

Dec. 27, 1949

E. C. BRIGGS

2,492,837

PORTABLE SIGNAL LIGHT

Filed March 13, 1947

2 Sheets-Sheet 1

Fig-1

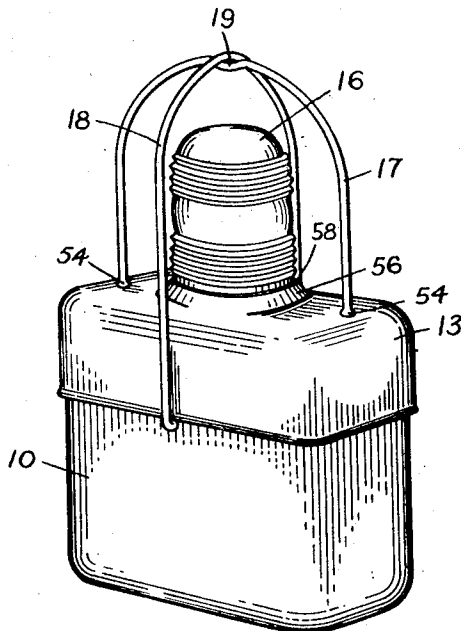


Fig-2

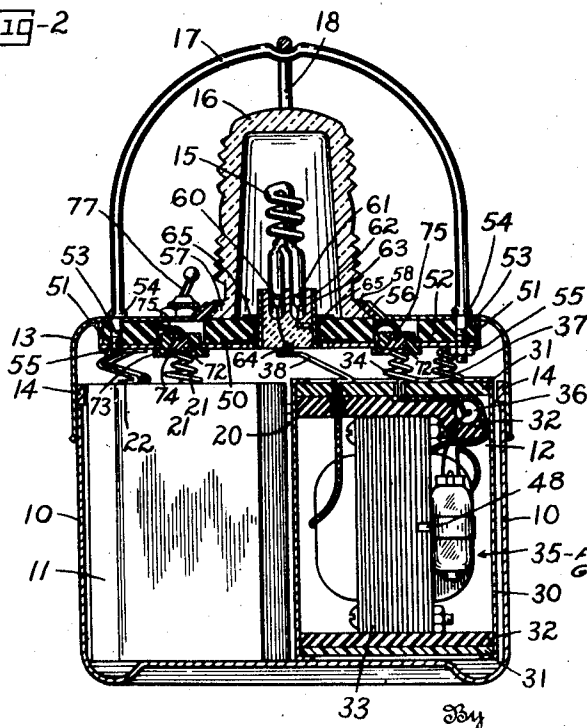
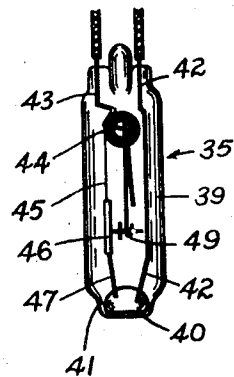


