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Armstrong

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[45] Date of Patent: Nov. 16, 1999

[54] **REMOTE CONTROL PORTABLE TRAFFIC CONTROL DEVICE AND SYSTEM**

[76] Inventor: **Sheldyn Kyle Armstrong**, 251 Academy Woods Dr., Gahanna, Ohio 43230

[21] Appl. No.: **09/010,298**

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[51] **Int. Cl.**[6] **H01Q 1/36**

[52] **U.S. Cl.** ..... **340/908**; 340/907; 116/63 P

[58] **Field of Search** ..... 340/908, 907, 340/902, 904, 539; 116/63 R, 63 P

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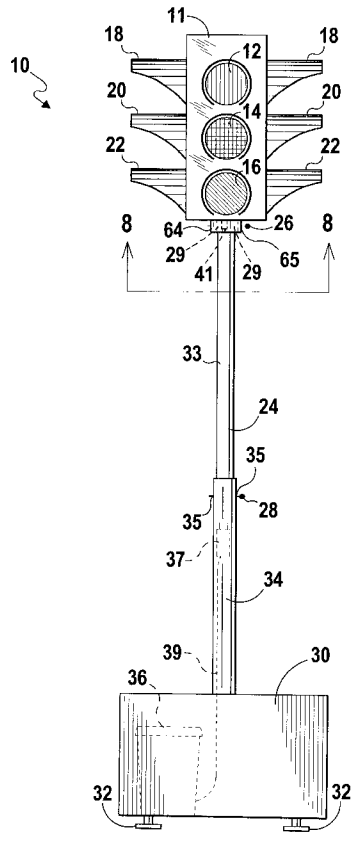
5,294,138	3/1994	Yang	280/47.34
5,345,232	9/1994	Robertson	340/906
5,400,019	3/1995	Riscoe, Jr.	340/908
5,493,292	2/1996	Fanslow et al.	340/908

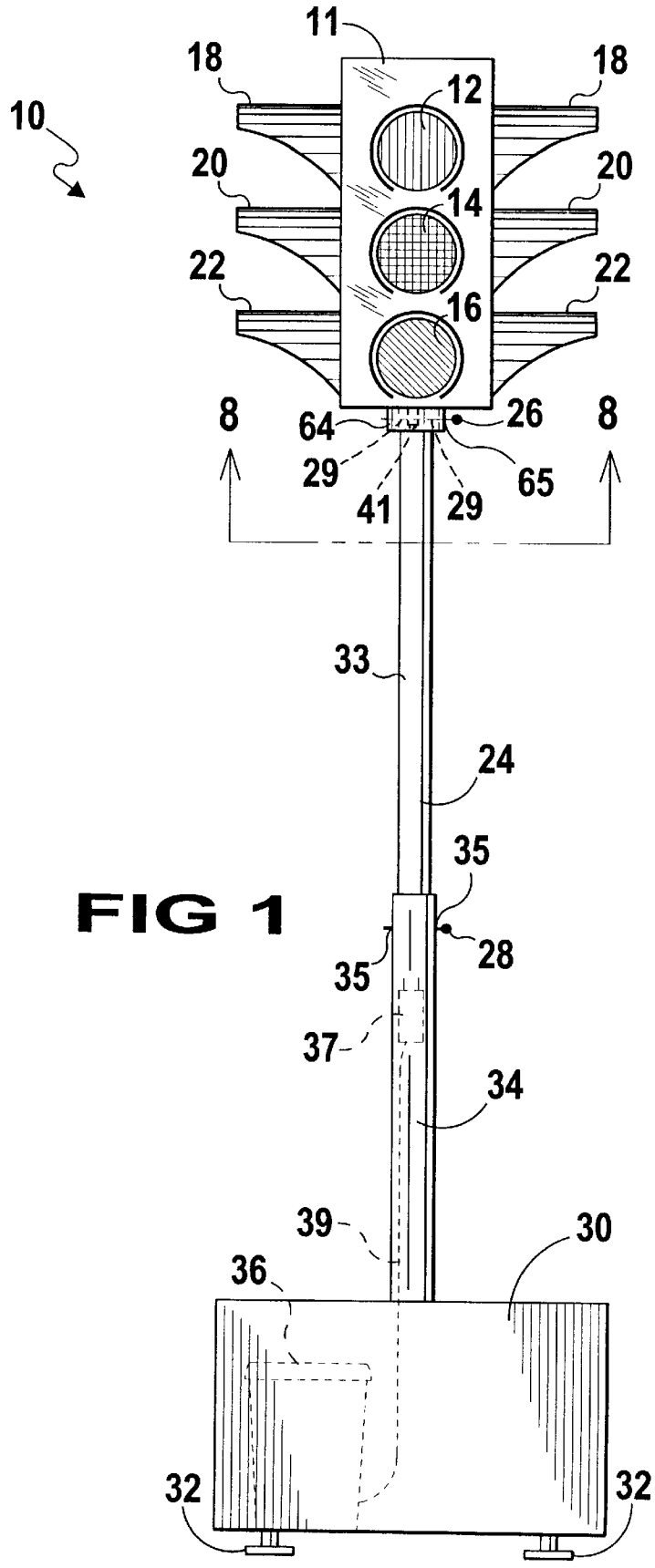
Primary Examiner—Jeffrey A. Hofsass
Assistant Examiner—Ashok Mannava
Attorney, Agent, or Firm—Michael I. Kroll

[57] **ABSTRACT**

A remote control portable traffic signaling device (**10**) and system (**94**) for controlling a flow of traffic. The remote control portable traffic signaling system (**94**) includes the portable signaling device (**10**) and a plurality of warning flashers (**76**). The portable signaling device (**10**) includes a remote control unit (**42**) and a signal head (**11**) having an LED display device (**50**) and a microprocessor (**46**). The remote control unit (**42**) transmits a control signal to be received by the microprocessor (**46**) for use in controlling a message communicated by the LED display device (**50**). A base unit (**30**) including a storage compartment for housing the power source (**36**) is connected to the signal head (**11**) for supplying power to the microprocessor (**46**) and LED display device (**50**) via a connection wire (**38**) extending through a pole (**24**) positioned therebetween. A device for adjustably connecting the pole (**26, 27, 28, 29, 35, 64** and **65**) between the signal head (**11**) and base unit (**30**) allows for height adjustment of the portable signaling device (**10**). A plurality of warning flashers (**76**) including a pair of high luminous LEDs (**82**) are positioned at a predetermined distance from the portable signaling device (**10**) to warn passersby of the presence of the portable signaling device (**10**).

1 Claim, 11 Drawing Sheets




11
18
18
12
10
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20
14
22
22
16
8
64
26
8
29
65
41
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33
24
35
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32

