May 4, 1948. R. L. FALGE 2,440,938

PORTABLE ELECTRIC SIGNAL LIGHT

Filed July 19, 1945 4 Sheets-Sheet 1

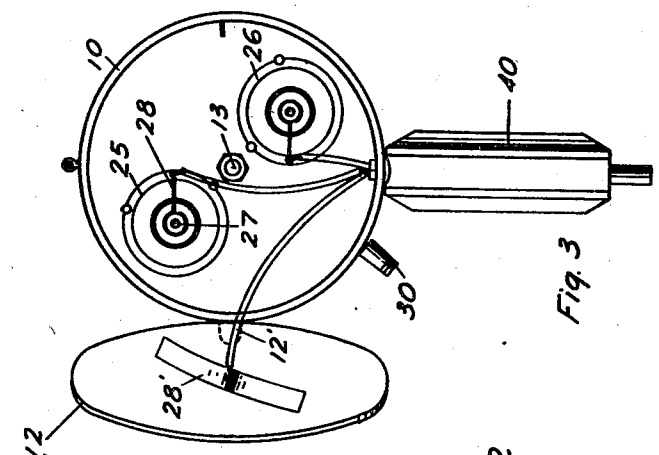

Fig. 3

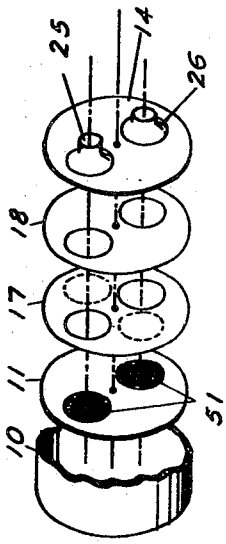

Fig. 18

