

July 26, 1949.

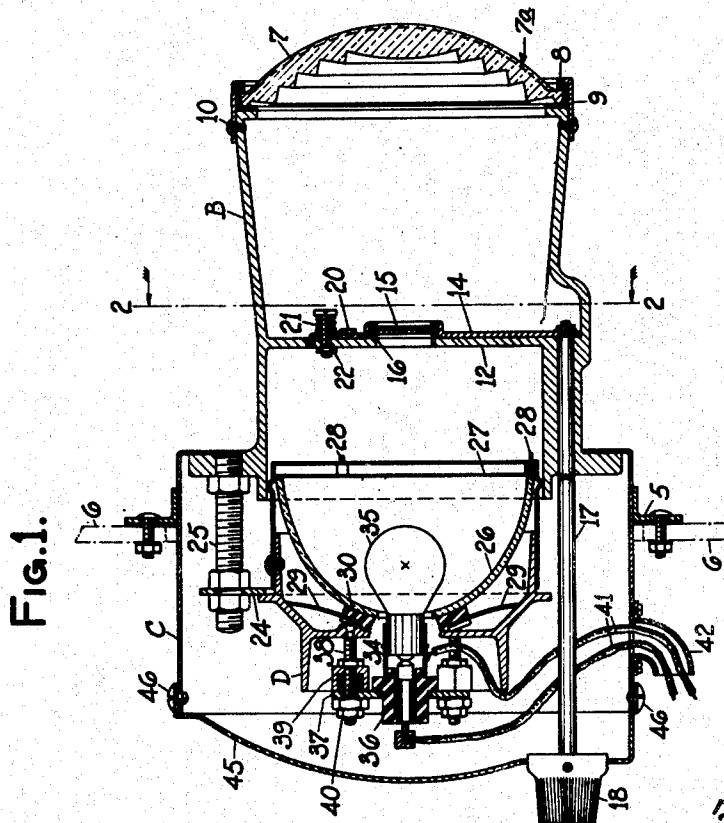
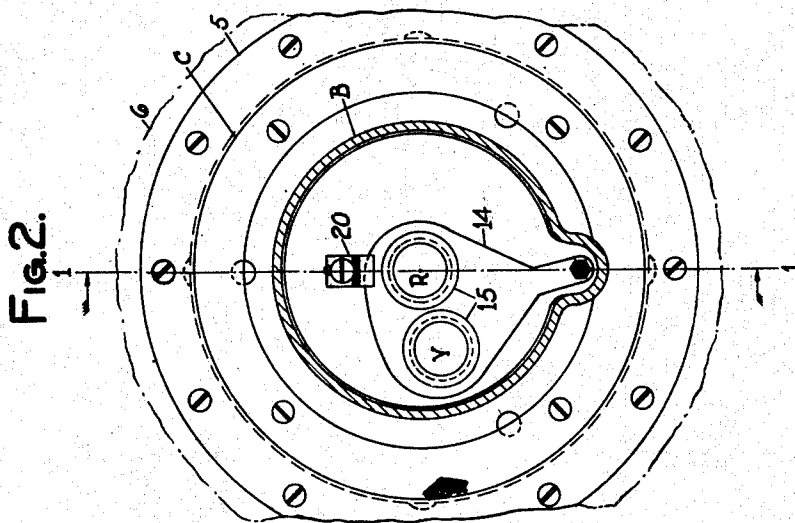
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2,477,299

TRAIN WARNING SIGNAL LIGHT

Filed Sept. 27, 1946

4 Sheets-Sheet 1



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FIG. 4.

