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A message display and voice annunciation system

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ABSTRACT

A message display and annunciation system 1 adapted for use in a transportation system, the message display and annunciation system including:

at least one terminal 2 having:

(i) visual display means 8 for displaying variable text information;

(ii) conversion means 11 for converting the current displayed text information into audio information; and

(iii) audio output means 9 for outputting the audio information as audible speech;

a system controller 3 remote from the terminal and adapted to communicate with the terminal 2, wherein the terminal 2 displays information received from the system controller 3; and

at least one actuator 4 selectively operable to actuate the terminal 2 to broadcast the current displayed information as audible speech.

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COMPLETE SPECIFICATION
FOR A STANDARD PATENT

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Invention Title:	A Message Display and Voice Annunciation System

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The following statement is a full description of this invention, including the best method of performing it known to us:

A MESSAGE DISPLAY AND VOICE ANNUNCIATION SYSTEM

Field of the Invention

The present invention relates generally to variable message signs and, in particular to variable message signs with voice annunciation.

The invention has been developed primarily for displaying information at a bus stop, where the information pertains to the buses that stop at the bus stop. However, it will be appreciated that the invention is not limited to this particular use.

Description of the Prior Art

Electronic variable message signs are used in the advertising and transport industries to visually indicate current or stored information to employees, stakeholders and patrons.

Various methods and apparatus have been previously used to output prerecorded audible messages to employees, stakeholders and patrons using visual signs that are capable of outputting information in an audible form. The previous methods of providing audible messages require the visual message to correlate with the prerecorded audible message.

More particular examples of some prior art methods and apparatus will now be discussed.

US Patent 5,409,380 discloses a continuously transmitting device worn by a "visually impaired" user which triggers playback of messages recorded orally. Although a microprocessor is used for generating the voice playback, the message is recorded beforehand using a microphone.

US Patent 4,660,022 discloses a system for guiding the blind that uses portable transmitters carried by blind persons to actuate sound generators. The produced sound is of predetermined content, rather than a variable message. The system is fundamentally a guide system, rather than an information system. It is also noted that the sound generator is located at the destination.

US Patent 4,025,922 and GB Patent 2,212,960 describe remote-controlled audible warning systems to assist the blind at traffic intersections. Again, the systems described in these patents are warning or guide systems, rather than information systems. The patents do not disclose means for providing continually updated information to users.

Finally, WO 9709009 discloses an acoustic aid for blind persons in which the control units carried by the blind persons are activated automatically when they are in the vicinity of the audio message provider. The particular example given relates to traffic light conditions. Again, the system is basically a warning system, rather than an information system, and does not provide continuously updated information audibly.

It is an object of the present invention to provide a message display system that can selectively annunciate a varying displayed message.

Summary of the Invention

According to a first aspect of the invention there is provided a message display and annunciation system adapted for use in a transportation system, the message display and annunciation system including:

at least one terminal having:

(i) visual display means for displaying variable text information;

(ii) conversion means for converting the current displayed text information into audio information; and

(iii) audio output means for outputting the audio information as audible speech;

a system controller remote from the terminal and adapted to communicate with the terminal, wherein the terminal displays information received from the system controller; and

at least one actuator selectively operable to actuate the terminal to broadcast the current displayed information as audible speech.

The visual display means may include a matrix of LED's for displaying the information.

Preferably, the conversion means is a text to speech synthesiser.

Alternatively, the conversion means may convert the displayed visual information into audio information using a plurality of prerecorded audio segments.

Preferably, the audio output means is a speaker.

Preferably, the actuator is remote from the terminal. The actuator may be carried personally. The actuator may be a radio transmitter. The radio transmitter may be selectively operable to transmit an encoded signal.

The message display and annunciation system preferably has a terminal controller for controlling the visual display means, conversion means and audio output means. Preferably, the terminal controller communicates with the system controller. The terminal controller may be responsive to the actuator to actuate the conversion means to convert the displayed information into audio information. A light level sensor for detecting the ambient light level in the vicinity of the terminal may communicate with the terminal controller. The terminal controller may control the brightness of the visual display means to compensate for the ambient light level detected by the light level sensor. An audio level sensor for detecting the ambient noise level in the vicinity of the terminal may communicate with the terminal controller. The terminal controller may control the volume of the audible speech to compensate for the ambient noise level detected by the audio level sensor. A temperature sensor for detecting the ambient temperature in the vicinity of the terminal may communicate with the terminal controller. The terminal controller may communicate the detected ambient temperature to the system controller.