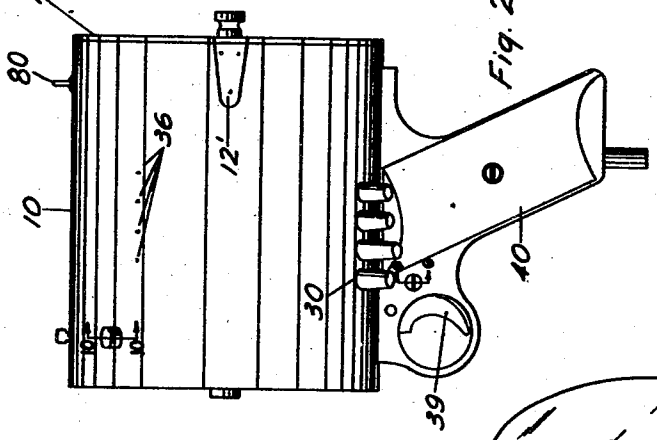

Fig. 2

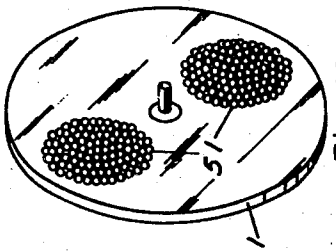

Fig. 12

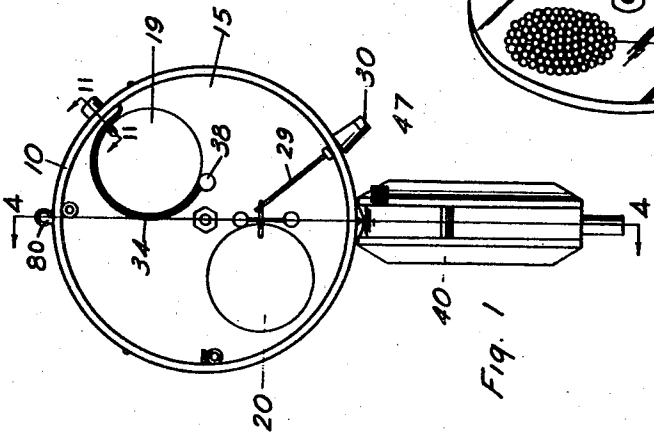

Fig. 1

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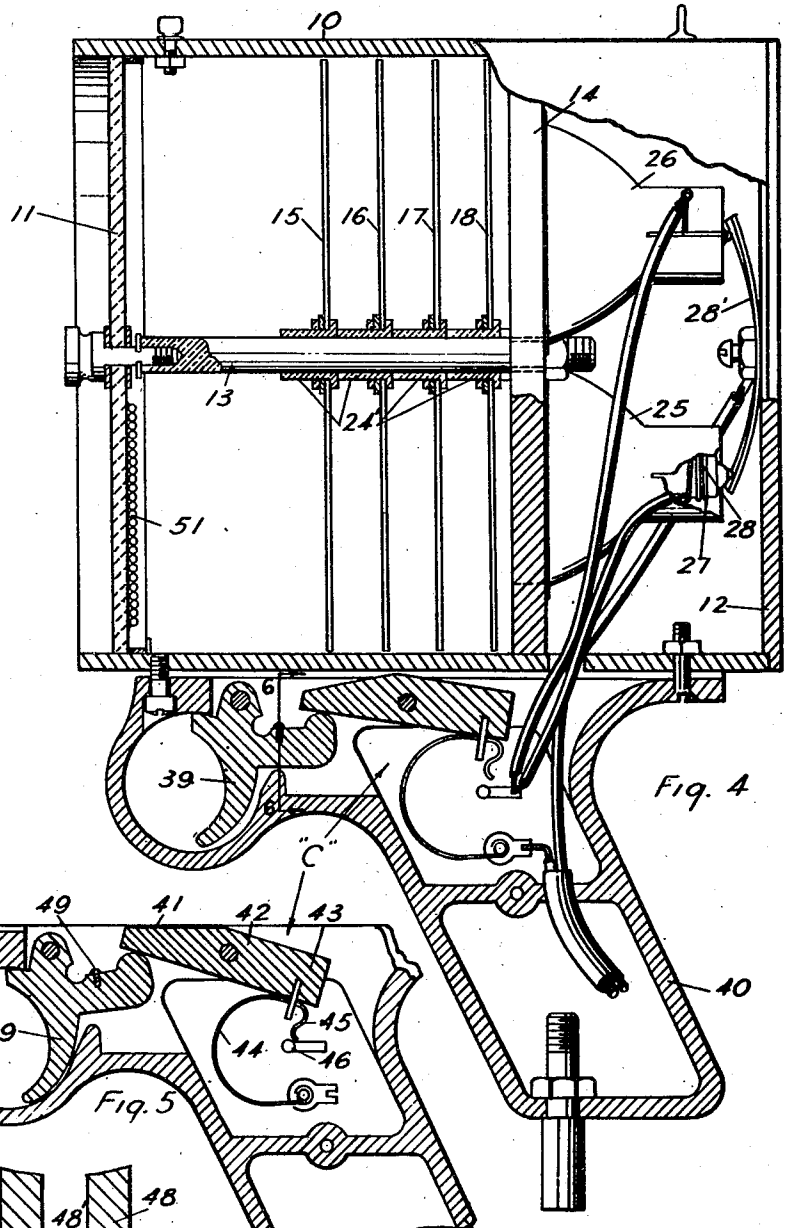

