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(54) **Method for displaying information on a screen of a displaying system and displaying system**

Verfahren zur Anzeige von Informationen auf einem Bildschirm eines Anzeigesystems und Anzeigesystem

Procédé pour afficher des informations sur un écran d'un système d'affichage et système d'affichage

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Description

[0001] The present invention concerns a method for displaying information on a screen of a displaying system and such a displaying system.

[0002] The displaying system comprises a screen, including pixels and configured to display information, and control means of the pixels.

[0003] In the field of displaying systems, notably of displaying systems of information related to trains, railway stations and/or railway lines, it is known to use a specific safe LCD monitor guarantying that the displayed information and therefore the displayed images are not affected by any manipulation made by hardware and/or software comprised in the monitor. To reach this goal, this LCD monitor has no internal processing unit for image manipulation, such as re-dimensioning or re-scaling and no internal memory. Therefore, this monitor is disable to manipulate information to display, and so images to display and is disable to copy images. Moreover, this monitor is specific and has a special hardware in order to enable to guaranty the validity of the information displayed.

[0004] Documents JP 2001265312 A and EP 1511001 A1 disclose methods allowing shifting a display window in order not to comprise a dead pixel, which was previously identified, on it.

[0005] However, each of these methods needs the operator to first identify the dead pixel in order to ensure the validity of information displayed, and therefore does not allow the operator to check the validity of the information displayed on a screen while using it. In particular, such methods do not allow the operator to check the presence of a dead pixel altering the information displayed, without having identified beforehand the dead pixel.

[0006] The problem presented by the use of such a monitor is that the monitor is complex, expensive and hard to implement.

[0007] So, the aim of this invention is to provide a displaying system simplified, easy to implement and allowing to check the validity of information displayed on a screen easily without need of a special hardware.

[0008] To this end, the invention concerns a method for displaying information on a screen of a displaying system according to claim 1.

[0009] Thanks to the invention, the validity of the information displayed on the screen is checked easily without need of a special hardware, on one hand, because the shift of the first display window relative to the visual reference indicators allows an operator to check if there is any problem in the functioning of the displaying system and, on the other hand, because the different steps presented above can be realized by a common screen associated with a common central unit of a computer. Therefore, the displaying system is simplified and easy to implement. For example, if a pixel fault occurs at the emplacement of the first display window an operator would observe that the first display window is shifted on the screen, whereas the faulty pixel would not move.

[0010] According to further aspects of the invention which are advantageous but not compulsory, such a method may incorporate one or several of the features according to claims 2 to 5.

[0011] The invention concerns also a displaying system according to claim 6.

[0012] The invention will now be explained in correspondence with the annexed figures, and as an illustrative example, without restricting the object of the invention. In the annexed figures:

- figure 1 is a schematic view of an installation including a displaying system according to a first embodiment of the invention;
- figure 2 is an enlarged view of a screen of the displaying system of figure 1;
- figure 3 is a flowchart of an example of method according to the first embodiment;
- figure 4 is a schematic view of an installation including a displaying system according to a second embodiment of the invention;
- figure 5 is an enlarged view of a screen of the displaying system of figure 3; and
- figure 6 is a flowchart of an example of method according to the second embodiment.

[0013] Figure 1 represents a main unit 10 connected to a displaying system 12. The main unit 10 is configured to transmit a video signal S1 to the displaying system 12. The main unit 10 receives, for example, some data relative to the functioning of a non-represented railway installation and is adapted to generate the video signal S1 in function of the received data. The received data correspond, for instance, to the state or position of a railroad switch. The main unit 10 forms a safety system guarantying the integrity of the video signal S1. The main unit forms preferably a SIL4-type safety system (Safety Integrity Level 4) which guarantees a certain safety level and the integrity of the video signal S1 to avoid a wrong image visualization recognized as "good" by an operator.

[0014] The displaying system 12 includes processing means 14 and a monitor 16. The monitor 16 comprises a screen 17 and control means 18 of the screen 17. The monitor 16 is, for instance, an ordinary LCD monitor currently used for word processing on a personal computer.

[0015] The video signal S1 comprises information 19 to display on the screen 17. The format of video signal S1 complies for example with Bitmap standard (BMP). The information 19 is, for instance, related to the railway installation, i.e. relative to the functioning of trains, railway stations and/or railway lines.

[0016] The processing means 14 comprise a processing unit 20, a memory 22, receiving means 24 of the video signal S1 and transmission means 26 of a command signal S2 to the control means 18. The processing means 14 are adapted to add additional data to information 19 comprised in the video signal S1 in order to generate the

command signal S2. The processing means 14 form, for example, a central unit, such as the central unit of a computer, connected, on one hand, to the monitor 16, and on the other hand, to the main unit 10.

[0017] The format of the command signal S2 complies for example with Digital visual interface-digital standard (DVI-D).

[0018] The screen 17 includes non-represented pixels controlled by the control means 18.

[0019] The control means 18 are adapted to control the lighting and the colour of the pixels and therefore images displayed on the screen 17, in function of the command signal S2. More especially, the control means 18 are adapted to control the lighting and the colour of the pixels via a control signal S3 of the pixels, which is function of the command signal S2 and which depends on the specifications of the screen 17. In fact, the control means 18 control the colour and the lighting of the pixels in order to display information 19 and the additional data on the screen 17.

[0020] The processing unit 20 is, for instance, a microcontroller and is adapted to execute algorithms comprised in the memory 22.

[0021] The memory 22 comprises a determination algorithm 28 of a top vertical position 30 and a bottom vertical position 32 on the screen 17 as shown on figure 2 and of associated visual reference indicators 34. The memory 22 includes a first displaying algorithm 36 of the visual reference indicators 34 which indicate the top 30 and/or bottom 32 vertical positions. The memory 22 includes a definition algorithm 38 of a first display window 40, a second displaying algorithm 41 of the first display window 40, a calculation algorithm 42 of a vertical position of the first display window 40 on the screen 17 and a comparison algorithm 44 of the said vertical position with the top 30 and bottom 32 vertical positions. The memory 22 includes also a command algorithm 46 of the control means 18.

[0022] The transmission means 26 are adapted to periodically transmit the command signal S2 to the control means 18, in order to periodically actualize the images displayed on the screen 17.

[0023] The determination algorithm 28 is adapted to determine, for example in function of the dimensions of the screen 17, the top vertical position 30 and the bottom vertical position 32, which define two reference positions of the first display window 40 on the screen 17. More especially, the top 30 and bottom 32 vertical positions define two vertical positions between which a first given point 55 of the first display window 40 is adapted to be displayed. In other words, the determination algorithm 28 is configured to determine two boundaries delimiting a vertical position of the first given point 55 and therefore to determine a top position and a bottom position for the first display window 40. The dimensions of the screen 17 are, for instance, transmitted by the monitor 16 when it is connected to the processing means 14. The determination algorithm 28 is also adapted to determine the visual reference indicators 34 in function of the top 30 and/or the bottom 32 vertical positions.

[0024] According to a variant of the invention, the top 30 and bottom 32 vertical positions define respectively the highest position at which a first given point of the first display window 40 is adapted to be displayed and the lowest position at which a second given point of the first display window 40 is adapted to be displayed.

[0025] The visual reference indicators 34 comprise several first horizontal lines 56 vertically adjacent to each other and extending between the top 30 and bottom 32 vertical positions, with an alternation of first horizontal lines of a first color and first horizontal lines of a second color. The highest first horizontal line 56 defines the top vertical position 30 and the lowest first horizontal line 56 defines the bottom vertical position 32. The first color is, for instance, the white color and the second color is, for instance, the black color. The first horizontal lines 56 have, for instance, a height of 1 pixel. The first horizontal lines 56 extend on all the length of the screen 17.

[0026] The top 30 and bottom 32 vertical positions and more generally the visual reference indicators 34 are adapted to have a fixed position on the screen 17.

[0027] The first displaying algorithm 36 is configured to command the displaying on the screen 17 of the visual reference indicators 34, which indicate the top 30 and/or bottom 32 vertical positions. The displaying algorithm 36 is adapted to add to the information 19 comprised in video signal S1 some data corresponding to the visual reference indicators 34 in order to generate the command signal S2 and to display the visual reference indicators 34 on the screen 17.

[0028] The definition algorithm 38 is configured to define, for instance, the dimensions of the first display window 40 which is intended to comprise the information 19 to display and which is intended to be displayed on the screen 17. The dimensions of the first display window 40 are lower than the dimension of the screen 17. The definition algorithm 38 is at least adapted to define the height of the first display window 40, which is lower than the height of the screen 17. The definition algorithm 38 is, for example, configured to define the dimensions of the first display window 40 in function of the dimensions of the screen 17. The definition algorithm define, for instance, that the dimensions of the first display window 40 are 20% lower than the dimensions of the screen 17.

[0029] According to a variant, the dimensions of the first display window 40 are initially entered by the operator and saved in the memory 22.

[0030] The definition algorithm 38 is also configured to define an initial vertical position of the first display window 40 on the screen 17. The initial position corresponds, for example, to a previously saved in the memory 22 position for a central point of the first display window 40 on the screen 17.