FIG 1

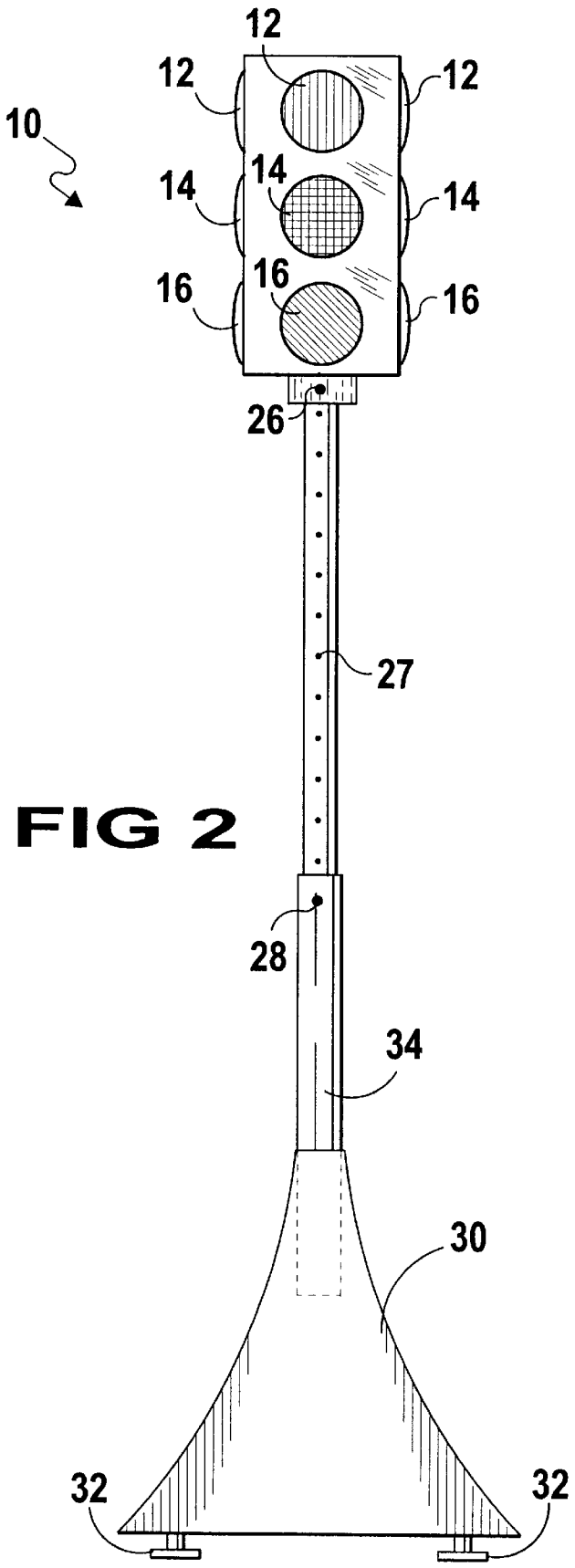

FIG 2

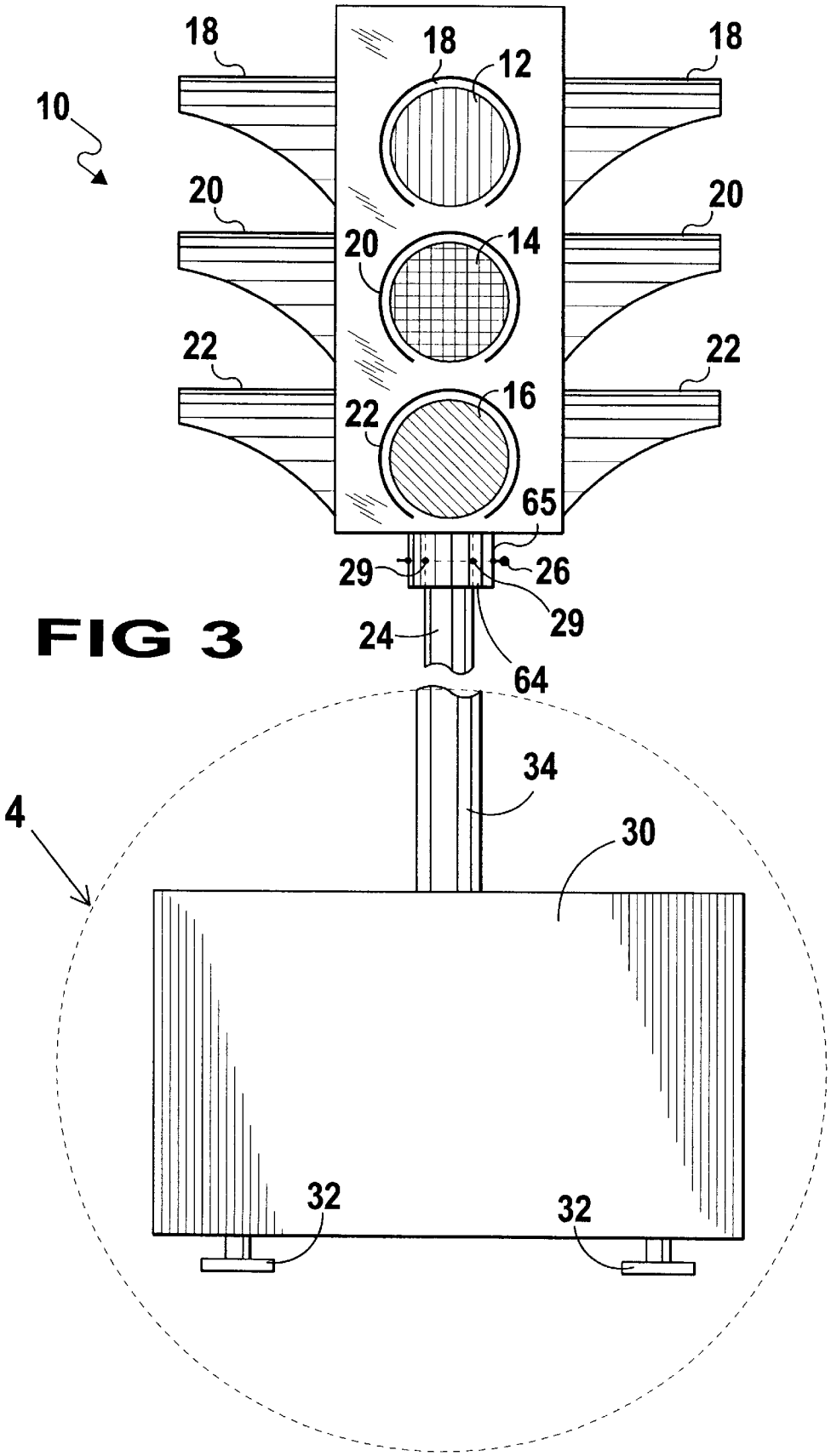

FIG 3

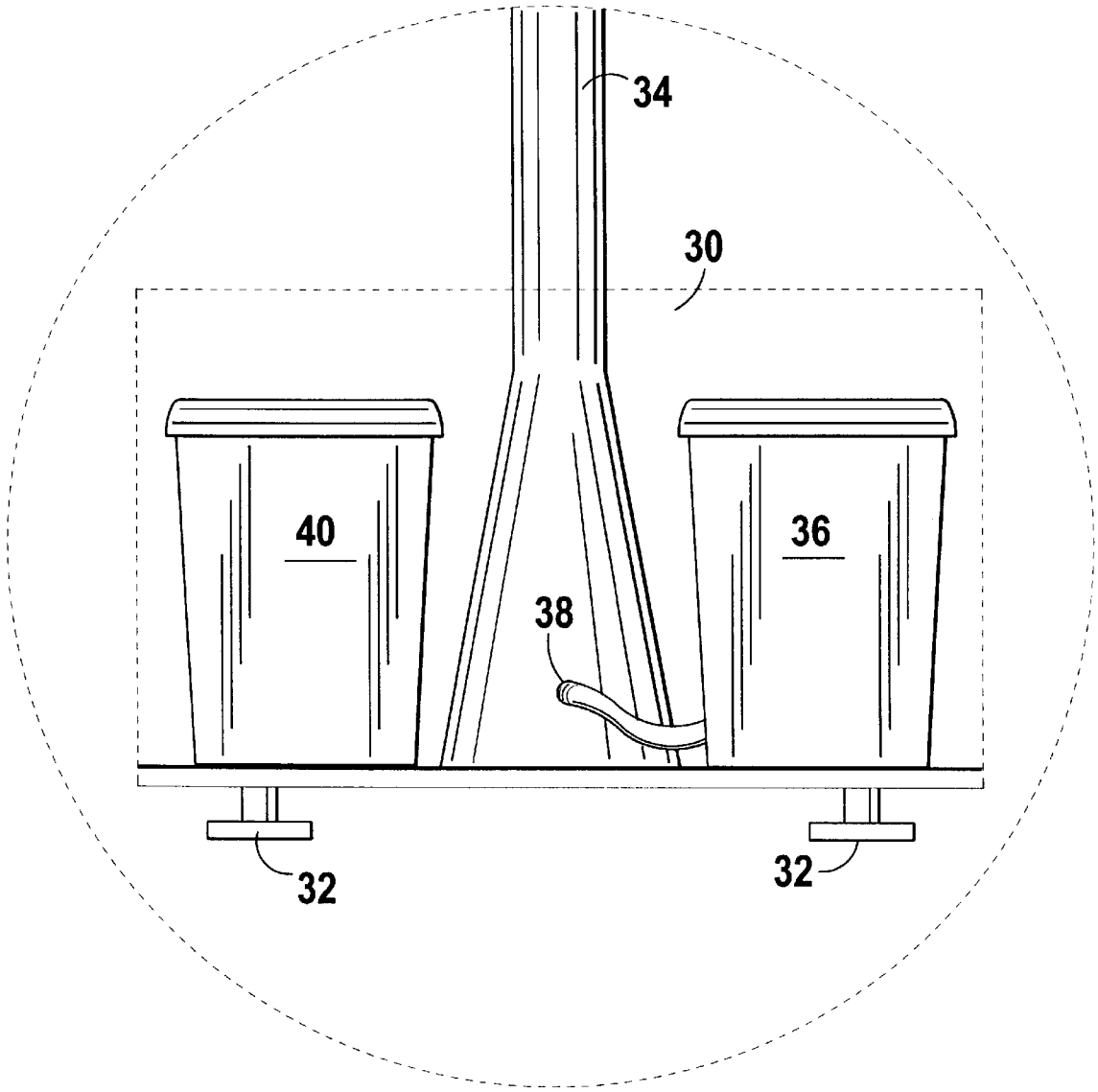

FIG 4

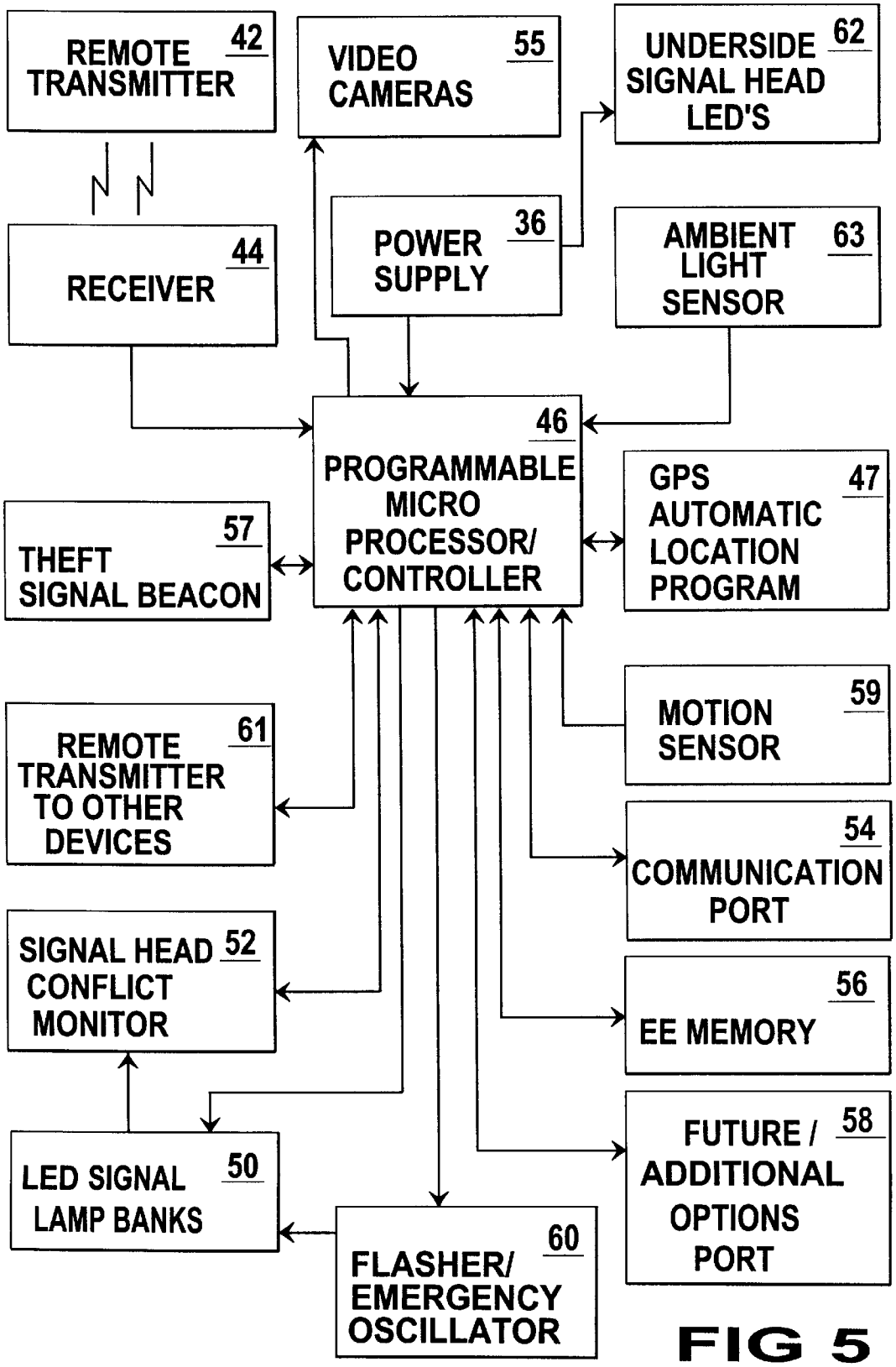
REMOTE TRANSMITTER 42
VIDEO CAMERAS 55
UNDERSIDE SIGNAL HEAD LED'S 62
RECEIVER 44
POWER SUPPLY 36
AMBIENT LIGHT SENSOR 63
46
PROGRAMMABLE MICRO PROCESSOR/ CONTROLLER
GPS AUTOMATIC LOCATION PROGRAM 47
THEFT SIGNAL BEACON 57
MOTION SENSOR 59
REMOTE TRANSMITTER TO OTHER DEVICES 61
COMMUNICATION PORT 54
SIGNAL HEAD CONFLICT MONITOR 52
EE MEMORY 56
FUTURE / ADDITIONAL OPTIONS PORT 58
LED SIGNAL LAMP BANKS 50
FLASHER/ EMERGENCY OSCILLATOR 60

