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[54] **SUPPLEMENTAL VISUAL DISPLAY FOR TRAFFIC SIGNAL**

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[52] **U.S. Cl.** ..... **340/131,** 340/130, 340/120, 340/142, 340/46, 116/63 R

[51] **Int. Cl.** **G08g 1/097**

[58] **Field of Search** ..... 340/131, 22, 275 S, 31 R, 340/37, 38 R, 40, 41 R, 44, 47, 120, 132, 130, 46, 142; 116/63 R

[56] **References Cited**

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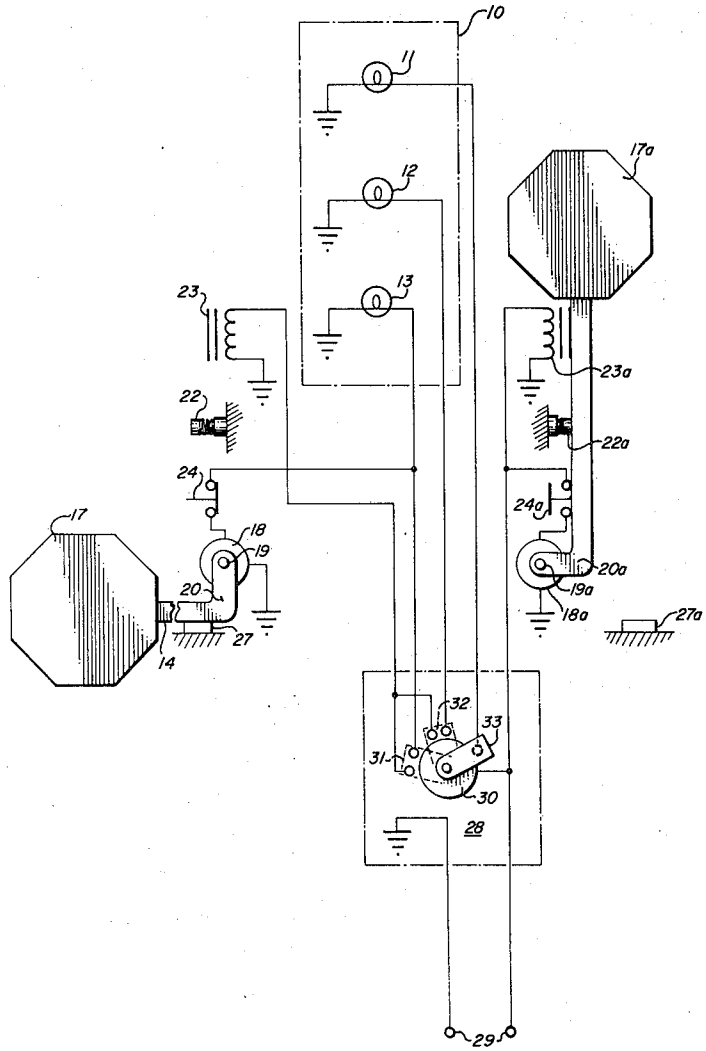
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[57] **ABSTRACT**

A supplemental visual display cooperates with a traffic signal for indicating the operational mode thereof. An arm supporting a visual display at one end is raised by an electric motor in response to an electric signal from the traffic signal controller and, thereafter, is normally retained in the upright position by an electromagnet. When the electromagnet is relaxed, in accordance with one operational mode of the controller, the arm pivots downwardly to exhibit the visual display.