Preferably, when an actuator actuates the terminal to broadcast the displayed information as audible speech, the speaker stops outputting the audible speech after a preset time has elapsed or after the audible speech has been repeated a preset number of times.

According to a second aspect of the invention there is provided a message display and annunciation system adapted for use in a transportation system, the message display and annunciation system including:

at least one terminal having:

(i) visual display means for displaying variable text information;

(ii) conversion means for converting the current displayed text information into audio information; and

(iii) audio output means for outputting the audio information as audible speech;

a system controller remote from the terminal and adapted to communicate with the terminal, wherein the terminal displays information received from the system controller, the terminal being responsive to an actuator for actuating the terminal to broadcast the current displayed information as audible speech.

Preferably, the conversion means is a text to speech synthesiser. Alternatively, the conversion means may convert the displayed visual information into audio information using a plurality of prerecorded audio segments.

According to a third aspect of the invention there is provided a terminal adapted for use in a transportation system as part of a message display and annunciation system, the terminal including:

(i) visual display means for displaying variable text information;

(ii) conversion means for converting the current displayed text information into audio information; and

(iii) audio output means for outputting the audio information as audible speech;

the terminal being responsive to a signal from a selectively operable actuator to broadcast the current displayed information as audible speech.

Preferably, the conversion means is a text to speech synthesiser. Alternatively, the conversion means may convert the displayed visual information into audio information using a plurality of prerecorded audio segments.

In order that the invention may be more fully understood and put into practice, a preferred embodiment thereof will now be described with reference to the accompanying drawings.

Brief Description of the Drawings

Fig. 1 is a schematic diagram of a message display and voice annunciation system according to one embodiment of the present invention.

Fig. 2 is a diagram illustrating a terminal of the message display and voice annunciation system installed at a bus stop.

Detailed Description

A schematic diagram of the preferred embodiment of a message system 1 is illustrated in Fig. 1. This system has been designed for a bus transport network.

A terminal 2 is connected to a system controller 3 by a communications link 17, typically a radio link. The terminal 2 includes a visual display 8 for displaying text messages such as bus arrival times, and a loudspeaker 9 for annunciating the displayed messages. The terminal is suitably positioned at a bus stop. The system controller 3 is remote from the terminal 2 and resides in a control centre or similar.

A blind or illiterate person who wishes to hear the information displayed by the terminal 2 carries an actuator 4 which remotely actuates the voice annunciation facility.

A terminal controller in the form of an embedded PC 6 provides local control of the terminal 2. In this embodiment, the embedded PC 6 is a LittleBoard 486i embedded PC that is manufactured by AMPRO. It should be appreciated though that other embedded PCs could also be used. The LittleBoard 486i embedded PC has an onboard PC/104 expansion port that allows other circuit boards complying with the well-known PC/104 standard to be connected to the LittleBoard 486i embedded PC. A significant advantage of using circuit boards that comply with the PC/104 standard is that systems composed of these boards are small in size and are therefore suitable for use in confined spaces.

The LittleBoard 486i embedded PC contains most of the features that are required to control the terminal 2. These features include

serial ports 13 to 15, a TCP/IP driver, serial handlers, memory and expansion ports.

The embedded PC 6 in this embodiment uses LINUX operating system software and all of the application programs that run on the embedded PC 6 are able to operate in a LINUX environment. It can be appreciated though that other operating systems could be used. In some embodiments it is conceivable that the embedded PC 6 does not use an operating system.

The embedded PC 6 includes a text to speech synthesiser 11 that converts text based digital information into a digital speech signal. In the present embodiment a software synthesiser, known as Festival, is used to implement the text to speech synthesis. The Festival software runs on the embedded PC 6 and allows the language of the speech synthesiser 11 to be customised to suit the country where the message system 1 is installed. The text based digital information includes any text that is displayed on the display 8 of the terminal 2. The digital speech signal is then passed to a sound card 10 that is connected to the embedded PC 6.