Fig. 4

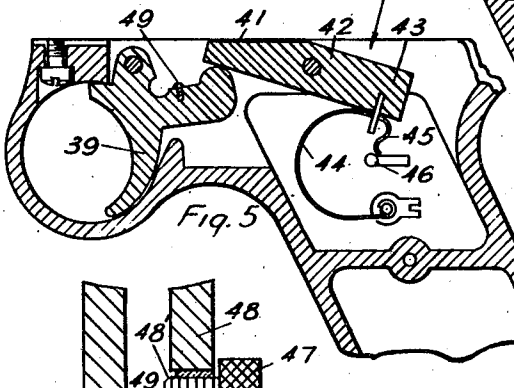

Fig. 5

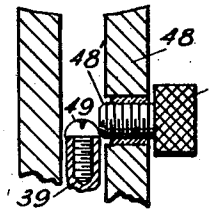

Fig. 6

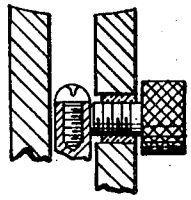

Fig. 7

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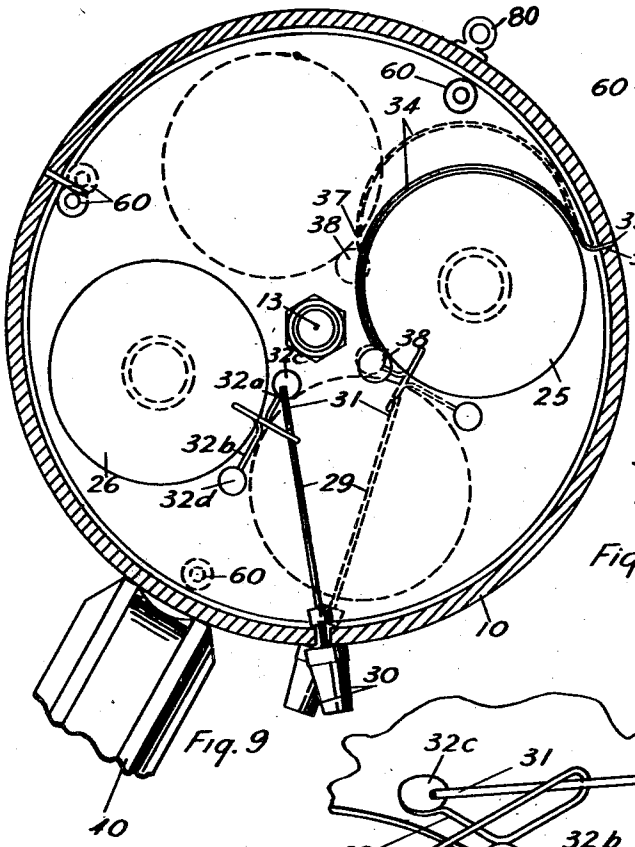

Fig. 9

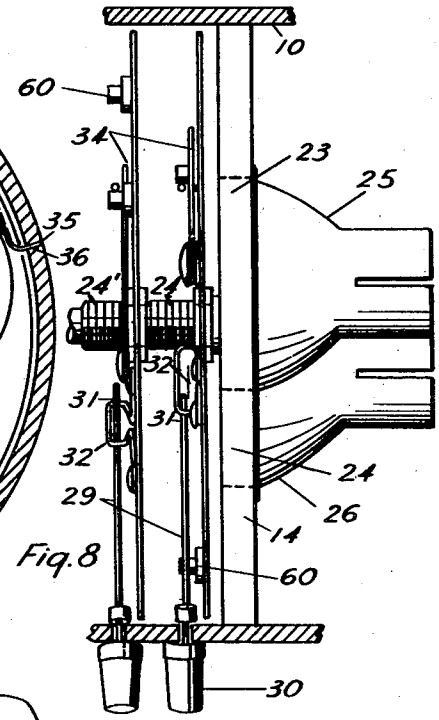

Fig. 8

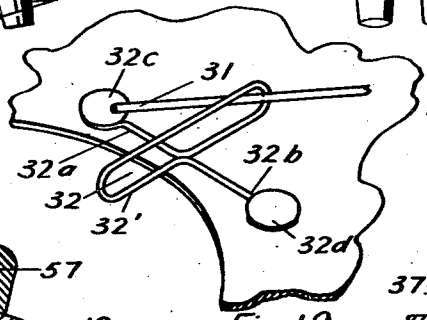

Fig. 19

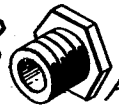

Fig. 21

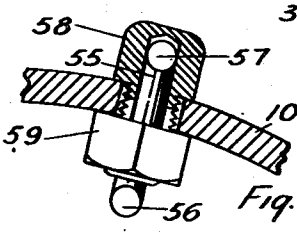

Fig. 10

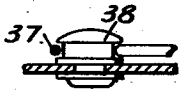

Fig. 22

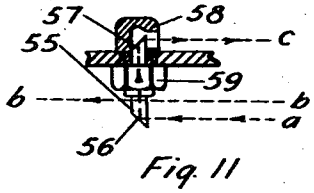

Fig. 11

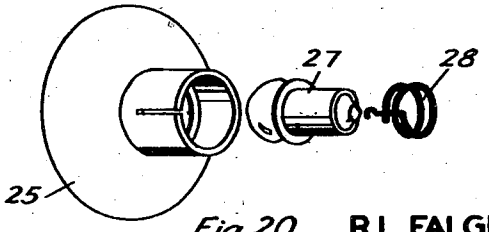

Fig. 20

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PORTABLE ELECTRIC SIGNAL LIGHT