FIG 5

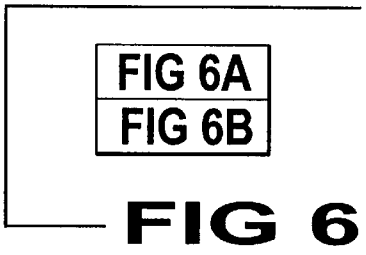
FIG 6A
FIG 6B

FIG 6

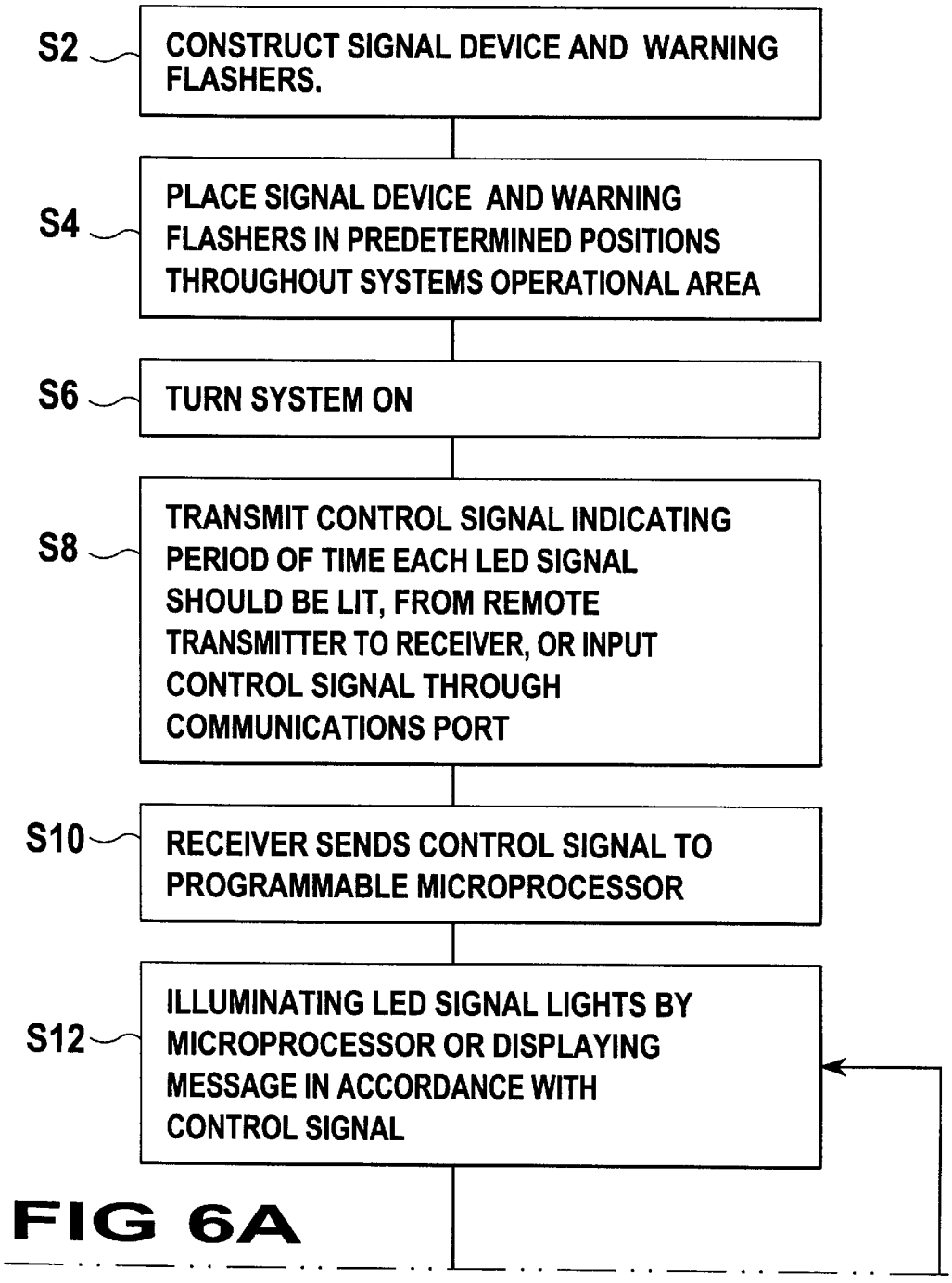
S2
CONSTRUCT SIGNAL DEVICE AND WARNING FLASHERS.
S4
PLACE SIGNAL DEVICE AND WARNING FLASHERS IN PREDETERMINED POSITIONS THROUGHOUT SYSTEMS OPERATIONAL AREA
S6
TURN SYSTEM ON
S8
TRANSMIT CONTROL SIGNAL INDICATING PERIOD OF TIME EACH LED SIGNAL SHOULD BE LIT, FROM REMOTE TRANSMITTER TO RECEIVER, OR INPUT CONTROL SIGNAL THROUGH COMMUNICATIONS PORT
S10
RECEIVER SENDS CONTROL SIGNAL TO PROGRAMMABLE MICROPROCESSOR
S12
ILLUMINATING LED SIGNAL LIGHTS BY MICROPROCESSOR OR DISPLAYING MESSAGE IN ACCORDANCE WITH CONTROL SIGNAL

