March 2, 1943. D. A. KELLY 2,312,649

SWITCH SIGNAL

Filed Jan. 22, 1941 3 Sheets-Sheet 1

Fig. 1.

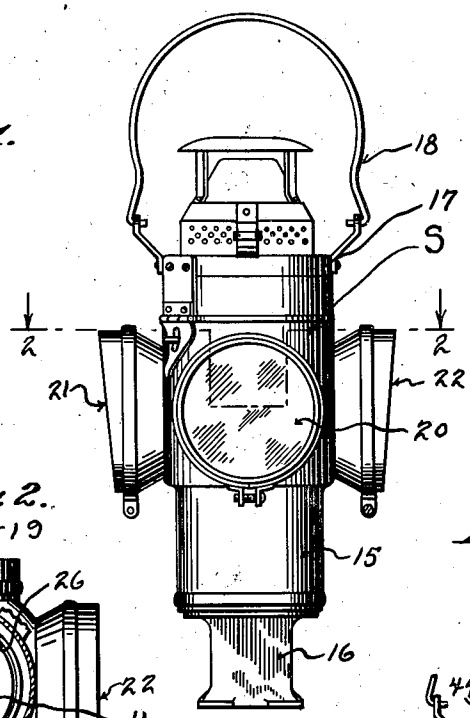


Fig. 2.

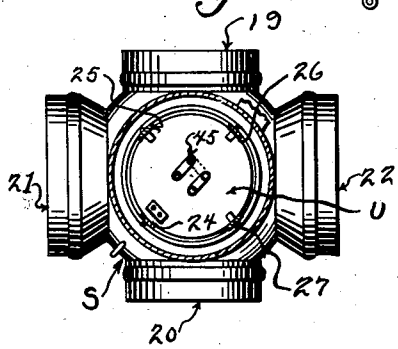


Fig. 3.

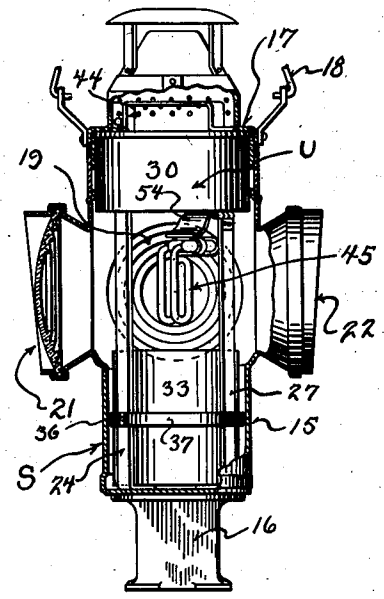
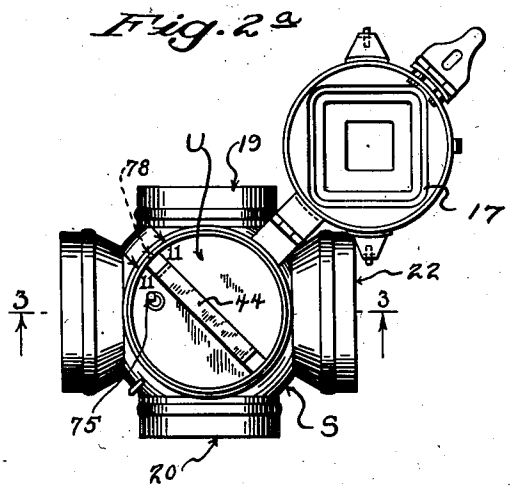


Fig. 2a



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March 2, 1943. D. A. KELLY 2,312,649

SWITCH SIGNAL

Filed Jan. 22, 1941 3 Sheets-Sheet 2

Fig. 4.

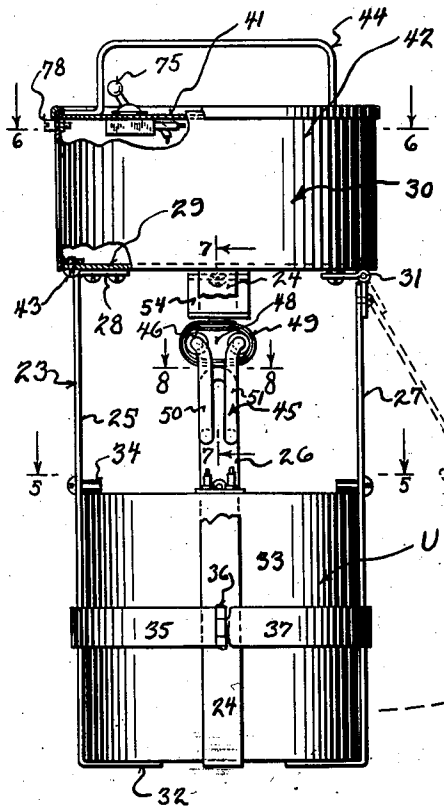


Fig. 5.