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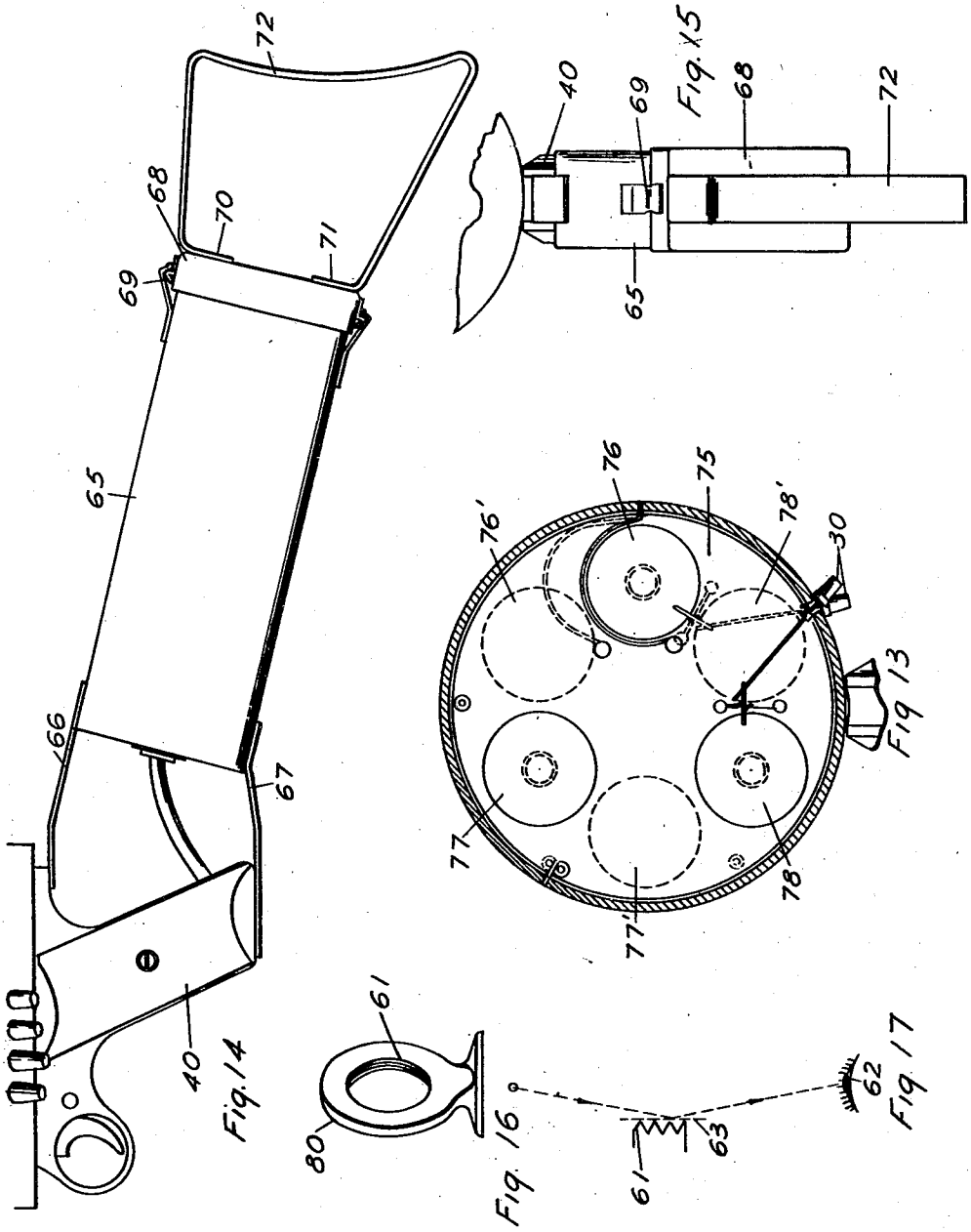

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Patented May 4, 1948

2,440,938

UNITED STATES PATENT OFFICE

2,440,938

PORTABLE ELECTRIC SIGNAL LIGHT

Raymond L. Falge, Bethesda, Md.

Application July 19, 1945, Serial No. 605,947

7 Claims. (Cl. 177—329)

1

This invention relates generally to electric lamps and more particularly to flashing signal lights provided with selectively-oscillatable media for changing color or for refracting or otherwise modifying the light beam.

One of the principal objects of my invention is to provide a signal light with a plurality of reflectors (either 2, 3, 4 or more may be used) to give higher visibility with lower power consumption, and at the same time with less weight towards greater portability.

Other objects include adjustable angles of viewing, as well as means for spreading the beam for a selected part of the light, together with dimming by mechanical rather than electrical means.