[0031] The second displaying algorithm 41 is configured to integrate the information 19 comprised in the video signal S1, into the first display window 40, in order to

generate the command signal S2. More especially, the command signal S2 contains data relative to the first display window 40 and to the reference visual indicators 34 in order to display the first display window 40 on the screen 17, over the reference visual indicators 34, i.e. over the first horizontal lines 56. The second displaying algorithm 41 is adapted to actualize information 19 comprised in the first display window 40 periodically in function of the video signal S1.

[0032] The calculation algorithm 42 of the vertical position of the first display window 40 is configured to calculate the vertical position of the first display window 40 on the screen 17. The calculation algorithm 42 is for example adapted to save a first variable equal to the position of the first given point 55 when the first display window 40 is in the initial position and to modify this variable each time the processing means 14 change the position of the first display window 40, in order to take this change into account.

[0033] The comparison algorithm 44 is adapted to compare the vertical position of the first display window 40 with the top 30 and bottom 32 vertical positions. In other words, the comparison algorithm 44 is adapted to check the position of the first display window 40, i.e. of the first given point 55, relative to the top 30 and bottom 32 vertical positions.

[0034] The command algorithm 46 is configured to command a vertical shift of the first display window 40, displayed on the screen 17, over the first horizontal lines 56. The vertical shift corresponds to a shift of a predetermined number of pixels, preferably comprised between 1 and 6. More generally, the range of the vertical shift is for instance fixed by the operator and depends on a speed of movement chosen by the operator for the first display window 40. More especially, the command algorithm 46 is adapted to modify the position of the first display window 40, i.e. to modify the command signal S2, in order to change the position of the first display window 40 on the screen 17, over the first horizontal lines 56. Therefore, the calculation algorithm 42 is adapted to modify the first variable each time the command algorithm 46 command a vertical shift of the first display window 40.

[0035] The command algorithm 46 is adapted to shift the first display window 40 relative to the reference visual indicators 34 and, more especially, over the reference visual indicators 34 in a predetermined direction. Preferably, the command algorithm is adapted to shift the first display window 40 over the first horizontal lines 56 of a predetermined number of first horizontal lines 56, preferably odd.

[0036] The command algorithm 46 is adapted to be executed periodically by the processing unit 20 in order to command periodically, with a predetermined duration, the shift of the first display window 40 on the screen 17, over the first horizontal lines 56. The predetermined duration is, for instance, preferably comprised between 1 s and 10 s. More generally, the predetermined duration is for instance fixed by the operator and depends on the speed of movement chosen by the operator for the first display window 40.

[0037] The command algorithm 46 is adapted to determine the direction of the shift of the first display window 40 in function of the top 30 and bottom 32 vertical positions and of the vertical position of the first display window 40. More especially, the command algorithm 46 is configured to shift the first display window 40 in a new direction opposed to the top vertical position 30, respectively to the bottom vertical position 32, when the comparison algorithm 44 detects that the first display window 40, i.e. the first given point 55, has reached and/or exceeded the top vertical position 30 according to the predetermined direction, respectively the bottom vertical position 32 according to the predetermined direction. The command algorithm is then configured to fix the predetermined direction equal to the new direction.

[0038] According to a variant, the calculation algorithm 42 is adapted to determine the vertical position of the first given point 55 and of a second given point of the first display window 40. The comparison algorithm 44 is adapted to compare the vertical position of the first given point with the bottom vertical position 32 and the vertical position of the second given point with the top vertical position 30. Then the command algorithm 46 is configured to shift the first display window 40 in a first new direction opposed to the bottom vertical position 32, when the comparison algorithm 44 detects that the first given point 55, has reached and/or exceeded the bottom vertical position 32 according to the predetermined direction and in a second new direction opposed to the top vertical position 30, when the comparison algorithm 44 detects that the second given point, has reached and/or exceeded the top vertical position 30 according to the predetermined direction.

[0039] An operating mode of the displaying system 12 will be explained hereafter, through the presentation of the method illustrated in Figure 3.

[0040] In an initial reception step 100, the displaying system 12 receives the video signal S1.

[0041] Then, in a determination step 102 the top vertical position 30 and the bottom vertical position 32 are determined by the determination algorithm 28. More especially, the visual reference indicators 34 are determined.

[0042] Then, in a definition step 104, the first display window 40 is defined by the definition algorithm 38 and comprises the information 19 to display.

[0043] In a further calculation step 105, the vertical position of the first display window 40 on the screen 17 is calculated through the calculation algorithm 42. More especially, during the calculation step 105, the value of the first variable is initially fixed equal to the position of the first given point 55, when the first display window 40 is intended to be displayed at the initial position, i.e. just after the definition step 104, then the value of the first variable is modified after each shift of the first display

window 40 realized by the command algorithm 46.In a generation step 106, the command signal S2 is generated. More especially, the information 19 comprised in the video signal S1 is integrated, into the first display window 40 and some data corresponding to the visual reference indicators 34 are added to the first display window 40 in order to generate the command signal S2.

[0044] In a further transmission step 108, the command signal S2, which comprises data corresponding to the first display window 40 and to its calculated vertical position and to the visual reference indicators 34, is transmitted, through the transmission means 26, to the control means 18. After the transmission step 108, the control means 18 are able to control the pixels to display the first display window 40 and the visual reference indicators 34 on the screen 17, with the first display window 40 displayed over the first horizontal lines 56.

[0045] Then, in a displaying step 110 the control signal S3 is transmitted to the pixels and the first display window 40 and the visual reference indicators 34 are displayed on the screen 17.

[0046] Then, during a comparison step 114 the calculated vertical position is compared with the top 30 and bottom 32 vertical positions.

[0047] If during the comparison step 114 the vertical position of the first given point 55 is lower than the top vertical position 30 and higher than the bottom vertical position 32, then, in a first command step 116, the command algorithm 46 commands a vertical shift of the first display window 40 on the screen 17, relative to the top 30 and bottom 32 vertical positions in the predetermined direction.

[0048] If during the comparison step 114 it has been detected that the first display window 40, i.e. the first given point 55, has reached and/or exceeded the top vertical position 30, or the bottom vertical position 32 according to the predetermined direction, then, in a second command step 118, the shift of the first display window 40 in a new direction opposed to the top vertical position 30, respectively to the bottom vertical position 32 is commanded. The first predetermined direction is fixed equal to this new direction. In other words, when the first given point 55 vertical position is equal or higher than the top vertical position 30 or when the first given position 55 vertical position is equal or lower than the bottom vertical position 30 the second command step 118 is realized.

[0049] Following to the first 116 and/or second 118 command steps, the calculation step 105 is repeated, which means that the first variable is modified according to the shift of the first display window 40. The calculation step 105 is, for instance, repeated with the predetermined duration. Thus, during the generation step 106, the video signal S1 considered corresponds to the last video signal S1 received by the processing means 14 and the position fixed for the first display window 40 in the command signal S2 corresponds to the calculated position.

[0050] Therefore, the first display window 40 is regularly shifted and the operator is able to observe any dysfunction in the display, which means any pixel fault or dysfunction of the processing means 14 or control means 18. Indeed if a dysfunction occurs the operator would observe that a part of the information 19 displayed on the screen 17 in the first window 40 is fixed and is not shifted compared with the rest of the information 19. The operator is able to observe the validity of the images displayed on the screen, checking the movement of the first display window 40 relative to the visual reference indicators 34 which are fixed. More especially, the first display window 40 is, for instance, shifted over the first horizontal lines 56, and the number of first horizontal lines 56 displayed on the screen 17 is function of the vertical position of the first display window 40. Therefore the operator is able to observe the shift or movement of the first display window 40 checking the number of first horizontal lines 56 displayed on the screen 17 between the first display window 40 and the bottom vertical position 32.

[0051] In the following, a second embodiment of the invention, as presented on figures 4, 5 and 6 will be described. Figure 4 represents a main unit 210 connected to a displaying system 212. In the second embodiment the element forming the main unit 210 and the displaying system 212 are globally similar than the ones presented in the first embodiment and have the same references increased of 200. In the following, only the difference between the first embodiment and the second embodiment will be presented. In fact, in the second embodiment, the displaying system 212 comprises the same elements than the displaying system 12 of the first embodiment plus some additional elements which are described below.

[0052] On figure 4, the memory 222 comprises a computing algorithm 248 of a second display window 250 and a computation algorithm 252 of a third display window 254.

[0053] The computing algorithm 248 is configured to compute the second display window 250 which is associated with the first display window 240 and which is intended to be displayed on the screen 217. The computing algorithm 248 is also configured to define a first initial vertical top position and a first initial vertical bottom position of the second display window 250 on the screen 217. The first initial top and bottom positions correspond for example to positions previously saved in the memory 222 by the operator.

[0054] The second display window 250 comprises second horizontal lines 258, vertically adjacent to each other and intended to be displayed over the first horizontal lines 256, with an alternation of second horizontal lines of a third color and second horizontal lines of a fourth color. The second horizontal lines of the third color are, for instance, transparent and the fourth color is, for instance, the red color. The second horizontal lines 258 have, for instance, a height of 1 pixel. The second horizontal lines 258 extend over the first horizontal lines 256, on a length lower than the screen 217 length. The second display window 250 is configured to be disposed at a predeter-

mined vertical distance of the first display window 240 and has a predetermined height. The second display window 250 extends initially between the first initial top and bottom positions.

[0055] According to a variant, the second horizontal lines 258 extend over the first horizontal lines 256, on a length equal to the screen 217 length.