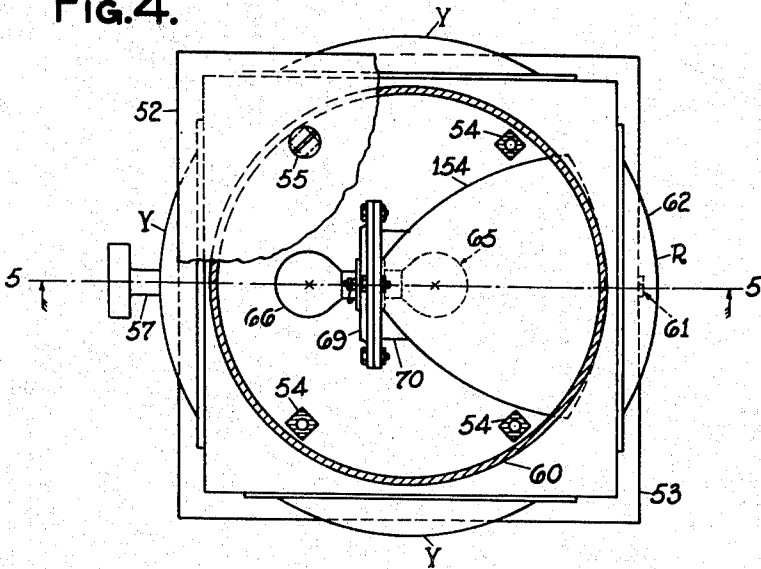
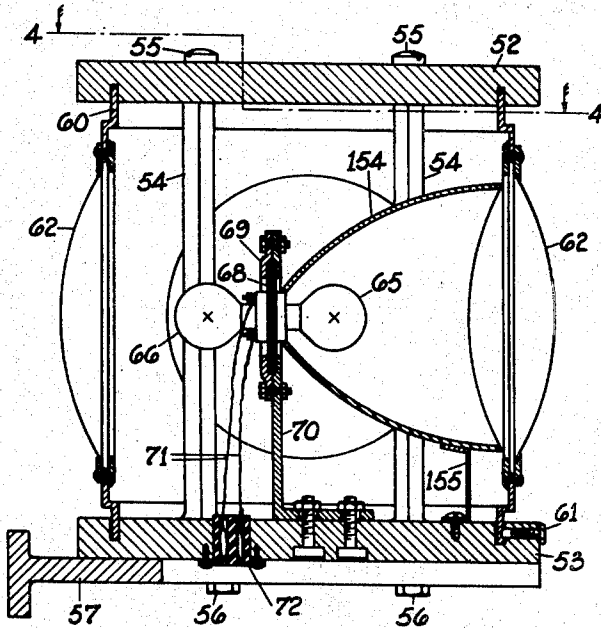


FIG. 5.



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FIG. 6.

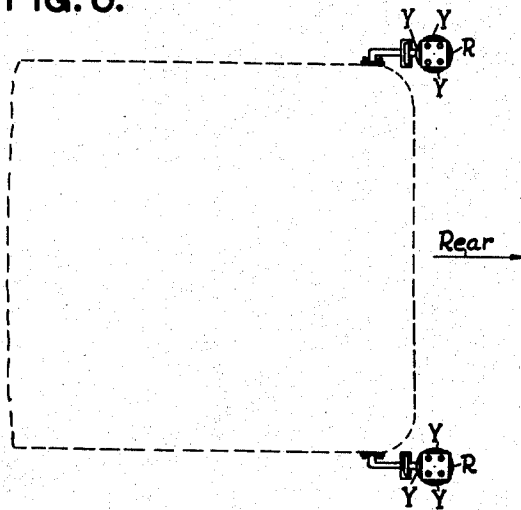
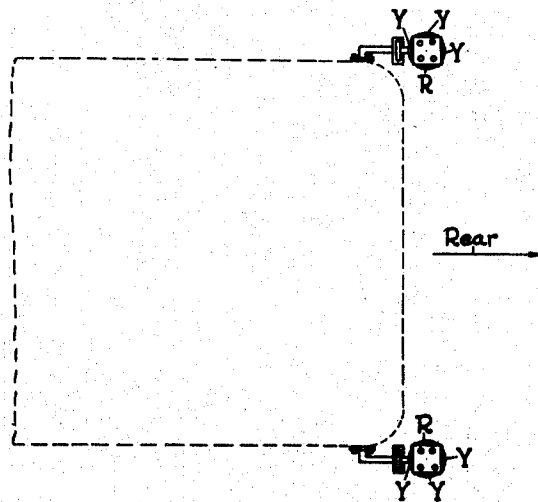


FIG. 7.