Fig-3



-FLASHING AND GRAVITY SWITCH

Inventor

Eugene C. Briggs

Marchal & Biebel
Attorneys

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Fig-5

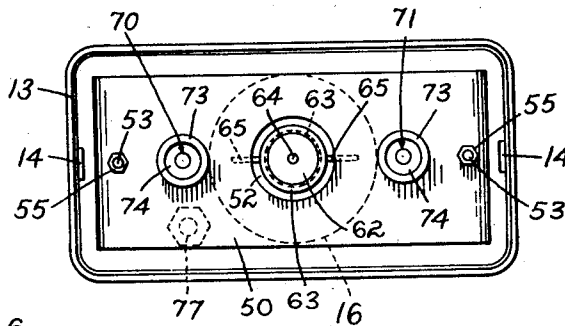


Fig-6

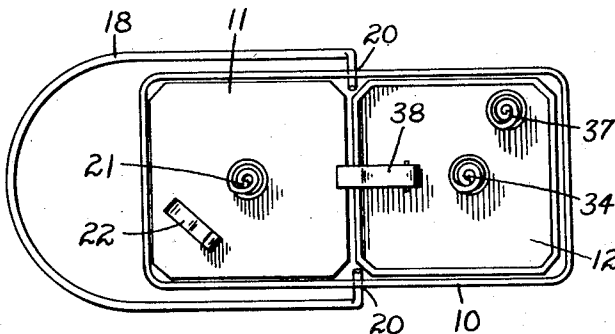


Fig-7

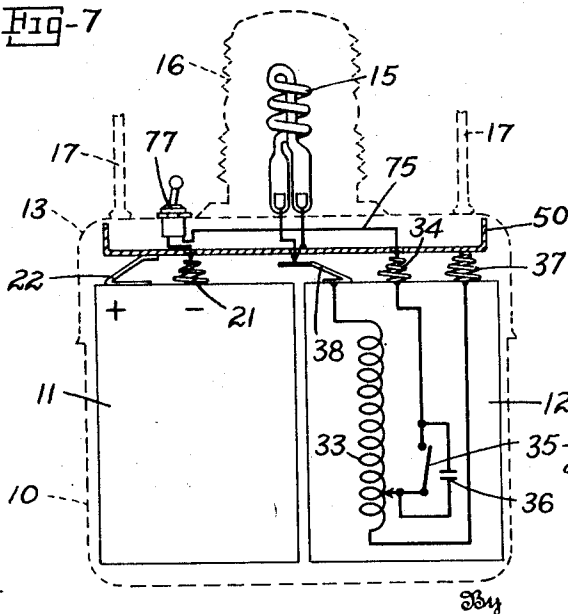
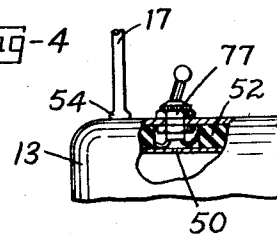


Fig-4



35-FLASHING AND
GRAVITY SWITCH

Inventor

Eugene C. Briggs

Marshall S. Biebel

Attorneys

UNITED STATES PATENT OFFICE

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PORTABLE SIGNAL LIGHT

Eugene C. Briggs, Dayton, Ohio, assignor, by
mesne assignments, to Emarco Corporation,
Chicago, Ill., a corporation of Illinois

Application March 13, 1947, Serial No. 734,362

13 Claims. (Cl. 177-329)

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This invention relates to electrically operated signal lights and more particularly to a portable light of the flashing type adapted for emergency or signal use.

It is an object of the invention to provide simple, economical and efficient construction of a self-contained portable flashing light of the gaseous discharge type energized by a battery and a power unit and embodying features of safety, automatic operation and facility of disassembly and reassembly.

It is also an object of the invention to provide a signal light including a gaseous discharge tube energized by a battery unit and a power unit and having separable connections between the units and the tube arranged to insure proper completion of an energizing circuit when the energizing units and the tube are assembled in various different relations without requiring assembly in only one specified relationship.

A further object of the invention is to provide a portable signal light of the flashing type in which energizing units are carried in a casing and a gaseous discharge tube is mounted on a cover removable from the casing and replaceable thereon in either of two alternate positions, and in which electrical connections are provided in the cover for completing a proper light energizing circuit in either position of the cover and with the energizing units in interchanged positions in the casing.

It is also an object of the invention to provide a simple, compact and economical flashing signal light which remains inoperative as long as it does not stand upright but which begins to operate immediately in response to being moved to an upright position such as by being picked up.

Another object of the invention is to provide a portable signal light having a fragile light producing tube projecting outwardly from a casing and having a handle means for convenience in transporting the same, the handle means being arranged to provide protection for the tube.

A further object of the invention is to provide a portable light including separable casing members forming a closed container and being individually provided with handle means arranged to engage each other and to secure the two casing members in closed relation as well as to provide for conveniently carrying the light by hand.

