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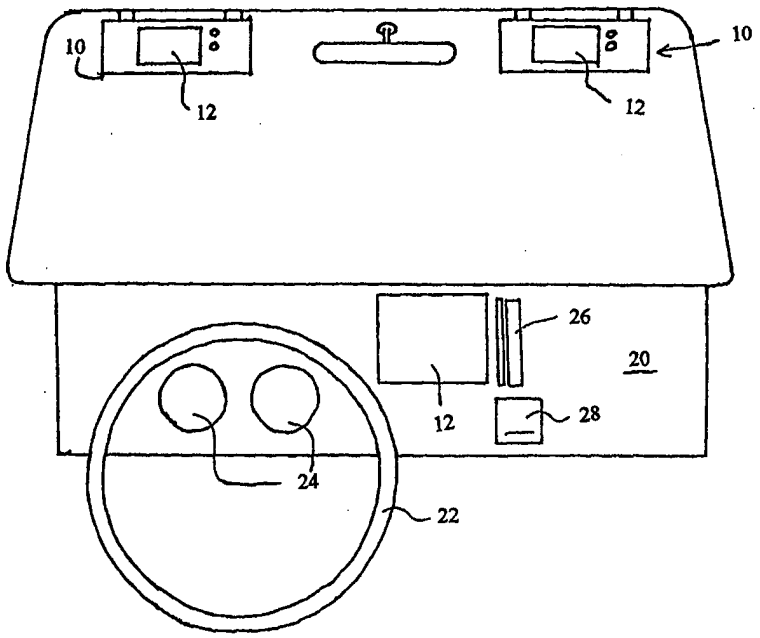

(57) Abstract

A sun visor in a vehicle (such as an automobile) includes a computer display to display data generated by a computer remotely located within the vehicle. The display is preferably a liquid crystal display which may be outfitted with a touch sensitive screen. The display may alternatively be provided in the dashboard of the vehicle. Peripheral devices such as a printer and/or a card reader may also be provided. The inventive display is particularly suited for use in a police environment.

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LIQUID CRYSTAL DISPLAY IN A SUN VISOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to data displays, and more particularly to an apparatus for conveniently and unobtrusively displaying data in an enclosed area, such as the passenger compartment of an automobile.

2. Description of the Related Art

Vehicles are frequently outfitted with computers to enable rapid and accurate transmission of data between the mobile vehicle and a base station. One exemplary application involves police vehicles which must stay in constant communication with a central police station. By providing a computer in each police vehicle, when a police officer stops a person for a traffic violation, the police officer can quickly and easily communicate with the central computer to analyze the person's file to determine if the person is wanted for any more serious infractions. In this manner, the police officer is more efficient and better able to perform his duties.

The presence of a computer in the police car does have disadvantages, however. First, the presence of the computer in the passenger compartment, especially the computer display, takes up valuable space and results in an inconvenient and uneconomical use of interior space. Second, the computer can get in the way of the police officer preventing the officer from having access to other parts of the interior of the vehicle. This obstruction presents a potential danger to the police officer.

Accordingly, it is an object of the invention to provide a conveniently located unobtrusive display that is capable of displaying computer generated signals. Further, it is an object of the invention to provide for the placement of the computer display to be such that the display is located at an ergonomically efficient location, so that users of the display will not experience discomfort or strain. Additionally, where the display is to be used by safety personnel, such as police officers who must be constantly alert, it is an object of the invention to provide for the display to be located so that it is easy for the police officer to view the display while continuously monitoring the potentially dangerous person whom he has stopped.

SUMMARY OF THE INVENTION

In one embodiment, a computer display is provided in the form of a liquid crystal display that is disposed within a sun visor in the automotive passenger compartment of an automotive vehicle. By disposing the liquid crystal display in the sun visor, the display is conveniently located out of the main space used by passengers in the automobile, while being readily accessible and located in an ergonomically correct position. When not in use, the sun visor folds up against the ceiling in known fashion, to thereby hide the display from view. The display is connected by wires to a computer located in a different part of the vehicle which provides the display with signals corresponding to data to be displayed.