[0056] The computing algorithm 248 is adapted to add into the command signal S202 some data corresponding to the second display window 250. More especially, the command signal S202 contains data relative to the second display window 250 in order to display the second display window 250 on the screen 217, over the first horizontal lines 256.

[0057] In the second embodiment, the top vertical position 330 and the bottom vertical position 332 define two reference positions, i.e. two limit positions of the second display window 250 on the screen 17

[0058] In this second embodiment, the calculation algorithm 242 is adapted to calculate the vertical position of the second display window 250. The calculation algorithm 242 is, for example, adapted to save a second and a third variables equal respectively to the first initial vertical top and bottom positions. The calculation algorithm 242 is adapted to modify the second and third variables each time the processing means 14 change the position of the second display window 50, in order to take into account this change. The second and third variables correspond respectively to the vertical position of a third given point and of a fourth given point of the second display window 250. The third given point is, for instance, the highest point of the second display window 250 and the fourth given point is, for instance, the lowest point of the second display window 250.

[0059] The comparison algorithm 244 is, for instance, adapted to compare the second variable with the top vertical position 230 and the third variable with the bottom vertical position 232. In other words, the comparison algorithm 244 is adapted to check the position of the second display window 250 relative to the top 230 and bottom 232 vertical positions.

[0060] The command algorithm 246 is configured to command a vertical shift in a predetermined direction of the second display window 250 and of the first display window 240 in a similar manner. The vertical distance between the first display window 240 and the second display window 250 stays fix.

[0061] The command algorithm 246 is configured to command the vertical shift of the second display window 250 over the first horizontal lines 256 in order to have before the shift, the second horizontal lines of the third color respectively of the fourth color superimposed over the first horizontal lines of the first color respectively of the second color and, after the shift, the second horizontal lines of the fourth color respectively of the third color superimposed over the first horizontal lines of the first color respectively of the second color, or conversely. This creates flashing of the second display window 250 after each shift of the second display window 250. Indeed the second display window 250 is displayed over the first horizontal lines 256, then when the fourth color which is red is over the first color and the third color which is transparent is over the fourth color which is black, the operator observe a dark red color on the screen 217 at the location of the second display window 250, which corresponds to an alternating of black and red horizontal lines. Moreover, when the fourth color is over the second color, the operator observe a pink color on the screen 217 at the location of the second display window 250, which corresponds to an alternating of white and red horizontal lines.

[0062] In the second embodiment, the command algorithm 246 is adapted to determine the direction of the shift of the first 240 and second 250 display windows in function of the second and third variables and of the top 230 and bottom 232 vertical positions. More especially, the command algorithm 246 is configured to shift the first 240 and second 250 display windows in a new direction opposed to the top vertical position 230, respectively to the bottom vertical position 232, when the comparison algorithm 244 detects that the second display window 250, has reached and/or exceeded the top vertical position 230 according to the predetermined direction, respectively the bottom vertical position 232 according to the predetermined direction. The command algorithm 246 is configured to vertically shift the first 240 and second 250 display windows relative to the visual reference indicators 234. More especially, the second display window 250 is vertically shifted over the reference visual indicators 234, i.e. over the first horizontal lines 256 and stays comprise between the top 230 and bottom 232 vertical positions.

[0063] More especially, the command algorithm 246 is adapted to modify the position of the first 240 and second 250 display windows, i.e. to modify the command signal S202, in order to change the position of the first 240 and second 250 display windows on the screen 17. Therefore, the calculation algorithm 242 is adapted to modify the second and third variable each time the command algorithm 246 command a vertical shift of the second display window 250.

[0064] The command algorithm 246 is adapted to be executed periodically by the processing unit 20 in order to command periodically, with a predetermined duration, the shift of the first 240 and second 250 display windows on the screen 217. The predetermined duration is, for instance, preferably comprised between 1 s and 10 s. More generally, the predetermined duration is for instance fixed by the operator and depends on a speed of movement chosen by the operator for the first 240 and second 250 display windows.

[0065] The computation algorithm 252 is configured to compute the third display window 254 which is intended to be displayed over the first horizontal lines 256.

[0066] The third display window 252 is preferably displayed at the same height than the second display window 250 and extends initially between the first initial top

and bottom positions. The third display window 254 is preferably horizontally adjacent to the second display window 250.

[0067] The third display window 254 includes safety visual indicators 259 and the computation algorithm 252 is adapted to actualize regularly the safety visual indicators 259 and therefore to modify the third display window 254 and so, the command signal S202.

[0068] The safety visual indicators 259 allow the operator to check the validity of the images and therefore of the information 219 displayed on the screen 217. The safety visual indicators 259 include a rotating bar 260 which is intended to rotate with a first predetermined period, which is, for instance, comprised between 0.2 seconds (s) and 3 s.

[0069] The safety visual indicators 259 include also a reference time 264 which is, for instance, refreshed by the computation algorithm 252 every second and the operator can check the validity of the information 219 displayed, checking that the reference time 264 is changing.

[0070] The safety visual indicators 259 include a fix color bar 266 comprising several color blocks adjacent to each other and which is associated with a dynamic color bar 268 similar to the fix color bar 266. The fix color bar 266 comprises, for instance, five color blocks adjacent to each other and extends horizontally. The dynamic color bar 268 is displayed below the fix color bar 266.

[0071] The dynamic color bar 268 is comprised in the third display window 254, and therefore, in the command signal S202, for instance, every second predetermined period. More especially the dynamic color bar 268 is alternately not displayed in the third display window 254 during a duration equal to the second predetermined period and displayed in the third display window 254. Therefore, the dynamic color bar 268 is displayed periodically with the second predetermined period. The second predetermined period is, for instance, equal to 1 s.

[0072] According to a variant, the third display window 254 includes a non-represented dynamic color bar comprising, for instance, several color blocks whose positions are exchanged periodically with a third predetermined period. The third predetermined period is, for instance, equal to 1 s.

[0073] According to another variant, the third display window includes the fix color bar 266, but not the dynamic color bar 268.

[0074] Advantageously, the third display window 254 defines an area, for instance a horizontal bar, comprising the safety visual indicators 259.

[0075] The computing algorithm 248 is adapted to add into the command signal S2 some data corresponding to the third display window 254. More especially, the command signal S2 contains data relative to the third display window 254 in order to display the third display window 254 on the screen 217, over the first horizontal lines 256.

[0076] Advantageously, the command algorithm 246 is configured to command a vertical shift of the third display window 254 in a similar manner than the shift of the first 240 and second 250 display windows. More especially, knowing that the third display window 254 is horizontally adjacent to the second display window 250, the vertical positions of the second 250 and third 254 display windows are globally equivalent.

[0077] According to a variant, the computation algorithm 252 is also configured to define a second initial vertical top and a second initial vertical bottom position of the third display window 254 on the screen 217. The second initial top and bottom positions correspond for example to vertical positions previously saved in the memory 22. Then, the calculation algorithm 242 is adapted to calculate the vertical position of the third display window 254. The calculation algorithm 242 is for example adapted to save a fifth and a sixth variables equal respectively to the second initial vertical top and bottom positions of the third display window 254. The calculation algorithm 242 is adapted to modify the fifth and sixth variables each time the processing means 14 change the position of the third display window 254, in order to take in account this change. Then, the comparison algorithm 244 is, for instance, adapted to check the position of the third display window 254 relative to the top 230 and bottom 232 vertical positions and the command algorithm 246 is adapted to determine the direction of the shift of the first 240, second 250 and third 254 display windows in function of the fifth and sixth variables and of the top 230 and bottom 232 vertical positions.

[0078] An operating mode of the displaying system 212 will be explained hereafter, through the presentation of the method illustrated in Figure 6.

[0079] This method comprises an initial reception step 300, a determination step 302, a definition step 304 and a generation step 306 respectively similar to the reception step 100, determination step 102, definition step 104 and generation step 106 presented for the first embodiment.

[0080] Then in a further computing step 308, the second display window 250 is computed by the computing algorithm 248 and in a computation step 310, the third display window 254 is defined by the computation algorithm 252. More especially, some data corresponding to the second 250 and third 254 display windows are added to the command signal S202.

[0081] In a further calculation step 311, the vertical position of the second display window 250 on the screen 217 is calculated through the calculation algorithm 242. More especially the second and third variables are initially fixed equal to the first initial vertical top and bottom position, the first time that the calculation step 311 is realized, then the values of the second and third variables are modified after each shift of the second display window 250 commanded by the command algorithm 246. In a further transmission step 312, the command signal S202, which comprises data corresponding to the first 240, second 250 and third 254 display windows and to the visual reference indicators 234 is transmitted, through the transmission means 226, to the control means 218. After the

transmission step 312, the control means 218 are able to display the first 240, second 250 and third 254 display windows and the visual reference indicators 234 on the screen 217, with notably the second and third display windows displayed over the first horizontal lines 256.

[0082] Then, in a displaying step 314 the control signal S3 is transmitted to pixels and the first 240, second 250 and third 254 display windows and the visual reference indicators 234 are displayed on the screen 217.

[0083] Then, during a comparison step 318 the second and third variables are respectively compared with the top 230 and bottom 232 vertical positions.

