reference is now made to Fig. 1, which is a general illustration of a theater system constructed and operative in accordance with a preferred embodiment of the present invention. The theater system comprises an audience location region 10 in which the audience is seated on selectably directable seats 12 so as to be directed to selected locations on a screen 14. The screen is typically a wide curved screen and may extend over 360 degrees as shown. Preferably the screen is located above the audience location region 10 such that an uninhibited view of the screen is afforded to each member of the audience. Where screen 14 is a wide curved screen it preferably defines a plurality of screen segments 16, each of which is associated with at least one projector 18.

Control apparatus 20, which will be described in detail hereinafter, is coupled to the audience location region 10 and to the screen 14 and associated projectors 18 by a suitable bus 22 which carries power, audio signals and control signals.

Reference is now made to Figs. 2 and 3 which, taken together, illustrate the overall control of the theater operations. An operator panel 30 indicates to an operator the status of the theater lights and doors and accepts from him emergency input, such as a presentation stop due to a fire. The operator panel 30 is typically connected to a com-

puter 32, such as a VAX by Digital Equipment Corporation. The computer 32 interfaces via a track controller 34 to a plurality of audio disk players 36, such as conventional compact disc players, each of which reads a compact disc corresponding to one of a plurality of given plot lines in an overall presentation. The various plot lines may typically represent different perspectives in an overall dynamic historical landscape.

For example, the historical landscape may be Spain on or about 1492, and the individual plot lines or perspectives may be, for example, those of Christian priests, Jews, Moors, explorers and the like. The individual plot lines or perspectives may be visually displayed on different segments 16 of the screen 14 and may move from segment to segment and may overlap and interact with each other. Additionally, the system provides each viewer with a choice of the language spoken by the characters on the screen 14. Typically, the languages available might be English, Spanish, German, French and Arabic.

The outputs of each audio compact disk player 36 and of an additional compact disk player 37 which provides time synchronization signals to computer 32 are modulated via conventional FM audio techniques by a frequency modulator 38. The modulated signal is fed, by a feeder 39 to a coaxial cable 40 connected to each of the feeders 39. Each frequency modulator 38 is tuned to a different frequency; the number of frequencies necessary, corresponding to the number of audio disk players 36, is the number of plot lines in a program multiplied by the number of languages available.

To provide the video portion of the presentation, computer 32 interfaces via a track controller 44 with a plurality of video disk players 46, such as conventional video disk players, each of which reads a video disk that has stored in it the action which will occur in one segment 16 of the screen 14. It will be appreciated that the action stored on each video disk is synchronized with the plurality of plot lines and thus, an individual plot line typically is stored in more than one of the video disks.

The output of each video disk player 46 is projected onto the segment 16 to which it corresponds by projector 18 which, in turn, is controlled by computer 32 as described hereinbelow.

Computer 32 typically also comprises a synchronizer 52, described in more detail with reference to Fig. 6A, which interfaces with a plurality of chair controllers 54 each of which provides feedback from and local control to each seat 12, a projector controller 56 preferably for controlling the on/off state of the plurality of video disk players 46, and a theater controller 58 which governs the theater light system 60 and theater wide special effects apparatus 62 which may include, for example,

apparatus of the type described in U.S. Patents 4,629,604 and 4,603,030, the teachings of which are incorporated by reference herein. The special effects may be, for example, visual, auditory, olfactory or any combination of the foregoing, and they may be cued to the particular plot line/perspective chosen by the viewer.

The operator panel 30, computer 32 and the controllers 56 and 58 typically comprise control apparatus 20.

Reference is now made to Figs. 4A and 4B which illustrate a form and typical operation, in block diagram form, of the viewer operable apparatus forming part of the apparatus of Fig. 1. There is provided, in association with a chair 64 for a member of the audience, a chair panel 70 having selector switches, such as dials, permitting the viewer to select one of a plurality of languages and also to select one of a plurality of given plot lines in an overall presentation. In addition, a volume control is typically included to tailor the sound level to the taste of the viewer.

In accordance with a preferred embodiment of the present invention, as the action relevant to each of the individual plot lines moves from one region on the screen 14 to the other, the chair 64 of the member of the audience following the given plot line moves so as to direct the viewer to follow the action. This movement is provided by chair directing motors 71, 72 and 73, shown in detail in Fig. 4A, which are directed by the chair controller 54 in accordance with the viewer's selections on chair panel 70.

The three chair directing motors 71, 72, and 73 respectively provide horizontal, pitch and roll motion of the chair and are typically a servo motor, such as one of the type produced by Warner of the USA, for the horizontal movement and two electric piston motors connected to screws, such as a Super Pac Electro Mechanical Actuator from Duff Norton of Charlotte, North Carolina of the USA, for the pitch and roll movements. The motor 71 for the horizontal direction typically provides 180 degrees of movement. The motors 72 and 73 for the pitch and roll motions typically provide small motions, typically about 5 degrees, to add emphasis to the story line. For instance, if a particular scene occurs on a ship sailing on the high seas, motors 72 and 73 will slightly roll and pitch the chair 64, giving the viewer sitting on the chair 64 an impression of being on the ship, and thus, being a part of the life of the characters in the scene.

