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Canadian Intellectual Property Office
An agency of Industry Canada

CA 2775748 C 2015/02/24

(11)(21) **2 775 748**

(12) BREVET CANADIEN / CANADIAN PATENT

(13) **C**

(22) **Date de dépôt/Filing Date:** 2004/03/12

(41) **Mise à la disp. pub./Open to Public Insp.:** 2004/10/07

(45) **Date de délivrance/Issue Date:** 2015/02/24

(62) **Demande originale/Original Application:** 2 517 660

(30) **Priorité/Priority:** 2003/03/25 (EP03006663.3)

(51) **Cl.Int./Int.Cl.** ***H04N 21/431*** (2011.01), ***H03M 11/02*** (2006.01), ***H04N 21/482*** (2011.01), ***H04N 5/445*** (2011.01)

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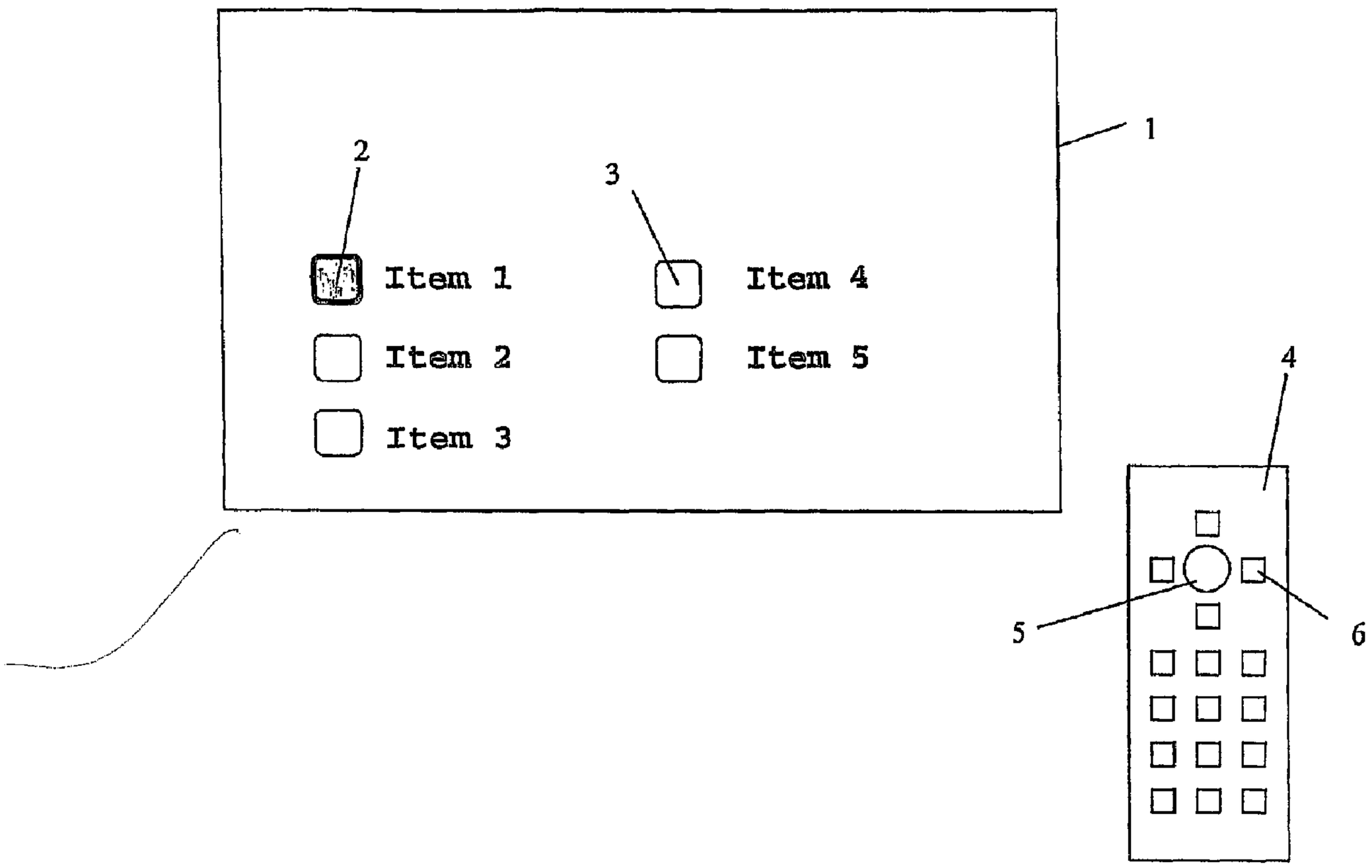
(54) **Titre : PROCEDE PERMETTANT DE REPRESENTER DES TOUCHES DE MENU ANIME**
(54) **Title: METHOD FOR REPRESENTING ANIMATED MENU BUTTONS**