Still further objects are to selectively change color filters, dimmers and beam spreaders by mechanism incorporated into the unit, with operation possible with one hand.

Again other objects are to provide a trigger switch which more nearly approaches the operation of a telegraph key than any of the commercial switches employed on lights of this type, and also to provide a safety "lock-off" on the trigger which also "locks-on" for continuous burning of the filament.

Additional objects are to provide a tell-tale signal to give the operator an indication of the color of light emanating from the barrel, in addition to indicating the dots and dashes sent.

A further object is to incorporate a self-contained power supply into a stock which may be added to steady the unit for aiming purposes.

Objects also are to improve the rear closure so as to ease the lamp replacement problem, and to improve the non-reflecting rear ring sight.

Still other objects will be evident from the following detailed description of the accompanying drawings, in which:

Fig. 1 is a front elevation, with the front closure removed.

Fig. 2 is a side elevation.

Fig. 3 is a rear elevation with the rear housing plate open.

Fig. 4 is a full section on the line 4—4 in Fig. 1, showing the switch and trigger in "off" position.

Fig. 5 is a partial section on the same line as Fig. 4, but with switch and trigger mechanism in "on" position.

Fig. 6 is a section through the actual gun taken on the line 6—6 of Fig. 4, showing mechanism for locking switch and trigger in "off" position.

Fig. 7 is a section on the same line as Fig. 6,

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but showing the mechanism in the position for locking switch and trigger in "on" position.

Fig. 8 is a detailed elevation of two of the color change filters, one in open and the other in closed position, with the housing cut away.

Fig. 9 is a plan view of the elevation shown in Fig. 8.

Figs. 10 and 11 are sectional views of the tell-tale device taken on line 10—10 of Fig. 2, and line 11—11 of Fig. 1, respectively.

Fig. 12 is a view of the front closure.

Fig. 13 is a view corresponding to Fig. 9, but showing the invention adapted for the use of three reflectors with color filters, instead of two.

Fig. 14 is a side elevation of the handle of the gun, to which has been added a stock with a self-contained power-supply.

Fig. 15 is a rear view of the part shown in Fig. 14.

Fig. 16 is a perspective of the rear sight.

Fig. 17 is an enlarged view of the threads on the inside aperture of the rear sight.

Fig. 18 is an exploded schematic view of the housing and front plate and the reflecting plate and with only two of the filters therebetween, one of which filters is shown in alternate position in dotted lines.

Fig. 19 is a fragmentary view, on an enlarged scale, of certain parts shown in Fig. 9.

Fig. 20 is an exploded rear view of one of the reflectors and its bulb.

Fig. 21 is a detail of the bearing on which the plate is secured, for rotation on the spindle.

Fig. 22 is a detail of the pivot by which the filter-holding spring is attached to the filter.

Referring to the drawings, the hollow cylindrical housing 10 is provided with front and rear closures 11 and 12, respectively, of which 12 is secured by a hinge 12' and latch (not shown) to housing 10, while 11 is removably secured to one end of a shaft or spindle 13, which is supported axially in the housing, by reason of projecting rigidity through the center of a plate 14 fixedly mounted in the housing.

Rotatably mounted for oscillation on shaft 13, between plate 14 and front plate 11, are a plurality of parallel-spaced filters 15, 16, 17 and 18, each of which filters has two circular openings 19 and 20 which may be shifted into, and out of, alignment with the two openings 23 and 24 in fixed plate 14. A bushing 24' is preferably threaded through each filter for oscillation on spindle 13, and for spacing the filters apart.

Mounted on the rear face of fixed plate 14, are reflectors 25 and 26, having their front periph-

eries surrounding the two openings 23 and 24 of plate 14, so as to project light through such openings, from bulbs 27 mounted at the small end of each reflector. A spiral spring 28 is interposed between each filament bulb 27 and a metal strip 28' attached to the inside face of the rear closure 12, and suitable other electrical connections are provided between such bulbs and the switch mechanism generally indicated at "C" mounted in the handle, and hereinafter described.

For oscillating each of the filters 15, 16, 17 and 18, there is provided a set of mechanism which is identical for each of such filters, and hence only one such set of mechanism will be described in detail.

The set of mechanism includes means for moving the filter into operative or in-operative position, and means for releasably holding the filter in either such operative or in-operative positions.