Further in accordance with a preferred embodiment of the present invention a sound track is provided to correspond to the viewer's selections of language and plot line/perspective. This sound track is played to the viewer by chair speakers 76 which receive a sound track input via chair control-

ler 54.

Additionally in accordance with a preferred embodiment of the invention, special effects, may be provided and cued to the particular plot line/perspective chosen by the viewer. These are provided by special effects apparatus 78 which receive control signals from controller 54.

Reference is now made to Fig. 5, which is a more detailed block diagram of the apparatus of Fig. 4B. It is seen from a consideration of Fig. 5 that the selector switches of panel 70 are coupled to a multiplexer 80, such as an FM receiver, and to a microprocessor 82, such as the 8096 from Intel. In accordance with viewer selections made at panel 70, the multiplexer 80 activates the output from one of a plurality of cue memories 84, such as an EPROM or a ROM, each of which corresponds to a given selectable plot line/perspective. Each cue memory 84 stores information about the motion, the volume control and the special effects required at each stage of one plot line.

Microprocessor 82 receives the output of the selected one of memories 84 and provides corresponding outputs to special effects apparatus 78 and to a motor controller 86, such as that provided with the Super Pac Electro Mechanical Actuator by Duff Norton, which, in turn, operates motors 71, 72 and 73 for governing the horizontal, pitch and roll motions of the viewer's chair 64.

Microprocessor 82 also provides an output to a speaker controller 94, such as a gain controller, which governs amplifiers 96 which, in turn, output to speakers 76. The speaker controller 94 typically operates to change the audio volume for each ear and thus, provides a pseudo-stereophonic experience for the viewer. The amplifiers receive the audio signal corresponding to the selected language and plot line after it is demodulated by a demodulator 98, such as an FM receiver, from the FM signal carried to the chair controller 54 by coaxial cable 40.

The demodulator 98 also extracts the time code signal, produced by audio disk player 37 (Fig. 2), from the audio signal according to standard FM techniques. This time code signal is supplied via a decoder 100, typically a counter, to the microprocessor 82 for defining the time base therein. Each time code signal is a synchronization signal which arrives at the beginning of a time slot of predetermined length, typically 5 seconds and indicates to the microprocessor 82 the command sequence, defined hereinbelow, to be read at the present time.

Reference is now made to Figs. 6A and 6B, which generally illustrate the operation of the apparatus of Figs. 1 and 5 including that of microprocessor 82. The operation of the system of Fig. 1 begins when the synchronizer 52 indicates to the

theater controller 58 to open the theater of the present invention, an operation which includes illuminating the theater, opening its doors, and broadcasting background music. As the audience files into audience location region 10 and finds their seats 12, signs placed in the region 10 are illuminated to indicate to the audience to utilize the selector switches of the chair panel 70 to select their preferred language and plot line.

Each microprocessor 82 then reads and stores the individual selections and indicates to synchronizer 52 that the individual selections have been made. Following completion of the entirety of selections, the synchronizer 52 synchronizes the entirety of audio and video disk players 36 and 46 at the beginning of the presentation, closes the theater, shuts off the lights, shuts off the background music, and then begins the presentation.

During the presentation, each microprocessor 82 moves the chair 64 associated with it, plays the music and produces the required special effects according to the plot line and language selected by the viewer and in conjunction with the scene of the presentation currently on the screen 14. The synchronizer 52 continually checks for the end of the presentation by checking the time synchronization signals from the additional compact disk player 37 and upon an affirmative response, opens the theater once again.

The actions performed by each microprocessor 82 are outlined in the flow chart of Fig. 6B. The microprocessor 82 reads the time code signal decoded by decoder 100 and determines whether it is synchronized therewith. If yes, the microprocessor 82 reads a viewer selection and checks that the plot line choice matches with that previously stored. If affirmative, the microprocessor 82 sets a modulation frequency and a cue memory 84 address in accordance therewith. A load command sequence, typically comprising the desired next position of each of the three motors 71, 72 and 73, the amplification levels of the amplifiers 96 and any special effect activity desired, is then carried out.

Should the plot line choice not match that selected and stored previously, indicating that the viewer has decided to change plot lines, the microprocessor 82 must move the chair 64 to the next position of the new plot line while also changing the sound to that of the new plot line.

Accordingly, the microprocessor 82 reads the previous command from the previous plot line, which indicates the current position of the chair. The multiplexer 80 is commanded to access the new cue memory 84 which contains the information for the new plot line and the next desired state is read from it. Accordingly, a number of actions occur which typically include chair movement, change of audio signal, and change of special

effects activity.

For chair movement, microprocessor 82 commands motors 72 and 73 to return the chair 64 to a horizontal position, using a fixed velocity, and then calculates the time needed to move from one horizontal position to the next based on a fixed velocity. If the time is less than the time between time code signals, typically arriving every 5 seconds, then the chair is commanded to move at a fixed velocity. Otherwise, it must accelerate to its new position. The acceleration is not allowed to exceed a predetermined acceleration, such as one which produces a change of 180 degrees in less than 5 seconds. Finally, the microprocessor 82 commands motors 72 and 73 to move the chair 64 to the new pitch and roll positions using a fixed velocity.

Upon changing plot lines, the sound is adjusted as follows. The speaker control 94 reduces the volume level in both ears to a very low level for the first half of the time slot. The sound is switched to the sound of the next plot line and the volume of both ears is slowly returned to the previous levels by the end of the time slot.