Other objects and advantages will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings—

Fig. 1 is a perspective view of a portable flash-

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ing light constructed in accordance with the present invention;

Fig. 2 is a vertical sectional view taken through the center of the light of Fig. 1, except that the battery unit is shown in full elevation;

Fig. 3 is a detailed view of a control switch included in the power unit shown in Fig. 2;

Fig. 4 is a fragmentary view of a portion of the cover of the light casing shown in Figs. 1 and 2, the cover being broken away and portions of the structure being sectioned to show more clearly the manner in which the toggle switch is mounted on the cover;

Fig. 5 is an elevational view of the inside of the cover embodied in the light of Figs. 1 and 2 and showing in particular the relative dispositions of the several electrical contact means inside the cover;

Fig. 6 is a top view of the lower portion of the light casing shown in Figs. 1 and 2 with the battery unit and power unit in place therein; Figs. 5 and 6 being vertically aligned in the drawing for convenient comparison of the positioning of the contact means on the battery and power units with respect to the contact means inside the cover; and

Fig. 7 is a schematic view combining a wiring diagram for the light with such portions of the mechanical structure as enter into the electrical circuit, all shown within an outline of the entire light assembly so that the correlation between structural features and electrical features of the light may be understood more readily.

In accordance with the present invention, there is provided a self-contained light adapted for general signal or position-marking purposes and having special utility as a marine or highway marker or signal, and which is particularly adapted to be carried by a vehicle and set out when the vehicle stops on a highway. Laws governing operation of trucks on public highways generally require that some such signal be carried by trucks for emergency warning purposes, independently of the normal lights energized from the truck battery, and the light of the present invention is especially well adapted for such use.

A flashing signal light embodying the invention in a preferred form, as illustrated in the drawings, comprises a generally rectangular lower casing member 10 formed of sheet metal or other suitable material and being shaped to receive in side-by-side relation a battery 11 and a power unit indicated generally by the numeral 12. A generally rectangular upper casing member or cover 13, also formed of sheet metal or other suit-

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able material is removably assembled on the lower casing member to provide a closed casing or container, the cover 13 being positionable on the lower member 10 in either of two alternate positions. Metal stops 14 are spot welded to the inside of the cover at positions spaced from the lower edge to insure proper placement of the cover on the lower casing member.

A gaseous discharge tube such as a neon or other rare gas containing tube 15 is centrally mounted in upwardly projecting relation to the cover 13 and is surrounded by a light diffusing rondelle 16.

The cover member 13 is provided with a fixedly mounted bail 17 secured to the cover on either side of the rondelle 16 and extending upward thereover in a plane perpendicular to the top of the cover and passing generally through the longer central axis of the cover. A second bail member 18 is pivotally secured to the lower casing member 10 and likewise extends upward over the rondelle 16 but in a plane at right angles to the plane of the first bail 17 so that the two bails encompass the light tube and rondelle as shown. By swinging the pivotally mounted bail 18 to the side, as shown in Fig. 6, the cover 13 together with the tube and bail 17 may be removed as a unit. When the pivotally mounted bail 18 is swung upward to the position shown in Figs. 1 and 2, it serves to lock the two casing members securely together, the bail 17 being formed with a depressed portion 19 for engaging and retaining the bail 18 as it is swung upward, resilience of the bails permitting sufficient deformation to allow passage of the bail 18 into and out of the depression 19. The ends of the bail 18 may be simply inserted in apertures at 20 medially disposed near the upper margin of either of the longer sides of the casing 10, as shown.

The bail arrangement described serves several purposes. It provides for securing the two casing members together to form a closed container; it provides a convenient handle for carrying the light in upright or operative position; and, at the same time, the bails encompass the tube and serve to protect it against breakage, particularly when the light is laid on its side for transportation in a vehicle and is likely to slide against other objects. It will further be noted that even when the cover is removed, bail 17 remains in protective relation with respect to the light tube.

The battery 11 suitably may be an ordinary 6 volt, dry cell battery of the type supplied for use in electric lanterns. Such batteries usually have a substantially square horizontal cross-section with cut-off corners as shown more clearly in Fig. 6. The battery has a central negative pole contact, which may be a coil spring contact 21, and a non-central positive pole contact, which may be a flat metallic spring contact 22, both contacts being exposed at the top of the battery in the usual manner.

The power unit 12 should be of generally the same size and configuration as the battery 11 so that the two may be positioned interchangeably in side-by-side relation in the lower casing member 10. A generally square configuration with cut-off corners is a suitable configuration for both the battery and power unit as may be seen more clearly in Fig. 6, as it provides ready interchangeability together with secure relative positioning, and the mating cut-off corners provide recesses for accommodating the ends of the bails projecting inward through the apertures 20.