[0084] Finally, if during the comparison step 318 the second variable, i.e. the vertical position of the third given point is lower than the top vertical position 230 or the third variable, i.e. the vertical position of the fourth given point, is higher than the bottom vertical position 232, then, in a first command step 320, the command algorithm 246 commands a vertical shift of the first 240, second 250 and third 254 display windows on the screen 217, relative to the top 230 and bottom 232 vertical positions in the predetermined direction. The condition presented above corresponds to the fact that the second display window 250 has not reached and/or exceeded the top vertical position 230 or the bottom vertical position 232, according to the predetermined direction.

[0085] Then, if during the comparison step 318 it has been detected that the second variable, i.e. the vertical position of the third given point, is higher than or equal to the top vertical position 230 or that the third variable, i.e. the vertical position of the fourth given point, is lower than or equal to the bottom vertical position 232, then, in a second command step 322, the command algorithm 246 commands the shift of the first 240, second 250 and third 254 display windows in a new direction opposed to the top vertical position 230, respectively to the bottom vertical position 232 and the first predetermined direction is fixed equal to this new direction. The condition presented above corresponds to the fact that the second display window 250 has reached and/or exceeded the top vertical position 230 or the bottom vertical position 232, according to the predetermined direction.

[0086] Following to the first 320 and/or second 322 command steps, the generation step 306 is repeated, which means that the calculation step 311 is also repeated and that the second and third variables are modified according to the shift command in the command step 320 or 322. More especially, following to the shift command, the generation 306, computing 308 and computation 310 steps are executed and the command signal S202 is modified according to the shift command in order to vertically shift the first 240, second 250 and third 254 display windows. In other words, after the command step 320 or 322, desired vertical positions of the first 240, second 250 and third 254 display windows are respectively modified in the generation 306, computing 308 and computation 310 steps.

[0087] The operator is able to observe the validity of the images displayed on the screen, checking the movement of the first 240, second 250 and third 254 display windows relative to the visual reference indicators 234 which are fixed.

[0088] In addition, the generation 306, computing 308, computation 310, calculation 311, transmission 312, displaying 314, comparison 318 and command 320, 322 steps are repeated periodically in order to refresh the images and the information 219 displayed on the screen 217. This notably enables to shift periodically the first 240, second 250 and third 254 windows and to actualize the data displayed in the third display window 254, i.e. the safety visual indicators 259. Therefore the operator is able to observe the safety visual indicators 259 to check the validity of the images and therefore of the information 219 displayed on the screen 217. Indeed the operator check the rotation of the rotating bar 260, the changing of the reference time 264, the displaying of the first fix color bar 266 and the flashing of the first dynamic color bar 268 and identify a dysfunction in the displaying system, for instance, if no rotation is observed or if the reference time does not change or if the fix color bar 266 is not correctly displayed. The repetition of the first 320 and/or second 322 command steps allows the operator to check that the first 240, second 250 and third 254 display windows are periodically shifted.

[0089] The operator is able to check the validity of the information 219, by checking the flashing related to the shift of the second display window 250 relative to the visual reference indicators 234, i.e. to the movement of the second horizontal lines 258 over the first horizontal lines 256.

[0090] The operator is also able to observe any dysfunction in the display, which means any pixel fault or dysfunction of the processing means 214 or control means 218, because if a dysfunction occurs the operator would observe that a part of the information 219 or of the visual indicators 229 displayed on the screen 217 is fixed and is not shifted compared with the rest of the information 219 or of the visual reference indicators 229. The operator is able to observe the validity of the images displayed on the screen, checking the movement of the first 240, second 250 and third 254 display windows relative to the visual reference indicators 234 which are fixed.

[0091] For example, the operator is able to check if a pixel fault occurs because, if a pixel fault occurs, the operator would observe that the first 240, second 250 and third 254 windows are shifted on the screen 217, whereas the faulty pixel would not move.

[0092] According to a variant of the invention, the processing means 14 are integrated in the main unit 10. In this variant the displaying system 12 comprises the main unit 10.

[0093] According to another variant, the first, second and third display windows are associated together in a main window which is shifted through the use of the command algorithm 246 and actualized through the use of the second displaying algorithm 241, computing algo-

rithm 248 and computation algorithm 250. In this variant the definition step 238 can be replace by a definition step of the main window. In this variant the main window corresponds, for example to the first display window 240 in which the second 250 and third 254 display windows are integrated.

[0094] According to another variant the shift of the first 40, 240, second 250 and third 254 display windows is not a vertical shift but a horizontal shift. Therefore in the preceding description the words "vertical", "top" and bottom" would be replaced, where appropriate, by the words "horizontal", "left" and "right".

[0095] According to another variant the shift of the first 40, 240, second 250 and third 254 display windows is both vertical and horizontal.

[0096] The embodiments and variants discussed above are suitable for being combined with one another wholly or partially to give rise to other embodiments of the invention.

Claims

1. Method for displaying information (19; 219) on a screen (17; 217) of a displaying system (12; 212), the screen (17; 217) including pixels and the displaying system (12; 212) comprising processing means (14; 214) and control means (18; 218) of the pixels, the method comprising the following steps performed by the processing means (14; 214) :

- the reception (100; 300), by the processing means (14; 214), of a video signal (S1; S201) comprising information (19; 219) to be displayed,
- the definition (104; 304), by a definition algorithm (38), of a first display window (40; 240) comprising the information (19; 219) to display, the first display window (40; 240) being displayed on the screen (17; 217) and the dimensions of the first display window (40; 240) being lower than the dimensions of the screen (17; 217), an initial position being defined for the first display window (40,240), the first display window (40; 240) comprising a first given point (55), the first given point (55) having a position on the screen (17; 217),
- the determination (102; 302), by a determination algorithm (28) of visual reference indicators (34; 234) displayed on the screen (17; 217), the visual reference indicators (34; 234) having a fixed position on the screen (17; 217) and comprising several first lines (56; 256) adjacent to each other according to a shift direction of the first display window (40; 240), with a spatial alternation of first lines of a first color and first lines of a second color,

the determination step (102; 302) comprising:

- determining a first (30) limit position and a second (32) limit position on the screen (17), the first limit position (30) and the second limit position (32) defining respectively the highest and the lowest positions along the shift direction between which the first given point (55) is adapted to be displayed,
- determining the visual reference indicators (34) as indicating the first and second limit positions on the screen (17),

- the calculation (105), by a calculation algorithm (42), of a position of the first display window (40) on the screen (17) by initially fixing a first variable equal to the position of the first given point (55) when the first display window is in the initial position and a predetermined direction along the shift direction, and
then, when the calculation (105) is repeated, modifying the first variable in accordance with a commanded shift of the first display window (40; 240),
- the displaying (110; 314) of the first display window (40; 240) and of the visual reference indicators (34; 234) on the screen (17; 217), the display window (40; 240) being displayed over the visual reference indicators (34; 234),
- the comparison (114), by a comparison algorithm (46), between the first variable and the first (30) and second (32) limit positions, and
if during the comparison step (116) the first variable is strictly comprised between the first limit position (30) and the second limit position (32), keeping the predetermined direction along the shift direction,
if during the comparison step (116) it has been detected that the first variable has reached and/or exceeded the first limit position (30) according to the predetermined direction along the shift direction, or respectively the second limit position (32) according to the predetermined direction along the shift direction, then, fixing the predetermined direction equal to a new direction along the shift direction opposed to the first limit position (30), respectively to the second limit position (32),- the
command (116, 118; 320, 322), by a command algorithm (46), of the shift in the predetermined direction along the shift direction of the first display window (40; 240), displayed on the screen (17; 217), relative to the visual reference indicators (34; 234),
- periodically repeating, with a predetermined time duration, the calculation (105), the displaying (110; 314), the comparison (114) and the command (116, 118; 320, 322) steps.

2. Method according to claim 1, wherein, previously to

the displaying step (314) and following to the definition step (304), the method comprises the following step:

- the computing (308) of a second display window (250) comprising second lines (258), adjacent to each other according to the predetermined direction and intended to be displayed over the first lines (256), with an alternation of second lines (258) of a third color and second lines (258) of a fourth color,

in that, during the displaying step (314), the second display window (250) is displayed on the screen (217), and in that, during the command step, (320, 322) the second display window (250) is shifted in the predetermined direction over the first lines (256) in order to have before the shift, the second lines (258) of the third color respectively of the fourth color superimposed over the first lines (256) of the first color respectively of the second color and, after the shift, the second lines (258) of the fourth color respectively of the third color superimposed over the first lines (256) of the first color respectively of the second color, or conversely.

3. Method according to any of the preceding claims, wherein the video signal (S1; S201) is generated by a main unit (10; 210) which forms a safety system guarantying the integrity of the video signal (S1; S201), the main unit forming preferably a SIL4-type safety system.

4. Method according to any of the preceding claims, wherein the predetermined time duration is comprised between 1 s and 10 s.

5. Method according to any of the preceding claims, wherein, previously to the displaying step (314) and following to the definition step (304), the method comprises the following step:

- the computation (308) of a third display window (254) comprising safety visual indicators (259) belonging to the group formed by: a rotating bar (260) with a first predetermined period, a first fix color bar comprising several color blocks adjacent to each other, a reference time (264), a second fix color bar (266) comprising several color blocks adjacent to each other associated with a first dynamic color bar (268) similar to the second fix color bar (266), displayed below the second fix color bar (266) and displayed periodically with a second predetermined period, a second dynamic color bar comprising several color blocks whose positions are exchanged periodically with a third predetermined period,

and in that, during the displaying step (314), the third display window (254) is displayed on the screen (217).