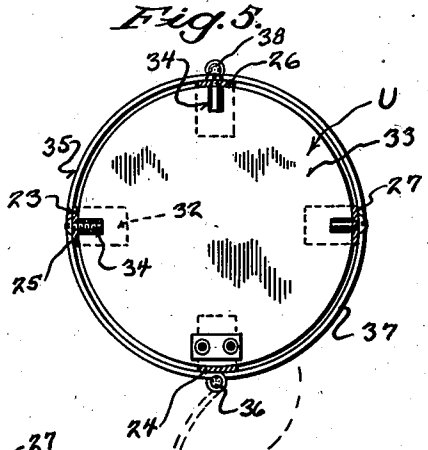


Fig. 12.

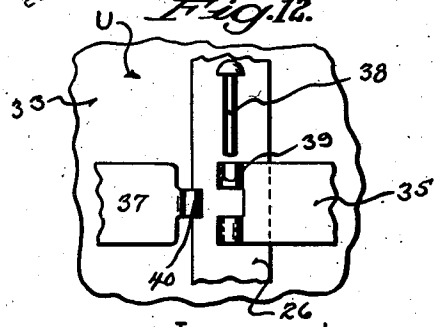
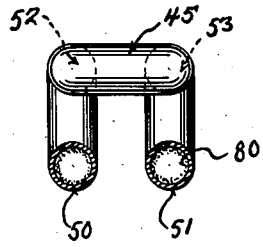


Fig. 8.



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March 2, 1943. D. A. KELLY 2,312,649

SWITCH SIGNAL

Filed Jan. 22, 1941 3 Sheets-Sheet 3

Fig. 6.

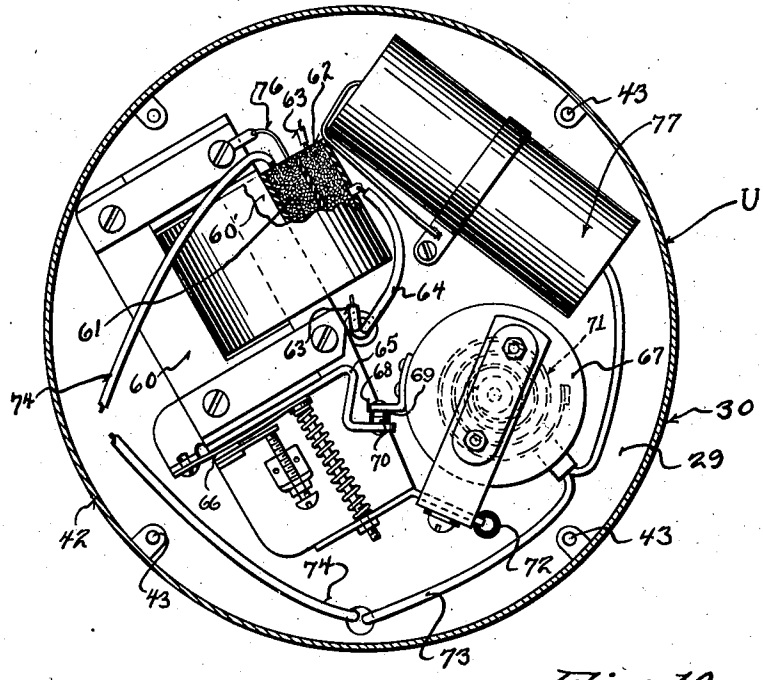


Fig. 10.

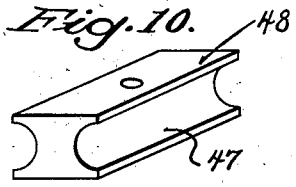


Fig. 7.