The means for moving the filter includes a lever 29 having its outer end provided with a finger piece 30, and having its inner end 31 projecting through a slot 32 formed in the reversely bent body portion 32' of a wire having its terminal portions 32*a* and 32*b* bent at right angles to such body portion and secured to the filter face by means of lugs 32*c* and 32*d*, respectively.

The means for releasably holding the filter in operative or in-operative position, includes a spring 34 shown as of semi-circular configuration, with one end 35 of such spring fitting in a notch 36 in the inside of the housing 10, and the other end 37 secured to a lug 38 mounted on the face of the filter, while a stop pin 60 limits the swing of the plates or filters.

The switch mechanism, referred to above generally as "C," includes a trigger 39 fulcrumed in the handle 40 so as to rock upwardly one end 41 of pivoted arm 42 and simultaneously depress the opposite end 43 of such arm, thereby compressing spring 44 and forcing contact 45 against contact 46, thus completing the circuit to light the bulbs 27.

For locking the trigger 39 in either contact-making or contact-breaking position, there is provided a set screw 47 projecting through a side wall 48 of the handle 40, at a point where the chamfered end 48' of such set screw will engage the hardened steel insert 49 mounted in the trigger, thus permitting such set screw to engage the insert either to hold the trigger in circuit-making or circuit-breaking position.

Fig. 12 shows a front plate 11 which is so mounted that it may be rotated into any angular relationship with respect to the filters and reflectors, so that the beaded portions 51 shown may be shifted completely into and out of register with the beams of light, or into any intermediate position relative thereto. This plate is shown made of transparent material and at diametrically opposite points, such limited areas 51, shown circular but if desired occupying up to a full quadrant, are covered by a layer of tiny transparent beads 51 to produce a diffusing or dispersing action on the beam of light projected therethrough from the bulbs 27.

The preferred method is to incorporate modifying means in a transparent front plate (modifying means may be beads, lenses, or similar refraction elements) and could also include stops (similar to camera stops) to reduce the volume of the light.

Whereas the plates 15, 16, 17 and 18 preferably also would carry color filters, now it is recognized that these positions may be exchanged, so that the plates 15, 16, 17 and 18 may carry modifying elements and the front plate may carry polarizing or other filters.

The basis of selecting the location of the various elements will be determined by the operator's convenience. An element requiring more or less permanent attention would probably be the front plate, while an element expected to be thrown frequently in or out of the light beam would be applied to the oscillatable plates 15 to 18.

Instead of being thus fixedly positioned, plate 11 may be angularly positioned, in order that a greater or less area of such beaded area may be interposed in the path of the light beam, thus giving varying degrees of diffusion of the transmitted beam of light. By reason of such rotative mounting, the plate 11 may be turned so that none of such beaded area is interposed in the path of the light beam, in which case the light through the aligned openings of the filters in Fig. 18 would be projected through the un-beaded portion of the plate 11, thus without any diffusing effect on the transmitted light beam.

The purpose of the tell-tale is to indicate to the operator whether his operation of the trigger is being transmitted, it being noted that the tell-tale is a periscopic device to indicate whether the signal gun is operating.

Another function of the tell-tale is to transmit to the operator the color of any light which is projected through a color filter, so that the accuracy of operation may be assured.

The tell-tale comprises a piece 55 which is preferably a length of transparent, light-conducting plastic, to each end of which has been applied faces 56 and 57 at such an angle that it will reflect a beam of light entering the rod perpendicular to its axis and lying in a plane containing both the axis and a line perpendicular to the angular face.

The two faces 56 and 57 are arranged perpendicularly to each other. The assembly is located in such relation to the housing 10 that the inner end 56 projects into the path of the projected beam of light and thus crosses the boundary zone *b*—*b* of the light emanating from a lamp 27 and intercepts such light, thus a ray *a* from the lamp 27 is incident on the face 56 and is reflected so as to be transmitted along the main axis of the rod upwardly until it intercepts face 57 where it is again reflected and projected toward *c* back into the operator's vision.

The parts 58 and 59 are ordinary convenient mechanical means for locating and holding rod 55 in its proper relationship to the lamps.

As shown in Figs. 1, 2 and 9, a rear ring sight 80 is mounted on the top side of the housing, adjacent the rear end thereof, and as shown in Fig. 16 is provided with internal ridges 61, such as may be formed by threading, for the purpose of reducing glare by reducing the surface from which light may be reflected into the operator's eyes, indicated at 62 in Fig. 17.

