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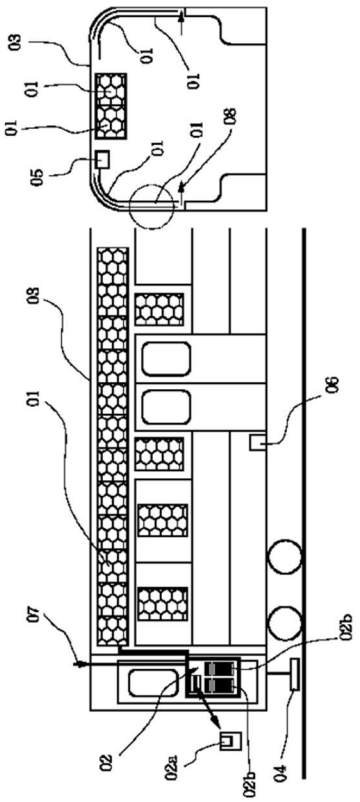
(54) **[Title of the Invention]** Display Device

(57) **[Abstract]**
[Object] To provide a means for efficiently providing information based on image information within a vehicle.
[Constitution] In a display device comprising a plurality of displays 01 and a drive device 02 that performs display on the displays on the basis of stored image data, the display device is installed in a vehicle 03 and the displays are flat displays having shapes conforming to the shape of a region where the display is to be installed within the vehicle.



[CLAIMS]

[Claim 1] In a display device comprising a plurality of displays and a drive device that performs display on the displays on the basis of stored image data, the display device characterized in that the display device is installed in a vehicle and the displays are flat displays having shapes conforming to the shape of a region where the display is to be installed within the vehicle.

[Claim 2] The display device recited in claim 1, characterized in that the vehicle has a transparent glass part and the display constitutes part of the transparent glass part or is installed in the transparent glass part itself.

[Claim 3] The display device recited in claim 1, characterized in that the drive device changes the display content of the display in approximate synchronization with the movement or stopping of the vehicle.

[Claim 4] The display device recited in claim 1, characterized in that the displays are arranged adjacent to each other, and the drive device performs display so as to change the display content on each display or so that the display content continuously moves across adjacent displays.

[Claim 5] The display device recited in claim 1, characterized by comprising a means for detecting a movement position of the vehicle, wherein the drive device changes the display content on the display in accordance with a detection signal from this detection means.

[Claim 6] The display device recited in claim 1, characterized in that the vehicle has a door for shielding from the exterior, and the drive device changes the display content on the display in approximate synchronization with the opening and closing of this shielding door.

[Claim 7] The display device recited in claim 1, characterized in that the drive device has a means for transferring the image data to the displays, which accesses the stored image data in accordance with the vehicle movement or position, or the opening and closing of the door, and transfers the image data to the displays.

[Claim 8] The display device recited in claim 1, characterized in that the display device comprises a means for detecting changes in brightness in part of the vehicle, and the display comprises a backlight, the brightness of which changes in accordance with the output of this detection means.

[Claim 9] The display device recited in claim 1, characterized in that the drive device comprises an information memory search online transfer means provided within the vehicle, which stores the image data, and accesses and transfers the same, and a communication information transfer means, which receives and transfers image data that is transmitted from outside the vehicle, wherein display is performed on the displays on the basis of image data from this information memory search online transfer means and this communication information transfer means.

[Claim 10] The display device recited in claim 1, characterized by having a pair of displays that are installed with their backs facing each other and forming a certain angle.

[Claim 11] The display device recited in claim 1, characterized by having a pair of displays that are installed with their backs facing each other, wherein this pair of displays has a mutually shared backlight.

[Claim 12] The display device recited in claim 1, characterized in that the display comprises a backlight, and the display device comprises a means for supplying a cooling air flow that cools this backlight via a gap between the display and the inner wall of the vehicle.

[Claim 13] The display device recited in claim 1, characterized in that the display comprises a backlight, and the display device comprises a means for supplying a cooling air flow that cools this backlight, and for discharging it to the exterior of the vehicle.

[Claim 14] The display device recited in claim 1, characterized in that the display is a surface-stabilized ferroelectric liquid crystal display, to which voltage is applied only when the display content changes and which otherwise maintains the display content without the application of voltage.