(57) **Abrégé/Abstract:**
Optical storage media often contain data structures for a menu suitable for selection of a title, a chapter, a parameter or others. Such menus usually comprise a number of buttons to be displayed, with each button having a state. Possible states of buttons are "unselected", "selected" or "activated". According to the invention, the representation of a menu button may vary, depending on its state. An image or an image sequence, e.g. cartoon, may be associated to a buttons state, providing user animation. Further, a sound or sound sequence, e.g. melody or click, may be associated to a buttons state, and may be played back when the button enters this state. A data structure is disclosed which allows storage of such menu data e.g. on a Blu-ray disc.

29316-34D

Abstract

Optical storage media often contain data structures for a menu suitable for selection of a title, a chapter, a parameter or others. Such menus usually comprise a number of buttons to be displayed, with each button having a state. Possible states of buttons are "unselected", "selected" or "activated". According to the invention, the representation of a menu button may vary, depending on its state. An image or an image sequence, e.g. cartoon, may be associated to a buttons state, providing user animation. Further, a sound or sound sequence, e.g. melody or click, may be associated to a buttons state, and may be played back when the button enters this state. A data structure is disclosed which allows storage of such menu data e.g. on a Blu-ray disc.

29316-34D

Method for representing animated menu buttons

This application is a divisional of Canadian Application Number 2,517,660 filed on March 12, 2004.

Field of the invention

This invention relates to a method for adding animated menu buttons to an optical storage medium.

Background

Today's optical storage media formats are capable of supporting visual menus, e.g. for content management or control functions. Applications of such visual menus are the selection of one out of multiple titles on the disc, the selection of a chapter within a title, and others. From the user perspective, such menus consist of a number of buttons shown on the display. The user may navigate within the menu, e.g. by pushing the up, down, left and right buttons on his remote control to select a menu button, and may activate a menu button through some kind of "OK" button on the remote control. An indicator, usually a highlight or an arrow, may provide feedback to the user, showing which button is currently selected or activated. A menu button may have one of the states "normal", "selected" or "activated".

However, known DVD menus are rather limited concerning extra features, since they contain only static visual buttons.

Further, a subtitling specification contained in the document "ETS 300 743: Digital Video Broadcasting (DVB); Subtitling System" (DVB-ST), provided by the European Telecommunication

Standardization Institute (ETSI), is known for embedding subtitles into video sequences.

Summary of the Invention

Some embodiments may be utilized to give more feedback to the user who operates a menu related to an optical storage medium. The feedback comprises visually and/or aurally animated buttons.

According to one aspect of the present invention, there is provided a method for representing menu buttons in a menu for controlling the presentation of video data stored on a removable storage medium, the menu buttons having one out of three states, the states being normal, selected or activated, the method comprising the steps of retrieving from said removable storage medium data describing the menu buttons, the data comprising for each button image data; and representing the menu buttons on a display, wherein a menu button is represented by different images corresponding to different image data, depending on its state being normal, selected or activated, and wherein the image data representing a particular menu button state on the display includes a sequence of pictures being an animation, and wherein a rate at which a sequence of pictures is displayed is relative to video frame rate and is an integer fraction of the video frame rate, and a value defining said rate at which the sequence of pictures is displayed is stored on said storage medium.