FIG 6A

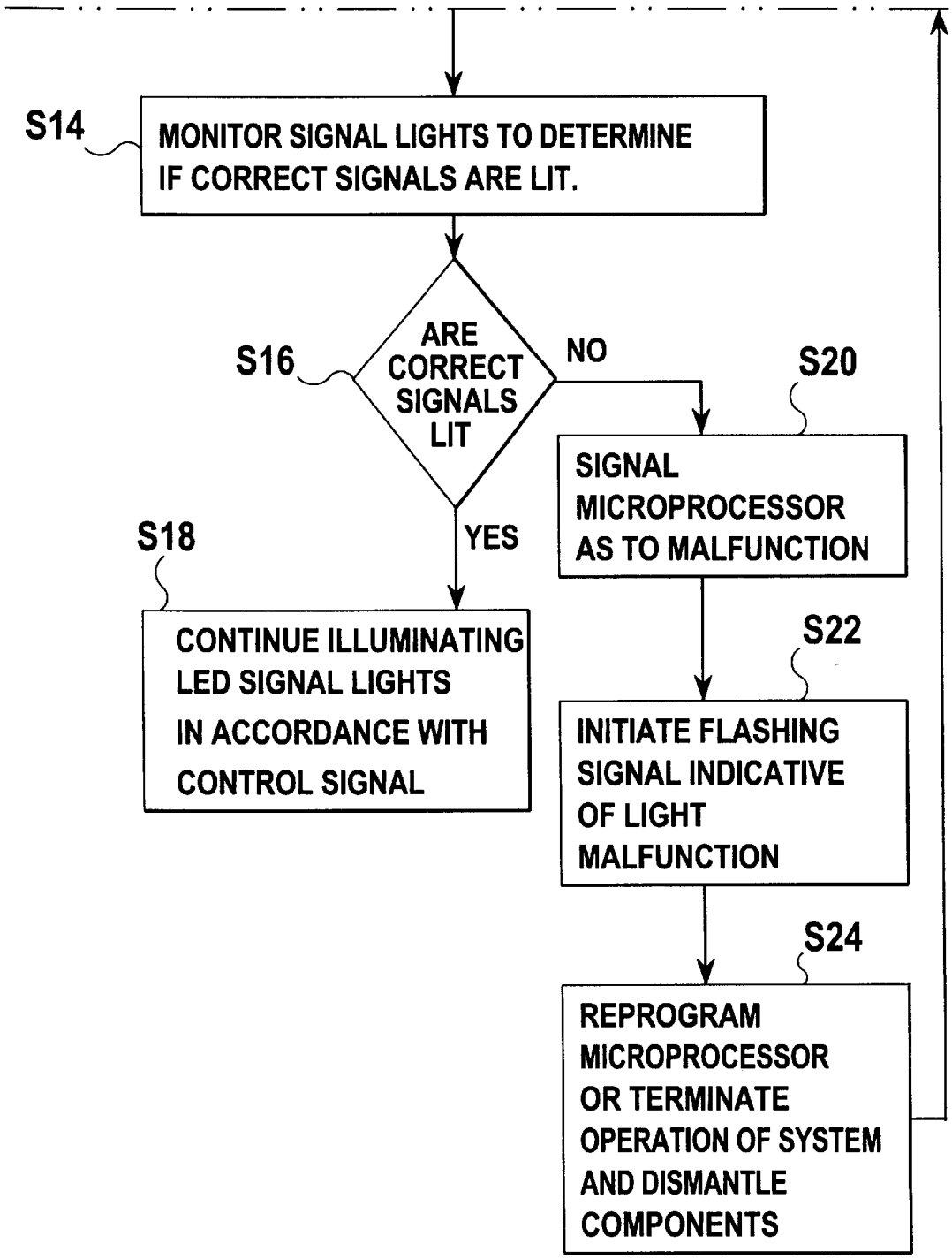
S14
MONITOR SIGNAL LIGHTS TO DETERMINE IF CORRECT SIGNALS ARE LIT.
S16
ARE CORRECT SIGNALS LIT
NO
S20
SIGNAL MICROPROCESSOR AS TO MALFUNCTION
YES
S18
CONTINUE ILLUMINATING LED SIGNAL LIGHTS IN ACCORDANCE WITH CONTROL SIGNAL
S22
INITIATE FLASHING SIGNAL INDICATIVE OF LIGHT MALFUNCTION
S24
REPROGRAM MICROPROCESSOR OR TERMINATE OPERATION OF SYSTEM AND DISMANTLE COMPONENTS