Once all the changes are completed, typically within one time slot, the microprocessor 82 continues as described hereinabove with the new plot line.

A typical time code signal is illustrated in Fig. 7. A typical memory command sequence is illustrated in Fig. 8. Each memory command sequence indicates the desired position of the chair 64, the volume levels of the amplifiers 96 and any special effects which are to occur during the time slot for which it is read.

It will be appreciated by persons skilled in the art that the present invention is not limited by what has been particularly shown and described hereinabove. The scope of the present invention is defined only by the claims which follow:

Claims

1. A theater system comprising:
 - means for displaying before an audience a feature having a plurality of generally simultaneously occurring plot lines;
 - audience seating means including means for individually orienting individual members of the audience so as to physically direct each individual member of the audience to follow one of the simultaneously occurring plot lines selected by him; and
 - means for providing a sound track to each individual member of the audience which corresponds to the one of the simultaneously occurring plot lines selected by him.

2. A theater system according to claim 1 and also comprising means for providing to each individual member of the audience special effects which correspond to the one of the simultaneously occurring plot lines selected by him.

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3. A theater system according to claim 1 and wherein the plurality of simultaneously occurring plot lines are intertwined.

4. A theater system according to claim 1 and comprising a central computer system governing the operation of the means for displaying and the means for seating.

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5. A theater system according to claim 1 and wherein the means for displaying is operative to display the feature on a screen exceeding 180 degrees in azimuth.

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6. An entertainment and educational system comprising:

means for storing a plurality of multi-media entertainment/educational experiences, each of said plurality of multi-media entertainment/educational experiences having a plurality of streams of interactively associated events;

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viewer selectable means for enabling a viewer to select one of said plurality of multi-media experiences; and

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viewer selectable means for enabling a viewer to select one of said plurality of streams of interactively associated events.

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7. An entertainment and educational system according to claim 6 and also comprising:

means for providing a sound track to the viewer which corresponds to the viewer selected one said plurality of multi-media experiences and to the viewer selected one of said plurality of streams of interactively associated events.

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8. An entertainment and educational system according to claim 7 and also comprising

audience seating means including means for individually orienting the viewer so as to physically the viewer to follow the viewer selected one of the multi-media experiences and the viewer selected one of said plurality of streams of interactively associated events.

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9. An entertainment and educational system according to claim 8 and also comprising means for providing to the viewer special effects which correspond to the viewer selected one of the multi-media experiences and the viewer selected one of said plurality of streams of interactively associated events.

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10. A system according to claim 6 and wherein the plurality of streams of interactively associated events are intertwined.

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11. A system according to claim 6 and comprising a central computer system governing the operation of the means for displaying and the

means for seating.