[Claim 15] The display device recited in claim 1, characterized in that the displays are one or more type of electronic display selected from a nematic liquid crystal display, a thin film transistor liquid crystal display, a surface-stabilized ferroelectric liquid crystal display, an antiferroelectric liquid crystal display, a plasma display, a light emitting diode display, an electron beam irradiation Braun tube display, an electroluminescent display, a plasma display, and a fluorescent tube display.

[Detailed Description of the Invention]

[0001]

[Field of Industrial Application] The present invention relates to a display device having a plurality of displays and a drive device for performing this display.

[0002]

[Prior Art] Conventionally, as shown in FIG. 27, image information such as announcements, maps and destination displays were provided within vehicles such as railway carriages, aircraft, buses and ships, by way of paper display using printed paper 101.

[0003]

[Problems to Be Solved by the Invention] However, there was a problem with this method, in so much as it was extremely difficult to change the content of the display. Further, there was a limit on the amount of information that could be supplied due to the limited space within the vehicle.

[0004] As a reflection of these conventional problems, an object of the present invention is to provide a means for efficiently providing information based on image information within a vehicle.

[0005]

[Means for Solving the Problems] In order to achieve this object, in the present invention, a display device comprising a plurality of displays and a drive device installed in a vehicle, which performs display on the displays on the basis of stored image data, flat displays having shapes conforming to the shape of a region where

the display is to be installed within the vehicle are used as the displays.

[0006] The drive device stores image data, which it searches for and delivers, and has a memory/search device such as an image information data searching device using various types of optical/magnetic recording media such as optical discs and hard discs, and rapidly displays images on the displays, on the basis of this image data.

[0007] If the vehicle has a transparent glass part, the display may constitute part of this transparent glass part, or be installed in this transparent glass part itself.

[0008] The drive device may change the display content of the display in approximate synchronization with the movement or stopping of the vehicle. Further, the displays may be arranged adjacent to each other, and the drive device may perform display so as to change the display content on each display or so that the display content continuously moves across adjacent displays. Furthermore, a means for detecting a movement position of the vehicle may be provided, wherein the drive device changes the display content on the display in accordance with a detection signal from this detection means. Furthermore, if the vehicle has a door for shielding from the exterior, the drive device may change the display content on the display in approximate synchronization with opening and closing of this shielding door. Further, the drive device may have a means for transferring the image data to the displays, which accesses the stored image data in accordance with the vehicle movement or position, or the opening and closing of the door, and transfers the image data to the displays.

[0009] The display device may comprise a means for detecting changes in brightness in part of the vehicle, and the display may comprise a backlight, the brightness of which changes in accordance with the output of this detection means.

[0010] The drive device may comprise an information memory search online transfer means provided within the vehicle, which stores image data, and accesses and transfers the same, and a communication information transfer means, which receives image data that is transmitted from outside the vehicle, wherein display is performed on the displays on the basis of image data from this information memory search online transfer means and this communication information transfer means.

[0011] This may have a pair of displays that are installed with their backs facing each other and forming a certain angle, or may have a pair of displays that are installed with their backs facing each other, while this pair of displays has a mutually shared backlight.

[0012] If the display comprises a backlight, the display device may comprise a means for supplying a cooling air flow that cools this backlight via a gap between the display and the inner wall of the vehicle. Furthermore, this may comprise a means for discharging this cooled air to the exterior of the vehicle.

[0013] The display may be a surface-stabilized ferroelectric liquid crystal display, to which voltage is applied only when the display content changes and which otherwise maintains the display content without the application of voltage. Furthermore, display may be performed by selecting and combining displays from nematic liquid crystal displays, thin film transistor liquid crystal displays, surface-stabilized ferroelectric liquid crystal displays, antiferroelectric liquid crystal displays, plasma displays, light emitting diode displays, electron beam irradiation Braun tube displays, electroluminescent displays, plasma displays, and fluorescent tube displays, each matched to the types of image information and character information.

[0014]

[Operation] With this configuration, because the displays are flat displays having shapes conforming to the shapes in the regions where the displays are to be installed within the vehicle, the displays can be installed with efficient use of the space within the vehicle along the interior walls and the like, within the vehicle. Furthermore, in terms of the image data that is supplied to the displays, various image information items such as announcements, maps, destination guides, and railway maps are stored, and these are displayed on the displays with suitable switching, whereupon the content of the display is instantaneously changed, and thus multiple types of items are displayed. Accordingly, the content of the displays can be changed very easily, and the amount of information that can be displayed is increased, such that information can be supplied very efficiently within the vehicle, based on image information.

