DESTINATION DISPLAY APPARATUS

Inventors: Ishi Habuka; Kazuko Habuka; Takashi Habuka, all of No-23-8, 3-chome, Sengoku, Bukyo-ku, Tokyo, Japan

Filed: Apr. 7, 1970

Appl. No.: 26,223

U.S. Cl. ...........................................340/325, 340/259, 340/372

Int. Cl. ..........................................G08b 23/00


ABSTRACT

Destination display webs mounted on various portions of a vehicle are operated in the same manner by providing a plurality of position detection elements for respective display sections of the display webs, a plurality of proximity switches associated with respective webs to detect position detection elements and a control circuit responsive to the output from the proximity switches to stepwise move the display webs.

2 Claims, 4 Drawing Figures
DESTINATION DISPLAY APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to destination display apparatus for use in a motor-bus and the like vehicle and more particularly to a destination display apparatus wherein a plurality of take-up motors of a plurality of display webs having the same displays are operated stepwise so that by selecting a display section of one display web other display webs are operated to display identical displays. Electric and motor-busses operating in city areas are provided with destination display apparatus on their front, rear and side surfaces for the convenience of the passengers. In a prior art destination display apparatus a long web inscribed with a number of destinations and the like is wrapped about a take-up shaft in the form of a roll, and the shaft is operated manually to display the desired destination. For this reason where a number of such display apparatus are installed on front, rear and side surfaces of the vehicle it takes hour and trouble to change the displays of all display apparatus in the same manner. This is especially troublesome for drivers of one-man cars.

SUMMARY OF THE INVENTION

In is therefore an object of this invention to provide a novel destination display apparatus which can vary in the same manner the destinations exhibited on a plurality of destination display apparatus.

According to a preferred embodiment of this invention there is provided a destination display apparatus comprising a plurality of display webs, each one of said display webs including a plurality of display sections for different destinations, an electric motor connected to one end of said display web and a plurality of position detection elements associated with respective display sections; a plurality of proximity switches respectively associated with the display webs to detect the position detection elements thereof as the display webs are moved by the forward or reverse operations of the motors; and a control circuit connected to the outputs of the proximity switches to stepwise move the display webs in response to the outputs from the proximity switches and to stop the motors when the display webs are moved to display the next display sections.

Forward and reverse push buttons are mounted in the drivers cabin so that the driver can operate all display webs mounted on various portions of the vehicle in the same manner by merely operating the buttons while watching a display web mounted on the front side of the vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG. 1 is a perspective view of a destination display web embodying this invention;

FIG. 2 is a plan view of a portion of the destination display web showing the manner of mounting position detection elements;

FIG. 3 is a connection diagram of proximity switches and a logic circuit and

FIG. 4 shows a sequence control circuit for the destination display apparatus embodying this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1 of the accompanying drawings there is shown a destination display web 1 of a fabric and the like inscribed with a number of destinations and the like informations to the passengers. The web 1 is moved between a pair of take-up shafts 2 and 3. Shaft 3 is coupled to the driving shaft of an electric motor 4 while shaft 2 is driven by a rewinding spring 5 for rewinding the web. A plurality of position detection elements T1, T2, and T3 are secured to the web 1 corresponding to respective destination display sections on the web. These elements may be made of magnetic material or electro conductive material, and are positioned on a straight line opposite a proximity switch TL. As shown best in FIG. 2, position detection elements T1, T2, and T3 are mounted at one end of respective display sections while a respective display section C respectively displaying destinations of the vehicle. It is to be understood that a destination display apparatus as shown in FIG. 1 is mounted on each of the front, rear and side surfaces of the vehicle.

As shown in FIG. 3, proximity switches TL1, TL2 and TL3 are mounted respectively on the front, rear and side surfaces of the vehicle to cooperate with respective destination display webs 1 for detecting position detection elements mounted on the front or rear surface of the display webs. Thus, each proximity switch produces one pulse whenever one position detection element of the associated display web passes past it. Outputs leads from these proximity switches TL1, TL2 and TL3 are connected to input terminals of NOT circuits N1 to N8 of a logic circuit LO comprising NOT circuits N1 to N8, an OR circuit, an AND circuit, a flip-flop circuit FF, diodes D1 to D6 and NOT circuits including current amplifiers NP1 to NP8 which are connected as shown in FIG. 3. The outputs of the negation circuits including the current amplifiers NP1 to NP8 are connected to auxiliary relays X1 to X4 respectively.