The liquid crystal display may be provided with a touch screen so that the user may provide feedback to the computer to interactively query or instruct the computer. Optionally, the sun visor may be provided with buttons which enable the user to interact with the computer. Further, a pointing device, such as a trackball or touch pad, may be

provided to enable the user to manipulate a pointer on the display and thus to enable the user to interact with a software program running on the computer.

In an alternative embodiment, the display may be provided within the dash of an automobile and connected to a computer. The in-dash display may be a standard cathode ray tube, or, preferably, may be a liquid crystal display. The in-dash display may be provided with feedback devices, such as buttons, a touch sensitive screen, track ball, or any other device which is capable providing signals to the computer.

A computer keyboard or key pad may be provided in the passenger compartment of the vehicle to enable the user to input commands to the computer. Peripheral devices may likewise be provided, such as a printer, a card reader, or any other device which is commonly associated with a computer as an input or output device. These peripherals may be unobtrusively located, for example, by incorporating them into the dashboard of the vehicle.

In one embodiment, a sun visor includes a sun visor body and a display disposed at least partially in the sun visor body. The sun visor body may include a front surface (the surface of the sun visor which faces a forward direction of an automobile when the sun visor is mounted in the automobile), a back surface (the surface of the sun visor which faces a backward direction of the automobile when the sun visor is mounted in the automobile), and a hinge disposed along at least one edge of at least one of the front surface and the back surface. The display may be disposed in the sun visor body to face the back surface of the sun visor.

The display may be formed from a liquid crystal display and a back light disposed in a proximity of the liquid crystal display such that at least a portion of light emitted by the back light impinges on at least a portion of the liquid crystal display. The liquid crystal display may be formed from a thin film transistor.

The display may be connected to a source of signals, such as a computer, and may be adapted and constructed to receive the signals and display information in accordance with the received signals. The display may also include at least one input device adapted and constructed to receive input from an external source (such as an user) and to transmit signals corresponding to the input to the computer. The input device may include at least one button and a touch sensitive layer on the liquid crystal display.

In another embodiment, a mobile computer system includes a vehicle having a body defining a passenger compartment and at least one other compartment, a computer disposed in the at least one other compartment, a display disposed within the passenger compartment, and a communication between the computer and the display to enable signals form the computer to be viewed on the display. A sun visor or dash may be disposed within the vehicle body and the display may be disposed within the sun visor and/or the dash.

BRIEF DESCRIPTION OF THE DRAWINGS

Certain illustrative embodiments of the present invention will now be described more specifically with reference to the attached drawings, wherein:

Figure 1 is a front view of an exemplary embodiment of a sun visor incorporating a display according to a first embodiment of the present invention;

Figure 2 is a view of the dash of a passenger compartment of a vehicle illustrating exemplary placements of a display incorporated in the vehicle sun visor, a display incorporated in the vehicle dash and various peripheral components incorporated in the vehicle dash; and

Figure 3 is a side view of a vehicle illustrating the relative placement of the computer and display incorporated in the sun visor.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

As shown in Fig. 1, a sun visor 10 is provided in which a display 12 is disposed. The sun visor is supported on its top edge by a rod 14 on which bearings 16 are rotatably disposed. The sun visor thus may be attached to the roof of an automobile (see Fig. 3) or any other suitable mounting place with appropriate brackets (not shown) by attaching the brackets to the bearings 16. Because the rod 14 and bearings 16 are rotatable relative to each other, it is possible to rotate the sun visor from a first position, where the display is viewable, to a second position, where the display is hidden from view (i.e., rests along the roof of the vehicle). Rotating sun visors (without the display of this invention) are commonplace in the automotive industry. The bearings provided for mounting the sun visor may be robust enough to keep the sun visor in a particular position, and may be provided with a ratcheting type mechanism which will hold the sun visor in one of a plurality of positions. By providing the sun visor with bearings of this nature, it is possible for the sun visor to resist moving solely under the influence of gravity, and thus may allow the user to set the angle at which the sun visor will be positioned.