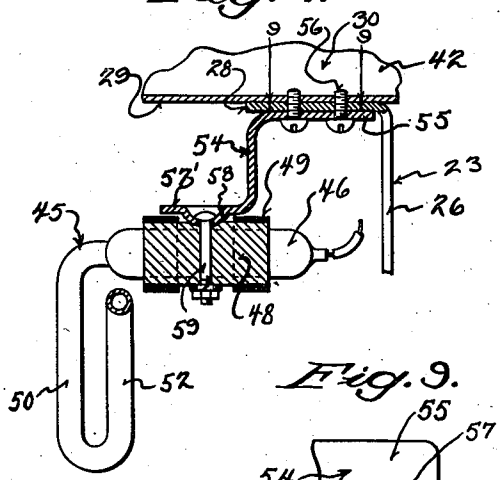


Fig. 11.

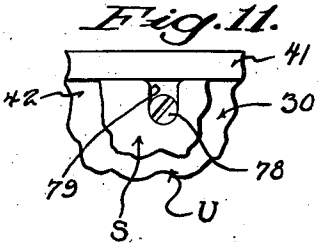
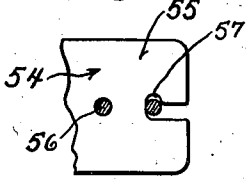


Fig. 9.



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UNITED STATES PATENT OFFICE

2,312,649

SWITCH SIGNAL

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Application January 22, 1941, Serial No. 375,477

1 Claim. (Cl. 177—329)

This invention appertains to illumination, and more particularly to electric lamp units of the type particularly adapted for use in signals, such as railroad switch signals and the like.

In railway switch signals, it is customary to provide a lamp casing embodying colored signal lenses with a source of illumination in the casing for showing through the lenses. The light for the signal usually consists of an oil fountain, a burner, a chimney, etc. This type of signal is open to serious objections: first, the oil lamp is not overly bright; second, time and care must be taken to keep the oil lamp in a clean condition; and, third, the oil reservoir or fountain must be frequently removed (generally every five to seven days) and refilled with oil. Naturally, the maintenance of these lamps is expensive and time-consuming.

One of the primary objects of this invention is to provide a self-contained electric light unit, which can be readily substituted for the oil fountain, burner, etc., in an ordinary switch lamp signal casing, without any change to said casing, and which will give a clearly distinguishable light at a great distance, and which will need no care other than the replacing of the battery once every three months, or less.

Another salient object of the invention is to provide a single unit for association with ordinary railway switch signal lamp casings, embodying a gas discharge tube, a source of energy therefor, and a flasher or periodic circuit opening and closing mechanism for the tube, whereby to cause the intermittent flashing of the tube.

A further object of the invention is to provide a compact and durable structure, which can be handled as a single unit for removal from and insertion into the signal lamp casing, and which includes a supporting frame for detachably receiving a battery and housing for the control mechanism, with a gas discharge tube supported in the frame preferably between the battery and the housing, so that the tube will be protected to a large extent during the handling of the unit.

A further important object of the invention is to provide a single gas tube for the unit, with novel means for arranging the tube in the unit, whereby when the unit is installed in the signal lamp casing, the tube will be correctly positioned relative to the focal point of the various signal lenses in the casing.

For the conservation of the battery, it is highly desirable to use only a single gas discharge tube, as the casing contains different colored lenses (for signal purposes); and as gas discharge tubes are of certain different colors, up to the present time, as far as I am aware, it has been impossible to use a single tube behind different colored lenses or glass plates, and obtain the desired colors for signal purposes.

It is, therefore, another salient object of the invention to provide a gas discharge tube constructed in such a manner that the tube will give a desired flame color (rust-gold), so that the various colors in a signal lamp will be correctly shown.

A still further object of the invention is to construct the tube itself in such a manner that a number of closely arranged bends thereof will be had, whereby a light of relative great brilliancy will be obtained within a limited space.

A still further important object of my invention is to provide novel means for mounting the gas discharge tube in the unit, whereby the tube can be adjusted within certain limits, so that the tube will be disposed at the correct place relative to the focal point of all of the lenses of a lamp signal casing.

With these and other objects in view, the invention consists in the novel construction, arrangement, and formation of parts, as will be hereinafter more specifically described, claimed, and illustrated in the accompanying drawings, in which drawings:

Figure 1 is a front elevational view, illustrating one type of a railroad switch signal lamp with which my unit can be associated.

Figure 2 is a horizontal, sectional view, taken on the line 2—2 of Figure 1 looking in the direction of the arrows, showing my novel unit associated with the casing of a railroad switch signal, the view illustrating the position of the gas discharge tube relative to the various lenses of the lamp signal casing.

Figure 2A is a top plan view with the top of the lamp casing swung back to an open position to show the unit associated with the casing.