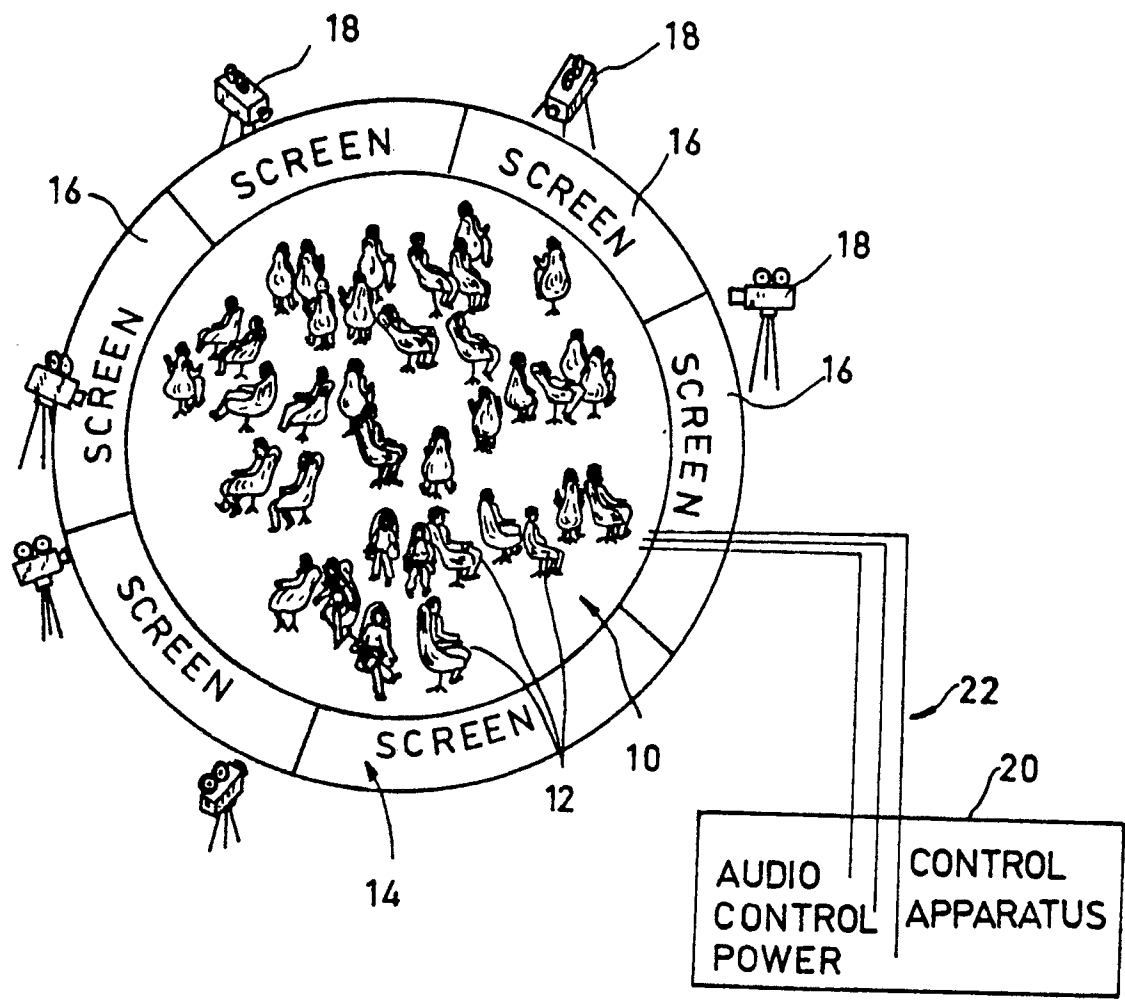
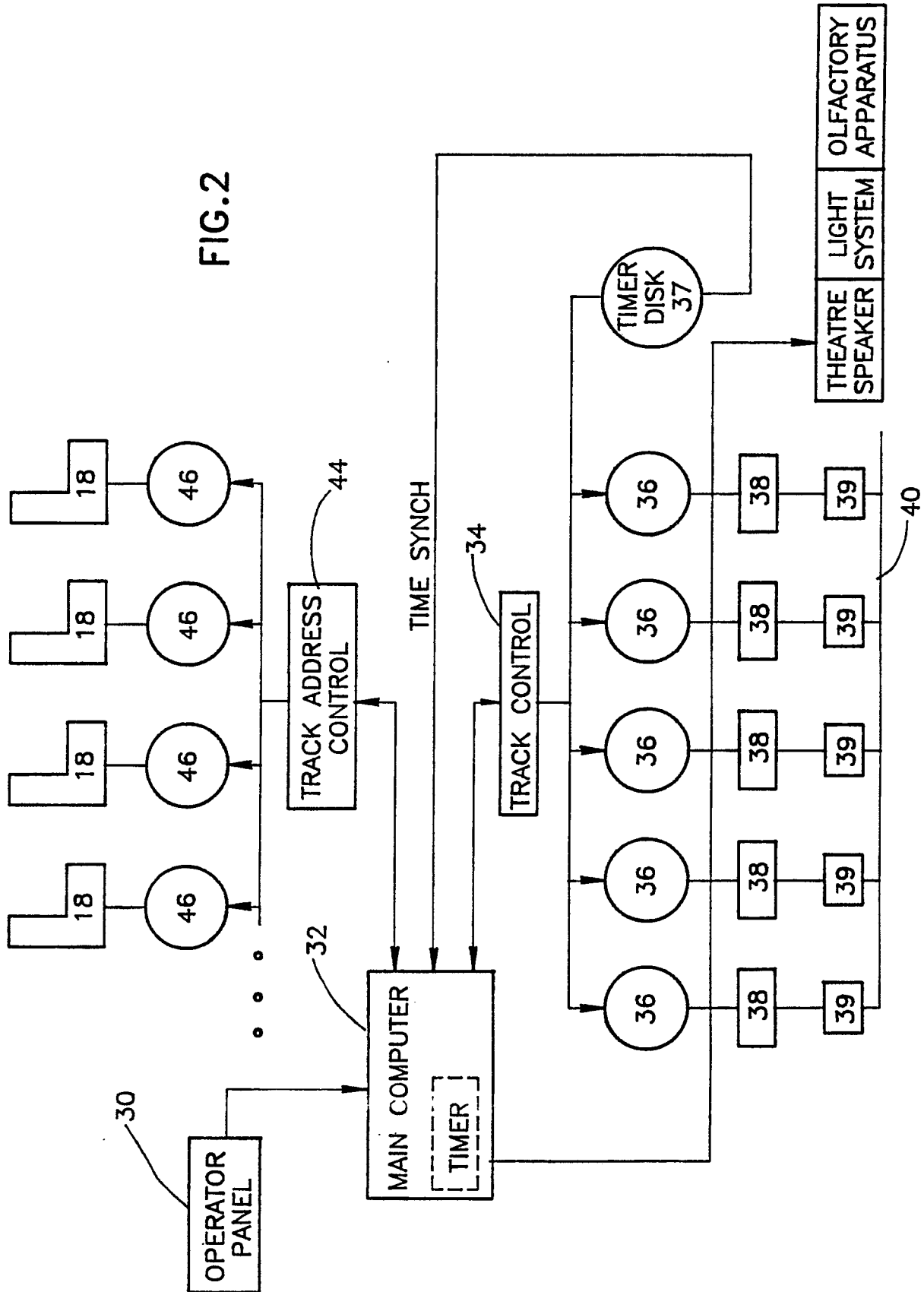