FIG 6B

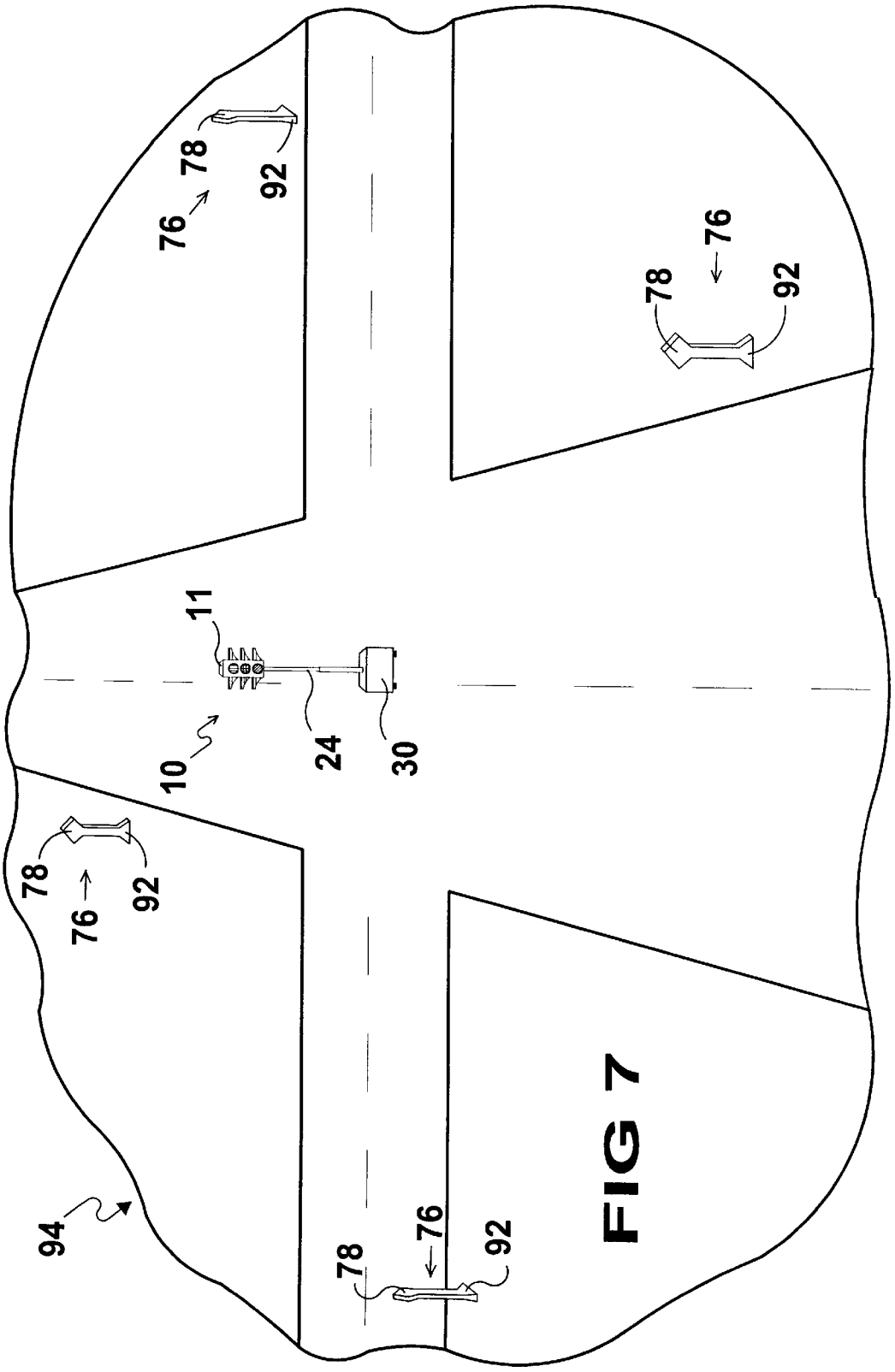

FIG 7

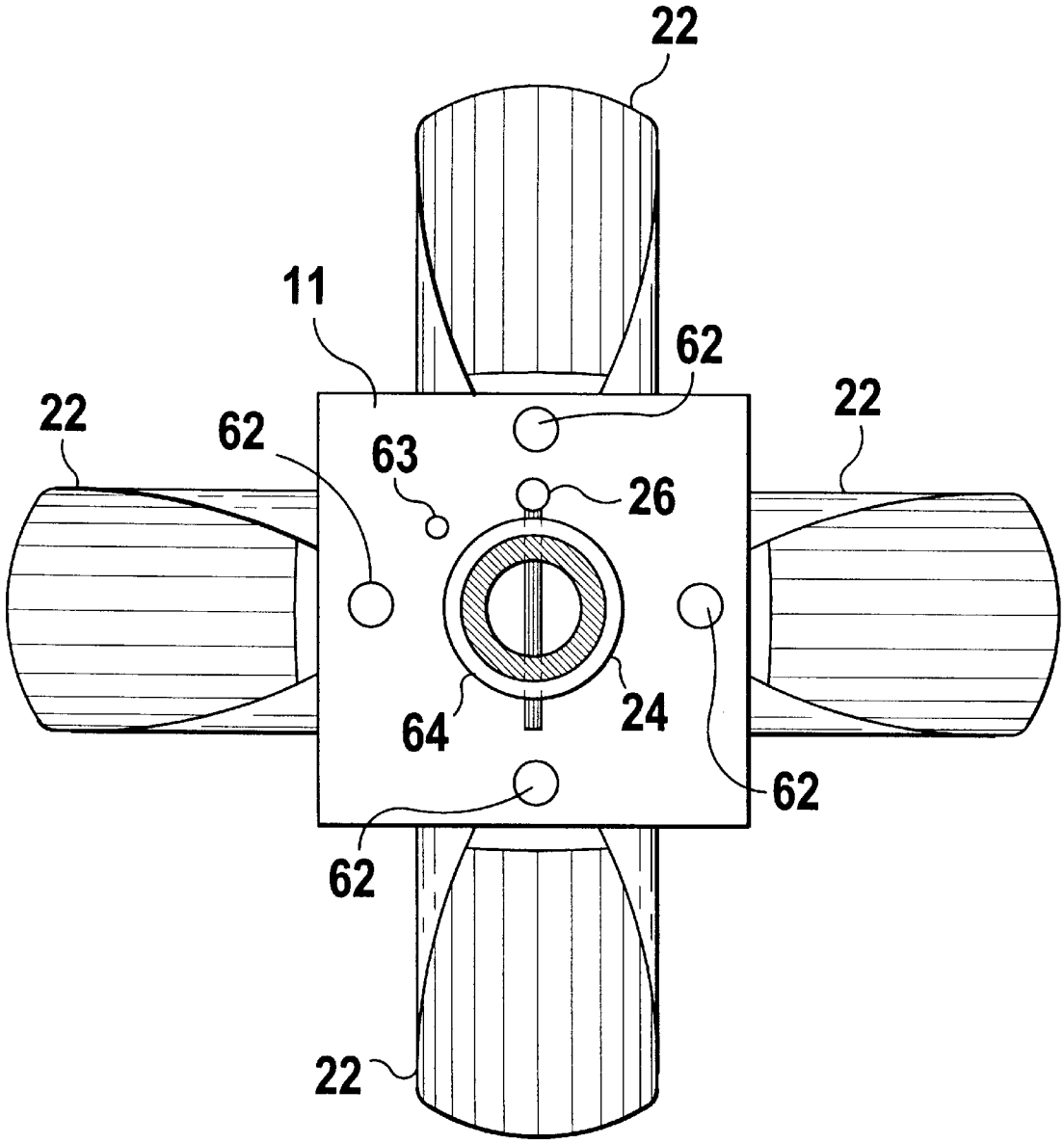

FIG 8

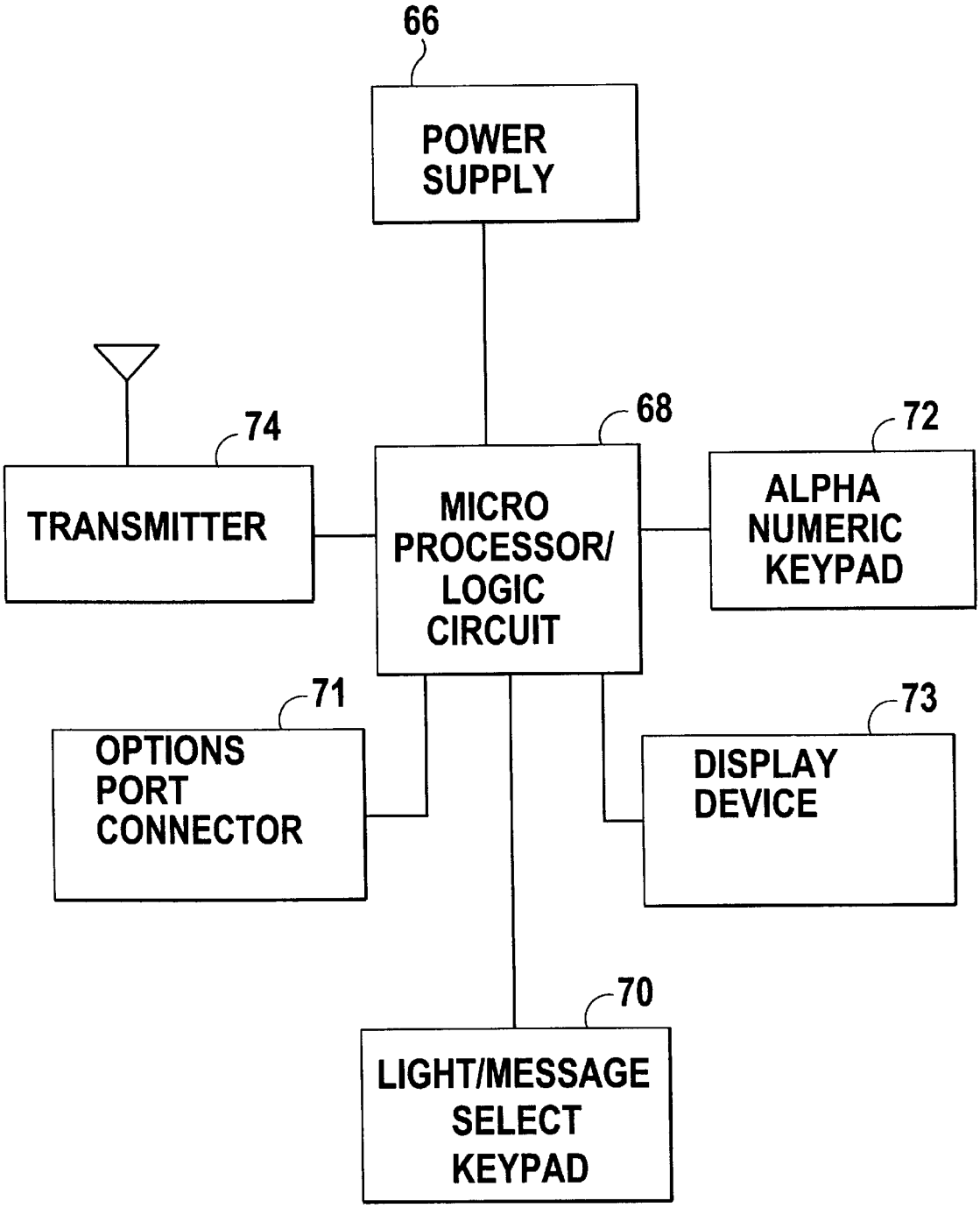
66
POWER SUPPLY
74
TRANSMITTER
68
MICRO PROCESSOR/ LOGIC CIRCUIT
72
ALPHA NUMERIC KEYPAD
71
OPTIONS PORT CONNECTOR
73
DISPLAY DEVICE
70
LIGHT/MESSAGE SELECT KEYPAD

FIG 9

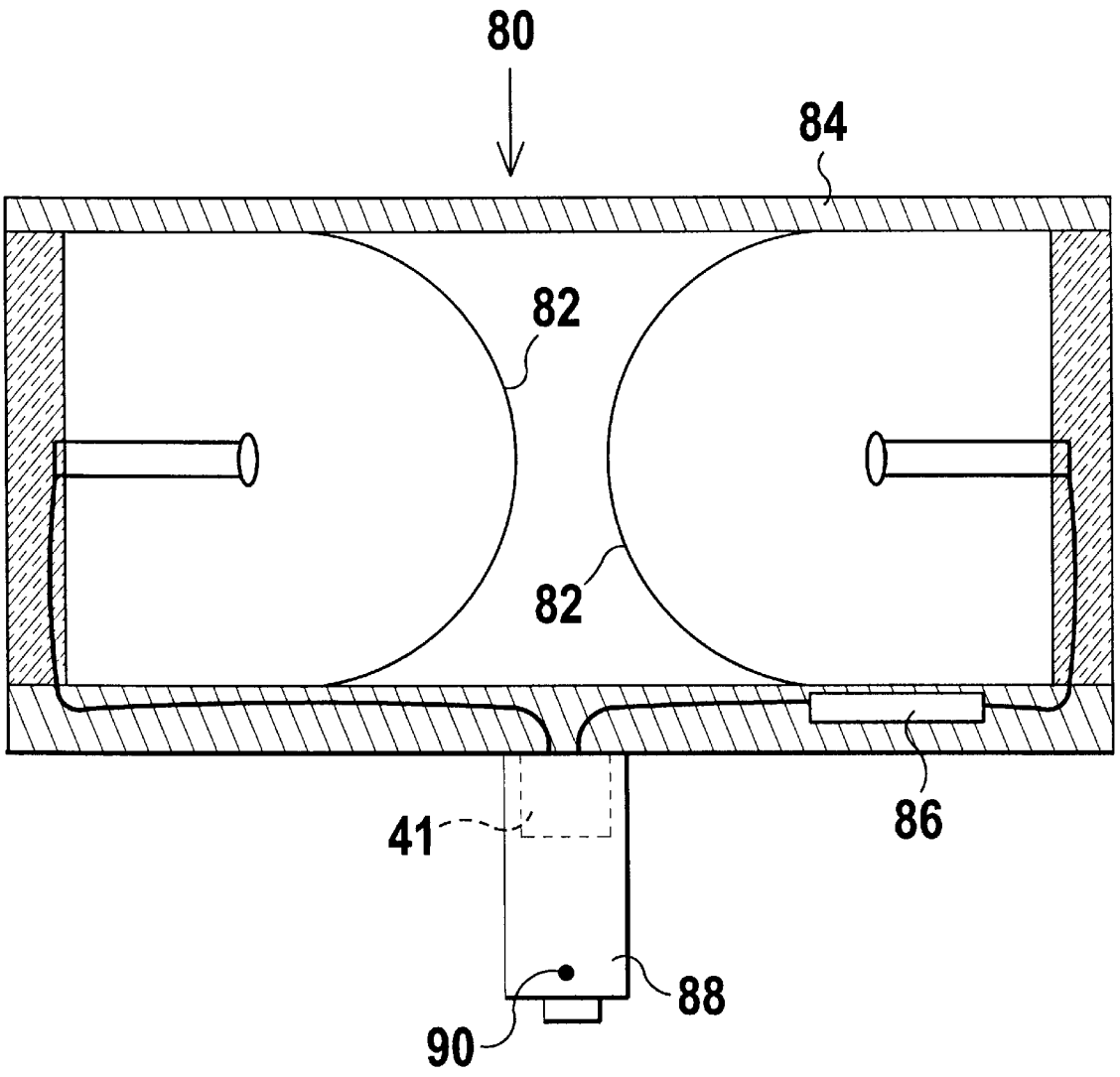

FIG 10

REMOTE CONTROL PORTABLE TRAFFIC CONTROL DEVICE AND SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The instant invention relates generally to remote signaling devices and, more specifically, to a remote control portable traffic signaling device and system for controlling a flow of traffic.