Figure 3 is a vertical, sectional view taken on the line 3—3 of Figure 2A, showing the unit associated with the lamp casing.

Figure 4 is an enlarged, front, elevational view, showing the novel unit removed from the lamp casing, parts of the view being shown broken away and in section to illustrate structural details.

Figure 5 is a horizontal, sectional view, taken on the line 5—5 of Figure 4 looking in the direction of the arrows, illustrating the means for detachably mounting the battery within the unit.

Figure 6 is a horizontal, sectional view, taken

on the line 6—6 of Figure 4, looking in the direction of the arrows, illustrating the control mechanism for the gas discharge tube, the figure being taken on a larger scale than Figures 4 and 5.

Figure 7 is an enlarged, fragmentary, detail, sectional view, taken on the line 7—7 of Figure 4 looking in the direction of the arrows, and illustrating the novel means employed for adjustably supporting the gas discharge tube.

Figure 8 is an enlarged, detail, sectional view through the gas discharge tube, taken on the line 8—8 of Figure 4, looking in the direction of the arrows.

Figure 9 is a fragmentary, detail, sectional view taken on the line 9—9 of Figure 7, looking in the direction of the arrows.

Figure 10 is a detail, perspective view of the block for supporting the terminals of the gas discharge tube.

Figure 11 is an enlarged, fragmentary, detail sectional view taken on the line 11—11 of Figure 2A, looking in the direction of the arrows, showing the means employed for insuring the proper positioning of the unit in the signal lamp casing; and

Figure 12 is an enlarged, detail view illustrating the means for detachably fastening the holding strap or gate for the battery in place.

Referring to the drawings in detail, wherein reference characters designate corresponding parts throughout the several views, the letter S generally indicates a railroad switch signal lamp. In the present instance, the switch signal has been shown to be of the type which is usually rotated by throwing a switch, but obviously the signal lamp can take various forms.

For the purpose of illustration, the signal S includes a substantially cylindrical housing 15, formed on or secured to a base 16 for association with the switch. The upper end of the casing is closed by a hinged cover 17, which may be provided with a bale handle 18. The body of the casing intermediate its ends is provided with a plurality of glass lenses, and the lenses 19 and 20, which are diametrically opposite, can be of a red color, and the lenses 21 and 22, which are diametrically opposite, can be of a green color. The color of the lenses can be varied according to the use to which the signal is to be put.

This is the usual character of railroad switch signals, and generally the casing detachably receives an oil fountain or reservoir, a burner, and a chimney, and in accordance with my invention, I remove these parts and detachably associate with the casing my novel self-contained lighting unit U, which forms the essential part of this invention, both per se and in combination with the switch signal casing.

The self-contained lighting unit U includes a supporting frame 23, and this frame embodies a plurality of spaced, vertically extending rigid legs 24, 25 and 26, and a swinging leg 27. The upper ends of the legs 24, 25 and 26 are provided with inturned arms 28, which are rigidly fastened to the bottom wall 29 of a housing 30 employed for receiving the various operating parts of the device, which will be later set forth.

The upper end of the swinging leg 27 is connected by means of a hinge 31 with the bottom wall 29. All of the legs have formed on their lower ends inwardly extending feet 32. These feet form means for detachably supporting a battery 33, which can be of the dry cell type. Lugs 34 can be formed on or secured to the legs for engaging the upper edge of the battery to prevent accidental shifting movement of the battery. By swinging the leg 27 to a raised position, the battery 33 can be readily slid out of the frame.

Any desired means can be provided for bracing the legs and for detachably holding the swinging leg 27 in its lowered battery-engaging position. As shown, a semi-circular brace band 35 is rigidly fastened to the legs 24, 25 and 26, and this brace band has connected to one end thereof, by means of a hinge 36, a swinging lock strap 37. The end of the lock strap, which is remote from its hinge, is detachably fastened to the brace band, such as by the use of a removable pin 38, which can be inserted in hinge barrels 39 and 40 formed respectively on the brace band 35 and swinging strap 37.

The housing 30 for the control mechanism of the unit also includes a top wall 41 and a depending cylindrical side wall or skirt 42. This side wall is detachably fastened to the bottom wall 29 of the housing, such as by the use of screws 43, and the top and side walls can be removed to permit access to be had to the control mechanisms. A hand grip 44 is carried by the housing 30 to facilitate the handling of the unit.

From the description so far, it can be seen that the battery and the housing are in spaced, vertical alinement, and this allows the convenient placing of the unit in, and the removal of the unit from the signal lamp casing.