FIG 1



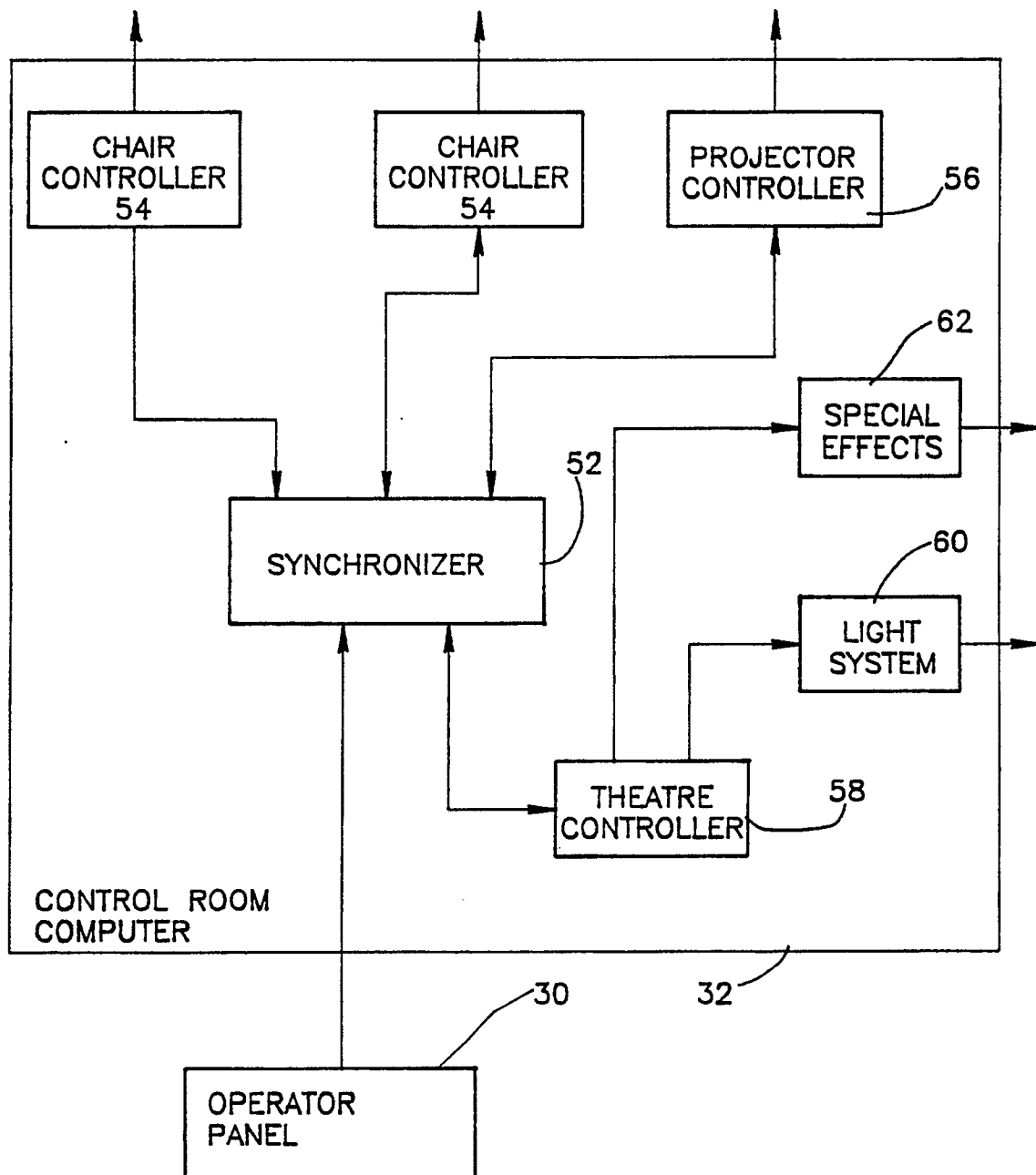


FIG.3

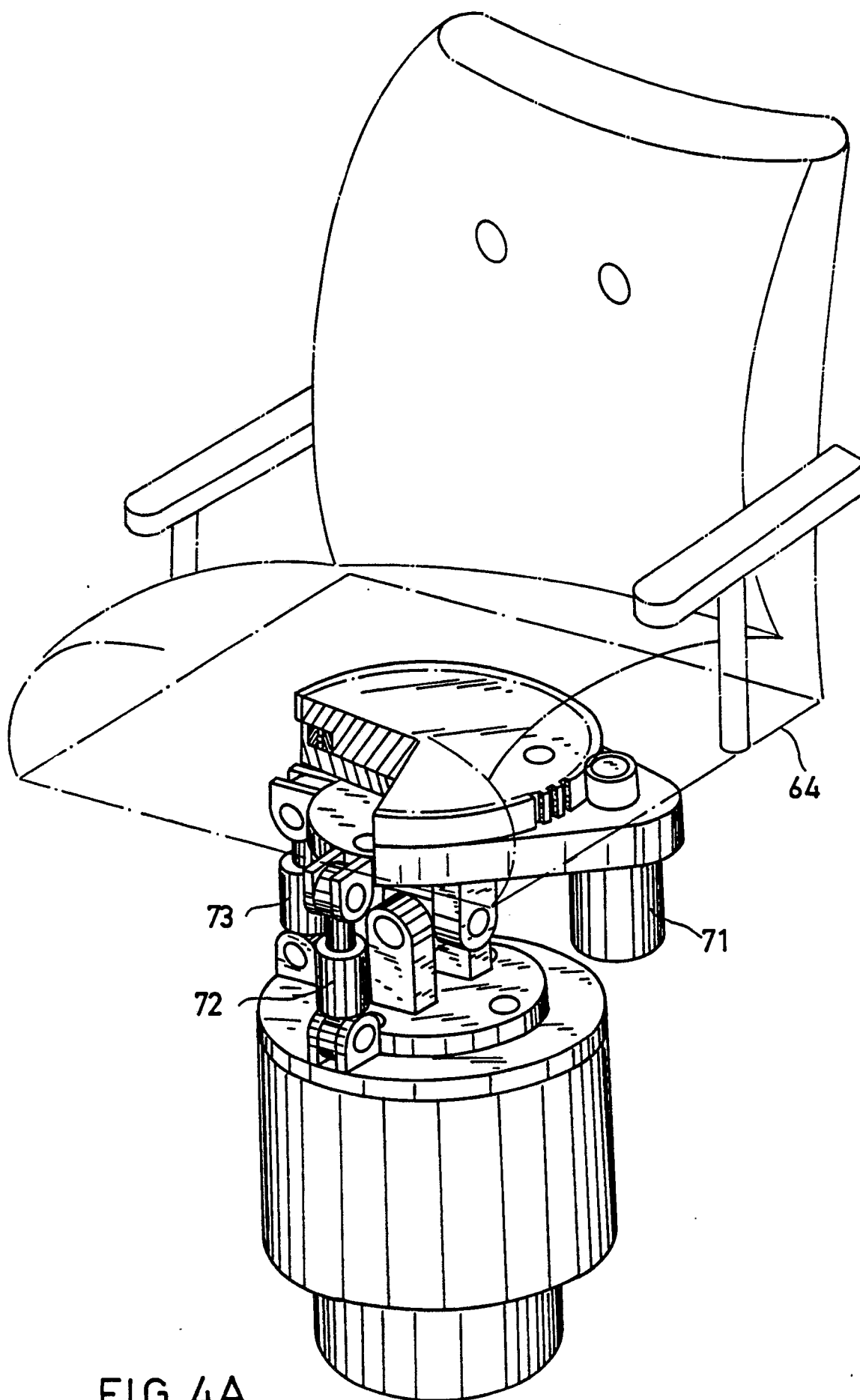