2. Description of the Prior Art

Numerous portable signaling devices have been provided in the prior art. For example, U.S. Pat. Nos. 2,829,362; 2,941,185; 5,252,969; 5,294,138; 5,400,019 and 5,493,292 all are illustrative of such prior art. While these units may be suitable for the particular purpose to which they address, they would not be as suitable for the purposes of the present invention as heretofore described.

U.S. Pat. No. 2,829,362

Inventor: Frank Terrill

Issued: Apr. 1, 1958

This invention relates to a traffic control system and, more particularly, to a system that can be employed to control the movement of traffic in an emergency condition that is not considered normal or permanent.

U.S. Pat. No. 2,941,185

Inventor: Wilbur J. Mullikin

Issued: Jun. 14, 1960

This invention relates to a signal for use at traffic intersections and adapted for easy transport from one location to another particularly for use around schools during opening and closing of the school and at special events requiring traffic control.

U.S. Pat. No. 5,252,969

Inventor: Mitsuhiro Kishi

Issued: Oct. 12, 1993

A temporary signal system wherein a pair of signal stands are installed at spaced locations adjacent a traffic restriction area. Each stand has at least red and green lights which light or flash for a predetermined time period to control vehicle traffic passing the restriction area. The signal stands include timers for counting actual time and providing the actual time, controllers for producing a flashing control signal for a selected red or green light upon reception of a time signal provided by the timer when the controller is in a flashing operation condition, and a lighting driver for permitting the selected red or green light to flash upon reception of the flashing control signal from the controller. The stands have an operation starting arrangement for initiating operation of the controllers of both of the stands at the same time, or a signal transmission arrangement for transmitting the operating condition data between the stands so that the lights of both stands are operated in a controlled and synchronized relationship with each other.

U.S. Pat. No. 5,294,138

Inventor: Nan S. Yang

Issued: Mar. 15, 1994

A traffic control cart includes a rolling wheel assembly, a base fixed on the rolling wheels, a column mounted on the base, an arm pivotally secured on one periphery wall of the column, a light device including at least a green light, a yellow light, and a red light being mounted on a top face of the column. The arm is allowed to reciprocate in a ninety-degree range from vertical position to horizontal position, in the meanwhile one color of the traffic lights is "on" thus controlling the traffic therearound.

U.S. Pat. No. 5,400,019

Inventor: Alfonso J. Riscoe, Jr.

Issued: Mar. 21, 1995

A portable traffic control device for temporary use capable of both automatic and manual operation which portable control device can be raised or lowered by hand and having a horizontal boom which folds down to a vertical position and with an adjustable and collapsible tripod stand and an electrical control circuit.

U.S. Pat. No. 5,493,292

Inventor: Bentley M. Fanslow et al.

Issued: Feb. 20, 1996

A traffic control signal particularly adapted for alternate one-way traffic situations such as are frequently encountered in highway construction zones whereby "STOP" AND "SLOW" sign panels can be alternately displayed with suitable control mechanism which produces a combination rotational and axial displacement of a signal panel whereby one traffic control message can be superimposed upon another for displaying either a "STOP" message or a "SLOW" for the vehicular traffic.

SUMMARY OF THE PRESENT INVENTION

The present invention relates generally to signaling devices and, more specifically, to a remotely or automatically controlled portable traffic signaling device and system for controlling a flow of traffic.

A primary object of the present invention is to provide an ultra portable signaling device and system that will overcome the shortcomings of prior art devices.

Another object of the present invention is to provide an ultra portable signaling device and system which is able to be controlled from a remote location.

A further object of the present invention is to provide an ultra portable signaling device and system which is 100% solid state construction and highly reliable.

A further object of the present invention is to provide an ultra portable signaling device and system which includes no moving parts.

An additional object of the present invention is to provide an ultra portable signaling device and system which includes a removable signal head for changing the identity and configuration of the signal head and thus the information and instructions communicated by the device.

A further object of the present invention is to provide an ultra portable signaling device and system which includes highly reliable power managed LED signal lamp banks which consume a minimal amount of energy during operation.

A yet further object of the present invention is to provide an ultra portable signaling device which is height adjustable or configuarable.

A still further object of the present invention is to provide an ultra portable signaling device and system including a base unit able to store at least one power source and thereby provide the device with an extended period of use.

An even further object of the present invention is to provide an ultra portable signaling device and system wherein the base unit aids in balancing the device and also includes a storage compartment for storing equipment, alternative signaling devices and spare parts for use with the device.

A yet further object of the present invention is to provide an ultra portable signaling device and system including a conflict monitor to monitor the device to prevent an error signal being communicated, e.g. a green light being displayed in opposing directions.

Another object of the present invention is to provide an ultra portable signaling device and system which may be easily and speedily deployed in a desired service area.

Another object of the present invention is to provide an ultra portable signaling device and system that is simple and easy to use.

A still further object of the present invention is to provide an ultra portable signaling device and system that is economical in cost to manufacture and maintain.

Additional objects of the present invention will appear as the description proceeds.

A remote control portable traffic signaling device and system for controlling a flow of traffic is disclosed by the present invention. The remote control portable traffic signaling system includes the portable signaling device and a plurality of oncoming warning flashers. The portable signaling device includes a wireless remote control unit and a signal head having LED signal lamp banks and a programmable microprocessor/controller. The remote control unit transmits a control signal to be received and analyzed by the microprocessor for use in controlling a message communicated by the display device. A base unit including a storage compartment for housing a power source is removably connected to the signal head for supplying power to the microprocessor and display device via a connection wire extending through a pole positioned therebetween. The power source may function as a universal power station able to supply at least one of AC and DC power. The power source may be a battery unit or even a motor generator. A connection device adjustably connects the pole between the signal head and base unit so as to allow for height adjustment of the portable signaling device. Thus the signal head and base are removably connected to one another. The plurality of warning flashers including a pair of high luminous LEDs are positioned at a predetermined distance from the portable signaling device to warn passersby of the presence of the portable signaling device.

To the accomplishment of the above and related objects, this invention may be embodied in the form illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that changes may be made in the specific construction illustrated and described within the scope of the appended claims.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

Various other objects, features and attendant advantages of the present invention will become more fully appreciated as the same becomes better understood when considered in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the several views.

FIG. **1** is a front perspective view of a first embodiment of the remote control portable traffic signal for use with the system of the present invention;

FIG. **2** is a front perspective view of the remote control portable traffic signal without light visors and including an alternatively shaped base unit for use with the system of the present invention;

FIG. **3** is an enlarged front view of the remote control portable traffic signal for use with the system of the present invention;

FIG. **4** is an enlarged view of the inside of the base unit of the remote control portable traffic signal for use with the system of the present invention;

FIG. **5** is a block diagram illustrating the internal components of the remote control portable traffic signal of the present invention;

FIG. **6** is a flow chart describing operation of the remote control portable traffic signaling system of the present invention;

FIG. **7** is a perspective view of the remote control portable traffic signaling system of the present invention;

FIG. **8** is a bottom view of the signal head taken along the line **8**—**8** in FIG. **1**;

FIG. **9** is a block diagram illustrating the components of the remote control unit for use with the portable traffic signal used in the system of the present invention; and

FIG. **10** is a cross-sectional side view of the power management LED warning flasher assembly for use with and providing an early warning system for the remote control portable traffic signaling system of the present invention.

DESCRIPTION OF THE REFERENCED NUMERALS

Turning now descriptively to the drawings, in which similar reference characters denote similar elements throughout the several views, the Figures illustrate a remote control portable signaling device and system of the present invention. With regard to the reference numerals used, the following numbering is used throughout the various drawing figures.

10 remote control portable traffic signal device for use with the system of the present invention
11 signal lamp head
12 red light
14 yellow light
16 green light
18 visor for red light
20 visor for yellow light
22 visor for green light
24 removable pole/main mast
26 first connector pin including locking nub
27 height adjustable pole including recesses
28 second connector pin including locking nub
29 pair of recesses
30 base
32 leveling feet
33 reflective sheeting
34 pole receiving device
35 recesses in pole receiving device
36 power source
37 universal power connector block within pole receiving device

38 wire cable connector
39 wire cable connecting power connector within pole receiving device to power source
40 storage compartment/additional battery storage
41 power connector within signal head
42 remote control transmitter unit
44 receiver
46 programmable microprocessor
47 GPS automatic location programming
50 LED signal lamp banks
52 conflict monitor
54 communication port
55 video camera
56 memory
57 theft signal beakon
58 future/additional options "piggy back" port
59 motion sensor
60 flasher/emergency oscillator
61 transmitter to other devices in area
62 LED for illuminating base unit
63 light sensors
64 collar for attachment of pole
65 recesses in connection collar
66 power source for remote control unit
68 microprocessor/logic circuit for remote control unit
70 light select input key
71 options port connector
72 numerical keypad
73 display device on remote control
74 remote control transmitter
76 warning signal indicating portable signal device is being approached
78 barricade warning flasher
80 replacement bulb assembly for use in barricade warning flasher
82 LEDs
84 clear tube housing LEDs
86 flasher circuit
88 plug for connection to bulb socket of stand
90 bulb socket receiving recess
92 stand for warning flasher
94 signaling system

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now descriptively to the drawings, in which similar reference characters denote similar elements throughout the several views, FIGS. **1** through **10** illustrate a remote control portable signaling device indicated generally by the numeral **10** for use in a signaling system indicated generally by the numeral **94**.

The remote control portable signaling system **94** includes the portable signaling device **10** and a plurality of warning flashers **76** positioned a predetermined distance from the portable signal device **10**. The warning flashers **76** provide an early warning system for indicating the presence of and proximity of passersby to the portable signaling device **10** as is illustrated in FIG. **7**. The warning flashers **76** may also alert passersby to the changing of the state of the portable signaling device **10**, e.g. from a green light to a red light.