The purpose of reducing glare is accomplished by a reduction in the horizontal area parallel to the line of sight, as indicated by 63 in Fig. 17.

As shown in Fig. 14, a metal battery case 65 is attached by straps 66 and 67 to the handle 40 by any suitable means.

For permitting access to the interior of the case, and permit replacement of the battery therein, a cover 68 is detachably secured to the case by cooperating spring clips 69 mounted on the case and cover.

Secured to the outer face of the cover 68 are

the ends 70 and 71 of the metal strap bent to form a shoulder rest 72.

The battery case and shoulder rest extend at any proper angle, such as is common for a rifle, for convenient operation of the signal light.

In Fig. 13 (which is a view corresponding to Fig. 9), the invention is shown adapted for the use of three reflectors with color filters, instead of two, as in Fig. 9.

Consistent with such three-reflector modification, each of the filters has three openings therein, and Fig. 13 shows one of these filters 75 provided with three openings 76, 77 and 78, shown in full lines as being equally angularly spaced.

Similarly as in the preferred form of Fig. 9, there is provided a set of mechanism (identical with that of Fig. 9) for moving the filter into operative or in-operative position and also for releasably holding the filter in either such operative or in-operative position. In Fig. 13, as in Fig. 9, dotted lines show the positions of the various parts after being shifted from their respective full-line positions.

The operation of the preferred form of my invention may be more readily understood by reference to Fig. 18 in connection with the other figures of the drawings.

Thus, in the relative positions of the parts shown in Fig. 18, beams of light from the reflectors are projected through the aligned openings of the filters (two filters only being shown in the interest of clearness and to avoid possible confusion if attempting to include all four shown in Fig. 4, or more or less than four if desired) and through the beaded portions of the front plate.

Hence, in such Fig. 18 relation of the parts, the emergent beam of light is characterized first by being uncolored (by reason of going through the aligned openings of all the color filters) and second by being diffused or dispersed after going through the beaded portions of the front plate.

Instead of the just-described emanating dispersed uncolored beam of light, it will be apparent that an emanating undispersed uncolored beam of light will result from leaving the reflector plate and filters all in the same relative positions as in Fig. 18, but rotatably shifting the front plate sufficiently to move the beaded areas into the positions shown in dotted lines in Fig. 18, so as to permit the projected beam of light to pass through the clear transparent unbeaded portion of the front plate.

Obviously, instead of getting a totally undispersed beam of light by moving such beaded areas entirely out of the path of the beam, it is possible to move such front plate so that any portion of the beaded area is in line with the beam of light, thereby giving any desired amount or degree of dispersion of the light emanating from the signal light.

Obviously, also, instead of the un-beaded area of the front plate being clear and transparent, it may have any color or design or surface configuration on such front plate, thus giving partly dispersed and partly colored of any degree or any other combination desired.

So much for the possible effects from shifting the front plate.

Obviously, other various effects can be obtained, as for example, if all the parts are left in the same relative positions as shown in Fig. 18, except to rotate filter 17 so that its openings are shifted into the positions shown in dotted lines in Fig. 18. Assuming the filter is red, then the

emanating beam of light will be dispersed red-colored, by reason of the beam of light passing through the red-colored portion of such filter.

Similarly, any one or more of the other filters may be shifted to give the desired color of light beam from one color filter or from blending of two or more color filters shifted into the path of the beams.

It is to be noted that the foregoing brief description of operation is predicated upon the "duplex" form of the invention, in which each filter has two openings therein, which are non-concentric relative to the axis of the filter and are diametrically oppositely positioned in said filter, and are equally spaced from such axis of the filter.

Similarly, the front closure has its two beaded areas located non-concentrically relative to the central axis of the housing and diametrically oppositely positioned on said closure and are equally spaced from such axis.

Similarly, also, the two reflectors are non-concentric relative to the axis of the housing and diametrically oppositely positioned relative to such axis and equally spaced from such axis.

By reason of the similarity of positioning of these parts just referred to, the beaded areas of the front closure can be aligned with the openings in each filter and with the reflectors, to permit the passage of beams of light, as indicated in Fig. 18 of the drawings and as explained above particularly in the description of the operation.

Turning to the "triplex" form of the invention, indicated in Fig. 13, the various elements referred to in the "duplex" form as diametrically oppositely positioned, are in Fig. 13 shown spaced 120 degrees from each other, but are equally spaced from, and non-concentric with, the axis of the housing.