Wires 18 may extend from the display 12 through the inside of the sun visor 10 and into the bar 14. From there, the wires may either extend directly out the end of the bar to be connected to a computer (not shown), or, as shown in Fig. 1, may extend through the hinge 16 to the interior of the roof of the vehicle. Once in the roof, the wires can be routed to any suitable location to be connected to the computer. An example of this routing is illustrated in dashed lines in Fig. 3. By placing the wires in the roof or other contained portion of the vehicle body, the wires can be hidden from view and thus not present a nuisance to passengers in the passenger compartment.

The display 12 is preferably a liquid crystal display ("LCD") which operates in a known manner. The LCD can have any desired dimensions, but it is envisioned that the LCD have a diagonal dimension of either 6.5 inches or 7.4 inches with a resolution of 640 x 480 pixels in the width and height directions respectively. The display is preferably connected to the computer using any standard interface, for example VGA or SVGA. The display may contain a back light, wholly or partially contained within the sun visor. The display may also receive light through the sun visor so that the back of the LCD is open to receive light.

A computer is preferably provided to communicate with the display. In this case, the computer can be mounted at any convenient location in the vehicle. Preferably, as shown in Fig. 3, the computer 30 is located at a remote location, such as the vehicle trunk, so that it does not clutter the interior of the vehicle's passenger compartment. Alternatively, the computer (or portions of it) can be provided in close proximity to the user of the display.

User accessible input devices such as a computer keyboard, a key pad, a floppy disc drive or any other type of input device may be provided in the passenger compartment of the vehicle. The computer can also be provided with various peripherals. One such peripheral is a card reader which can read information stored on a magnetic strip on a card. For example, several states have begun to print magnetic strips on drivers licenses. By using a card reader, the police officer could directly access a person's file, either locally or remotely, by simply swiping the driver's licence through the card reader.

The LCD may be provided with a touch sensitive layer overlying the LCD layers to enable the user to provide input and feedback to the computer. Touch sensitive layers are well know in the art. The display may also, preferably, be provided with a

protective coating, such as non-reflective protection glass, to prevent the display from being scratched or otherwise damaged. The display may be implemented as a monochrome TFT display, or may be an EL monochrome screen. Alternatively, a color LCD could be used.

Optionally, the display may be provided with buttons to enable the user to provide input or feedback to the computer. These buttons may be on the sun visor or may be provided remote from the sun visor. The input buttons may be low profile buttons. A pointing device (not shown), such as a touch pad or track ball may also be provided to enable the user to manipulate a pointer on the display, thus simplifying and expanding the interactive capabilities of the display/computer. It is envisioned that such a pointing device would be preferably located on the sun visor, but may also be provided remote from the sun visor.

The sun visor may be manufactured as a universal model which will fit in various types of automobiles. Alternatively, existing vehicle sun visors can be retrofitted to include a display, or unique sun visors custom made to fit any particular vehicle model may be manufactured to include a display.

As shown in Fig. 3, the computer 30 is preferably located in the trunk or the rear of the vehicle. The computer may be mounted using suitable brackets to prevent it from moving relative to the vehicle. Preferably, the computer is mounted to minimize the effect of vibrations on the computer. The mounting bracket can include a standard docking bar for a lap-top computer. In this instance, the display should be capable of working in conjunction with a standard VGA output from a SUB-DIS or docking connector from suitable notebooks.

A cable 18 is preferably provided to link the computer and the display. It is currently envisioned that a cable of approximately 7 meters in length will be sufficient to link the computer, display, and any attendant peripherals.