According to another aspect of the present invention, there is provided a removable storage medium containing video data and a data segment representing menu data for a menu for controlling the presentation of said video data, wherein the menu comprises menu buttons, the menu buttons having one out of three states, the states being normal, selected or activated, and wherein the data describing the menu buttons comprise image data; a menu button is represented by different images corresponding to different image data, depending on its state being normal, selected or activated, wherein the image data representing a particular menu button state on the display includes a sequence of pictures being an animation; and the data segment comprises a value representing a rate for displaying a sequence of

pictures, the rate being relative to a video frame rate and being an integer fraction of the video frame rate.

According to still another aspect of the present invention, there is provided a method for representing menu buttons in a menu for controlling the presentation of video data stored on a removable storage medium, the menu buttons having one out of three states, the states being normal, selected or activated, the method comprising the steps of retrieving from said removable storage medium data describing the menu buttons, the data comprising for each button image data in bitmap format; and representing the menu buttons on a display, wherein a menu button is represented by different images corresponding to different image data, depending on its state being normal, selected or activated, and wherein the image data representing a particular menu button state on the display includes a sequence of pictures being an animation, and wherein a rate for displaying a sequence of pictures is relative to a video frame rate, and a value defining said rate at which the sequence of pictures is displayed is stored on said storage medium.

According to yet another aspect of the present invention, there is provided a removable storage medium containing video data and a data segment representing menu data for a menu for controlling the presentation of said video data, wherein the menu comprises menu buttons, the menu buttons having one out of three states, the states being normal, selected or activated, and wherein the data describing the menu buttons comprise image data in bitmap format; a menu button is represented by different images corresponding to different image data, depending on its state being normal, selected or activated, wherein the image data representing a particular menu button state on the display includes a sequence of pictures being an animation; and the data segment comprises a value representing a rate for displaying the sequence of pictures, the rate being relative to a video frame rate.

According to a further aspect of the present invention, there is provided a method for representing menu buttons in a menu for controlling the presentation of video data stored on a removable storage medium, the menu buttons having one out of three states, the states being normal, selected or activated, the method comprising

the steps of retrieving from said removable storage medium data describing the menu buttons, the data comprising for each button image data in pixel data format, a rate for displaying a sequence of pictures and two region identifiers per button state, wherein the button images are addressable through said region identifiers; and representing the menu buttons on a display, wherein a menu button is represented by different images corresponding to different image data, depending on its state being normal, selected or activated.

According to yet a further aspect of the present invention, there is provided a removable storage medium containing video data and a data segment representing menu data for a menu for controlling the presentation of said video data, wherein the menu comprises menu buttons, the menu buttons having one out of three states, the states being normal, selected or activated, and wherein the data describing the menu buttons comprise image data in pixel data format, a rate for displaying a sequence of pictures and two region identifiers per button state; a menu button is represented by different images corresponding to different image data, depending on its state being normal, selected or activated, wherein the image data are addressable through said region identifiers.

According to some embodiments, a menu button shown on a display may look different, depending on its state. The state may be "normal", "selected" or "activated", and for each of these states the button may have different color or shape. Additionally, a sound or sound sequence may be attached to some or all menu buttons, depending on the buttons state. Examples for sounds are a click or a melody, or a speech sequence. Some embodiments provide a data structure by which those additional features can be described.

Advantageous embodiments are disclosed in the following description and the figure.

Brief description of the drawing

An exemplary embodiment of the invention is described with reference to the accompanying drawing in Fig.1, which shows an on-screen menu according to the invention, and a corresponding remote control.