The unit also includes a gas discharge tube 45, and this tube is formed in a certain novel manner, and is arranged in the unit in a certain way for a purpose which will also later appear.

The gas discharge tube is mounted within the frame, and preferably between the housing 30 and the battery 33, and thus the tube is protected to a great extent from injury during the handling of the unit. The terminals 46 of the tube are arranged in spaced, parallel relation and approximately in a horizontal plane, and these terminals are mounted within grooves 47 formed in the opposite sides of a solid supporting block 48. Adhesive tape 49 or the like is utilized for firmly binding the terminals of the tube to the block and within the grooves thereof, but, obviously, other means can be provided for holding the tube on the block.

The tube itself is first formed in the shape of a U, to provide spaced, parallel legs 50 and 51, and these legs are then bent back upon themselves to provide additional legs or stretches 52 and 53. Thus, the tube includes four parallel legs arranged in spaced relation, but in close proximity to one another. This gives a compact tube with a maximum amount of tube length, in a minimum amount of space, and the legs of the tube are so disposed relative to the colored lenses of the signal lamp casing, as will be further brought out, to give a relatively broad appearing light.

As only one tube is utilized, it becomes highly important to have this tube correctly disposed relative to the focal point of all of the lenses of the lamp casing, and hence the tube is supported in a novel way to permit a limited adjustment thereof to be had in the frame.

The mounting for the tube includes a supporting bracket 54 having a right angularly extending supporting foot 55, which is connected by means of screws 56 to the bottom wall 29 of the housing 30. One of the screws passes through a restricted slot 57 formed in the foot 55, and the bracket can swing on the other of the screws to a limited extent. By tightening the screws,

the bracket can be firmly held in an adjusted position. The lower end of the bracket is provided with a right angularly extending foot 57', which extends inwardly toward the center of the unit. This foot has struck out therefrom a depending socket or semi-spherical boss 58, which is adapted to bear against the upper face of the supporting block 48 for the tube. A bolt 59 extends through the socket and through the block, and the head of the bolt is free to rock in the socket and as the opening for the bolt is of greater diameter than the bolt, the bolt can swing in all directions in the socket. By loosening the nut on the bolt, the bolt and the block can be swung in various directions to a limited degree, so that the legs of the tube can be positioned to the best advantage relative to the lenses of the casing. After the adjustment of the tube has been had, the bolt can be tightened.

The adjustment of the support for the gas discharge tube is also important, due to the fact that in actual practice it is practically impossible to bend the terminals of the gas tube at direct right angles to the legs of the tube, and, consequently, by swinging or adjusting the supporting bracket, the legs of the tube can be brought into a desired vertical position.

As brought out above, the housing 30 receives the control mechanism for the unit, and the mechanism per se forms no part of the invention. The mechanism includes a periodic circuit interrupter and a transformer or induction coil, and mechanism of known types can be employed. The circuit interrupter can be of the type shown in the Tupper Patents Nos. 1,585,318 and 1,585,319, issued May 18, 1936, or the entire mechanism in the housing can be of the character more specifically shown in the Shattuck et al. Patent No. 2,122,847, issued July 5, 1938.

In Shattuck, different circuits are employed for allowing substantially continuous lighting of the neon lamp, or an intermittent lighting of the neon lamp. The mechanism employed in this unit only includes the circuit for intermittently lighting or flashing the gas discharge tube. As the mechanism is wellknown, such mechanism will not be described in detail, but it is to be noted (see Figure 6) that the same includes a transformer or induction coil 60 having a core 60', a primary winding or coil 61 and a secondary coil or winding 62. The terminals of the secondary coil 62 are connected by wires 63 and 64 to the terminals of the tube.

When a circuit is closed through the primary coil, the core 60' is adapted to attract a swinging armature 65, which is normally held away from the core by leaf springs 66. The circuit, through the primary coil, is periodically interrupted by an oscillating balance wheel 67 carrying an arm 68 having a contact 69, which is adapted to engage a contact 70 on the armature. A coil spring 71 has one end connected to the balance wheel, and the other end to the supporting frame for the balance wheel, and this frame is insulated from the bottom wall 29 of the housing. The coil spring normally functions to hold the contact 69 into engagement with the contact 70, and to turn the balance wheel in a counterclockwise direction (to the position shown in Figure 6).