6. Displaying system (12; 212) adapted to carry out a method according to any of claims 1 to 5.

Patentansprüche

1. Verfahren zum Anzeigen von Informationen (19; 219) auf einem Bildschirm (17; 217) eines Anzeigesystems (12; 212), wobei der Bildschirm (17; 217) Pixel aufweist und das Anzeigesystem (12; 212) Verarbeitungsmittel (14; 214) und Steuerungsmittel (18; 218) der Pixel umfasst, wobei das Verfahren die folgende durch die Verarbeitungsmittel (14; 214) ausgeführten Schritte umfasst:

Empfangen (100; 300), durch das Verarbeitungsmittel (14; 214) eines anzuzeigende Informationen (19; 219) umfassenden Videosignals (S1; S201),
Definieren (104; 304), durch einen Definierungsalgorithmus (38), eines die anzuzeigenden Informationen (19; 219) umfassenden ersten Anzeigefensters (40; 240), wobei das erste Anzeigefenster (40; 240) auf dem Bildschirm (17; 217) angezeigt wird und die Dimensionen des ersten Anzeigefensters (40; 240) geringer sind als die Dimensionen des Bildschirms (17; 217), wobei für das erste Anzeigefenster (40; 240) eine Ausgangsposition definiert ist, wobei das erste Anzeigefenster (40; 240) einen ersten gegebenen Punkt (55) umfasst, wobei der erste gegebene Punkt (55) eine Position auf dem Bildschirm (17; 217) aufweist,
Bestimmen (102; 302), durch einen Bestimmungsalgorithmus (28), von auf dem Bildschirm (17; 217) angezeigten visuellen Referenzindikatoren (34; 234), wobei die visuellen Referenzindikatoren (34; 234) eine feste Position auf dem Bildschirm (17; 217) aufweisen und entsprechend einer Verschiebungsrichtung des ersten Anzeigefensters (40; 240) mehrere einander benachbarte erste Zeilen (56; 256) umfassen, aufweisend ein räumliches Abwechseln von ersten Zeilen einer ersten Farbe und ersten Zeilen einer zweiten Farbe,
wobei der Bestimmungsschritt (102; 302) umfasst:

Bestimmen einer ersten (30) Grenzposition und einer zweiten (32) Grenzposition auf dem Bildschirm (17), wobei die erste Grenzposition (30) und die zweite Grenzposition (32) die höchste bzw. tiefste Position entlang der Verschiebungsrichtung definieren,

zur Anzeige zwischen denen der erste gegebene Punkt (55) eingerichtet ist,
Bestimmen der visuellen Referenzindikatoren (34) als erste und zweite Grenzpositionen auf dem Bildschirm (17) anzeigend,
Berechnen (105), durch einen Berechnungsalgorithmus (42), einer Position des ersten Anzeigefensters (40) auf dem Bildschirm (17) durch ein anfängliches Festlegen einer ersten Variable, die gleich der Position des ersten gegebenen Punkts (55) ist, wenn das erste Anzeigefenster in der Ausgangsposition und einer vorbestimmten Richtung entlang der Verschiebungsrichtung ist und
dann, wenn die Berechnung (105) wiederholt wird, Ändern der ersten Variable entsprechend einem befohlenen Verschieben des ersten Anzeigefensters (40; 240),

Anzeigen (110; 314) des ersten Anzeigefensters (40; 240) und der visuellen Referenzindikatoren (34; 234) auf dem Bildschirm (17; 217), wobei das Anzeigefenster (40; 240) über den visuellen Referenzindikatoren (34; 234) angezeigt wird,
Vergleichen (114), durch einen Vergleichsalgorithmus (46), einer ersten Variable mit den ersten (30) und zweiten (32) Grenzpositionen, und wenn die erste Variable während des Vergleichsschritts (116) genau zwischen der ersten Grenzposition (30) und der zweiten Grenzposition (32) liegt, Beibehalten der vorbestimmten Richtung entlang der Verschiebungsrichtung,
wenn während des Vergleichsschritts (116) erfasst wurde, dass die erste Variable die erste Grenzposition (30) entsprechend der vorbestimmten Richtung entlang der Verschiebungsrichtung bzw. die zweite Grenzposition (32) entsprechend der vorbestimmten Richtung entlang der Verschiebungsrichtung erreicht und/oder überschritten hat, dann Festlegen der vorbestimmten Richtung gleich der neuen Richtung entlang der Verschiebungsrichtung, die gegenläufig zur ersten Grenzposition (30), bzw. der zweiten Grenzposition (32) ist, - das Befehlen (116, 118; 320, 322), durch einen Befehlsalgorithmus (46), des Verschiebens in der vorbestimmten Richtung entlang der Verschiebungsrichtung des ersten auf dem Bildschirm (17; 217) angezeigten Anzeigefensters (40; 240) relativ zu den visuellen Referenzindikatoren (34; 234), periodisches Wiederholen, mit einer vorbestimmten Zeitdauer, der Schritte des Berechnens (105), des Anzeigens (110; 314), des Vergleichens (114) und des Befehlens (116, 118; 320, 322).

2. Verfahren nach Anspruch 1, wobei das Verfahren vor dem Anzeigeschritt (314) und nach dem Definitionsschritt (304) folgenden Schritt umfasst:

Berechnen (308) eines zweiten Anzeigefensters (250), umfassend zweite Zeilen (258), die entsprechend der vorbestimmten Richtung einander benachbart und zum Anzeigen über den ersten Zeilen (256) vorgesehen sind, aufweisend ein Abwechseln der zweiten Zeilen (258) einer dritten Farbe und zweite Zeilen (258) einer vierten Farbe,
wobei während des Anzeigeschritts (314) das zweite Anzeigefenster (250) auf dem Bildschirm (217) angezeigt wird und wobei während des Befehlsschritts (320, 322) das zweite Anzeigefenster (250) in der vorbestimmten Richtung über die ersten Zeilen (256) verschoben wird, sodass vor dem Verschieben die zweiten Zeilen (258) der dritten Farbe bzw. der vierten Farbe die ersten Zeilen (256) der ersten Farbe bzw. der zweiten Farbe überlagern und nach dem Verschieben die zweiten Zeilen (258) der vierten Farbe bzw. der dritten Farbe die ersten Zeilen (256) der ersten Farbe bzw. der zweiten Farbe überlagern, oder umgekehrt.

3. Verfahren nach einem der vorangehenden Ansprüche, wobei das Videosignal (S1; S201) durch eine Haupteinheit (10; 210) erzeugt wird, die ein Sicherheitssystem bildet, welches die Integrität des Videosignals (S1; S201) sicherstellt, wobei die Haupteinheit vorzugsweise ein Sicherheitssystem vom Typ SIL4 ist.

4. Verfahren nach einem der vorangehenden Ansprüche, wobei die vorbestimmte Zeitdauer zwischen 1 s und 10 s beträgt.

5. Verfahren nach einem der vorangehenden Ansprüche, wobei das Verfahren vordem Anzeigeschritt (314) und nach dem Definitionsschritt (304) folgenden Schritt umfasst:

- Berechnen (308) eines dritten Anzeigefensters (254) umfassend visuelle Sicherheitsindikatoren (259), gehörend zu der Gruppe gebildet aus: einem rotierenden Balken (260) mit einer ersten Rotationsperiode, einem ersten festen Farbbalken umfassend mehrere einander benachbarte Farbblöcke, eine Referenzzeit (264), einem zweiten festen Farbbalken (266) umfassend mehrere einander benachbarte Farbblöcke, die mit einem dem zweiten festen Farbbalken (266) ähnlichen ersten dynamischen Farbbalken (268) assoziiert sind, der unter dem zweiten festen Farbbalken (266) angezeigt wird und periodisch mit einer zweiten vorbestimmten Dauer

angezeigt wird, einen zweiten dynamischen Farbbalken umfassend mehrere Farbblöcke, deren Positionen periodisch mit einer dritten vorbestimmten Dauer ausgetauscht werden,

wobei das dritte Anzeigefenster (254) während des Anzeigeschritts (314) auf dem Bildschirm (217) angezeigt wird.