Detailed description of the invention

Fig.1 shows a video screen 1 containing a menu that comprises buttons 2,3 and related text describing the buttons. When a user presses a button 5,6 on a remote control 4, the state of a button 2,3 may change, and also the representation of the button. In Fig.1 one button 2 is selected, and thus looks different from the unselected buttons 3. When the user e.g. presses the "right" button 6 on the remote control, another button 3 is selected being right from the currently selected button 2. When the user presses the "OK" button 5, the selected button is activated, and the function associated with the selected button is performed. The selected button 2 according to the invention is animated, e.g. has another color and another shape than an unselected button 3, and its color or shape may change. Particularly, the button may also be replaced by a moving symbol, a moving cartoon or the like, depending on the state.

A preferred embodiment of the invention is based on the syntax and semantics of the subtitling specification contained in the document "ETS 300 743: Digital Video Broadcasting (DVB); Subtitling System" (DVB-ST), provided by the European Telecommunication Standardization Institute (ETSI). To provide enhanced capabilities for menus relating to optical storage

media, the page composition segment defined in DVB-ST is extended to describe animated menu buttons and to associate a sound or sound sequence to a button. The enhanced page composition segment is herein called a "menu page composition segment".

This invention, like DVB_ST, uses page composition segments to describe the position of one or more rectangular regions on the display, assuming that a region contains a representation of one button in a certain state, e.g. as pixel data or bitmap. Each button image is thus addressable through an identifier (ID), or "region_id". In this embodiment of the invention, backward compatibility is kept with DVB-ST by using an associated segment type ID for the menu page composition segment. The menu page composition segment is defined as listed in Tab.1.

The "menu page composition segment" according to the invention may also replace the original page composition segment, e.g. in DVB-ST. A menu page composition segment describes a menu and provides the necessary layout and timing information as well as additional control information.

In one embodiment of the invention, being a simple case with static menus, each button is represented by e.g. three images. A first image represents the button in the "normal" state, a second image represents the button in the "selected" state and a third image represents the button in the "activated" state. These images may be stored e.g. as bitmap files on the storage medium, and may be used to display the menu.

In another embodiment, going beyond static menus, the menu page composition segment also allows to describe animated

buttons. In this case, the "normal" state and the "selected" state of a button are each represented through a series of images that are displayed, and may be e.g. cyclically repeated, on the screen to achieve the animation effect. Also for the "activated" state of a button an animation can be defined, but here it may be advantageous to display the animation phases only once, because the menu will usually disappear or be modified after a button was activated.

For all button animations of a menu the menu author can specify an animation frame rate, defining how long each phase of an animation is displayed.

Advantageously, the invention also provides the possibility to give aural feedback to the user. If a button is either in the "selected" state or in the "activated" state, it may be assigned a sound identifier associated with a sound, which may be stored on the storage medium. The associated sound is played back when the button enters the respective button state. In one embodiment of the invention the associated sound is played back repeatedly, as long as the button is in the respective state.

The structure of the menu page composition segment and the semantics of the fields of the menu page composition segment are based on the structure and semantics given in DVB-ST, Section 7.2.1 "Page composition segment". Additional semantics definitions are used for an enhanced menu according to the invention.

Tab.1 shows the structure of a menu page composition segment according to the invention. Lines 1-8 are identical to the subtitle segment of the DVB-ST standard, giving the

possibility to keep backward compatibility. The meaning of the fields shown in Tab.1 is described in the following. The addressing of pixels is based on a coordinate system whose origin is defined by the top-left corner of the associated video screen. Pixel addresses increase from left to right and from top to bottom. The dimensions of the associated video are defined as video_width * video_height.