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2,477,299

TRAIN WARNING SIGNAL LIGHT

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Application September 27, 1946, Serial No. 699,679

1 Claim. (Cl. 177-352)

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This invention relates to warning signal lights for railway trains, and more particularly to a system or organization of changeable color warning signal lights for the rear and front ends of trains which will afford the desired indications or information to satisfy the varying conditions encountered in railroad operation.

It is common practice on railroads, in order to indicate or mark the rear end of a train at night, to provide rear end or marker lights, usually in the form of two oil burning or electric lanterns with colored roundels, which are lighted at night. For various purposes, such as enabling station agents and operators to observe when the rear end of a train has passed, such marker lights with their limited intensity and range are adequate. Under other conditions, however, such as when a train stops and it is necessary to warn following trains, it is desirable that the marker lights should have an intensity to be clearly visible for much longer distances. Also, a train is sometimes stopped under special conditions where there may be obstructions affecting train movement on other tracks, and it is desirable to provide a distinctive and arrestive indication for the marker lights on the rear end of the stopped train and also preferably at the front end, so as to afford the proper protection to train movement on the other tracks. In accordance with usual railroad operating practice, the color of either one or both of the marker lights is changed at times to show that a train is on a siding, or running on some track or in a certain direction which calls for a different display of rear-end lighting; and it is desirable to provide facilities by which the color, as well as the intensity, of the marker lights may be readily changed as conditions require.

With these conditions in mind, it is proposed in accordance with this invention to provide a system or organization of rear end marker lights for trains which is capable of giving the desirable long range indication for warning following trains to stop, which may be operated to display another distinctive and arrestive long range indication on both the front and rear ends when required under special emergency conditions to warn trains on other tracks to stop, and which permits ready change in the color of the marker lights as may be necessary.

The primary object of this invention is to provide a system of warning signal lights for railway trains having these desirable operating characteristics by simple, economical and reliable apparatus. Various other objects, characteristic

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features and attributes of the invention will be in part apparent and in part pointed out as the description progresses.

The accompanying drawings illustrate certain specific embodiments of the invention, with certain parts and circuits shown diagrammatically and in a simplified manner for the purpose of facilitating an explanation and understanding of the nature of the invention.

In these drawings, Fig. 1 is a longitudinal vertical section through a marker light embodying the invention, said section being taken along the line 1-1 in Fig. 2.

Fig. 2 is a transverse section through the marker light along the line 2-2 in Fig. 1.

Fig. 3 is a fragmentary view illustrating the operating knob projecting from the end of the marker light casing for changing the color of the light.

Fig. 4 is a plan view, partly in section along the line 4-4 of Fig. 5, illustrating a modified form of marker light.

Fig. 5 is a vertical section along the line 5-5 of Fig. 4 of this modified form of marker light.

Figs. 6 and 7 are diagrammatic views indicating the relationship of the modified form of marker lights to the ends of a car or caboose for two different forms of indications.

Fig. 8 illustrates in a simplified and diagrammatic manner one form of control unit and associated circuits for use with the marker lights of this invention.

Fig. 9 is a modified arrangement of control unit and circuits.

Referring to Figs. 1 and 2, the marker light of this invention is an efficient light projecting unit which includes an electric lamp with a concentrated prefocused filament, and an optical system including a reflector and lens capable of providing a beam of a prescribed spread and range of visibility suitable for a good warning stop indication, when the electric lamp of this unit is operated at its full brilliancy.

In the specific construction of the marker light illustrated, which is similar to that employed in color light signals of the so-called search light type, such as disclosed, for example, in the patent to O. S. Field, No. 1,835,150, dated December 8, 1931, the marker light comprises in general a cast iron lens barrel B and a sheet metal housing C. In the particular arrangements shown, it is assumed that this marker light will be permanently attached to the end of the passenger coach or caboose, such as by a flange suitably attached, as by welding or rivets, to a

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metal end wall 6 of the car. This marker light, however, may be provided with a bracket of the usual type, so that it may be removably supported in the usual sockets provided on cars and cabooses for marker lights, if so desired.