As shown in Fig. 2, a display 12 may additionally or alternatively be provided in the vehicle dash 20. By providing the display in the vehicle dash, it is possible to eliminate the problem of having the display occupy space within the passenger compartment of the vehicle. Moreover, providing a display in the vehicle dash is convenient in that it enables two or more passengers to view the display simultaneously.

The location of the display 12 in the dash 20 should be chosen such that the driver's view of the display is not compromised by the vehicle steering wheel 22. Also, the location of the display should be coordinated with necessary gauges 24 and any other desired peripherals, such as card reader 26 and printer 28, which may be provided in the vehicle dash to enable input and output to/from the computer.

This invention has been described with respect to use by police officers. It should be understood, however, that the inventive computer systems and computer system displays may be employed by numerous other persons engaged in dramatically different occupations. For example, a salesperson could use the inventive computer system and computer display system to access past sales logs and to update sales records. Likewise, delivery persons could use the inventive computer systems and computer system displays in conjunction with their deliveries to ensure timely delivery as well as to track the deliveries themselves. Other applications of these concepts are well within the scope of a person of ordinary skill in the art.

Examples of information which may be provided by the computer include: GPS positioning data, either alone or in connection with a map to inform the user of the current location of the vehicle, a proposed vehicular destination or the locations of other

police officers; text of radio dispatches; mug shots of suspects whom the police officer is instructed to apprehend; or any other type of data that a person would find useful to have displayed in an automobile.

It is understood that various other modifications will be apparent to and can be readily made by those skilled in the art without departing from the scope and spirit of this invention. Accordingly, it is not intended that the scope of the claims appended hereto be limited to the description as set forth herein, but rather that the claims be construed as encompassing all the features of patentable novelty that reside in the present invention, including all features that would be treated as equivalents thereof by those skilled in the art which this invention pertains.

What I claim is:

1. A sun visor, comprising:

a sun visor body; and

a display disposed at least partially in said sun visor body.

2. The sun visor of claim 1, wherein said sun visor body comprises a front surface, a back surface, and a hinge disposed along at least one edge of at least one of said front surface and said back surface.

3. The sun visor of claim 1, wherein said sun visor body comprises a front surface, defined as a surface of said sun visor which faces a forward direction of an automobile when said sun visor is mounted in said automobile, and a back surface, defined as a surface of said sun visor which faces a backward direction of said automobile when said sun visor is mounted in said automobile, and wherein said display is disposed in said sun visor body to face said back surface of said sun visor.

4. The sun visor of claim 1, wherein said display comprises a liquid crystal display and a back light disposed in a proximity of said liquid crystal display such that at least a portion of light emitted by said back light impinges on at least a portion of said liquid crystal display.

5. The sun visor of claim 4, wherein said liquid crystal display is comprised of a thin film transistor display.

6. The sun visor of claim 1, wherein said display is connected to a source of signals, and wherein said display is adapted and constructed to receive said signals and display information in accordance with said received signals.

7. The sun visor of claim 6, wherein said source of signals is a computer.

8. The sun visor of claim 7, wherein said sun visor further comprises at least one input device adapted and constructed to receive input from an external source and to transmit signals corresponding to said input to said computer.

9. The sun visor of claim 8, wherein said input device comprises at least one button.

10. The sun visor of claim 8, wherein said input device comprises a touch sensitive layer on said liquid crystal display.

11. A mobile computer system, comprising:

a vehicle having a body defining a passenger compartment and at least one other compartment;

a computer disposed in said at least one other compartment;

a display disposed within said passenger compartment;

a communication between said computer and said display to enable signals form said computer to be viewed on said display.

12. The computer system of claim 11, wherein a sun visor is disposed within said vehicle body and said display is disposed within said sun visor.

13. The computer system of claim 11, wherein a dash is disposed within said passenger compartment and said display is disposed within said dash.