Instead of a speech synthesiser 11, the embedded PC 6 may have a means for converting text based digital information into a digital speech signal that operates by matching prerecorded audio information with the text based digital information in order to produce the digital speech signal.

In this embodiment the sound card 10 is a PC/104 based sound card from Diamond Systems. The sound card 10 also includes an amplifier. The sound card 10 converts the digital speech signal into an analogue speech signal and amplifies this analogue signal. The amplified analogue speech signal is then output to a speaker 9.

The display 8 consists of a matrix of LED's. The LED matrix is arranged into four lines that are each capable of displaying 16 to 20 alphanumeric characters. The display 8 is connected to the embedded PC 6 via a display controller 7. The display controller drives the display 8 and communicates with the embedded PC 6 via serial port 13.

The embedded PC 6 is also connected to a custom interface board 5 via serial port 14. The custom interface board has a RF receiver, light level sensor, audio level sensor and a temperature sensor.

The RF receiver communicates with the control actuator 4. If the RF receiver detects a transmission from the control actuator 4 requesting displayed text to be converted to speech, the interface board 5 signals the embedded PC 6 which then activates the text to speech synthesiser 11. The text to speech synthesiser then converts the selected text to speech. The terminal repeatedly annunciates the selected text for a preset period of time. Alternatively, the terminal may annunciate the selected text a preset number of times. After the preset period of time has elapsed, or after the selected text has been annunciated the preset number of times, the terminal falls silent and displays text only. If the RF receiver does not detect a transmission from the actuator 4, the terminal will continue to display text only.

The light level sensor detects the ambient light level in the vicinity of the terminal 2. The detected light level is communicated by the interface board 5 to the embedded PC 6 which then processes the detected light level and controls the display controller 7 to set the brightness of the display 8 to an appropriate level that compensates for the ambient light level.

The audio level sensor detects the ambient noise level in the vicinity of the terminal 2. The detected noise level is communicated by the interface board 5 to the embedded PC 6 which then processes the detected noise level and controls the sound card 10 to adjust the speaker volume to compensate for the ambient noise level.

The temperature sensor detects the ambient temperature within and outside the terminal 2. The detected temperature values are communicated by the interface board 5 to the embedded PC 6 that makes the temperature values available to the system controller 3 as appropriate.

The control actuator 4 is a hand held two-button, keyfob device. The keyfob transmits a coded signal to the RF receiver located on the interface board 5 of the terminal 2. As previously mentioned, if the RF receiver detects a radio transmission it informs the embedded PC 6, which

then activates the text to speech synthesiser 11. By pressing either one of the control actuator's two buttons, a person is able to skip through text that they do not want to hear.

In this embodiment, the system controller 3 is a PC. A serial port 16 of the system controller 3 connects to the serial port 15 of the terminal 2. The system controller 3 runs controlling software that allows a user to control the terminal 2.

As illustrated in Fig. 2, the terminal 2 can be situated at a bus stop for providing people at the bus stop with information pertaining to certain buses. In the embodiment shown in Fig. 2, the terminal 2 is located on top of a pole 18 so as to put the terminal 2 substantially out of reach. It can be seen from Fig. 2 that the terminal 2 has a display with four lines.

The foregoing describes only one embodiment of the present invention and modifications, obvious to those skilled in the art, can be made thereto without departing from the scope of the present invention.

The message display and voice annunciation system could be adapted to operate at train stations to indicate the arrival times of trains. The system could also be used in an airport terminal to provide information pertaining to plane arrivals and departures.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A message display and annunciation system adapted for use in a transportation system, the message display and annunciation system including:

at least one terminal having:

(i) visual display means for displaying variable text information;

(ii) conversion means for converting the current displayed text information into audio information; and

(iii) audio output means for outputting the audio information as audible speech;

a system controller remote from the terminal and adapted to communicate with the terminal, wherein the terminal displays information received from the system controller; and

at least one actuator selectively operable to actuate the terminal to broadcast the current displayed information as audible speech.