After the armature has been attracted by the core, and the armature has moved the balance wheel in a clockwise direction by the sudden movement of the armature 65 toward the core, the movement of the balance wheel in a clockwise direction is limited by an energy absorbing and insulated stop 72. One end of the spring 71 is connected by a wire 73 with one terminal of the battery, and the other terminal of the battery is connected by a wire 74 with one terminal of the primary coil. The other terminal of the primary coil is grounded by a wire 76 to the frame of the transformer. A hand switch 75 is disposed within the length of the wire 74 for controlling the operation of the device.

Hence, briefly, it can be seen that when the switch 75 is closed, current will flow from the battery through the wire 73, through the balance wheel 67, through the contacts 69 and 70, through the frame of the transformer or induction coil to the wire 76, and back through the wire 74 and the switch to the battery. This will attract the armature 65, and the balance wheel 67 will be turned in its clockwise direction, and as the contact 69 moves away from the contact 70, the current to the primary coil will be interrupted, and the armature 65 will move away from the core under the influence of its spring 66. Upon return of the balance wheel to its normal position by the spring 71, the contact 69 will again engage the contact 70, and the circuit will again be closed to the primary coil. As the gas discharge tube is in the circuit of the secondary coil, the induced current will flash the gas discharge tube.

A condenser 77 can be incorporated in the circuit at the proper point, if so desired.

As signal lamp casings may vary in size and shapes, the unit U is built for association with a certain make and size of a standard switch signal lamp casing, and, hence, the tube 45 is properly disposed in the unit, so that when the unit is associated with that particular casing, the tube will be correctly positioned relative to the lenses of the casing.

It is also essential that the tube be disposed in the most advantageous manner relative to the lenses, so that the legs of the tube, when viewed through a lens, will give a relatively broad light. To insure the proper placing of the unit in the casing, the upper end of the unit carries a positioning lug 78, which is adapted to fit within a locating notch 79 formed in the upper edge of the body of the signal lamp casing, and when the lug is positioned in the notch 79, the tube 45 will be in the desired place relative to the lenses.

By referring to Figures 2 and 3, it can be seen that the four legs of the tube are so disposed that one leg faces each lens, and the legs lying on each side of the leg facing the lens will also be visible through the lens when the tube flashes. Thus, three legs will be visible upon each flash of the lamp through each lens, which will give a desired broad appearance to the light.

As gas discharge tubes come in definite colors, it has been impractical to use such a tube in rear of lenses of different colors, and in order to utilize a single gas discharge tube with different colored lenses, and still obtain the desired color, the tube is formed in a novel way. In effect, I utilize the combined advantages of a gas discharge tube and a fluorescent tube, and the tube is coated with a fluorescent substance 80 (Willemite) which is not colored, and the tube is filled with a pure neon gas. This combination gives a flash which closely simulates the flame of an oil lamp, and the color is best described as being rust-gold. The flashing of the tube of this color behind the lenses will correctly

give the desired color. Great stress is laid on the manner in which the tube is made to give these desired colors, the way the tube is formed to provide the plurality of legs, and the location of the tube in the center of the casing, and at the desired point relative to all of the lenses.

In actual practice, best results have been obtained by having one set of facing lenses of a blue color, and the other set of facing lenses of a red color. Upon the flashing of the tube of the rust-gold color, the light emanating through the blue lenses will be of the desired and correct shade of green, while the light emanating through the red lenses will be of the preferred red color.

From the foregoing description, it can be seen that I have provided a self-containing unit which can be quickly and readily associated with switch signal lamp casings which are already in use, and which will convert ordinary oil-burning switch signal lamps into a gas discharge tube switch signal lamp. By the use of the unit, the frequency of attending to an oil lamp is eliminated, and by a series of tests the exact life of a battery of a certain size with a gas discharge tube of certain characteristics can be accurately determined. Tests at the present time show that the life of a battery is three months.

Various changes in details can be made without departing from the spirit or the scope of the invention, but what I claim as new is:

In a signal lamp of the type including a casing having a plurality of different colored lenses arranged in the same horizontal plane; a self-contained lighting filler unit detachably associated with the casing including a frame, a battery detachably fitted in the frame, a housing forming a part of the frame, the housing and battery being arranged in spaced relation, with one above the other, a single gas tube disposed in line with the lenses and centrally in the frame between the battery and the housing, whereby the frame, battery, and housing form a guard for the tube, and a flasher mechanism for the tube disposed in the housing electrically connected with the tube and battery.

DANIEL ALLCOTT KELLY.