14. A sun visor, comprising:

a body;

a liquid crystal display disposed within said body and adapted and constructed to receive computer signals from a computer;

buttons disposed within said body adapted and constructed to provide signals to the computer; and

a touch screen disposed on said liquid crystal display adapted and constructed to provide signals to the computer.

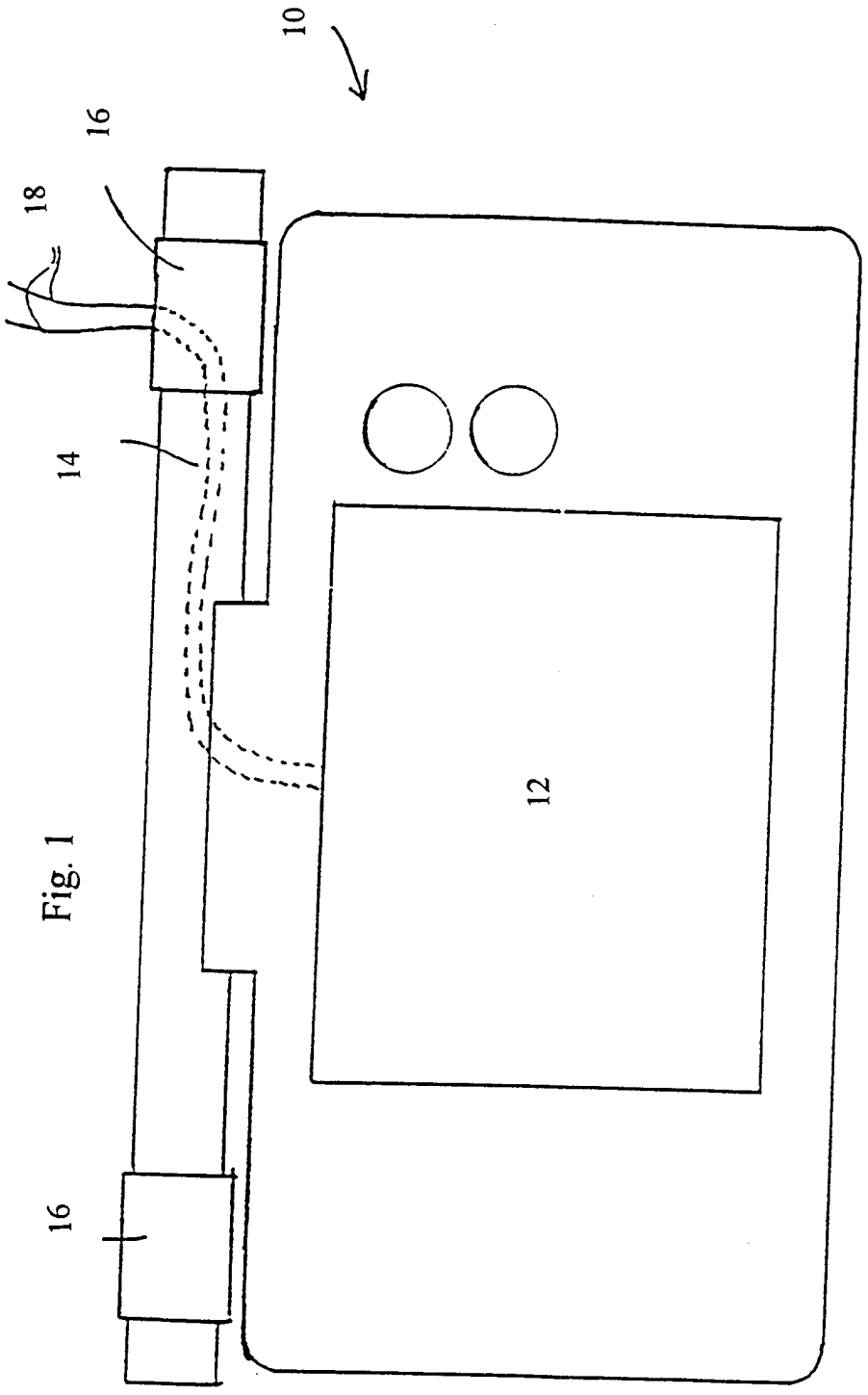
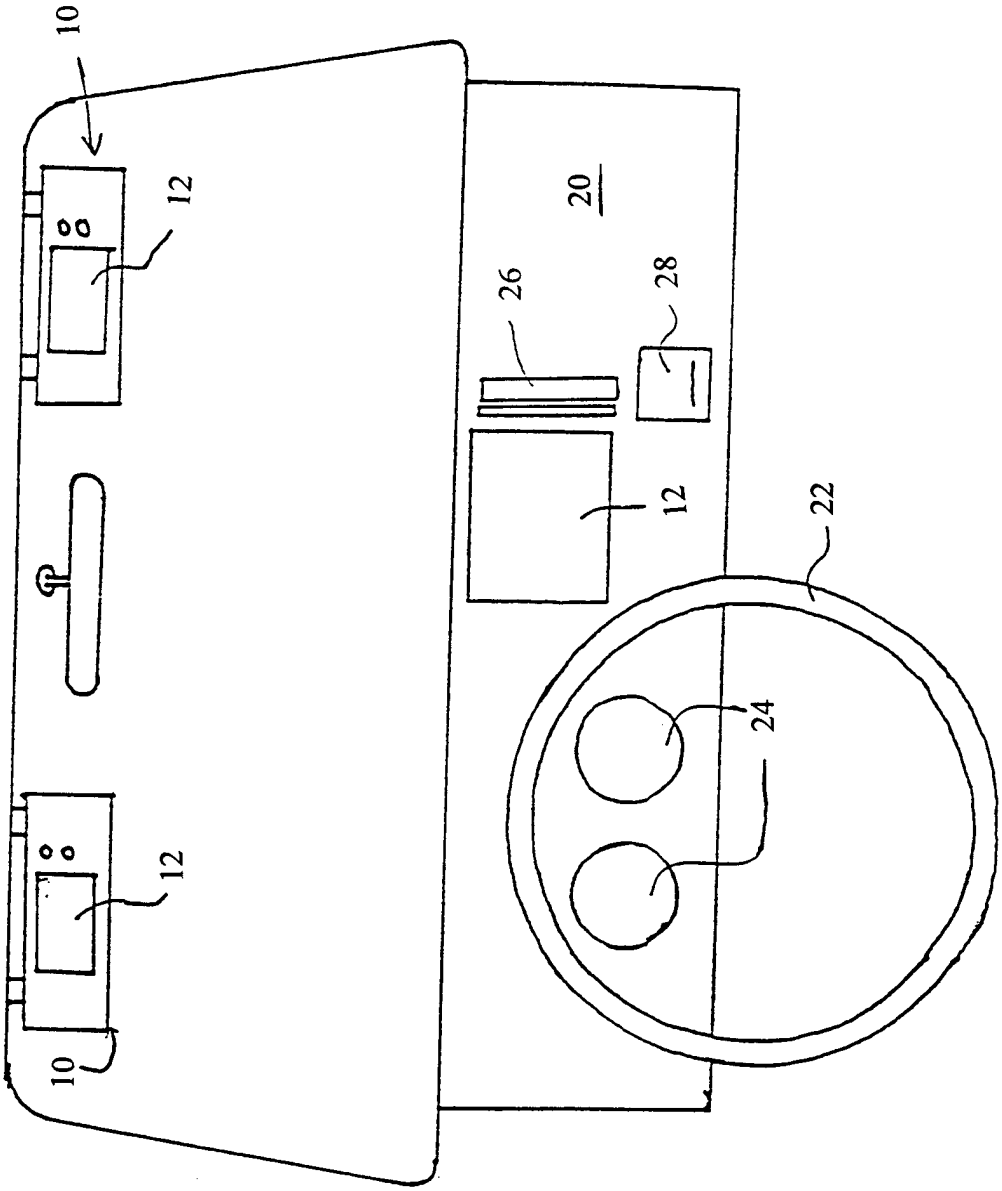