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The power unit 12 comprises sheet metal side walls 30 having their ends crimped over bottom and top terminal plates 31 of molded resinous or other suitable insulating material, while additional pads 32 of insulating and cushioning material such as rubber are disposed against the inner faces of the plates 31. A high tension autotransformer 33 of suitable construction is mounted between the pads 32.

Three contact points are provided at the top face of the power unit. These include a central coil spring contact 34 connected through a gravity-controlled switch 35 to one side of the transformer. A condenser 36 is shunted around the switch 35. A non-central coil spring contact 37 serves as a common or grounded contact, being connected to the low potential end of the transformer winding. A third, flat spring metal, contact point 38 is disposed in a medial position adjacent one margin of the top face of the unit, as shown in Fig. 6, and this contact is connected to the high potential lead of the transformer.

The control switch 35, as shown more clearly in Fig. 3, preferably comprises a sealed glass tube 39 containing a globule of mercury 40 which is free to flow about the inside of the tube under the effect of gravity as the tube is tilted between vertical and horizontal positions, the normally lower end of the tube being formed with a well 41 for collecting the mercury in a pool when the tube is positioned substantially upright. A pair of flexible leads are connected respectively to relatively stiff wire elements 42 and 43 which extend through the upper end of the tube in sealed relation with the wall thereof. The wire element 42 extends downwardly through the length of the tube and projects into the well 41 in such position as to make electrical contact with the globule of mercury when it is in the well. The other wire element 43 supports a resilient member 44 having a depending arm 45. For purposes of illustration, the resilient member 44 has been shown as a hair spring but other forms of resilient members may be utilized. A curved plate armature 46 is attached to the lower end of the arm 45 and a stiff wire contact element 47 is secured to the lower end of the armature 46, the contact 47 extending downward sufficiently far to make electrical contact with the globule of mercury 40 when it is in the well 41.

The switch 35 is mounted adjacent the core of the transformer 33, as shown in Fig. 2, in a normally vertical position with the well 41 toward the bottom of the casing 10. A slot 48 is provided in the transformer core immediately opposite the armature 46 so as to provide a leakage path for the magnetic flux which includes the armature. When the transformer is energized the armature is attracted, and moves against the action of the hair spring, carrying with it the contact element 47 and which is drawn away from the mercury, thus breaking the circuit. A combination guide and stop assembly 49 maintains the armature in proper relation during such movements.

The switch 35 controls energization of the power unit and functions both as an on-and-off switch and as an automatic interrupter switch while the light is operating. So long as the light lays on its side, the mercury globule 40 remains out of the well 41, the circuit remains open and the power unit remains unenergized, but when the light is placed in a substantially upright position, the mercury globule flows into the well 41,

completing the circuit, and the transformer immediately is energized. Such energization serves magnetically to attract the armature 46 towards the transformer core and to move the element 47 out of contact with the mercury globule, thereby breaking the circuit, deenergizing the transformer and permitting the armature and contact 47 to return to their normal position under the influence of the resilient member 44. This results in completing the circuit, re-energizing the transformer, and repeating the cycle. As the control switch continuously makes and breaks the energizing circuit, flux in the transformer alternately increases and decreases with the result that successive pulses of high potential energy are transmitted to the gaseous discharge tube causing it to discharge and emit a high energy light beam each time the circuit through the transformer is opened, for example, about 100 times per minute. Thus the brief lighted periods follow in a continuous sequence, giving a high shock condition to the eye of the observer, but actually involving a closed circuit for flow of electrical energy from the battery for only a small fraction of time.

As has been indicated, the gaseous discharge tube is mounted on the cover and means are provided in the cover for interconnecting the tube, the battery, and the power unit in a proper energizing circuit as shown in Fig. 7, the connecting means being so arranged as to insure completion of the proper circuit when the cover is assembled on the lower casing in either of two alternate positions and when the battery and power unit are interchangeably positioned at either side of the casing with the battery orientated in any of the four possible positions at either side position.

A ground plate 50 of aluminum or other suitable conductive material is mounted in parallel relation spaced from the inside face of the cover 13, the plate 50 having upwardly turned end flanges 51 engaging the plate and determining the spaced relationship therewith so as to provide a cavity between the plate and the top of the cover. This cavity is filled with a slab 52 of cushioning insulating material, such as sponge rubber, held in slightly compressed condition between the plate and the cover. For holding the plate 50 against the cover 13, threaded ends 53 of the bail 17 extend downwardly through the cover and the plate, as shown, and compress the two together between upset shoulders 54 on the bail and nuts 55 on the threaded ends 53.