Each portable signaling device **10** includes a signal head **11** and a base unit **30** connected together by either a removable pole **24** as shown in FIG. **1** or a height adjustable pole **27** as shown in FIG. **2**. The removable and adjustable poles **24** and **27** both include reflective sheeting thereon to improve visibility at night. The signal head **11** includes at least one side having a red light **12**, a yellow light **14** and a green light **16** positioned thereon so as to be visible when illuminated. The red, yellow and green lights **12**, **14** and **16** are indicative of the lights on a commonly known traffic signal. The signal head **11** may also include additional lights such as green and yellow arrows for indicating turning signals. In order to signal vehicles on other sides of the portable signal device **10** additional red, yellow and green lights **12**,**14** and **16** may be positioned so as to be viewable by vehicles approaching the portable signal device **10** from any desired direction. Shields **18**, **20** and **22** are also positioned about each light to shade the respective light from bright sunlight or to direct the light and thereby provide more intense illumination.

A connection collar **64** is positioned below the signal head **11** for removably and adjustably connecting the signal head **11** to either the removable or height adjustable pole **24** or **27**. The connection collar **64** is hollow and shaped to receive the pole **24** therein. A recess **65** is positioned on either side of the connection collar **64** for receiving a first securing pin **26** therethrough and connecting the pole **24** thereto. The collar also includes a universal power connector **41** for connecting with a power source located in the base **30** through either the removable or height adjustable pole **24** or **27**.

An underside of the signal head **11** is illustrated in FIG. **8**. As is illustrated in this figure, a plurality of LEDs **62** are positioned on an underside of the signal head **11** to thereby illuminate the base unit **30** and thus make the signaling device **10** more visible during periods of decreased visibility and darkness. The illuminating LEDs **62** may include light sensors **63** and thus only illuminate the base unit **30** when certain light deficient situations exist, e.g. at night or during a rain storm. The depiction of four LEDs **62** is for purposes of illustration only and not meant to limit the invention in any manner as to the number of LEDs which may be used to illuminate the base unit **30**, the number of LEDs being a design choice of the individual user and not affecting the operation of the system **94** in any manner. Light sensor **63** can also generate a signal for transmission to the programmable microprocessor **46** which will be interpreted to control the output or brightness of the LED lamp banks **50**.

It is to be understood that the present invention is not limited to use of the signal head **11** as described above. Any type of signal head such as a stop sign, a caution sign, a blinking red or yellow light, a message board, a speaker system for producing an audio or radio signal, etc. may be connected to the pole **24** using an appropriate connection collar **64**. Thus, the portable signal device **10** is able to communicate any desired message to passersby and is not limited to displaying the information communicated by the above described signal head. While numerous mechanisms for communicating a signal have been listed above, and a preferred mechanism for communicating a signal is shown and described herein, those of ordinary skill in the art who have read this description will appreciate that there are numerous other mechanisms for communicating a signal and, therefore, as used herein the phrase "signaling means for communicating a signal" should be construed as including all such mechanisms as long as they achieve the desired result of communicating a signal, and, therefore, that all such alternative mechanisms are to be considered as equivalent to the one described herein.

Connected at the opposing side of either the removable or height adjustable pole **24** or **27** is the base unit **30**. The base unit **30** includes leveling feet **32** positioned at a side opposite the connection with the pole **24** for maintaining the portable signal device **10** in an upright position. In lieu of the feet **32**, lockable wheels may be positioned on an underside of the

base unit **30** providing the device **10** with easy mobility by simply rolling the device **10** into the proper position. A pole receiving device **34** is positioned to extend from the base unit **30** and receive either the removable or height adjustable pole **24** or **27** therein. The pole receiving device **34** includes a recess **35** positioned on either side thereof for receiving a second securing pin **28** and adjustably securing either the removable or height adjustable pole **24** or **27** within the pole receiving device **34**. The pole receiving device **34** is of a length able to receive a substantial portion of the height adjustable pole **24** or **27** therein and thus allow for height adjustment and stability of the portable signal device **10**. The pole receiving device **34** also includes a universal power connector block **37** to provide a connection between the power source located in the base **30** and either the removable or height adjustable pole **24** or **27** via a connection cable **39** for ultimately providing power to the signal head **11**.

The height adjustable pole **27** includes a plurality of aligned recess pairs along the length thereof and a pair of recesses **29** at a top side thereof. The pair of recesses **29** at the top side are aligned with the recesses **65** in the connection collar **64** of the signal head **11** for placement of the first connecting pin **26** therethrough and connection of the pole **24** to the signal head **11**. The opposing end of the height adjustable pole **27** is positioned within the pole receiving device **34** to a desired depth wherein the signal head **11** extends to a desired height above the ground and a pair of the plurality of aligned recesses **29** corresponding to the desired height are aligned with the recesses **35** in the pole receiving device **34**. The second connecting pin **28** is inserted to extend through the pair of aligned recesses **29** in the height adjustable pole **27** and the recesses **35** in the pole receiving device **34** for adjustably connecting the base unit **30** to the height adjustable pole **27**. Alternatively a plurality of fixed length poles **24** may be removably connected between the base **30** and signal head **11** for maintaining a fixed height for the device **10**.

While a preferred structure for adjustably connecting the pole **24** between the signal head **11** and base unit **30** is shown and described herein, those of ordinary skill in the art who have read this description will appreciate that there are numerous other structures for connecting the pole **24** between the signal head **11** and base unit **30** and, therefore, the phrase "means for connecting the pole **24** between the signal head **11** and base unit **30**" should be construed as including all such structures as long as they achieve the desired result of adjustably connecting the pole **24** between the signal head **11** and base unit **30**, and therefore, that all such alternative mechanisms are to be considered as equivalent to the one described herein.

FIGS. **3** and **4** depict the base unit **30** in more detail. FIG. **4** illustrates the internal components of the base unit **30** which includes an area for placement of an internal power source **36**. The internal power source **36** is connected to the signal head **11** via a connection wire **38** extending from the power source **36** through the pole receiving device **34** and the pole **24**. A storage area **40** for tools and alternative signaling devices and parts for the signaling device **10** is also located within the base unit **30**. The positioning of the storage area **40** and the power source **36** in FIG. **4** is for purposes of example only and not meant to limit the invention in any manner. Furthermore, the portable signaling device **10** may include more than one internal power source **36** for supplying additional power to the signal head **11** and thus increase its operating life without recharging the power source **36**. The shape of the base unit **30** may be in the form of a box as depicted in FIG. **1** or pyramidal as depicted in FIG. **2**. The actual shape of the base unit **30** is not critical as long as the base unit **30** is able to provide a storage area for an internal power supply **36** and any tools or replacement parts deemed necessary while being able to adjustably secure the pole **24** in an upright position.

The internal components of the signal head **11** are depicted in FIG. **5**. The internal power source **36** is positioned within the base unit **30** and includes an extension wire **38** which extends through the pole **24** and provides an electrical connection to a programmable microprocessor/controller **46**. The programmable microprocessor/controller **46** is connected to a receiver **44** which receives signals transmitted by a user via a remote transmitter **42** or through the communication port **54** or **58**. The remote transmitter **42** will be described in more detail with specific reference to FIG. **9**. The instructional data received by the programmable microprocessor/controller **46** via the receiver **44** or the communication port **54** is either stored in a memory **56** or used to control operation of the signaling device **10**. The programmable microprocessor/controller **46** is connected to illuminate the LED signal lamps **50**, i.e. the red, yellow and green lights, based upon the instruction data received by the programmable microprocessor/controller **46**. Also connected to the programmable microprocessor/controller **46** is a GPS automatic location programmer **47** for adjusting the timing controlled by the programmable microprocessor/controller **46** based upon the location in which the system is placed.

The LEDs **62** on the underside of the signal head **11** are also directly connected to the power source **36**. The light sensor device **63** which senses the amount of light in the environment in which the signal device **10** is operating is connected to the programmable microprocessor/controller **46**. The light sensor **63** generates a signal for transmission to the programmable microprocessor **46** which will be interpreted to control the output or brightness of the LED lamp banks **50**. Based upon the amount of light sensed by the light sensor device **63**, the programmable microprocessor/controller **46** provides power from the power supply **36** to the LEDs **62** when certain predetermined light deficiency requirements are met.

A conflict monitor **52** is connected between the LED signal lamps **50** and the programmable microprocessor/controller **46** for monitoring the signals being communicated by the LED signal lamps **50**, i.e. the lighting sequence of the LED signal lamps **50**. The conflict monitor **52** determines if the illumination of the LED signal lamps **50** is in error, e.g. if a green light is lit in opposing directions, and communicates such to the programmable microprocessor/controller **46**. In response to receipt of an error signal the microprocessor/controller **46** causes either the illumination of the LED signal lamps **50** to cease or initiates a safety situation such as a flashing red light, i.e. a stop signal, or turns the system off. Connected between the programmable microprocessor/controller **46** and the LED signal lamps **50** is a flasher/emergency oscillator circuit **60** for producing a flashing effect whereby the LED signal lamps will flash on and off. The flasher/emergency oscillator circuit **60** is controlled by the microprocessor/controller **46** based upon the instruction data transmitted to the programmable microprocessor/controller **46** and stored in the memory **56** or it may be activated upon determining by the conflict monitor **52** that the LED signal lamp banks are lit in error.