FIG 4A

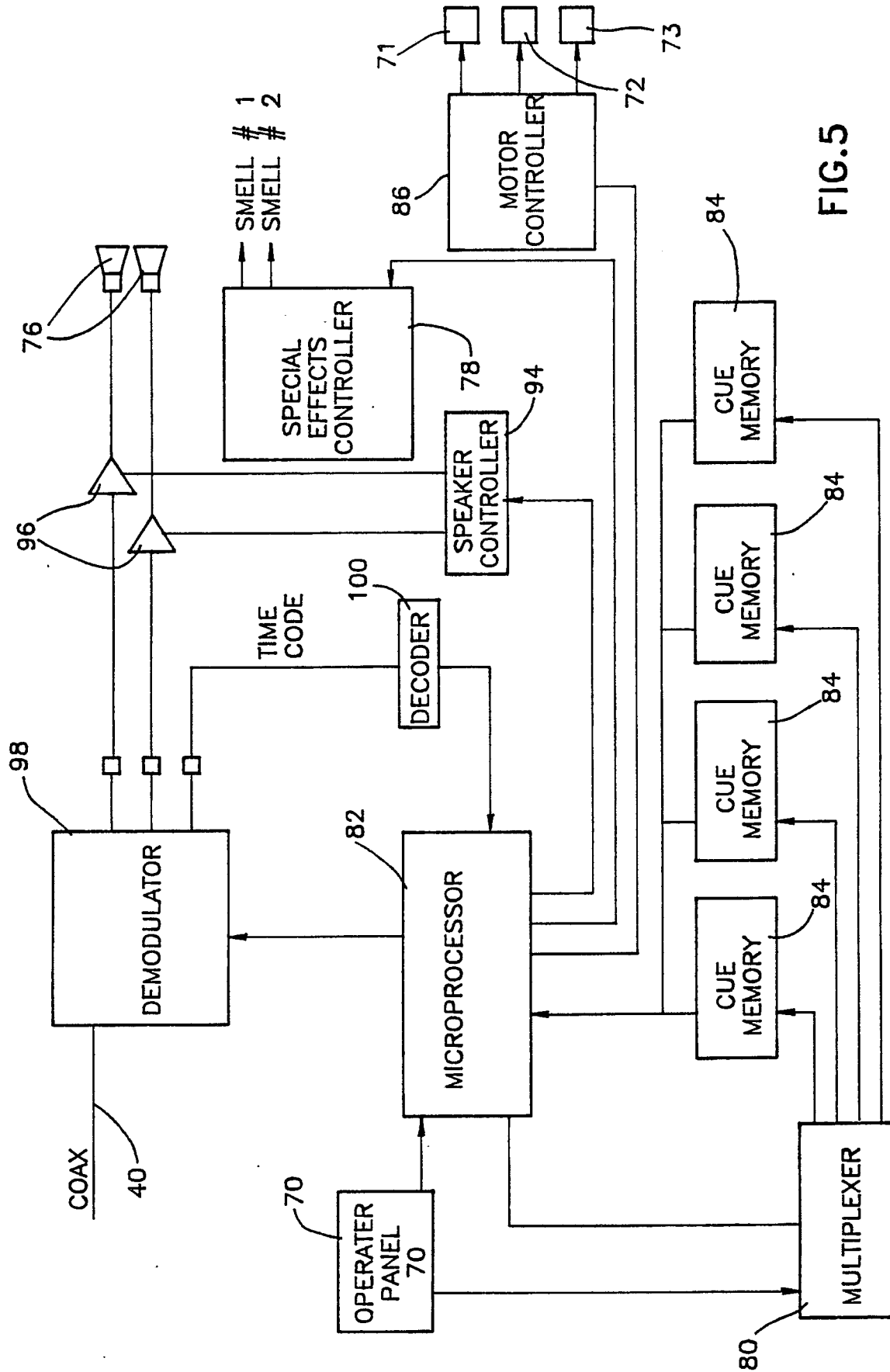


FIG.5