Fig. 1

Fig. 2



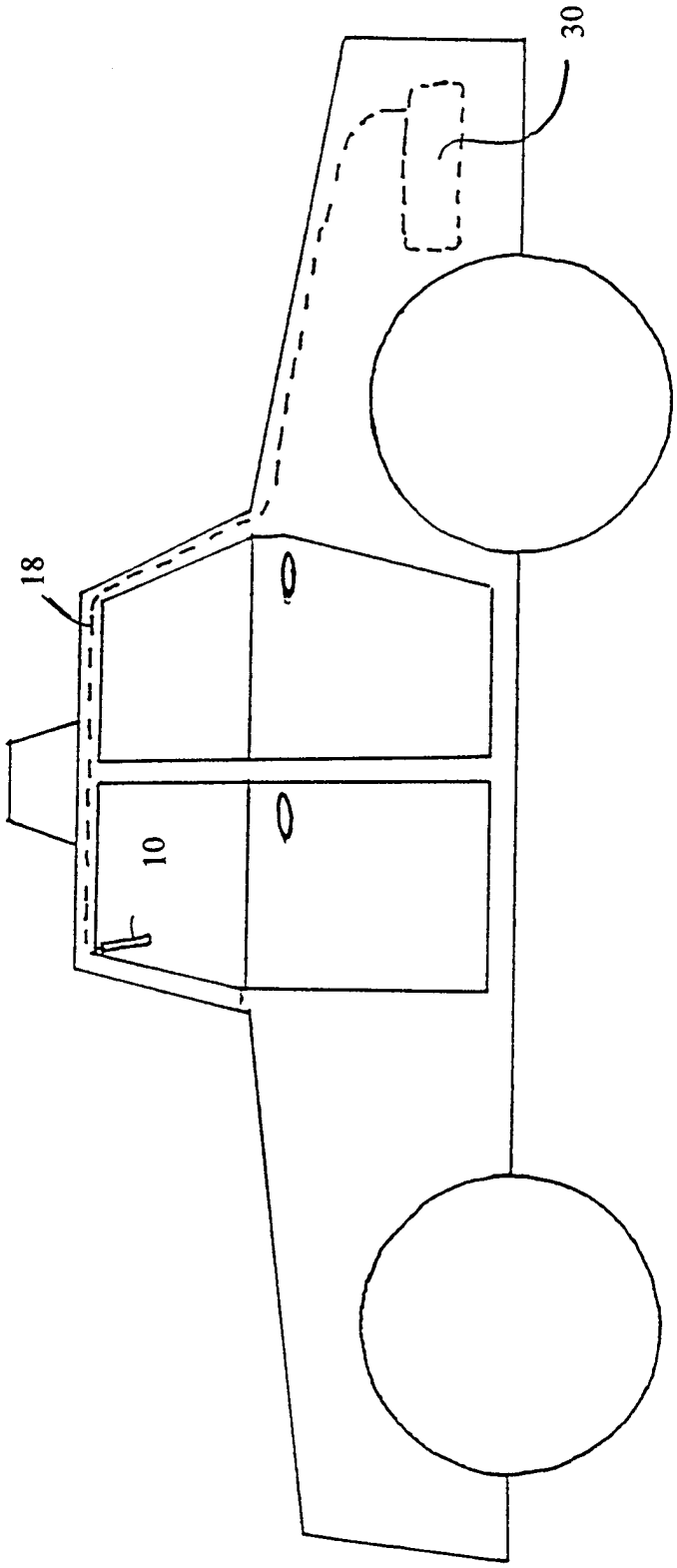


Fig. 3