The advantage of the "triplex" over the "duplex" is in the amount of light produced. If two lights give illumination of 10,000 foot-candles, three will give 15,000, 4 lights will give 20,000, etc. The amount of light is increased in direct proportion to the number of reflectors used. There is a limit, however, to the number of reflectors used, the limit on it being the size suitable for portability and taking into consideration the size of power supply needed.

From the foregoing, it will be observed that I have provided a signal light having the advantage of a plurality of basic units of individual sources of light and reflectors, and by proper disposition of these basic units, have made possible the incorporation into a portable light, of filtering, polarizing, or other modifying devices by convenient rather than cumbersome means, whereby filters, for example, may be so placed as to be instantly operable by the thumb of the hand holding and flashing the "light" gun.

Furthermore, other advantages thus accrue from this disposition of parts, as for example, the "tell-tale," located atop the housing, between the front closure and the front filter, so as to indicate to the operator not only that the light is "on" or "off," but also the color transmitted, while the overall efficiency of my signal light is contributed to by the self-contained power-supply cooperating with the positively-locking, wear-resisting trigger mechanism, including the hardened pin and cooperating set screw, for holding the trigger positively, yet quickly releasable, in either "on" or "off" position for any period of time desired, and yet adapted for rapid making and breaking of the light circuit in sending dots

and dashes by flashing light projected through the quickly-changeable light modifying media for selectively giving widely varying characteristics thereto, such as brightness, color, dispersion, etc., in accordance with different purposes and conditions of use of such signal light.

While in accordance with the provisions of the statutes, I have illustrated and described the best embodiment of my invention now known to me, it will be apparent to those skilled in the art that changes may be made in the subject matter and form of the invention disclosed without departing from the spirit of my invention as set forth in the appended claims, and that in some cases certain features of my invention may be used to advantage without a corresponding use of other features.

Although described herein as made of plastic, the tell-tale may be made of glass where weight or breakage is not a controlling factor, and used any place where rays of light are concealed from the vision of airplane pilot or any operator.

I claim:

1. In a signal light, a housing, a source of light, a reflector for such source of light, such housing being provided with a front closure of transparent material having a limited area thereof covered by a layer of tiny transparent beads to produce a diffusing or dispersing effect on the beam of light projected therethrough from said source of light, said closure being rotatively adjustable so that a greater or less area of such beaded area may be interposed into the path of the light, thus giving varying degrees of diffusion of transmitted light.

2. In a signal light as set forth in claim 1 wherein the beaded area is non-concentric relative to the axis of said front closure.

3. In a signal light as set forth in claim 1 wherein the beaded area is non-concentric relative to the axis of said front closure and said reflector is non-concentric relative to the axis of said housing.

4. In a signal light as set forth in claim 1 wherein a light modifying medium is positioned between said light source and said front closure and having an opening therein, said medium being oscillatable to bring said opening out of alignment with said light source and said beaded area, thus modifying the projected light by the characteristics of said medium through which such light passes.

5. A portable signal light comprising a housing, a plurality of sources of light mounted nonconcentrically and diametrically oppositely positioned and equally spaced from the central axis of said housing, a light modifying medium oscillatably mounted in said housing and having nonconcentric openings diametrically oppositely positioned and equally spaced from the central axis of said housing, said medium being oscillatable to bring said openings into alignment with said sources of light, for permitting beams of light to be projected from said sources of light through said openings.

6. A portable signal light comprising a housing, a plurality of sources of light mounted nonconcentrically and diametrically oppositely positioned and equally spaced from the central axis of said housing, a light modifying medium oscillatably mounted in said housing and having non-concentric openings diametrically oppositely positioned and equally spaced from the central axis of said housing, a front closure having a plurality of beaded areas non-concentrically and diametrically oppositely positioned and equally spaced from the central axis of said housing, said medium being oscillatable to bring said openings into alignment with said sources of light, for permitting beams of light be to projected from said sources of light through said openings, and said front closure being rotatively movable to bring said beaded areas into or out of alignment with said beams of light.

7. A light projecting device comprising a support member, a plurality of light sources mounted in said support member, a light modifying medium oscillatable in said support member for varying the effect of such medium on a beam of light from said light source and a front closure having an area of transparent beads thereon, said front closure being rotatively movable to bring said beaded area into and out of the paths of such beams of light.

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