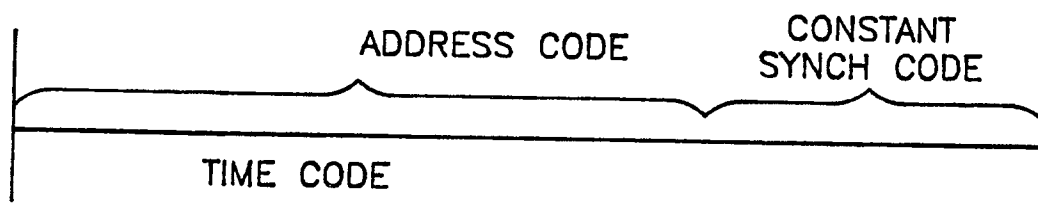
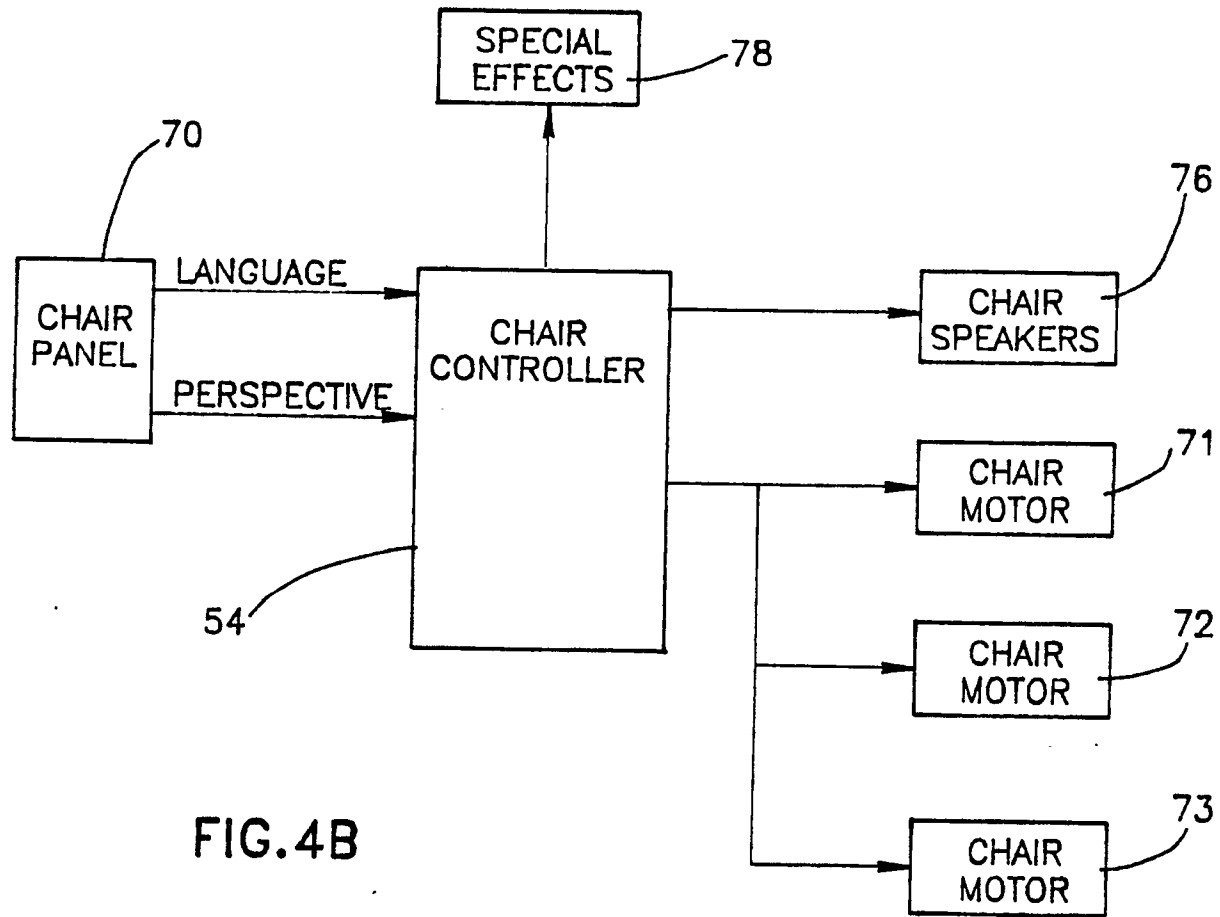