	Field	Size	Type
1	menu_page_composition_segment () {		
2	sync_byte	8	bslbf
3	segment_type	8	bslbf
4	page_id	16	bslbf
5	segment_length	16	uimsbf
6	page_time_out	8	uimsbf
7	page_version_number	4	uimsbf
8	page_state	2	bslbf
9	animation_frame_rate_code	4	uimsbf
10	reserved	6	bslbf
11	while (processed_length < segment_length) {	8	uimsbf
12	button_number	16	uimsbf
13	button_horizontal_address	16	uimsbf
14	button_vertical_address		
15	neighbour_info()	8	uimsbf
16	upper_button_number	8	uimsbf
17	lower_button_number	8	uimsbf
18	left_button_number	8	uimsbf
19	right_button_number		
20	normal_state_info()	8	uimsbf
21	start_region_id_normal	8	uimsbf
22	end_region_id_normal	8	uimsbf
23	selected_state_info()	16	uimsbf
24	start_region_id_selected	8	uimsbf
25	end_region_id_selected	8	uimsbf
26	action_state_info()		
27	start_region_id_activated	8	uimsbf
28	end_region_id_activated	8	uimsbf
29	button_command_info()		
30	sound_info()		
31	selected_sound_id	8	uimsbf
32	activated_sound_id	8	uimsbf
33	}		
34	}		

Tab.1: Syntax of a menu page composition segment

A segment is generally a data unit within the storage area. The *segment_type* defines its type. The menu page composition segment may be identified by setting e.g. *segment_type* = 0x18, since this value is not used in DVB-ST yet. The other fields in lines 2-8 of Tab.1 define the segment data set.

The animation_frame_rate_code field specifies the frame rate of animations in the case of animated buttons being used. It applies to a range of regions specified by start_region_id_xxx and end_region_id_xxx, with the "xxx" referring the state of a button. If a start_region_id_xxx and its corresponding end_region_id_xxx differ, they define a range of regions that shall be presented with this animation frame rate. For the normal and selected state, the presentation may be cyclically repeated; for the "activated" state, the presentation shall be performed only once. When any start_region_id_xxx is identical to the associated end_region_id_xxx, this designates a static or non-animated button state. Only the region designated by start_region_id_xxx is displayed, and for that button state the animation_frame_rate_code shall have no meaning.

Tab.2 shows an exemplary list of animation_frame_rate_codes. An animation may be visible at full video frame rate, e.g. 30 pictures per second, meaning that with each video frame another phase of the animation is displayed. It may also be sufficient to display only with every other video frame another phase of the animated button, thus achieving another effect. Further, it is possible to define the frame rate to either be relative or absolute. Therefore the values of the animation_frame_rate_code field have two different meanings, depending on if an associated video is present. In this case the animation_frame_rate_code gives the animation frame rate

relative to the video frame rate, otherwise it gives the absolute frame rate.

animation_frame_rate_code	Relative animation frame rate	Abs. animation Frame rate
0x0	Reserved	Reserved
0x1	Full video frame rate	30 Hz
0x2	½ of video frame rate	15 Hz
0x3	¼ of video frame rate	8 Hz
0x4	1/8 of video frame rate	4 Hz
0x5	1/16 of video frame rate	2 Hz
0x6	1/32 of video frame rate	1 Hz
0x7 - 0xF	reserved	Reserved

Tab.2: Example of animation_frame_rate_code

The button_number field specifies a number that is an internal identifier for a button, and is used for the fields defined below, e.g. the neighbour_info() field. Additionally, when button_number is entered directly through the user interface (UI), the associated button may be activated. Therefore a button_number is unique within the menu. It may be e.g. a two-digit number in the range between 0 and 99.

Some fields used for menu animation according to the invention must be specified separately for each button. They are listed from line 11 of Tab.1, where a loop over all buttons starts. Each instance of the loop refers to one button. Implicitly, the button described by the first instance of the while-loop within menu_page_composition_segment() may be considered as "selected" when entering the menu, and may be considered as "activated" if a page timeout for the menu is set and becomes active.