The lens 7 of the marker light is of the stepped or Fresnel type, preferably formed with vertical flutes on the outer face, or provided with equivalent optical expedients, to increase the horizontal spread of the light beam provided by the lens to a suitable angle, such as 30°, for assuring visibility of the light from various angles side-wise, for curves and the like. The sectional view of the lens 7 according to Fig. 1 is assumed to be taken along the vertical axis of one of the flutes, the base of such flute being indicated by the dotted line 7a. This lens 7 is secured in the outer end of the lens barrel B by a gasket 8 and a retaining ring 9, which is attached by screws 10 or the like to the lens barrel in the usual way.

The lens barrel B is provided with a transverse partition 12 located approximately at the focal point of the lens 7, and a movable color screen 14 is arranged to position small colored glasses 15 in front of a central opening 16 in this partition 12, so as to change the color of the projected light beam. The color screen 14, which is of a general sector shape as shown in Fig. 2, is fixed to the end of a shaft 17 journaled in the lens barrel B, so that when this shaft 17 is turned by an operating knob 18 on the outside of the casing, which is detachably fixed to this shaft by a set screw or equivalent, the small glass discs 15 of the appropriate color, such as red and yellow, may be positioned in front of the opening 16 in the partition, thereby changing the color of the beam to red or yellow as desired. The position of the operating knob 18 is indicated by suitable means, such as an arrow or pointer and letters on the casing as shown in Fig. 3.

The color screen 14 is held in its operated set position against displacement by jar or vibration by a friction member 20, which has one bent end fitting in a hole in the partition and another flat end bearing on the color screen. A compression helical spring 21, with its pressure adjustable by a screw bolt and nut 22, presses this friction member 20 against the color screen 14 to provide the desired friction for holding the color screen in its set position. The color glasses 15, which are located approximately at the focal point of the lens 7, are supported in the color screen 14 by suitable clips or retaining rings to permit the necessary expansion of the glass when heated by the transmitted light.

A reflector and an incandescent lamp with a concentrated filament are supported in a reflector and lamp unit D for projecting a concentrated beam of light focused at a point adjacent the color screens. This unit D is removably supported in a plate 24, in the manner disclosed in the Field Patent No. 1,835,150, dated December 8, 1931; and this plate 24 is adjustably attached to the end of the lens barrel B by three threaded studs 25. The reflector 26 is preferably of glass silvered on the back and ellipsoidal in shape. This reflector 26 is held in place in the reflector and lamp unit D against a felt ring 27 and a plurality of adjustable stop screws 28 by a leaf type spring 29 bearing against a block 30 of felt cemented to the back of the reflector.

The socket 34 for the lamp 35 with the usual bayonet type base, is attached to a block 36 of insulating material fastened to a plate 37 which is adjustably supported at three points on studs

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38 fixed to the frame or casing of the reflector and lamp unit D. As shown, the plate 37 bears against compression springs in collars 39 on the studs 38; and adjusting nuts 40 on the studs permit compression or relaxation of the springs to obtain the desired adjusted position of the plate 37. The wires 41 connected to the lamp socket 34 extend through an outlet 42 and through the associated conduit or cable (not shown) to an appropriate permanent or detachable connector in the lighting circuit. A detachable cover 45, held in place by screws 46, permits access to the reflector and light unit, to permit replacement of lamp bulbs, adjustment, and the like.

The marker light of this invention provides a concentrated beam of a selected color, with the appropriate spread, so as to be visible at greater distances and under adverse weather conditions than the usual type of marker light with its inefficient optical system.

The marker lights now commonly used on trains provide front and side indications of selected colors, as well as rear indications; and when it is desired to provide such indications, a modified construction of marker light shown in Figs. 6 and 7 may be employed. In this modified structure of Figs. 6 and 7, four colored lenses are mounted in a sleeve or shell rotatable on a vertical axis around light sources to provide the desired front, sides and rear colored light beams, the light beam to the rear being obtained from a lamp and a reflector providing a beam of high intensity and visibility under adverse conditions.