1 Claim, 3 Drawing Figures



2 Sheets-Sheet 1

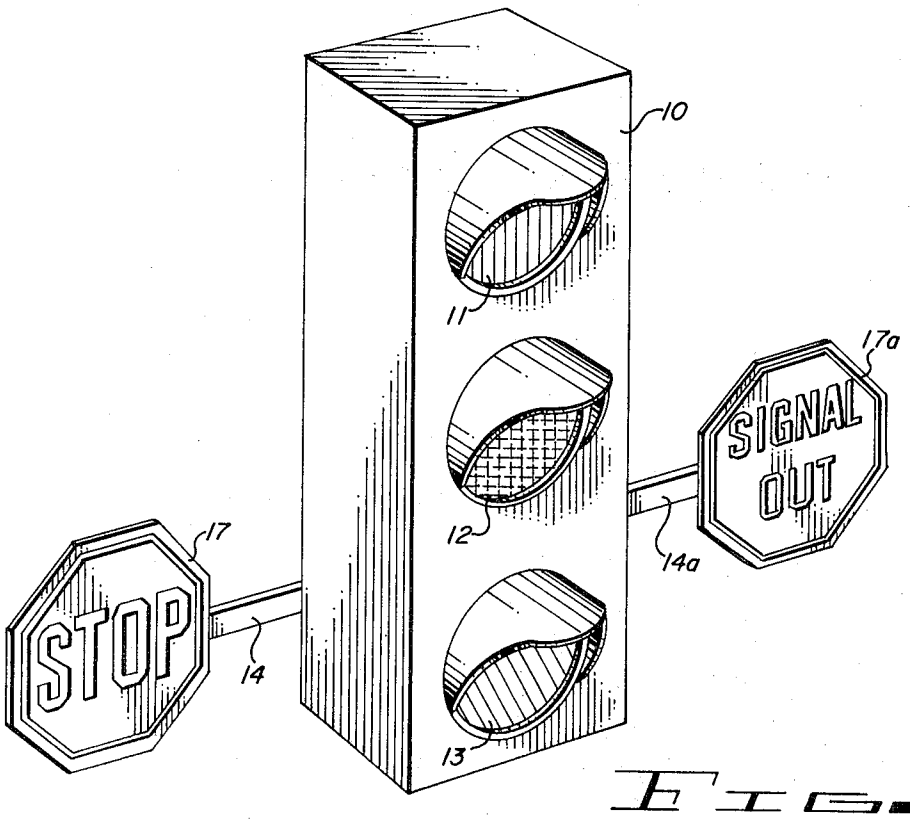


Fig-1

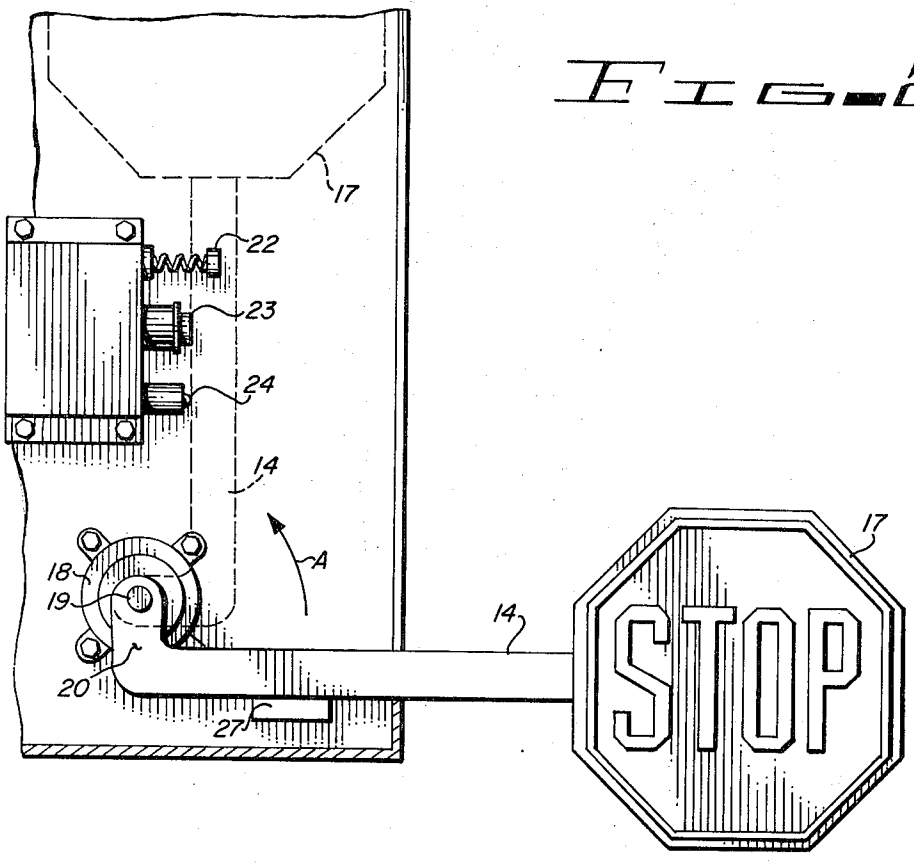


Fig-2

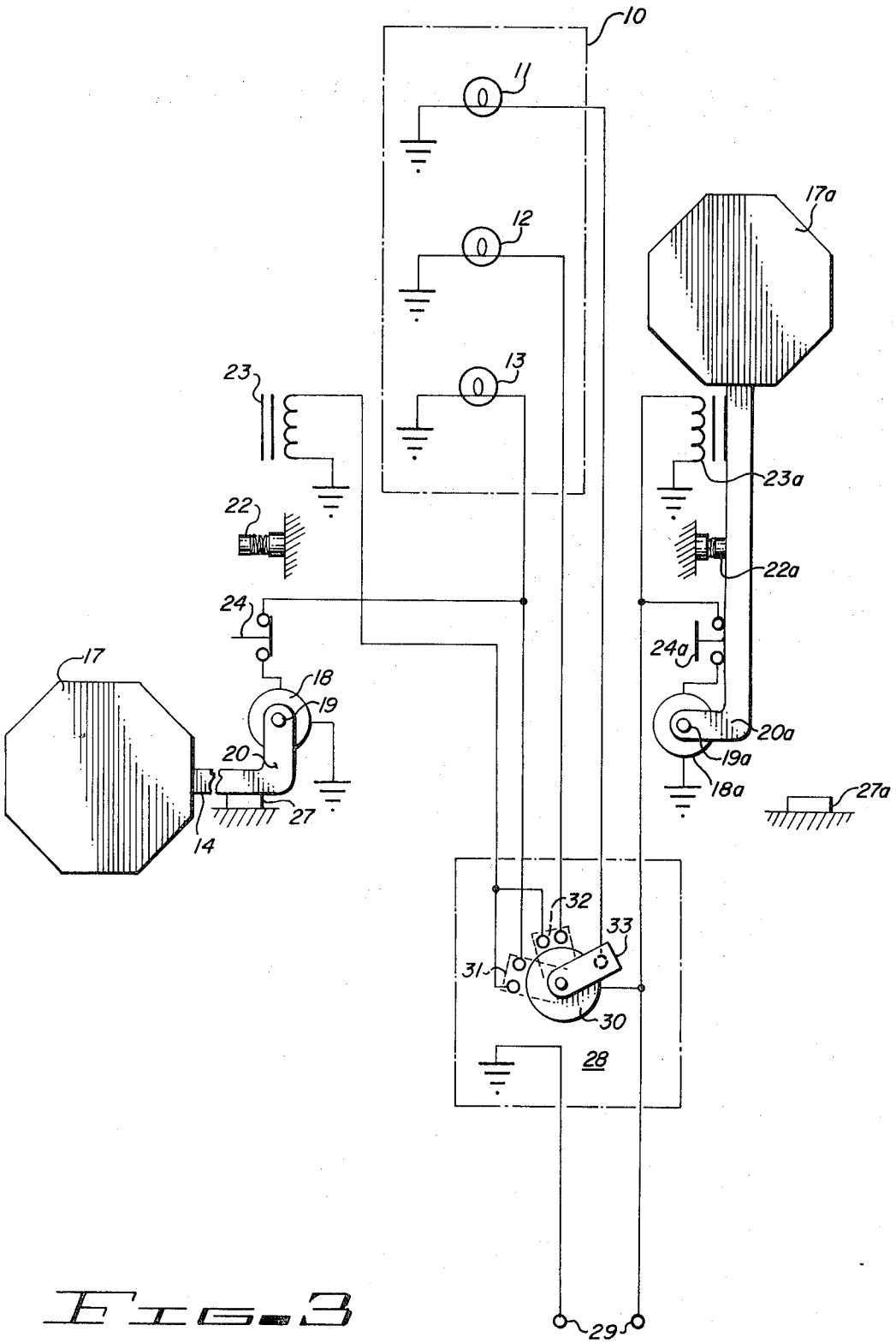

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24a
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Fig-3

SUPPLEMENTAL VISUAL DISPLAY FOR TRAFFIC SIGNAL

This invention relates to signalling devices.