The button_horizontal_address field specifies the horizontal address of the top left pixel of the button. The specified horizontal position may be in between 0 and video_width-1. Likewise, the button_vertical_address field specifies the vertical address of the top left pixel of the button. The specified vertical position may be in between 0 and video_height-1.

The upper_button_number field specifies the button to be selected when the user navigates upward from the current button. The lower_button_number field specifies the button to be selected when the user navigates downward from the current button. The left_button_number field specifies the button to be selected when the user navigates left from the current button. And the right_button_number field specifies the button to be selected when the user navigates right from the current button.

The start_region_id_normal field specifies the ID of the first region to be presented for a button presentation in normal state, and the end_region_id_normal field specifies the ID of the last region to be presented for a button presentation in normal state. All regions with an ID between and including start_region_id_normal and end_region_id_normal shall exist; if start_region_id_normal differs from end_region_id_normal, that range of regions shall be presented cyclically with the animation frame rate as defined by animation_frame_rate_code.

The start_region_id_selected field specifies the ID of the first region to be presented for a button presentation in the selected state, and the end_region_id_selected field specifies the ID of the last region to be presented for a button presentation in the selected state. All regions with IDs

between start_region_id_selected and end_region_id_selected shall exist; if start_region_id_selected differs from end_region_id_selected, that range of regions shall be presented cyclically with the animation frame rate described by animation_frame_rate_code.

The start_region_id_activated field specifies the ID of the first region to be presented for a button presentation in activated state, and the end_region_id_activated field specifies the ID of the last region to be presented for a button presentation in activated state. All regions with IDs between start_region_id_activated and end_region_id_activated shall exist; if start_region_id_activated differs from end_region_id_activated, that range of regions shall be presented once with the animation frame rate described by animation_frame_rate_code.

The button_command_info() field serves as a container for commands associated with this button, specifying the commands to be performed when the button is activated.

Finally, the selected_sound_id field specifies the ID of the sound to be played when the button enters the "selected" state, and the activated_sound_id field specifies the ID of the sound to be played when the button enters the "activated" state.

The invention may be used particularly for menus stored on Blu-ray discs, but also DVD or other optical or non-optical high-capacity storage media.

CLAIMS:

1. A method for representing menu buttons in a menu for controlling the presentation of video data stored on a removable storage medium, the menu buttons having one out of three states, the states being normal, selected or activated, the method comprising the steps of

- retrieving from said removable storage medium data describing the menu buttons, the data comprising for each button image data in bitmap format; and

- representing the menu buttons on a display, wherein a menu button is represented by different images corresponding to different image data, depending on its state being normal, selected or activated, and

wherein the image data representing a particular menu button state on the display includes a sequence of pictures being an animation, and wherein a rate for displaying a sequence of pictures is relative to a video frame rate, and a value defining said rate at which the sequence of pictures is displayed is stored on said storage medium.

2. A removable storage medium containing video data and a data segment representing menu data for a menu for controlling the presentation of said video data, wherein the menu comprises menu buttons, the menu buttons having one out of three states, the states being normal, selected or activated, and wherein

- the data describing the menu buttons comprise image data in bitmap format;

- a menu button is represented by different images corresponding to different image data, depending on its state being normal, selected or activated, wherein the image data representing a particular menu button state on the display includes a sequence of pictures being an animation; and

- the data segment comprises a value representing a rate for displaying the sequence of pictures, the rate being relative to a video frame rate.

3. An apparatus for displaying a menu on a screen, the menu being controlled by menu data read from a storage medium according to claim 2 and the menu comprising menu buttons, wherein the apparatus is adapted for representing the menu buttons according to the method of claim 1.