6. Anzeigesystem (12; 212), angepasst zum Ausführen eines Verfahrens nach einem der Ansprüche 1 bis 5.

Revendications

1. Procédé d'affichage d'informations (19 ; 219) sur un écran (17 ; 217) d'un système d'affichage (12 ; 212), l'écran (17 ; 217) incluant des pixels et le système d'affichage (12 ; 212) comprenant un moyen de traitement (14 ; 214) et un moyen de commande (18 ; 218) des pixels, le procédé comprenant les étapes ci-dessous, mises en œuvre par le moyen de traitement (14 ; 214), consistant à :

- recevoir (100 ; 300), par le biais du moyen de traitement (14 ; 214), un signal vidéo (S1 ; S201) comprenant des informations (19 ; 219) à afficher ;
- définir (104 ; 304), par le biais d'un algorithme de définition (38), une première fenêtre d'affichage (40 ; 240) comprenant les informations (19 ; 219) à afficher, la première fenêtre d'affichage (40 ; 240) étant affichée à l'écran (17 ; 217) et les dimensions de la première fenêtre d'affichage (40 ; 240) étant inférieures aux dimensions de l'écran (17 ; 217), une position initiale étant définie pour la première fenêtre d'affichage (40 ; 240), la première fenêtre d'affichage (40 ; 240) comprenant un premier point donné (55), le premier point donné (55) présentant une position sur l'écran (17 ; 217),
- déterminer (102 ; 302), par le biais d'un algorithme de détermination (28), des indicateurs de référence visuels (34 ; 234) affichés à l'écran (17 ; 217), les indicateurs de référence visuels (34 ; 234) présentant une position fixe sur l'écran (17 ; 217) et comprenant de multiples premières lignes (56 ; 256) mutuellement adjacentes selon une direction de déplacement de la première fenêtre d'affichage (40 ; 240), avec une alternance spatiale de premières lignes d'une première couleur et de premières lignes d'une deuxième couleur,

l'étape de détermination (102 ; 302) comprenant les étapes ci-dessous consistant à :

- déterminer une première position limite (30) et une seconde position limite (32) sur l'écran (17), la première position limite (30) et la seconde position limite (32) définissant respectivement la position la plus haute et la position la plus basse le long de la direction de déplacement entre lesquelles le premier point donné (55) est apte à être affiché ;
- déterminer les indicateurs de référence visuels (34) comme indiquant les première et seconde positions limites sur l'écran (17) ;
- calculer (105), par le biais d'un algorithme de calcul (42), une position de la première fenêtre d'affichage (40) sur l'écran (17), en définissant initialement une première variable égale à la position du premier point donné (55) lorsque la première fenêtre d'affichage est dans la position initiale et dans une direction prédéterminée le long de la direction de déplacement, et ensuite, lorsque le calcul (105) est répété, en modifiant la première variable conformément à un déplacement commandé de la première fenêtre d'affichage (40 ; 240) ;

- afficher (110 ; 314) la première fenêtre d'affichage (40 ; 240) et les indicateurs de référence visuels (34 ; 234) à l'écran (17 ; 217), la fenêtre d'affichage (40 ; 240) étant affichée au-dessus des indicateurs de référence visuels (34 ; 234) ;
- effectuer une comparaison (114), par le biais d'un algorithme de comparaison (46), entre la première variable et les première (30) et seconde (32) positions limites ; et si, lors de l'étape de comparaison (116), la première variable est strictement comprise entre la première position limite (30) et la seconde position limite (32), conserver la direction prédéterminée le long de la direction de déplacement ;

si, au cours de l'étape de comparaison (116), il a été détecté que la première variable a atteint et/ou dépassé la première position limite (30) selon la direction prédéterminée le long de la direction de déplacement, ou respectivement la seconde position limite (32) selon la direction prédéterminée le long de la direction de déplacement, alors, définir la direction prédéterminée comme étant égale à une nouvelle direction le long de la direction de déplacement opposée à la première position limite (30), ou respectivement, à la seconde position limite (32) ;

- ordonner (116, 118 ; 320, 322), par le biais d'un algorithme d'instruction (46), le déplacement dans la direction prédéterminée le long de la direction de déplacement de la première fenêtre d'affichage (40 ; 240), affichée à l'écran (17 ; 217), par rapport aux indicateurs de référence visuels (34 ; 234) ; et
- répéter périodiquement, selon une durée pré-

déterminée, les étapes de calcul (105), d'affichage (110 ; 314), de comparaison (114) et d'instruction (116, 118 ; 320, 322).

2. Procédé selon la revendication 1, dans lequel, avant l'étape d'affichage (314) et après l'étape de définition (304), le procédé comprend l'étape ci-dessous consistant à :

- calculer (308) une deuxième fenêtre d'affichage (250) comportant des secondes lignes (258), mutuellement adjacentes selon la direction prédéterminée et destinées à être affichées sur les premières lignes (256), avec une alternance de secondes lignes (258) d'une troisième couleur et de secondes lignes (258) d'une quatrième couleur ;

caractérisé en ce que, lors de l'étape d'affichage (314), la deuxième fenêtre d'affichage (250) est affichée à l'écran (217), et **en ce que**, lors de l'étape d'instruction (320, 322), la deuxième fenêtre d'affichage (250) est déplacée dans la direction prédéterminée sur les premières lignes (256) afin d'avoir, avant le déplacement, les secondes lignes (258) de la troisième couleur, et respectivement de la quatrième couleur, superposées sur les premières lignes (256) de la première couleur, et respectivement de la deuxième couleur et, après le déplacement, les secondes lignes (258) de la quatrième couleur, et respectivement de la troisième couleur, superposées sur les premières lignes (256) de la première couleur, et respectivement, de la deuxième couleur, ou inversement.

3. Procédé selon l'une quelconque des revendications précédentes, dans lequel le signal vidéo (S1 ; S201) est généré par une unité principale (10 ; 210) qui forme un système de sécurité garantissant l'intégrité du signal vidéo (S1 ; S201), l'unité principale formant de préférence un système de sécurité de type « SIL4 ».

4. Procédé selon l'une quelconque des revendications précédentes, dans lequel la durée prédéterminée est comprise entre 1 s et 10 s.

5. Procédé selon l'une quelconque des revendications précédentes, dans lequel, avant l'étape d'affichage (314) et après l'étape de définition (304), le procédé comprend l'étape ci-dessous consistant à :

- calculer (308) une troisième fenêtre d'affichage (254) comprenant des indicateurs visuels de sécurité (259) appartenant au groupe formé par : une barre rotative (260) avec une première période prédéterminée, une première barre de couleur fixe comprenant plusieurs blocs de couleur adjacents les uns aux autres, un temps de référence (264), une seconde barre de couleur fixe (266) comprenant plusieurs blocs de couleur adjacents les uns aux autres, associée à une première barre de couleur dynamique (268), similaire à la seconde barre de couleur fixe (266), affichée sous la seconde barre de couleur fixe (266), et affichée périodiquement avec une deuxième période prédéterminée, une seconde barre de couleur dynamique comprenant plusieurs blocs de couleur dont les positions sont échangées périodiquement avec une troisième période prédéterminée ; et

caractérisé en ce que, lors de l'étape d'affichage (314), la troisième fenêtre d'affichage (254) est affichée à l'écran (217).