FIG. 7

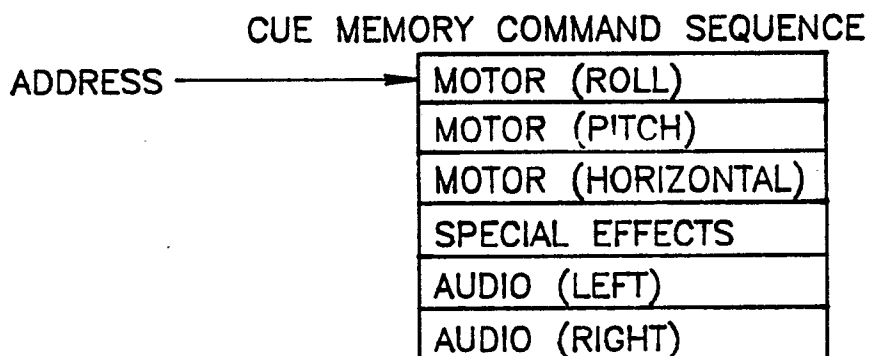
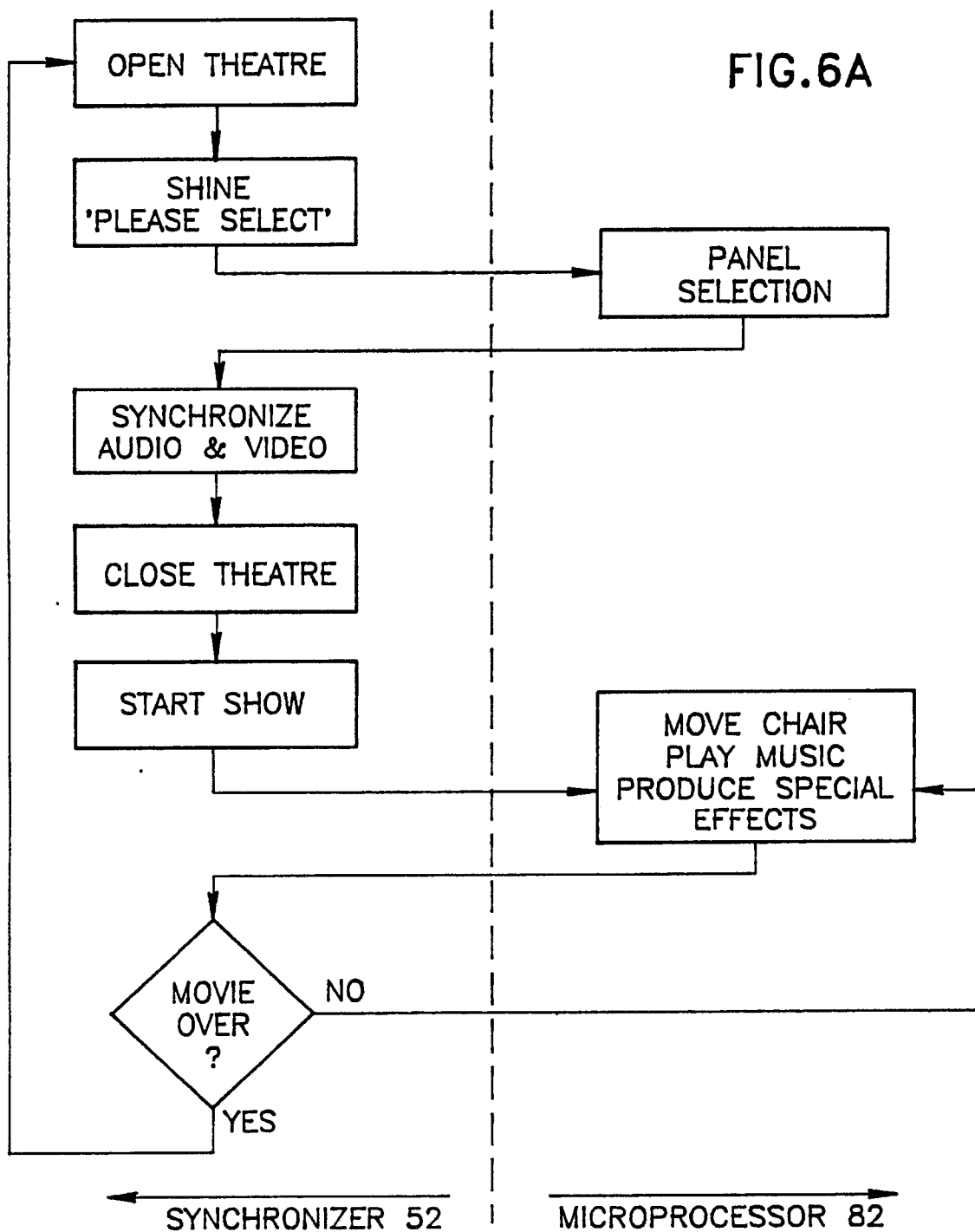
**FIG.8**

FIG.6B