In a further aspect, the present invention relates to electrical signalling devices which periodically display perceptive signals for regulating traffic.

More particularly, the invention concerns a supplemental visual display for cooperating with the signalling device to indicate the operational mode thereof.

Electric signalling devices for the regulation of traffic, either pedestrian or vehicular, are well know. The signalling device generally displays a perceptible signal as an indicator of an immediate or emergent condition. The exigency of the condition is conveyed by a universal interpretation of the displayed signal.

Exemplary of perceptible signalling devices is the conventional three-phase signal commonly encountered at traffic intersections. The traffic signal has three different colored lights which are sequentially illuminated to regulate the flow of traffic through the intersection. Periodically displayed is the green, yellow or red signal, which is interpreted as proceed, caution, or stop, respectively. Other electric signalling devices display such varied perceptible signals as flashing lights, buzzers, bells, and semaphore arms to indicate various messages.

Frequently, the messages warn of immediate hazard and require an expeditious response by the percipient. However, many times the signals are not discernable due to environmental conditions. For example, glare from direct or reflected light can nullify a lighted signal, as can a high ambient noise level cancel an audio signal. The problem is further compounded by the possible loss of electrical energy to the signalling device, thereby rendering it inoperative. In either case, the intended perceiver may unknowingly be placed in jeopardy.

It would be highly desirable, therefore, to reinforce the signalling device with a supplemental visual display.

Accordingly, it is a principal object of the present invention to provide a supplemental visual display for use in combination with an electric signalling device for indicating the operational mode thereof.

Another object of the present invention is to provide a visual signal to augment the perceptible signal periodically displayed by an electric signalling device.

Yet another object of the present invention is to provice a visual signal which is activated in response to an electric power failure to the signalling device for indicating that the signalling device is currently inoperative.

Yet still another object of the present invention is the provision of a supplemental visual display of the above type which is readily operatively adjoined to existing electric signalling devices.

Electrical signalling devices of the type generally used to control pedestrian or vehicular traffic generally include an electric controller, a source of continuous electrical energy supplied to the controller, and at least one perceptible signal periodically activated in response to the controller. The controller may activate the signal in accordance with a timed sequence, as illustrated by an intersection traffic signal, or on a demand basis, as exemplified at railroad crossings.

Briefly, to accomplish the desired objectives of the present invention, in accordance with a preferred embodiment thereof, first provided is an electric motor having a power output shaft. An arm secured at one end to the power output shaft carries a visual display at the other end thereof. The electric motor is interconnected with the controller to rotatably raise the arm in one direction in response to an electric signal from the controller and to permit the arm to fall freely in the other direction in the absence of an electric signal from the controller. The arm is normally retained in the raised position by an electromagnet, which position of the arm also activates a normally closed switch which delimits the rotation of the electric motor.

It will be understood, therefore, that as long as an electric signal is transmitted from the controller to the electromagnet, the arm will be retained in the raised position. When the electric signal from the controller to the electromagnet is interruped, either by normal periodic activity of the controller or an electric power failure thereto, the electromagnet releases the arm. Since the power output shaft is freely rotatable in the direction opposite the powered rotation direction, the arm will pivot therewith and freely fall to extend and exhibit the supplemental visual display. In the next cycle of operation, the controller concurrently supplies electrical energy to the electromagnet and to the motor, thereby raising the arm to be retained by the electromagnet.

A more comprehensive understanding of the present invention and the objects and advantages thereof will become readily apparent to those skilled in the art from the following detailed description thereof, taken in conjunction with the drawings, in which:

FIG. 1 is a perspective view of an electric signalling device, herein shown as a three-phase traffic signal for purposes of illustration, and having operatively affixed thereto the supplemental visual display of the present invention;

FIG. 2 is a partial rear elevational view of a traffic signal of FIG. 1 and specifically illustrating the mechanical attachment of the device of the present invention thereto; and

FIG. 3 is a schematic illustration detailing the operative connection between the traffic signal of FIG. 1 and the supplemental visual display device of the present invention.