The rondelle 16 projects outward from a central aperture in the cover, the aperture being provided with an angularly upturned flange 56 against which the angular base 57 of the rondelle is received through the intermediary of a rubber gasket 58, the base 57 of the rondelle resting against the rubber slab 52 and being pressed outwardly by pressure exerted through the slab.

The tube 15 includes electrodes 60 and 61 and a base 62 of insulating material, such as porcelain, surrounded by a metallic ferrule 63. The base of the tube conveniently may be force fitted into a central aperture in the sponge rubber slab 52, a corresponding but larger aperture being provided in the ground plate to expose the base of the tube. One of the tube electrodes 60 is connected to a central contact point 64 in the base while the other electrode 61 is grounded to the metallic ferrule 63. The ferrule 63 in turn is grounded to the plate 50 by means of metallic

strips 65 which are folded outward about opposite portions of the margins of the aperture in the sponge rubber so that the vertically extending portions of the strips are held between the rubber and the ferrule 63 while the lower horizontal portions of the strips are held between the rubber and the plate 50. The tube is centrally positioned so as to bring its central contact point 64 into engagement with the marginally disposed high-potential spring contact 38 of the power unit when that unit is positioned in either side of the casing, so long as the contact 38 is disposed adjacent the battery.

Two additional contact points indicated generally at 70 and 71 are provided in the cover structure symmetrically disposed one on either side of the central tube contact 64 and in such positions as to engage the central contacts 21 and 34 of the battery and power unit, respectively, when these are interchangeably positioned in the casing.

The contacts 70 and 71 are of similar structure and disposition in the cover. Each includes a central metallic contact element 72 set in an annular molded element 73 of resinous or other insulating material which is provided with a conical outward opening 74 for directing the contacts 21 and 34 toward the metallic members 72. The molded elements 73 in turn are force fitted into apertures in the ground plate 50 and the sponge slab 52 as shown. The two contacts 70 and 71 are interconnected by an insulated lead 75 so that, irrespective of the relative positioning of the battery 11 and the power unit 12, the central contact 21 of the battery will be connected to the low potential contact 34 of the power unit.

An on-and-off switch such as the toggle switch 77 may be interposed in the lead 75, if a positive manual on-and-off control is desired. The switch 77 may be mounted in the usual way on the cover 13 as shown in detail in Fig. 4, the rubber pad 52 being recessed to receive the inwardly projecting portions of the switch.

The ground plate 50 extends over substantially the entire inner face of the cover 13 so that the non-central contact 22 on the top of the battery and the non-central contact 37 on the top of the power unit may engage the ground plate, and be interconnected by it, whatever may be the relative positioning of the battery and power unit with respect to each other and with respect to the casing.

The structure described provides for completing the light energizing circuit between the tube, the battery and the power unit when the cover and associated parts are positioned on the casing in either of two alternate positions and when the battery and power unit are in interchanged upstanding positions at either side of the casing, the requisite being that the marginally disposed contact 38 on the power unit be directed inward so as to engage the central contact 64 of the tube. The battery may be positioned in either side of the case and turned in any of the four possible directions in each position without interfering with proper completion of the circuit.

The interrelationships between the electrical features and the structural features of the light are more readily appreciated from the schematic view of Fig. 7 in which a wiring diagram has been combined with structural elements entering into the electrical system, and this combined system has been superimposed on an outline of

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the entire light so that the relationships may be clearly understood.

When the light is out of service, the toggle switch 77 may be placed in the "off" position and the light will be inoperative whatever its position. When the toggle switch 77 is omitted, the light may be laid on its side, as when being carried in a vehicle, and it will then remain inoperative because of the operation of the control switch 35 hereinabove explained. When being so carried, the rondelle 16 and the tube 15 are protected from breakage by the encompassing bails 17 and 18.

When the light is to be used, the toggle switch 77 should be turned on and the light positioned or carried in an upright position by means of the bails. If the switch 77 has been omitted, simply placing the light in an upright position will serve to start it operating. While in operation, intermittent flashes of red light are emitted by the neon tube at a relatively low frequency producing an effective warning signal.