FIG. 4 shows a sequence control circuit of the destination display apparatus of this invention comprising contacts X1, X2, X3, X4, X5 and X6 and X8, and X10, auxiliary relays X1 to X6, a forward push button PB1 and a reverse push button PB2 mounted on a motor, auxiliary relays X7 and X8 having contacts X7-1 to X7-4 and X8-1 to X8-4 respectively, diodes D7 and D8, a capacitor C and operating coils M1 to M8 of electromagnetic switches for motors M1 to M8 which are connected as shown in FIG. 4.

In operation, it is assumed that the destination display sections of respective display webs are adjusted to assume correct positions. For example, it is assumed that position detection elements T1 on respective display sections A are facing proximity switches TL1 to TL3. In this case all displays on the front, rear and side surfaces are the same, in this example UENO. Under these circumstances, each one of output signals from the proximity switches TL1 to TL3 is a binary "1", the output signals from the NOT circuits N1 to N8 are a binary "0." As a result, the OR circuit provides a "0" output so that NOT circuit N1 provides an output signal "1" reversing the flip-flop FF to generate an output signal "1." This output signal is coupled to auxiliary relay X4 via NOT circuit N2 and the AND circuit including the current amplifier NP2 to energize relay X3 thus opening contact X3, thereof shown in the sequence control circuit of FIG. 4. On the other hand the output signal "1" supplied to the inputs of the NOT circuits including the current amplifiers NP3 to NP8 from flip-flop FF causes these amplifiers to respectively produce output signals "0," thus deenergizing the auxiliary relays X1 to X8. Conversely, relay contacts X1-1, X2-2, X3-5, X4-2, X5-3 and X6-4 are maintained closed.

Under these conditions depression of forward push button PB1 energizes auxiliary relay X3 to close its contacts X3-1 through X3-5 and X3-6 to form circuits through electromagnetic switches M1 to M8, relay contacts X1-1 to X2-1, relay contacts X3 to X5, and X6, diode D7 and forward push button PB, across terminals T1 and T2. Further, as current flows from terminal T1 to diode D7 via relay contact X3, electromagnetic switches M7 to M8, relay contacts X7-4 to X8-4 and relay contacts X7 to X8, drive respective motors in the forward direction to begin moving respective display webs.

As the display webs begin to move, all output signals of proximity switches TL1 to TL3 become "0" and all output signals from the NOT circuits N1 to N8 become "1." As a consequence, all inputs to AND circuit A become "1" to apply an output signal "1" to the reset input of the flip-flop circuit FF, causing it to reverse from the abovementioned state. Thus, the flip-flop circuit FF provides a "0" output signal to deenergize auxiliary relay X4 to close its contact X4-1. Since the outputs from the NOT circuits N1 to N8 are "1," signals "1" are supplied to the inputs of the NOT circuits including the amplifiers NP1 to NP8, causing them to provide "0"
output signals. Thus auxiliary relays X₁ to X₄ are still being deenergized. Accordingly, currents still flow through electromagnetic switches M₁,₆ - M₄,₆ and M₁,₈ - M₄,₈ to continue the forward operation of motors.

Even when the position detection elements T₅ in the display sections displaying SENDAI on respective display webs come to confront respective proximity switches TL₁ to TL₄ at different times, each display web is positively brought to stop at the section displaying SENDAI. If it is assumed that the proximity switch TL₁ first detects the position detection element T₁, only the output signal from this proximity switch TL₁ is "1" and the output signals from the other proximity switches are "0." Consequently, the NOT circuit N₁ will provide an output signal "0" whereas the NOT circuits N₂ and N₃ will provide output signals "1." Accordingly, the OR circuit provides an output signal "1" whereas the NOT circuit N₄ provides an output signal "0" and thus the flip-flop circuit FF is not reversed. Since the output signal from the NOT circuit N₄ is "0" and since the output signal from the flip-flop circuit FF is also "0," a "0" signal is applied to the input of the NOT circuit including the current amplifier NP₁, to generate a "1" signal to energize auxiliary relay R₁. This opens contacts X₁,₆ and X₁,₈ to deenergize electromagnetic switches M₁,₆ and M₁,₈ thus stopping motor M₁ (not shown). Similarly, other motors M₂ and M₄, not shown, are sequentially stopped.