[0015]

[Embodiments]

(Embodiment 1) FIG. 1 is a schematic view illustrating a display device according to a first embodiment of the present invention. As shown in the drawing, this device is installed in a vehicle carriage 03, and comprises a plurality of displays 01, and a drive device (02 or the like) that stores image data and performs display on the displays on the basis thereof. Flat displays, having shapes conforming to the shape of the region in which the displays are to be installed within the vehicle carriage 03, are used as the displays 01.

[0016] Electronic-display displays comprising various electronic-display-control light emitting means, such as nematic liquid crystal displays (STN), thin film transistor liquid crystal displays (TFT), surface-stabilized ferroelectric liquid crystal displays (FLC), antiferroelectric liquid crystal displays (AFS), plasma displays, light emitting diode (LED) displays, electron irradiation displays, electroluminescent displays, and fluorescent tube displays can be used for the displays 01.

[0017] FIG. 2 shows the sectional structure of a liquid crystal display 01. Here, a liquid crystal 01A that controls the transmission of light is enclosed between a common electrode 01B and drive electrodes 01C. Furthermore, orientation films 01D and 01E, which orient the liquid crystal, are provided on the electrode surfaces, and a spacer 01F,

which maintains a specific space between the orientation films 01D and 01E, is provided therebetween. Color filters 01J are provided at the surface of the common electrode 01B, at each of the drive electrodes 01C, with protection film 01H therebetween. These color filters 01J and drive electrodes 01C are each trapped between glass substrates 01G and 01K. Polarizing films 01M, and 01L, which polarize the transmitted light that is transmitted through the liquid crystal, are affixed to the surfaces of the glass substrates 01G and 01K. Furthermore, a seal 01N is provided around the sides of the display 01, which seals the liquid crystal 01A. A backlight 01P is provided on one side of the liquid crystal panel that is configured in this manner, in order to irradiate transmitted light from one side of the liquid crystal panel, such that backlight-irradiated light 01Q is transmitted to the display 01. Furthermore, the structure is such that cooling air 08 passes by the backlight 01P, in order to limit the temperature-rise of the backlight 01P to no greater than a certain temperature. In FIG. 2, the structure is such that the cooling air 08 flows between the vehicle carriage 03 and the backlight.

[0018] Display data such as image data is transferred for display to the displays 01 by an electronic filing device 02, which has a data access means for various optical discs 02a, or magnetic disks such as hard disks or floppy disks, or various memory drive devices such as magnetic tape or semiconductor memories, and an autochanger 02b for optical discs or the like.

[0019] FIGS. 3 to 5 illustrate modes of installing the displays 01 in the vehicle carriage 03. That is to say, FIG. 3 shows the modes in which displays 01 having shapes conforming to the curved surface parts 03a of the inner walls of the carriage are installed in the vehicle carriage 03. FIG. 4 shows the mode in which the displays 01 are divided into flat displays 01a and 01b and installed in a shape conforming to the curved surface parts 03a of the inner walls in the vehicle carriage 03 with mutual angles between the flat displays 01a and 01b in a shape conforming to the curved surface parts 03a of the inner walls of the carriage. FIG. 5 shows the mode in which displays 01 are divided into a plurality of displays which are flat displays 01c to 01g and installed in a shape conforming to the curved surface parts of the inner walls of the carriage in the vehicle carriage 03, with mutual angles between the flat displays 01c to 01g conforming to the curved surface parts of the inner walls of the carriage.

(Embodiment 2) FIG. 6 is a schematic view illustrating a display device according to a second embodiment of the present invention. Here, backlights 01P are not provided on windows that are provided in the vehicle carriage 03, which is to say on transparent glass parts 03b, but rather the displays 01h are directly affixed, and display is performed as a result of the liquid crystal display appearing, brought about by external light from the exterior of the vehicle. Furthermore, as shown in FIG. 7, it is also possible to install this with a liquid crystal display 01 directly encased within the transparent glass part 03b.