A future additions/options port **58** is also connected to the programmable microprocessor/controller **46** for connection of peripheral devices such as an audio signal device for producing an audio or radio warning signal or a message

board for displaying a warning message in addition to the message already communicated by the signal head **11**. The future additions/options port **58** may also be used to program the microprocessor/controller **46** instead of through the use of the remote control unit **42**. An additional options port **58** is also connected to the programmable microprocessor/controller **46** for connection of any additional peripheral devices or for use in programming of the programmable microprocessor/controller **46** or changing the interval times at which the programmable microprocessor/controller **46** illuminates the LEDs of the signal head.

Other components such as a video camera **55**, theft signal beacon **57**, a motion sensor **59** and a transmitter **61** for alerting other devices within the system as to current conditions are also connected to the programmable microprocessor/controller **46**. The video camera **55** is connected to the power supply for recording on video tape all occurrences which occur in the area surrounding the signaling device **11**. The video camera **55** operates as a conventional video camera and video tapes all occurrences surrounding the device when connected to the power supply. An individual video camera **55** can be positioned on all sides of the device to record all occurrences surrounding the device. The theft signal beacon **57** is connected to the programmable microprocessor/controller **46** for transmitting a theft signal when the signal head is removed from the device by an unauthorized party. The theft signal beacon operates as a conventional radio signal transmitter. A motion sensor **59** is also connected to the programmable microprocessor/controller **46** for sensing the flow of traffic and any moving objects around the device. The programmable microprocessor/controller **46** can then adjust the signaling of the device to best accommodate the flow of traffic surrounding the device. When the programmable microprocessor/controller **46** changes the programmed signaling of the device or simply changes signals in accordance with its programming it is able to alert other signaling devices within the system area as to the changes. The other signaling devices can then adjust their signaling patterns to correlate with the other devices in the system and thereby increase the flow of traffic.

The internal components of the remote control unit **42** are illustrated in FIG. **9**. The remote control unit **42** includes an internal power source or battery **66** for supplying power to a microprocessor **68**. The face of the remote control unit **42** includes a keypad including light/message select keys **70** and alpha-numeric keys **72**. The light/message select keys **70** allows the user to select a particular message to be displayed by the signal device or to select a particular one of the LED signal lamps for inputting a control signal. The light/message select keys **70** include a plurality of buttons for entering a predetermined mode for use in programming the programmable microprocessor/controller **46** or for stepping through a programmed menu to select predetermined programming for the programmable microprocessor/controller **46**. The alpha-numeric keys **72** are used in conjunction with the light/message select keys **70** to select an LED signal light and to set a duration for which the selected light will remain illuminated, e.g. setting the red light to remain illuminated for 45 seconds, the yellow light to remain illuminated for 5 seconds and the green light to remain illuminated for 35 seconds. The microprocessor **68** receives this information from the light/message select keypad **70** and the alpha-numeric keypad **72** and relays the signals to a transmitter **74** for transmission to the receiver **44** in the signal head **11** of the portable signal device **10**. The remote control unit **42** also includes a connections port **71** for connection to the connection port **54** for directly programming the programmable microprocessor/controller **46** and a display device **73** for displaying the programming options to the user as he activates the alpha-numeric keypad **72** and light/message select keypad **70**.

FIG. **10** illustrates an LED barricade warning flasher replacement bulb assembly **80** used with the warning signal device **76**. The warning signal devices **76** are positioned prior to encountering the portable signal device **10**. The warning flasher **80** includes two LEDs **82** preferably positioned head-to-head within a clear tube **84** although other configurations may be used. It is preferred to use two **10**mm High luminous LEDs for producing the most energy efficient warning signal although any LEDs suitable to produce a sufficient amount of light may be used. In this configuration, the LEDs **82** illuminate the tube **84** and direct light towards the opposing side of the tube **84** in which they are placed thus directing light through the transparent LED bodies and out of both sides of the tube **84**. A current limit resistor or flasher circuit **86** may be connected to the LEDs **82** causing them to flash on and off. Connected to an underside of the tube **84** is a universal connector device **88** for connecting the warning flasher **80** to any number of different stands and thus placement of the warning flasher **80** in any number of different places and positions. An internal power source may be present within the warning flasher **80** or may be within the stand **92** and connected to the warning flasher **80** via the connection collar **88** for supplying power to illuminate the LEDs **82**.

The operation of the device and system will now be described with specific reference to FIG. **6**. In step S2 the portable signaling device **10** is constructed by connecting the desired signal head **11** and base unit **30** to opposite sides of the pole **24**. The height of the signal device **10** is adjusted by controlling the depth to which the pole **24** extends into the pole receiving device **34** of the base unit **30**. Alternatively, various fixed length poles can be used to set the portable signaling device at a desired height. The warning flashers **80** are then connected to their respective stands **92** to form the warning signal devices **76**. Next the system **94** is set up by positioning the portable signaling device **10** in the middle of the system area and each warning signal device **76** about the area in which the system **94** is to operate as stated in step S4. The portable signaling device **10** is positioned in the center of the area while the warning signal devices **76** are positioned about the area to warn that the portable signaling device **10** is activated and will be encountered shortly. The portable signaling device **10** and each warning signal device **76** is then turned on by supplying power to the appropriate components as described in step S6 thus making the system **94** operational.

The portable signaling device **10** is then programmed to communicate the desired signal either through a transmission from the remote control unit **42** to the receiver **44** in the signal head **11** or through data input to the programmable microprocessor/controller **46** through the communications port **54** or future additions/options port **58** as stated in step S8. If the remote control unit **42** is used, the signals received by the receiver **44** are sent to the programmable microprocessor/controller **46** in step S10. If the signal head **11** includes a plurality of lights, e.g. red, yellow and green as used in a conventional traffic signal, the time periods for operation are programmed into the microprocessor/controller **46**. If the signal head **11** is an LED message board the message to be displayed is input to the microprocessor/controller **46** for display on the message board as described in step S12.

As the LED signal lamps **50** are lit according to the programmed time periods, the sequence is constantly checked by the conflict monitor **52** to determine if an error in illuminating the LEDs has occurred, e.g. two LEDs are illuminated at the same time, steps **S14** and **S16**. If it is determined the illumination of the LEDs are correct, the illumination of the LEDs is continued in accordance with the programming of the microprocessor/controller **46** as stated in step **S18**. If an error in illuminating the LEDs occurs, an error signal indicative of a malfunction is transmitted to the microprocessor/controller **46** and the microprocessor/controller **46** initiates a flashing signal, e.g. a flashing red LED signifying a stop signal to control traffic, indicating an illumination malfunction as described in steps **S20** and **S22**. This signal continues until the microprocessor is reprogrammed or operation of the system is terminated and dismantled in step **S24**.

From the above description it can be seen that the remote control portable signal device and system of the present invention is able to overcome the shortcomings of prior art devices by providing a remote control portable signal device and system which is able to be controlled from a remote location and includes a removable head piece for changing the signal communicated by the device. The portable signaling device and system is also configured to consume a minimal amount of energy during operation and is height adjustable. A base unit of the device includes a storage compartment for storing equipment and replacement parts for the device and is also able to store a plurality of power sources to thereby provide extended use of the device. Furthermore, the remote control portable signal device and system of the present invention is simple and easy to use and economical in cost to manufacture, operate and maintain.

It will be understood that each of the elements described above, or two or more together may also find a useful application in other types of methods differing from the type described above.

While certain novel features of this invention have been shown and described and are pointed out in the annexed claims, it is not intended to be limited to the details above, since it will be understood that various omissions, modifications, substitutions and changes in the forms and details of the device illustrated and in its operation can be made by those skilled in the art without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

What is claimed is new and desired to be protected by Letters Patent is set forth in the appended claims:

1. A remote control portable traffic signaling system including a device connected to a power source for controlling a flow of traffic comprising:

a) remote control means for transmitting a control signal;

b) a signal head including a display means for communicating a message to passersby and a controller for receiving said control signal transmitted by said remote control means and connected to control said message communicated by said display means based upon said received control signal, said display means comprising red LED's facing in multiple directions, yellow LED's facing in multiple directions, and green LED's facing in multiple directions, said red, yellow and green LED's being each illuminated for a length of time indicated by a control signal received from said remote control unit;

c) a base unit including a storage compartment for housing the power source, the power source being connected to supply power to said display means, tools, optical and other replacement parts for use by said portable signal device;

d) a pole positioned between said signal head and base unit;

e) means for adjustably connecting said pole between the signal head and base unit;

f) conflict monitor means in said signal head connected between said controller and said display means for monitoring illumination of said red, yellow and green lights to determine it said illumination is in error and causes said lights to cease operation or initiates a safety situation it the operation of said lights is in error, said controller generating a default error signal upon receipt of an error signal from said conflict monitor;

g) the underside of said signal head having a plurality of downwardly facing LED's illuminating said base unit and light sensors to turn on said downwardly facing LED's when a light deficient situation exists and generate a signal for transmission to said microprocessor to control the brightness of said red, yellow, and green LED's;

h) a plurality of warning flashers positioned about an operating area at a predetermined distance from said portable signaling device for indicating the presence of said portable signaling device controlling a flow or traffic, each of said warning flashers comprising a stand and an LED flashing assembly connected to said stand;

i) said signal head further includes a communication port connected to said controller for attachment of a peripheral device for communicating a second message to passerby, a memory connected to said controller for storing said received control signal for use by said controller in controlling said display device;

j. said display device being controlled by said controller to produce at least one of an audio signal, a radio frequency, and any other communication signal; and

k. beacon means for transmitting a theft signal when said signal head is removed from said device by an unauthorized party.

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