In the particular structure illustrated, top and bottom members 52, 53 are held together in the proper space relation by four pillars 54, which are assumed to be integral with the bottom member 53 and detachably connected to the top member 52, as by screws 55. The bottom member 53 has attached thereto by bolts 56 a bracket 57 with a key-stone end shaped to fit the usual socket on cars and cabooses. The lens shell 60 is supported and movable in circular grooves in the top and bottom members 52, 53, a spring pressed detent 61 being employed to engage in holes or recesses in this lens shell 60 to hold it in its set positions. Four lenses 62 of the appropriate color, such as red and yellow indicated by R and Y, are secured in openings equally spaced around the periphery of the lens shell 60 by suitably retaining members, as indicated.

This modified construction of marker lights of Figs. 6 and 7 comprises two light sources in the form of electric lamps 65, 66 with concentrated filaments, these lamps being disposed in effect back to back in the usual bayonet type sockets attached to a flexible diaphragm 68 of rubber or the like clamped by a member 69 to a supporting bracket 70 bolted to the bottom member 53. These lamps 65, 66 are connected in multiple and the wires 71 are preferably terminated at a plug socket 72 in the bottom member 53, so that when the marker light has been mounted on the car the electrical connections may be made to the lamps by a plug on the end of a flexible cable (not shown). A reflector 154 suitably supported by a bracket 155 is associated with one of the lamps 65 to provide a concentrated light beam toward the rear. The top member 52 may be detached and the lens shell 60 removed to give access to the lamp bulbs, for replacement, cleaning the reflector and lens, and the like.

It can be seen that the colors of the indications to the rear, side and front provided by this mod-

ified form of marker light may be changed by rotating the lens shell 60. Thus, the lens shells 60 for the two marker lights at the rear end of a car or caboose may be positioned to give the color indications indicated in Fig. 6, to conform with the character of indications required by certain operating rules for the rear end of a train running with the current of traffic on single track or multiple track railroads, namely, yellow-yellow to the front and each side and red-red to the rear. Fig. 7 illustrates another indication of rear end marker lights commonly used for the rear end of a train when on a siding to be passed by another train, namely, yellow-yellow to the front, each side, and to the rear. It can be understood that the lens shells may be shifted to give other combinations of red and yellow, and that different colored lens in different relative positions may be employed to provide color combinations suitable for different operating conditions and operating rules, as may be required.

Two marker lights of the character described are supported on the rear end of the car or caboose or on the front or rear end of a locomotive indicated in outline in Fig. 8; and the electric lamps of these units are supplied with current from a suitable source, such as a battery maintained charged by an axle driven generator or the like. The system of this invention also includes a suitable control unit, which may be permanently attached in a convenient location near the rear platform of the car, or may be a portable unit, perhaps even including the battery, which is provided with suitable plug connectors and cables (not shown) in an obvious manner to the light units.

The control unit comprises, in addition to a master cut-out switch SW shown conventionally, two manually operable keys or switches K and EK of any suitable construction, one K for governing the intensity of the light beam, and the other EK for rendering a flasher device FR effective to cause the marker lights to flash or blink for an emergency distinctive indication. In the simplified arrangement shown, it is assumed that this flasher device FR will be a flasher relay of the type used for highway crossing signals, and such as disclosed, for example, in the patent to O. S. Field, No. 2,097,786, dated November 2, 1937.

This type of flasher relay comprises two coils 78 and 79 which attract a rocking armature (not shown) to one extreme position or the other to operate contacts shown diagrammatically as contact fingers 80 and 81 which are movable between positions shown by solid and dotted lines into engagement with stationary contacts indicated by arrows. The upper contact finger 80 in the position shown acts to provide a shunt around the coil 79 causing movement of the armature and operation of this contact finger to its dotted position. This upper contact finger 80 in the other dotted line position provides a similar shunt for the other coil 78. Thus, if the flasher relay should stop in the condition shown, with the contact finger 80 in the right-hand position, closure of the operating circuit for the relay causes current to flow through the left-hand coil 78 to actuate the armature and shift the contact finger 80 to its other left-hand position, whereupon the coil 78 comes deenergized and shunted, and the other coil 79 receives current. Consequently, so long as the flasher relay is supplied with current, its armature is rocked back and forth, and the contact fingers 80 and 81 are shifted back and forth, so that the other contact finger 81 may be em-

ployed to intermittently open and close a circuit. This type of flasher relay involves other structural features illustrated and described in detail in the patent to Field, No. 2,097,786 above mentioned, but for the purpose of an understanding of the present invention, this explanation of its operating characteristics is sufficient. This type of flasher relay may be constructed and adjusted to operate its contacts at the rate desired, such as 80 times a minute, to provide a distinctive and arrestive flashing indication.