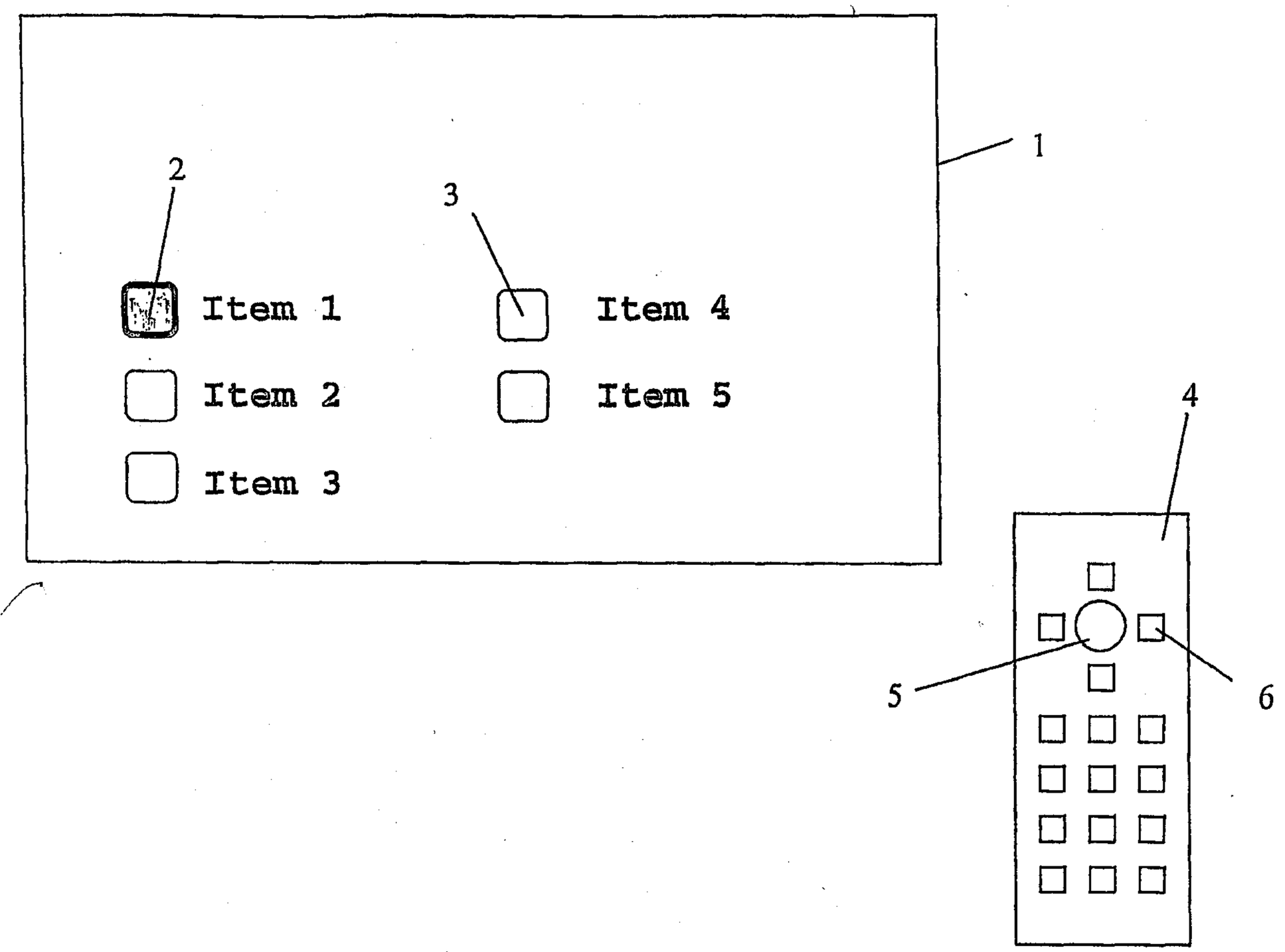
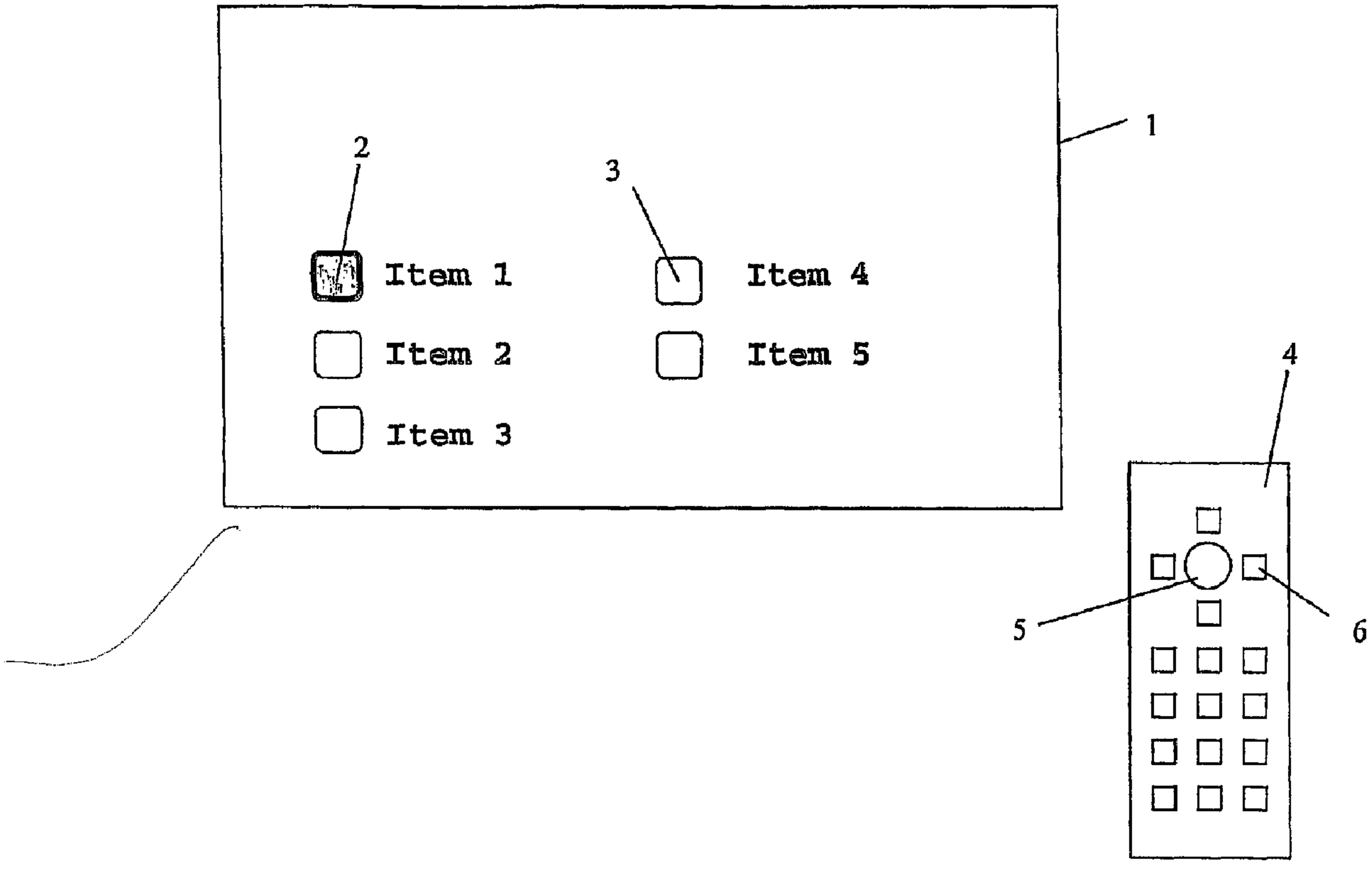


Fig.1


1
2
3
4
5
6
Item 1
Item 2
Item 3
Item 4
Item 5