Since each one of the NOT circuits N₁ to N₄ provides an output signal "0" when all motors M₁ to M₄ are stopped, all inputs to the NOT circuit N₄ will be "0" and this NOT circuit provides an output signal "1" to reverse the flip-flop circuit from the state shown in the drawing. Thus, all circuit elements are brought back to the condition prior to the depression of the forward push button. In this manner, each time the forward push button is depressed, the display sections of each display web are advanced stepwise to display the desired destination.

Where it is desired to change the display from section C to section A or B, the reverse push button PB₂ is depressed. Then auxiliary relay R₄ is energized to close its contacts X₆,₆ - X₆,₄, whereby the direction of the current flowing through electromagnetic switches M₁,₄ - M₄,₄ is reversed to reverse the direction of rotation of respective motors. The logic circuit shown in FIG. 5 operates in the same manner as the above described forward running and stopping operations of the motors.

Thus, the invention provides a novel destination display apparatus according to which the operator who depresses the forward or reverse push button while watching a display web on the front side of a vehicle can display the same destinations on other display webs.

While the invention has been shown and described in terms of a preferred embodiment thereof it should be understood that the invention is by no means limited to the illustrated embodiment and that many changes and modifications will be obvious to one skilled in the art without departing from the true spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. Destination display apparatus for a vehicle, comprising a plurality of pairs of take-up shafts;
   a plurality of display webs each connected at both ends thereof to each pair of take-up shafts, each of said display webs having a plurality of destination display sections for different destinations;
   a plurality of electric motors each coupled to a take-up shaft of each pair of take-up shafts;
   a plurality of position detection elements secured to portions corresponding to the respective destination display sections on each of the display webs;
   a plurality of proximity switches mounted on the front, rear and side surfaces of a vehicle to detect said position detection elements;
   a first plurality of NOT circuits each connected to the output of a corresponding one of the proximity switches;
   an OR circuit connected to the outputs of the first NOT circuits;
   an AND circuit connected to the outputs of the first NOT circuits;
   a first additional NOT circuit;
   a flip-flop circuit connected to the output of the OR circuit via the first additional NOT circuit for producing an output signal when each proximity switch detects said position detection elements and connected to the output of said flip-flop circuit for resetting said flip-flop circuit when each proximity switch fails to detect said position detection elements;
   a second plurality of NOT circuits;
   a first plurality of auxiliary relays connected to the output of each of the first NOT circuits via the second plurality of NOT circuits and connected to the output of said flip-flop circuit to deenergize said first auxiliary relays when each proximity switch detects said position detection elements;
   a second additional NOT circuit;
   a third additional NOT circuit connected in series with the second additional NOT circuit;
   a first additional auxiliary relay connected to the output of said flip-flop circuit through the connected second and third additional NOT circuits to energize said first additional auxiliary relay when each proximity switch detects said position detection elements;
   a forward push button;
   a second additional auxiliary relay;
   a pair of terminals for connection to an electrical power supply;
   a first series circuit connected in series with the forward push button for stepwise advancing said destination display sections and the second additional auxiliary relay, said first series circuit being connected across the pair of terminals;
   a reverse push button;
   a third additional auxiliary relay, each of the auxiliary relays and additional auxiliary relays having contacts controlled by them;
   a second series circuit connected in series with a reverse push button for backing said destination display sections and the third additional auxiliary relay, said second series circuit being connected across said pair of terminals;
   a first plurality of electromagnetic switches;
   a parallel circuit comprising a second contact of each of the second and third additional auxiliary relays;
   a first motor driving circuit forming a series shunt circuit by connecting a first contact of each of said first auxiliary relays and the first plurality of electromagnetic switches, both ends of said first motor driving circuit being connected to one of said pair of terminals and a connecting point between a first contact of each of said first and second auxiliary relays through the parallel circuit of a second contact of each of the second and third additional auxiliary relays to stepwise advance said destination display sections until each proximity switch detects said position detection elements;
   a second plurality of electromagnetic switches; and
   a second motor driving circuit forming a series shunt circuit by connecting a second contact of each of said first auxiliary relays and the plurality of second electromagnetic switches, both ends of said second motor driving circuit being connected to one of said pair of terminals and said connecting point through one of the contacts of said second auxiliary relay in order to stepwise advance said destination display sections until each proximity switch detects said position detection elements.

2. Destination display apparatus as claimed in claim 1 further comprising a rewinding spring having one end affixed to one end of a take-up shaft of each pair of take-up shafts and another end affixed to the vehicle.

* * * * *