Considering the use or operation of this organization of the invention, it is contemplated that, when the train is operating in the normal current direction of traffic on a single or double track railroad, the two marker lights will be manually set to display red-red to the rear, and that the electric lamps L, L¹ for these marker lights are energized for a normal or low brilliancy over a circuit which may be traced from the (+) terminal of the battery, switch SW, resistance 83, lamps L, L¹, and wire 84 back to the battery. It will be noted that the resistance 83 is included in this circuit; and the value of this resistance is chosen to limit current through the electric lamps to a value suitable for the desired short range indications required for marker lights of trains under ordinary conditions. For example, such short range indications of reduced brilliancy will serve to mark the rear end of the train when in motion, or standing under conditions where it is not likely to be overtaken by a following train, and will also be sufficient to enable station agents, car operators and other interested persons to observe with the passage of the train.

When the train is on the siding, and it is desirable to change the colors of the marker lights to conform with the operating rules of the railroad, such as red-red to yellow-yellow, the trainman may quickly and easily shift the color screens 14 in the marker lights of Figs. 1 and 2 by turning the knob 18, or turn the lens shells 60 of the marker lights of Figs. 4 and 5, to obtain the desired change in color. It can be seen that this change in color will occur quickly, and without any interval where no light may be displayed, as usually happens when a trainman takes down and turns the oil lanterns now ordinarily used for marker lights.

At other times, when the train is running against the current direction of traffic, or on a slow speed freight track of a railroad having three or more tracks, and it is desirable to change to other color combinations of the marker lights, such as red-yellow or yellow-red, to conform with the particular operating rules, this change in the color combination may be made readily by a trainman in a similar manner.

Considering now the situation where the signal marker lights on the rear end of a train are needed to provide an advance warning for other trains to stop, as, for example, when a train should stop for any reason under conditions calling for flagging protection, then it is contemplated that the trainman will operate key K from the position shown to increase the current through the lamp filaments and give a beam of full brilliancy by establishing a shunt around the resistance 83 over wire 86, contacts 87 of switch K, wire 88, contacts 89 of switch EK and wire 90. The types of light projecting units disclosed are capable, when the electric lamps are lighted to their full brilliancy, of giving a beam of intensity to be visible at several thousand feet, corresponding approximately with the range of the usual

color light block and interlocking signals. This increase of beam intensity, making the marker lights visible at a long distance, provides protection for the rear end of the train during time required for the trainman to get back far enough for adequate flagging protection. The character of the indication provided by the light projecting unit of this invention is far superior, in its range, visibility, and distinctive character to the present oil burning or electric lamps, which have a limited range, and sometimes may be confused with other lights along the railroad of like color and intensity. In short, the increased intensity of the rear end marker light in accordance with this invention materially adds to the rear end protection of trains, particularly during the time required for a flagman to take position, and also because the brilliancy of the type of light used gives them a distinctive character over other lights along a railroad.

Considering a still different operating condition, there are times when a train is brought to a stop under special conditions, such as by an emergency application of the brakes due to a parting of the train, or other causes, where there is the possibility that some other track or tracks of the railroad are obstructed, and train movement past the train on such other tracks is dangerous. When such emergency stop condition occurs, it is contemplated that the trainman will at once operate the emergency stop switch EK from the position shown to the other position to provide an emergency flashing indication. In the specific arrangement shown, the operation of the switch EK establishes a circuit for energizing the flasher relay from the (+) terminal of the battery, cut-out switch SW, contacts 92 of switch EK, wire 93, coils of flasher relay FR and wire 94 back to the battery. This causes the contact finger 81 of the flasher relay FR to move back and forth at some prescribed rate, such as 80 times a minute, and the movement of this contact finger 81 intermittently establishes a shunt, including wires 95, 96, 93, contacts 92 of switch EK and wire 90 around the resistance 83, so that the electric lamps are changed alternately from their full brilliancy to their normal brilliancy. If desired, the contact finger 81 of the flasher relay FR may be arranged to open and close the lighting circuit, to extinguish and fully light the lamps; but the arrangement shown and described is considered preferably, because any failure of the flasher relay will not leave the lighting circuit entirely open and no lights showing.