2. The message display and annunciation system of claim 1, wherein the visual display means includes a matrix of LED's.

3. The message display and annunciation system of claim 1 or 2, wherein the conversion means is a text to speech synthesiser.

4. The message display and annunciation system of any one of claims 1 to 2, wherein the conversion means converts the displayed visual information into audio information using a plurality of prerecorded audio segments.

5. The message display and annunciation system of any one of claims 1 to 4, wherein the audio output means is a speaker.

6. The message display and annunciation system of any one of claims 1 to 5, wherein the actuator is remote from the terminal.

7. The message display and annunciation system of claim 6, wherein the actuator is carried personally.

8. The message display and annunciation system of claim 6 or 7, wherein the actuator is a radio transmitter.

9. The message display and annunciation system of claim 8, wherein the radio transmitter is selectively operable to transmit an encoded signal.

10. The message display and annunciation system of any one of claims 1 to 9 further having a terminal controller for controlling the visual display means, conversion means and audio output means.

11. The message display and annunciation system of claim 10, wherein the terminal controller communicates with the system controller.

12. The message display and annunciation system of claim 10 or 11, wherein the terminal controller is responsive to the actuator to actuate the conversion means to convert the displayed information into audio information.

13. The message display and annunciation system of any one of claims 10 to 12 further having a light level sensor communicating with the terminal controller, wherein the light level sensor detects the ambient light level in the vicinity of the terminal.

14. The message display and annunciation system of claim 13, wherein the terminal controller controls the brightness of the visual display means to compensate for the ambient light level detected by the light level sensor.

15. The message display and annunciation system of any one of claims 10 to 14 further having an audio level sensor communicating with the terminal controller, wherein the audio level sensor detects the ambient noise level in the vicinity of the terminal.

16. The message display and annunciation system of claim 15, wherein the terminal controller controls the volume of the audible speech to compensate for the ambient noise level detected by the audio level sensor.

17. The message display and annunciation system of any one of claims 10 to 16 further having a temperature sensor communicating with the terminal controller, wherein the temperature sensor detects the ambient temperature in the vicinity of the terminal.

18. The message display and annunciation system of claim 17, wherein the terminal controller communicates the detected ambient temperature to the system controller.

19. The message display and annunciation system of any one of claims 1 to 18, wherein when an actuator actuates the terminal to broadcast the displayed information as audible speech, the audio output means stops outputting

the audible speech after a preset time has elapsed or after the audible speech has been repeated a preset number of times.

20. A message display and annunciation system adapted for use in a transportation system, the message display and annunciation system including:

at least one terminal having:

(i) visual display means for displaying variable text information;

(ii) conversion means for converting the current displayed text information into audio information; and

(iii) audio output means for outputting the audio information as audible speech;

a system controller remote from the terminal and adapted to communicate with the terminal, wherein the terminal displays information received from the system controller, the terminal being responsive to an actuator for actuating the terminal to broadcast the current displayed information as audible speech.

21. The message display and annunciation system of claim 20, wherein the conversion means is a text to speech synthesiser.

22. A terminal adapted for use in a transportation system as part of a message display and annunciation system, the terminal including:

(i) visual display means for displaying variable text information;

(ii) conversion means for converting the current displayed text information into audio information; and

(iii) audio output means for outputting the audio information as audible speech;

the terminal being responsive to a signal from a selectively operable actuator to broadcast the current displayed information as audible speech.

23. The terminal as claimed in claim 22, wherein the conversion means is a text to speech synthesiser.

24. A message display and annunciation system substantially as herein described with reference to the drawings.

25. A terminal for use in a message display and annunciation system,

the terminal being substantially as hereinbefore described with reference to the drawings.

DATED this 8th day of June, 2004

BRISBANE CITY COUNCIL

By its Patent Attorneys

CULLEN & CO.