6. Système d'affichage (12 ; 212) apte à mettre en œuvre un procédé selon l'une quelconque des revendications 1 à 5.

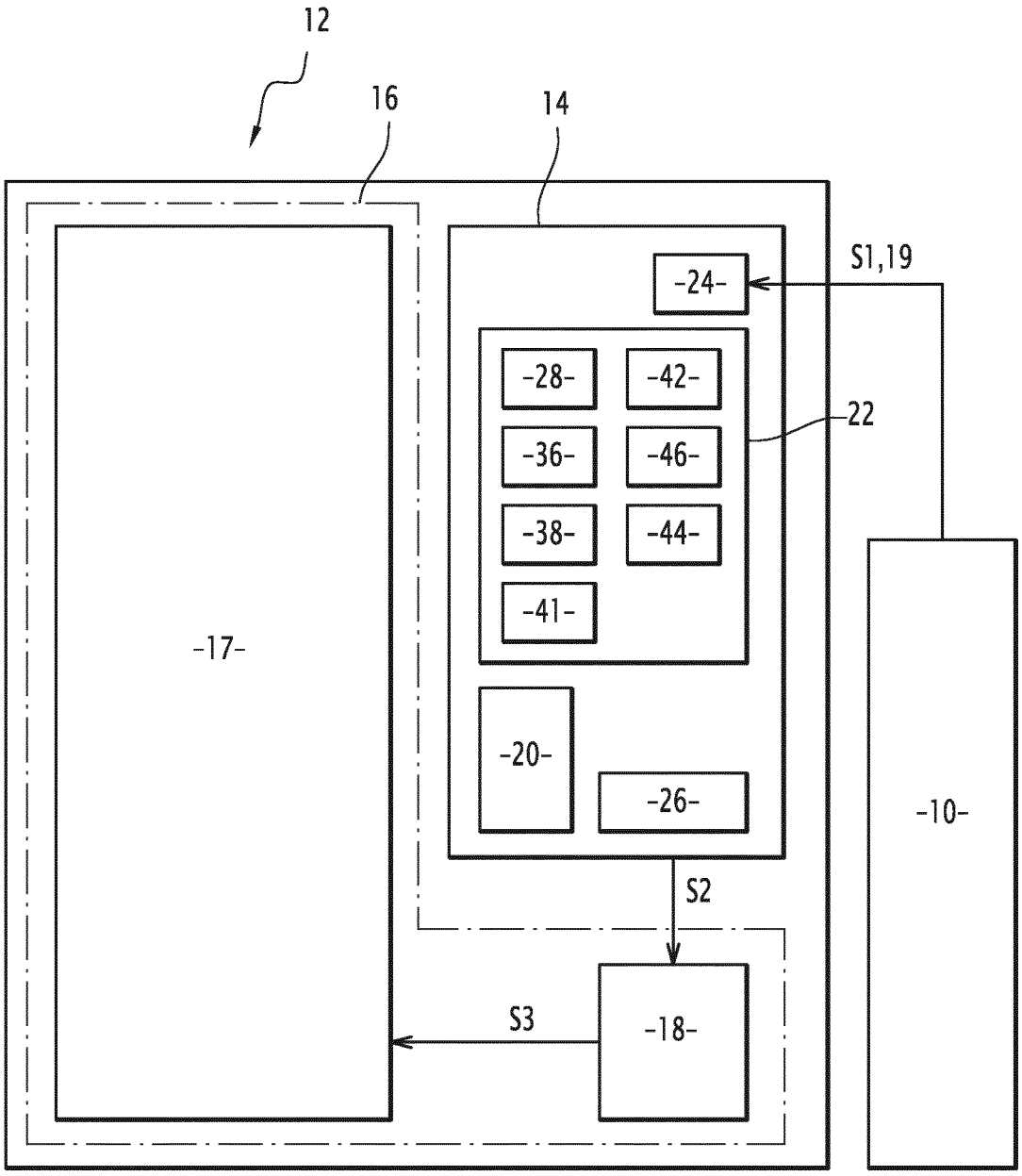

FIG.1

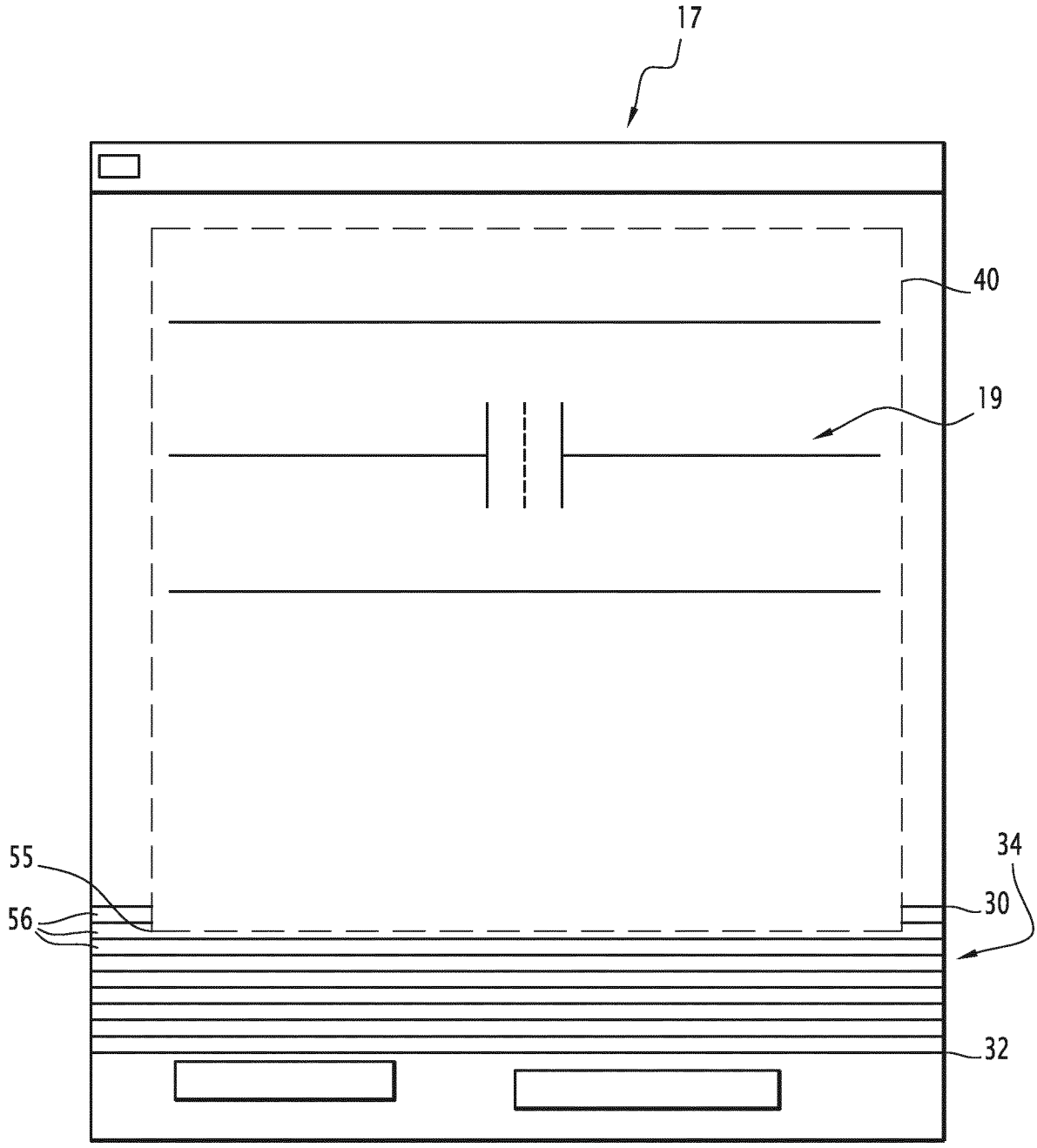

FIG.2

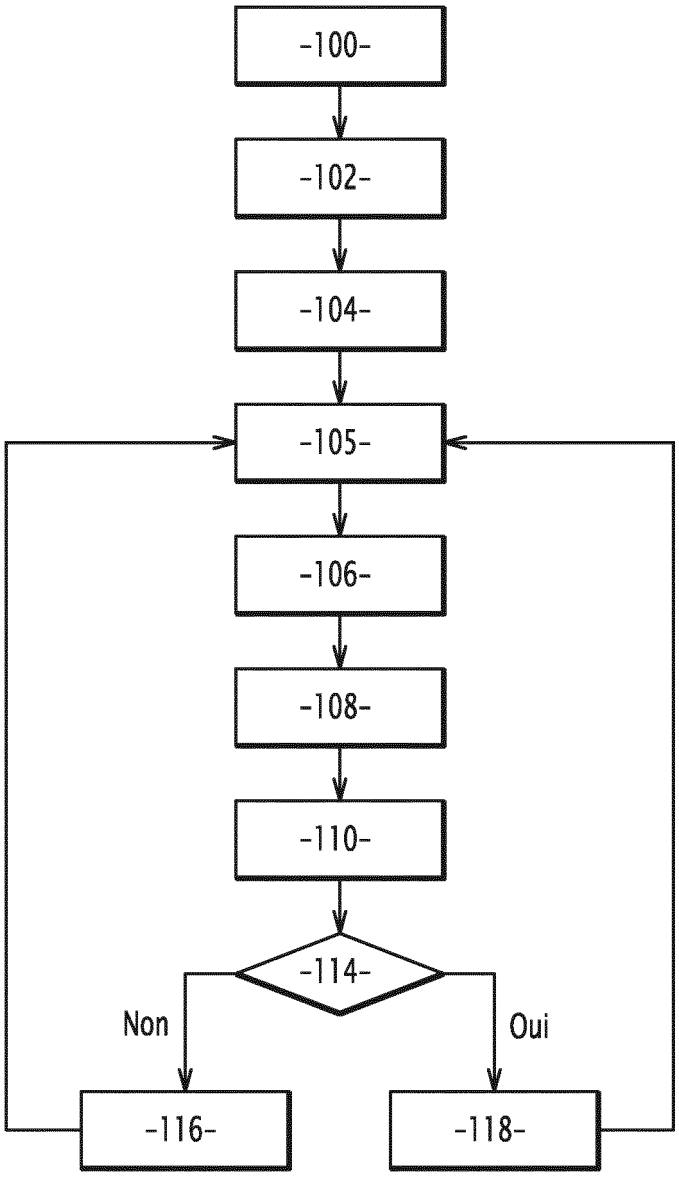

FIG.3

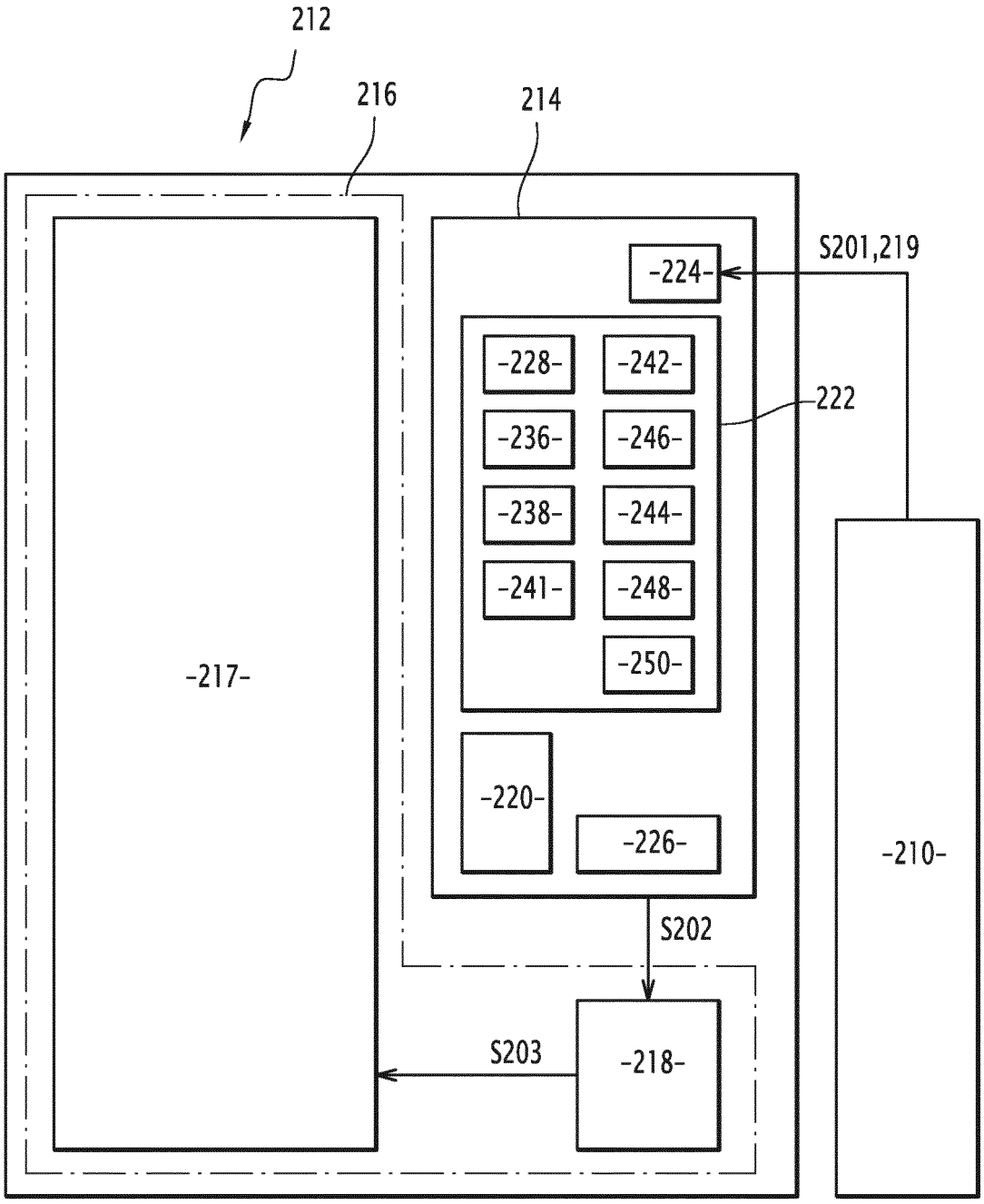
212
216
214