(Embodiment 3) FIG. 8 is a schematic view illustrating a display device according to a third embodiment of the present invention. Here, as shown in FIG. 9, by way of a moving/stopping detection position-detecting sensor 04, which is provided on the vehicle carriage 03, from among the displays 01, image information is displayed on displays 01i and 01j when the carriage is stopped, and when the carriage is moving, the movement of the carriage is detected by the moving/stopping detection position-detecting sensor 04, and from among the displays 01, the image information for the display 01j is changed by the electronic filing device, and then displayed.

(Embodiment 4) FIG. 10 and FIG. 11 are schematic views illustrating a display device according to a fourth embodiment of the present invention. Here, a plurality of images displayed on respective displays 01 are successively sent in the manner of display modes A1 to A2 and then A3, so as to move on the displays by changing the display content, in display [screen sized] units. Alternatively, a particular image ABC is progressively increased so as to be shown in the form of display modes B1 and B2. Alternatively, as shown with display modes C1 and C2, image information is displayed on the displays within the vehicle carriage in uninterrupted motion, by performing continuous moving display of certain image information across adjacent displays.

(Embodiment 5) FIG. 12 and FIG. 13 are schematic views illustrating a display device according to a fifth embodiment of the present invention. Here, as shown in FIG. 13, by way of a moving/stopping detection position-detecting sensor 04, which is provided on the vehicle carriage 03 and detects the position of the vehicle carriage, when the vehicle carriage has moved from a carriage stop position A to a carriage stop position B, the position of the vehicle carriage is detected by the moving/stopping detection position-detecting sensor 04 and, on the basis thereof, from among the display images 01i and 01j on the display 01, the electronic filing device 02 changes the content displayed for the display image 01j.

(Embodiment 6) FIG. 14 is a schematic view illustrating a display device according to a sixth embodiment of the present invention. Here, by way of an opening and closing detection sensor 06 for the opening and closing doors 03C provided on the vehicle carriage 03, when the opening and closing doors 03C have gone from an open state to a closed state, as shown in FIG. 15, from among the display images 01i and 01j on the display 01, the display image displayed on 01j is changed by the electronic filing device 02, on the basis of an opening and closing detection signal from the opening and closing sensor 06.

(Embodiment 7) FIG. 16 is a schematic view illustrating a display device according to a seventh embodiment of the present invention. Here, by way of a brightness sensor 05 that is provided within the vehicle carriage 03, changes in brightness at the interior and exterior of the vehicle are detected, and when the brightness outside the vehicle has changed from a daytime bright state to an evening dark state as shown in FIG. 17, the brightness of the backlight 01P provided on the display 01 is adjusted in accordance with the brightness sensor 05 so as to control the brightness so that the display image can easily be recognized.

(Embodiment 8) FIG. 18 is a schematic view illustrating a display device according to an eighth embodiment of the present invention. Here, an antenna 07 is provided on the electronic filing device 02 that is provided on the vehicle carriage, in order to receive communication information from the exterior; and communication information images are displayed on the displays 01 by way of receiving image information, in an external communication, which is different from the image information that is stored in the electronic filing device itself. For example, by changing some of the

display content, from display of the image that is stored in the electronic filing device itself as shown in FIG. 18, to an external communication information image as shown in FIG. 19, image information from within the vehicle, and from outside the vehicle, is suitably displayed on the display 01 within the vehicle carriage 03.

(Embodiment 9) FIG. 20 is a schematic view illustrating a display device according to a ninth embodiment of the present invention. Here, in the vehicle carriage, two displays 01k are installed so as to face each other back-to-back [suspended] from the ceiling in the center of the carriage, at vertical angles relative to each other, and a backlight is installed at the back of each of the displays.

(Embodiment 10) FIG. 21 is a schematic view illustrating a display device according to a tenth embodiment of the present invention. Here, in the vehicle carriage, two displays 01n are installed united so as to face each other back-to-back [suspended] from the ceiling in the center of the carriage as shown in the figure, and a common backlight 01p is provided between the two displays.

(Embodiment 11) FIG. 22 is a schematic view illustrating a display device according to an eleventh embodiment of the present invention. Here, backlights 01t and 01r are respectively provided at the back of the displays, for displays 01s and 01r, which are provided in the vehicle carriage, and a cooling air passage gap 03c is provided between the vehicle carriage 03 and the backlights 01t and 01r, in which cooling air 08 flows, which cools the backlights.