Turning now to the drrawings, in which the same reference numerals indicate corresponding elements throughout the several views, FIG. 1 generally illustrates a conventional three-phase traffic signal **10** having three sequentially activated perceptible signals — a red light **11**, a yellow light **12** and a green light **13**. An arm **14**, an element of the supplemental visual display device of the present invention, is shown extending from the traffic signal **10**. A plate **17**, carried at the free end of the arm **14**, bears selective indicia, "Stop," to cooperate with and augment the red light **11**. Similarly, an arm **14***a*, having a plate **17***a* at the free end thereof bearing the message, "Signal Out," is extended to indicate the malfunction of the traffic signal **10**. The manner of cooperation between the supplemental visual display device of the present invention and the signalling device for indicating the operational mode thereof will be hereinafter described in detail.

The mechanical elements of the supplemental visual display device of the present invention are shown in FIG. **2**. A motor **18**, having a power output shaft **19**, is secured to the traffic signal **10**. The arm **14** has an an-

gular portion 20 at the end thereof, which is secured to and rotatable with the shaft 19. In response to an electrical signal, the motor 18 rotates the shaft 19 in the direction of the arrow A to raise the arm 14 from the extended position, herein illustrated, to the raised position, as indicated by the dotted lines. A housing 21, holding a spring plunger 22, an electromagnet 23, and a normally closed switch 24, is also secured to the traffic signal 10. The housing 21 is positioned such that during the final movement of the arm 14 into the raised position, the spring plunger 22 is compressed and allowing the arm 14 to contact the electromagnet 23. In the raised position, as the arm 14 is engaged by the electromagnet 23, the arm 14 concurrently abuts the normally closed switch 24 to open the switch which discontinues the electric signal to the motor 18. This, of course, prevents overloading the motor 18 and the arm 14 is retained thereafter in the raised position by the electromagnet 23. When, in accordance with a subsequent mode of operation of the traffic signal 10, the electric signal to the electromagnet 23 is discontinued, the arm is free to fall into the extended position. It will be appreciated that the shaft 19 is freely rotatable in the direction counter to the arrow A. This can be accomplished simply either by using a motor having an armature with low resistance to rotation or a ratchet arrangement between the motor 18 and the shaft 19. The angled portion 20 of the arm 14 creates an unstable condition when the arm is raised and, thereby, gives a mechanical advantage to assist the arm in falling from the raised position to the extended position. The spring plunger 22 biased against the arm 14 provides an initial assist in the free fall movement of the arm 14. A stop 27 limits the free fall of the arm 14 to the extended position to display the message carried upon the plate 17. As the arm 14 begins to fall, the switch 24 returns to the normally closed state, thereby permitting a subsequent electric signal to the motor 18 to again pivot the arm 14 into the raised position. As specifically noted herein by the dotted line representation, the supplemental visual display device of the present invention is concealed and hidden from view when the arm 14 is in the raised position and, alternately, extended and exposed to view when the arm 14 has fallen against the stop 27.

FIG. 3 schematically illustrates a preferred method of electrically operating the supplemental visual display device of the present invention in response to the operational mode of the traffic signal. In accordance with conventional practice, the traffic signal 10 includes a controller 28 which usually receives a continuous source of electrical energy supplied thereto through the electric leads 29. A timer 30 within the controller 28 is provided with three sets of contacts 31, 32 and 33, which are associated with the red light 11, the yellow light 12, and the green light 13, respectively. Electrical contact set 31 is also associated with the electromagnet 23 and the electric motor 18 with the normally closed switch 24 in series between the contact set 31 and the motor 18. The contact set 32 is associated with the electromagnet 23, while the contact set 33 communicates only with the red light 11.