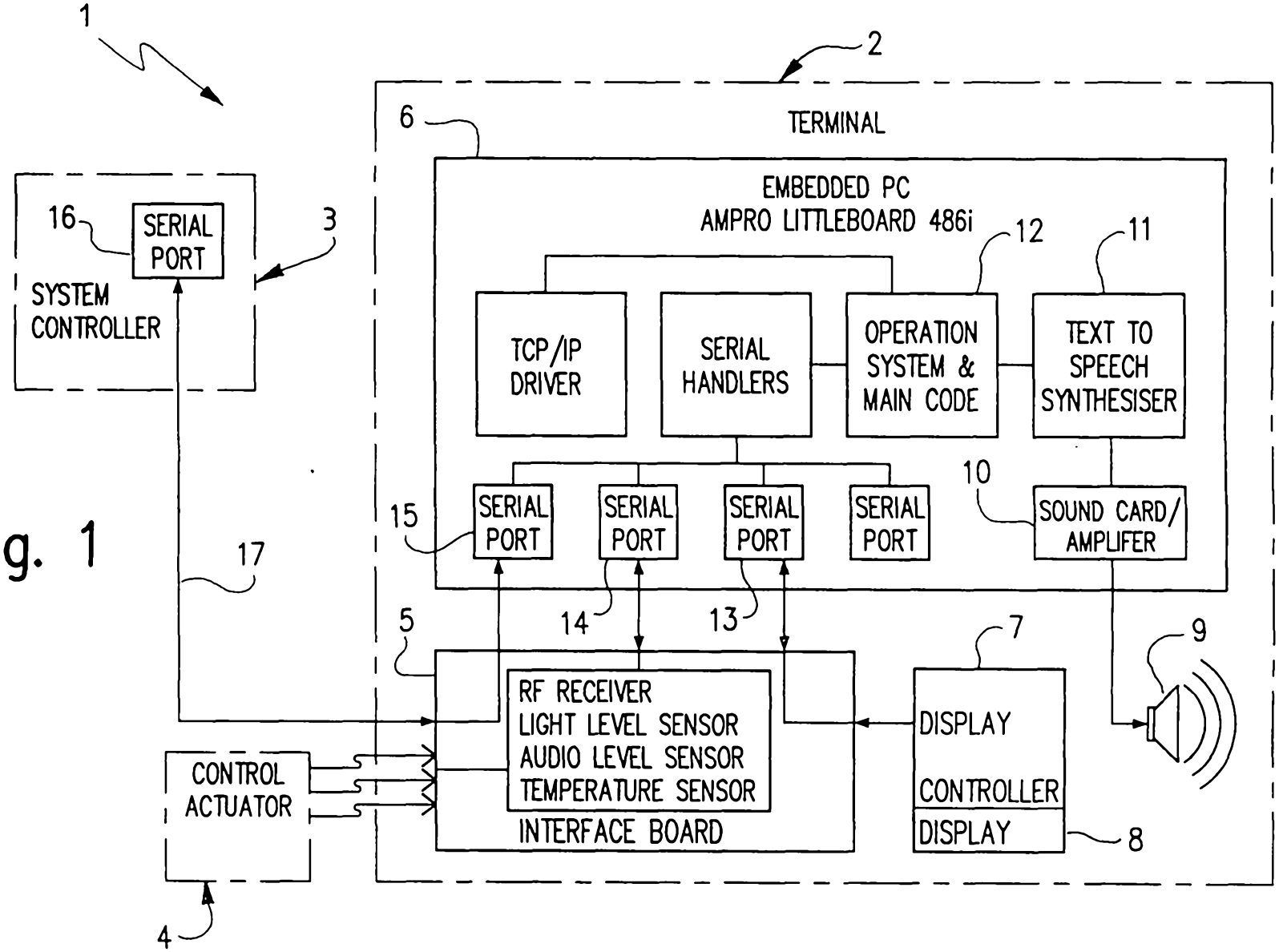
1
2
TERMINAL
6
EMBEDDED PC
AMPRO LITTLEBOARD 486i
12
11
TCP/IP DRIVER
SERIAL HANDLERS
OPERATION SYSTEM & MAIN CODE
TEXT TO SPEECH SYNTHESISER
16
SERIAL PORT
3
SYSTEM CONTROLLER
15
SERIAL PORT
SERIAL PORT
SERIAL PORT
SERIAL PORT
10
SOUND CARD/ AMPLIFER
17
5
14
13
7
9
RF RECEIVER
LIGHT LEVEL SENSOR
AUDIO LEVEL SENSOR
TEMPERATURE SENSOR
INTERFACE BOARD
DISPLAY
CONTROLLER
DISPLAY
8
CONTROL ACTUATOR
4