(Embodiment 12) FIG. 23 is a schematic view illustrating a display device according to a twelfth embodiment of the present invention. Here, cooling air that has passed through the cooling air passage gap 03c is discharged to the exterior by an exhaust fan 09, directed to the exterior, from the ceiling of the vehicle carriage.

(Embodiment 13) FIG. 24 is a schematic view illustrating a display device according to a thirteenth embodiment of the present invention. Here, as shown in FIG. 24, surface-stabilized ferroelectric liquid crystal displays (FLC) 11, 12 and 13, which, once a voltage has been applied during image formation, have the capacity for image memory even if voltage is not applied, and a thin film transistor liquid crystal display (TFT) 10, which does not have image memory capacity, but which has a rapid display-switching speed and is suitable for high definition color display, are installed as the displays; and images that are infrequently changed after having been once formed are displayed at all times by the displays 11 to 13, while images that are frequently changed at all times, or for which moving image display is necessary, are displayed by the display 10, such that the display content is changed from the display image 10a to 10b only on the displays 10, as shown in FIG. 25.

(Embodiment 14) FIG. 26 is a schematic view illustrating a display device according to a fourteenth embodiment of the present invention. Here, various types of displays suited to the display images are provided at different positions within the vehicle carriage 03. From among the display-installation regions within the vehicle, curved surface displays 14 such as nematic liquid crystal displays that use flexible transparent cover electrodes, light emitting diodes (LED) and the like, which can easily be configured for curved surface displays, are used for the curved surface regions. Liquid crystal displays 15 such as nematic liquid crystal displays (STN/LCD), thin-film transistor liquid crystal displays (TFT), surface-stabilized ferroelectric liquid crystal displays (FLC) and antiferroelectric liquid crystal displays (AFS), which can perform display with external light as a backlight, are used for the glass windows 18 of the vehicle carriage. Furthermore, thin multi-electron-beam-irradiation CRTs, plasma displays, thin-film transistor liquid crystal displays (TFT) or the like, having relatively rapid response speeds, are used for the moving-image-display displays 16 on the walls within the vehicle. Furthermore, a display, such as one in which a multiplicity of light emitting diodes (LED) are aligned, is used as a band-shaped elongate mounted display 17 for simple display of characters alone, which extends in the lengthwise direction of the vehicle carriage as shown in FIG. 26.

[0020] Note that, in the embodiments, a railway carriage or the like was described as an example of the vehicle, but it is conceivable that this be applied to other vehicles such as aircrafts, ships, buses, elevators, recreational facilities and the like.

[0021]

[Effects of the Invention] As described above, by virtue of the present invention, a means can be provided for efficiently supplying information based on image information within a vehicle.

[0022] In other words: (1) the display efficiency, such as in the changing of displays, can be markedly increased by efficient installation in which displays for display of announcements, guidance and the like, which are to be displayed within the vehicle, are made electronic; (2) information such as communication information, which could not be displayed in the past, can be displayed; (3) by moving display images across a plurality of displays, the display content can be seen in all places within the vehicle; and (4) it is possible to automatically and suitably control the display content and the display mode in accordance with stopping of the vehicle, changes in brightness within the vehicle, opening and closing of doors and the like.

[Brief Description of the Drawings]

[FIG. 1] This is a schematic view illustrating a display device according to the first embodiment of the present invention.

[FIG. 2] This is a sectional view showing the sectional structure of the liquid crystal display in the device in FIG. 1.

[FIG. 3] This is a schematic view illustrating modes of installing the displays in the device in FIG. 1 in a vehicle carriage.

[FIG. 4] This is a schematic view illustrating other modes of installing the displays in the device in FIG. 1 in a vehicle carriage.

[FIG. 5] This is a schematic view illustrating still other modes of installing the displays in the device in FIG. 1 in a vehicle carriage.

[FIG. 6] This is a schematic view illustrating a display device according to the second embodiment of the present invention.

[FIG. 7] This is a schematic view illustrating the manner in which a liquid crystal display is installed so as to be directly encased within the transparent glass part in the device in FIG. 6.

[FIG. 8] This is a schematic view illustrating a display device according to the third embodiment of the present invention.

[FIG. 9] This is a schematic view illustrating a change in the display state of the display in the device in FIG. 8

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