This emergency flashing indication given in this manner will be recognized as calling for a stop by any approaching train on other tracks, as well as on the same track, and will provide the desired protection a long time before a trainman can get to the appropriate flagging position.

In this connection with this flashing emergency stop, it is contemplated that one or more similar light projecting units, with the associated flashing arrangement, will be provided for the locomotive or power unit at the head end of the train to enable the engineer to give the same arrestive and distinctive emergency indication for trains approaching in that direction as may be required.

Fig. 9 illustrates a modified organization of control unit in which, in addition to the manual control switches for providing the high intensity and flashing indication, automatic means is provided to give these indications under the desired operating conditions. As previously explained, it is

considered desirable to increase the intensity of the marker light indications when the train is stopped; and for this purpose a contact 100 operated by a centrifugal governor G or equivalent speed-responsive element, is arranged to close a shunt, comprising wires 101, 102 around the contacts 87 of the control switch K, so that when the train comes to a stop the high intensity indication is given automatically. The speed governor G of the conventional type shown is connected by suitable gearing (not shown) to the wheels or axle of the car or caboose upon which the control unit is mounted.

For the purpose of giving the emergency flashing indication, a movable contact member 104 and associated stationary contacts indicated by arrows are provided to initiate operation of the flasher relay FR the same as operation of the control switch EK when an emergency brake application is given. The contact member 104 is connected to a diaphragm or piston 105 urged downward by a spring 106. The space under the piston 105 is connected by a pipe 107 to the brake pipe; and when the brake pipe pressure drops to a predetermined low value, as in the case of an emergency brake application of the brakes, the spring 106 overcomes this pressure to move the contact member 104 down into engagement with the stationary contacts and complete a circuit connection including wires 109, 110 around the contact 92 of the switch EK to cause operation of the flasher relay the same as if the control switch EK were manually closed.

From the foregoing it can be seen that I have provided a simple and efficient organization of warning signal lights for trains which will afford the desired information and protection under the varying conditions encountered in practice to a better advantage than possible with the present type of rear end marker lights.

Warning signal or marker lights are commonly used on railroad trains at night; but the high intensity and long range indications characteristic of the marker lights of this invention permit their use effectively for marker and stop warning purposes during the daytime, if so desired.

Various modifications, adaptations, and changes may be made in the particular structures and arrangements of circuits shown and described without departing from the invention; and I desire to have it understood that the specific embodiments shown and described are merely typical or illustrative of the nature of the invention.

What I claim is:

In a system of warning lights for railroad trains, a four-way light projecting unit on each side of the rear-end car of a train, each of said units comprising one light source for supplying light to each side and to the front of the train and a separate light source with an associated reflector for projecting light to the rear of the train at a relatively higher intensity, each of said units also having a rotatable lens carrier with a lens of a selected color for each of the four ways of its unit, said lens carrier being adaptable to be manually operated to different positions to give different colored indications for the different directions in which that unit projects light beams, whereby the manually setting of the lens carrier for both light projecting units selectively determines the particular combination of colored light beams to be projected for giving the desired rear-end aspect for that train, circuits means for normally energizing all of said light sources in multiple at a rel-

atively low energy level to cause said units to give the normal desired rear-end signal aspect, and manually governed means including a flashing relay and manually operable contacts, for acting on said circuit means to at times cause it to steadily energize said light sources at a relatively high energy level and at other times cause it to intermittently energize said light sources at a relatively high energy level, whereby said light projecting units may be manually caused at times to give in four directions a warning signal of the stopped condition of said train and at other times to give in four directions a distinguishable warning signal that such train fouls an adjacent track, but in all cases to give a warning signal of higher light intensity to the rear of the train than in any of its other light projecting directions.

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