As shown in FIG. 3, the timer has closed contact set 33, thereby permitting electricity to reach the red light 11. Since the contact sets 31 and 32 are open, neither the electric motor 18 nor the electromagnet 23 are energized permitting the arm 14 to fall against the stop 27 to display the message carried upon the plate 17. According to conventional practice, the appropriate message would be "Stop" to supplement the perceptive signal of a red light. Subsequent to opening the contact set 33, the timer will close the contact set 31. The electric motor 18 now energized rotates the arm 14*a* to the raised position to engage the electromagnet 23, which is also energized. Concurrently, the arm 14*a* abuts and compresses the spring plunger 22 and urges the normally closed switch 24 into the open position to interrupt the electric signal to the motor 18. The next sequential stage of the timer closes the contact set 32 and opens the contact set 31 to display the yellow light 12 and maintain the electromagnet 23 in the energized state. When the timer passes from the contact set 32 to the contact set 33 to again energize the red light 11, the electromagnet 23 is de-energized and with an initial assist from the spring plunger, the arm 14 falls into the extended position.

In addition to the supplemental visual display device hereinbefore described in detail and used as an adjunct to the red light, the traffic signal is provided with a second supplemental visual display device mechanically identical to the first device for purposes of a safety and hazard warning that a power barrier has rendered the traffic signal inoperative. Similar to the previously described supplemental display device, the instant display device, as specifically seen in FIG. 3, includes a motor 18*a* having a power output shaft 19*a* and an arm 14*a* having an angle portion 20*a* thereof secured to the shaft 19*a* and a plate 17*a* at the free end of the arm which bears selective indicia thereon. The appropriate message for the plate 17, as shown in FIG. 1, is "Signal Out."

The message "Signal Out" is displayed only in those instances of a power failure to the controller of the traffic signal. Therefore, as shown in FIG. 3, the arm 14*a* is normally retained in the raised position whereby the plate 17*a* is hidden from view by the traffic signal 10. The electromagnet 23*a* receives an electric signal directly from the main input line 29 to the controller and is, therefore, maintained in the raised position for the duration of continuous electrical energy supplied to the controller. It is noted herein that the motor 18*a* also receives an electric signal directly from the main electrical energy source to the controller. In the raised position, the arm 14*a* opens the normally closed switch 24*a* to discontinue the electric signal to the motor 18*a*. When the electric signal is interrupted, as by a power failure to the controller, the electromagnet 23*a* relaxes and the arm 14*a* freely falls to rest against the stop 27*a* and display the message upon the plate 17*a*. When the arm 14*a* moves away from the switch 24*a*, the switch closes. Upon resumption of electrical energy supplied to the controller, the motor 18*a* is activated to rotate the shaft 19*a* and raise the arm 14*a* into the concealed position. The operation of the elements of the supplemental visual display device herein, including the spring plunger 22*a*, is functionally identical to those described in connection with the aforementioned supplemental visual display device including the arm 14.

As shown in the drawings and described herein, the supplemental visual display device of the present invention cooperates with a three-phase traffic signal for indicating the operational mode thereof. It will be readily apparent to those skilled in the art, however, that a supplemental visual display device constructed in accor-

dance with the teachings of the present invention utilizing similar mechanical elements and having an altered electrical circuit is adapted for use with single-phase traffic signals and other signalling devices utilizing audible or visual perceptible signals.

Having fully described and disclosed the present invention and the preferred embodiment thereof in such clear and concise terms as to enable those skilled in the art to understand and practice the same, the invention claimed is:

1. For use in combination with an electrical signalling device which includes

an electrical controller,

a source of continuous electrical energy supplied to said controller, and

at least one perceptible signal periodically activated in response to said controller,

a supplemental visual display device cooperating with said signalling device and for operating in response to

failure of said perceptible signal, said visual display comprising:

a. an electric motor having a power output shaft freely rotatable in one direction and rotatable in the other direction in response to an electric signal;

b. an arm secured at one end to said power output shaft and rotatable therewith to freely fall in one direction and to be raised thereby in the other direction;

c. a plate bearing selective indicia carried by the free end of said arm;

d. electromagnetic means for normally retaining said arm in a raised position; and

e. normally closed switch means associated with the electric signal to said motor and opened by said arm when said arm is retained by said electromagnetic means.

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