S201,219
-224-
-228-
-242-
222
-236-
-246-
-238-
-244-
-241-
-248-
-250-
-217-
-220-
-226-
-210-
S202
S203
-218-

FIG.4

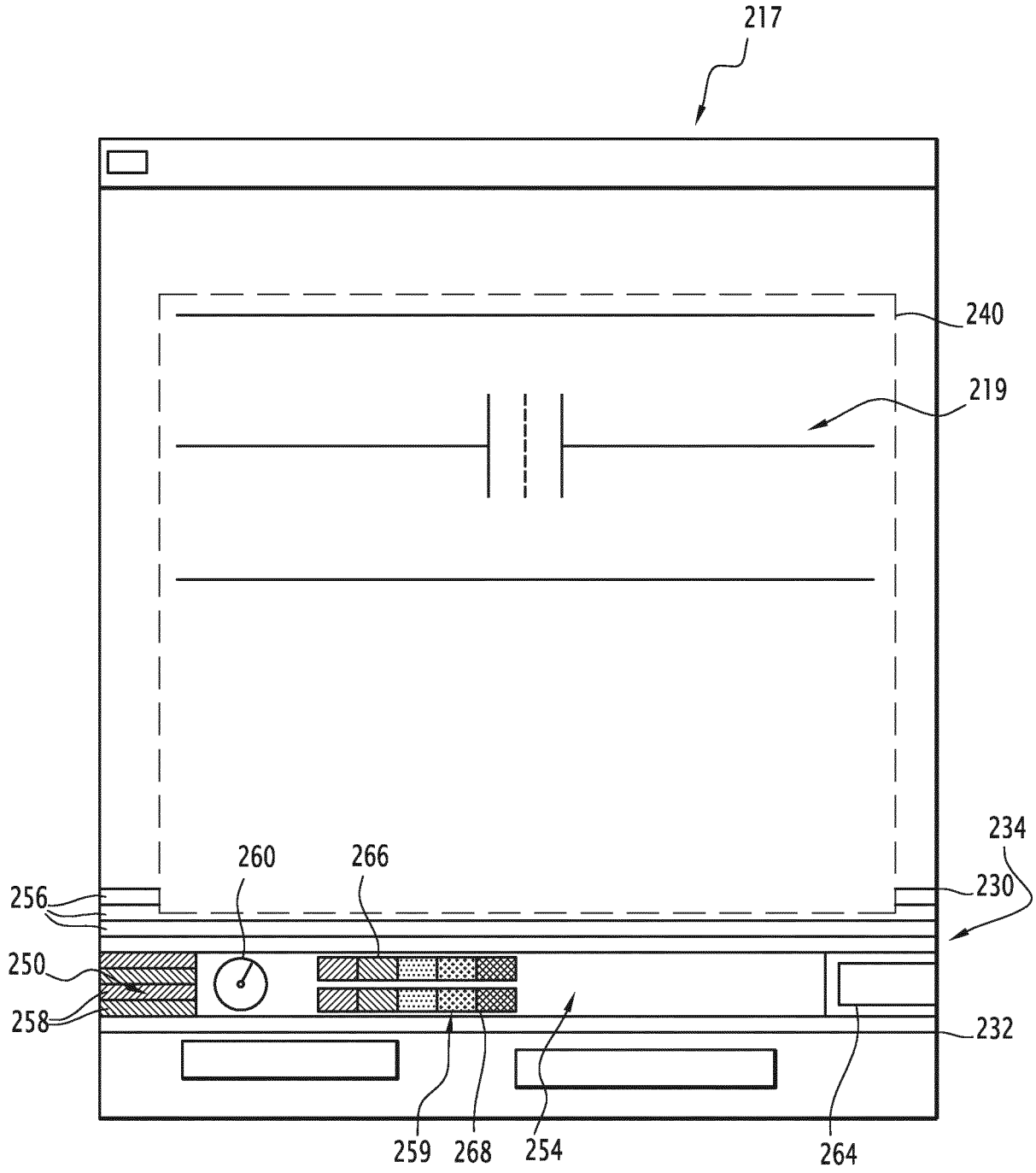

FIG.5

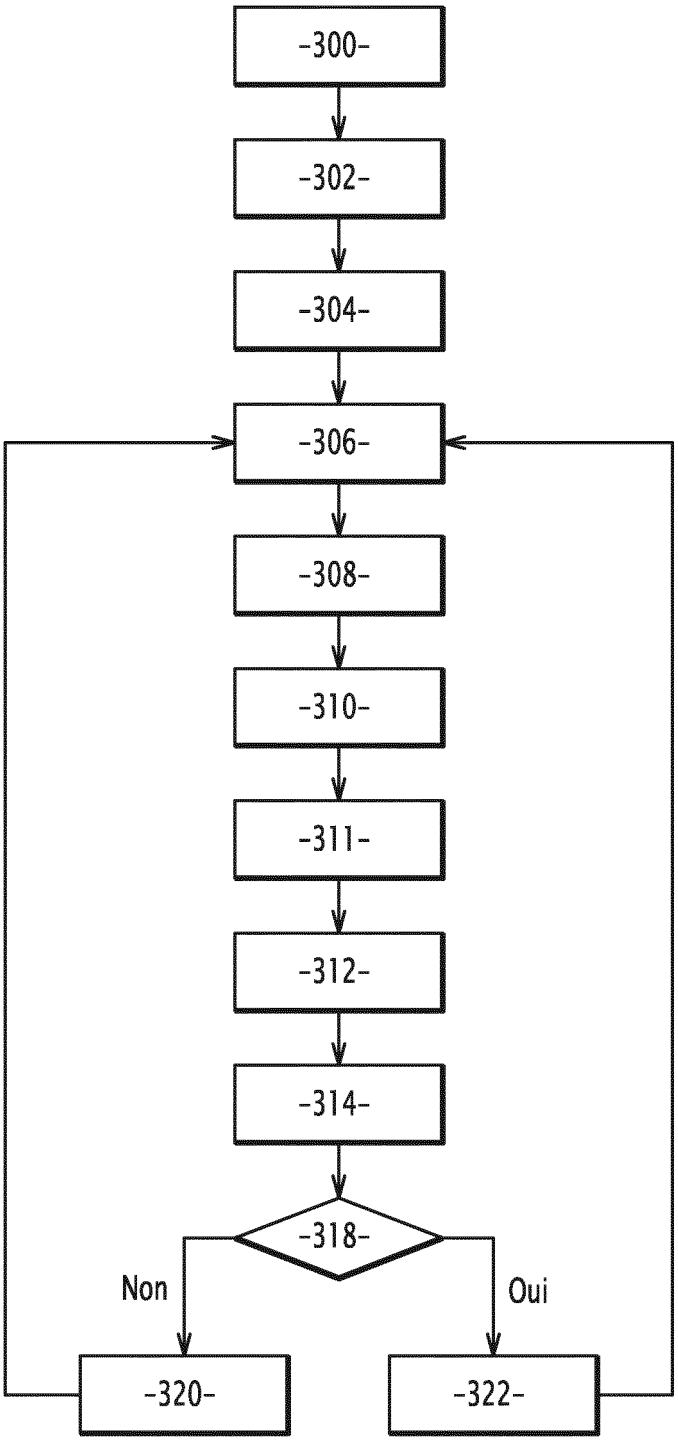

FIG.6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2001265312 A **[0004]**
- EP 1511001 A1 **[0004]**