Fig. 1

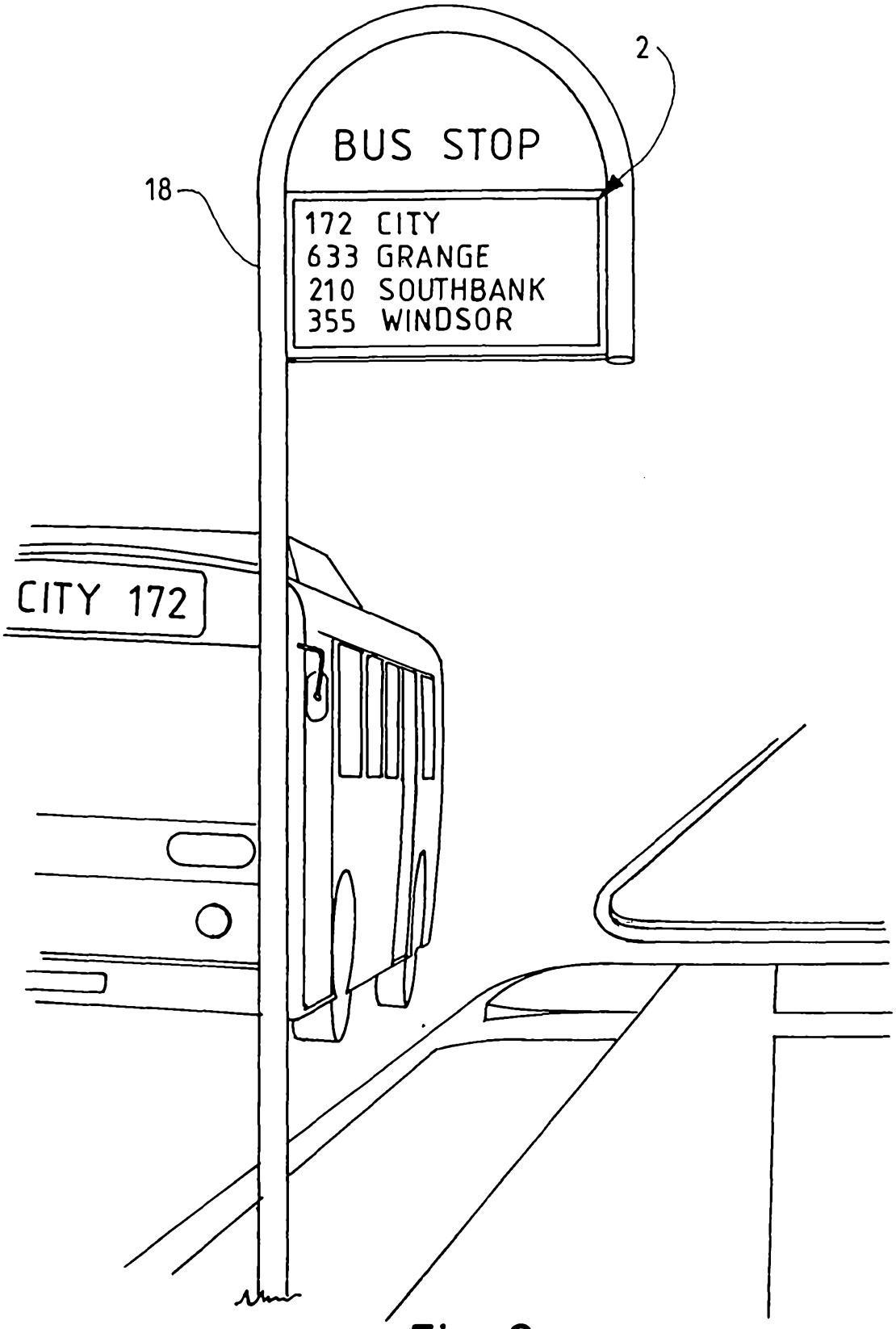
2
BUS STOP
18
172 CITY
633 GRANGE
210 SOUTHBANK
355 WINDSOR
CITY 172

Fig. 2