Because of the system of interconnections between the electrical elements of the light and the simple locking arrangement between the two parts of the casing, assembly and disassembly of the light are greatly facilitated, so that, for example, a truck operator working in the dark may if necessary disassemble the light, replace a dead battery, and reassemble the light with certainty that proper circuit-completing contacts will be made. Furthermore, the mere picking up of the light is sufficient, in the absence of toggle switch 77, or when the switch 77 is closed, to place it in operation, so that no manipulation is required, and the user is protected by the flashing of the light as soon as it is picked up and while he is moving to set it out. The light is constructed in a rugged fashion and effectively withstands rough usage such as it is likely to receive when carried on trucks.

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A self-contained portable signal light comprising a casing, a battery and a power unit removably positioned in said casing, a gaseous discharge tube on the top of said casing, means for connecting said power unit with said tube, stationary unitary means within the casing for interrupting the energizing circuit for said power unit to cause the intermittent flashing of said tube, said means being sensitive to the position of said light to provide for energization of said power unit only when said light occupies a substantially upright position.

2. A self-contained portable signal light comprising a casing, a battery and a power unit removably positioned in said casing, a gaseous discharge tube on the top of said casing, means for connecting said power unit with said tube, stationary unit means for interrupting the energizing circuit for said power unit to cause the intermittent flashing of said tube, and said unitary means including a gravity controlled switch for said energizing circuit sensitive to the position of said light to provide for energization of said power unit only when said light occupies a substantially upright position and handle means encompassing and affording protection to said tube and

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connected to said casing in such position that said casing will occupy said upright position when said light is picked up and carried by the handle means.

3. A portable flashing light of the character described comprising a lower casing member, a removable upper casing member assembled upon said lower casing member and forming a closed container therewith, a gaseous discharge tube mounted on said upper casing member and projecting upwardly therefrom, removable energizing means for said tube within said container, and means encompassing and protecting said upwardly extending tube and including members connected respectively to said upper and lower casing members for removably securing the same in assembled relation.

4. A portable flashing light of the character described comprising a lower casing member, a removable upper casing member assembled upon said lower casing member and forming a closed container therewith, a gaseous discharge tube mounted on said upper casing member and projecting upwardly therefrom, energizing means for said tube within said container, and means encompassing and protecting said upwardly extending tube and including a bail fixedly mounted on said upper casing member and enclosing said tube, and a second bail pivotally mounted on said lower casing member and detachably engageable with said first mentioned bail to detachably secure said casing members together and to provide a carrying handle for the light.

5. A portable flashing light of the character described comprising a lower casing member complementary in shape to said lower casing member in either of two pre-determined positions and, a removable upper casing member adapted to be assembled upon said lower casing member in either of said two pre-determined positions to form a closed container therewith, a battery and a power unit within said lower casing member in side-by-side relationship therewith, a gaseous discharge tube mounted on said upper casing member, and electrical contacts on said upper casing member for completing an energizing circuit from said battery to said power unit and from said power unit to said tube in either of said alternate positions of said upper casing member.

6. A portable flashing light of the character described comprising a lower casing member, a removable upper casing member adapted to be assembled upon said lower casing member forming a closed container therewith, a battery and a power unit interchangeably positioned within said lower casing member in side-by-side relation therewith with a definite side of said power unit adjacent said battery, a gaseous discharge tube mounted on said upper casing member and connections on said upper casing member completing an energizing circuit from said battery to said power unit and from said power unit to said tube in any of said side-by-side relations of said unit and said battery.

7. A portable flashing light of the character described comprising a lower casing member complementary in shape to said lower casing member in either of two pre-determined positions and, a removable upper casing member adapted to be assembled upon said lower casing member in either of said two pre-determined positions to form a closed container therewith, a battery and a power unit interchangeably positioned within

said lower casing member in side-by-side relation therewith with a definite side of said power unit adjacent said battery, a gaseous discharge tube mounted on said upper casing member, and connections on said upper casing member completing an energizing circuit from said battery to said power unit and from said power unit to said tube in any of said side-by-side relations of said unit and said battery and in either of said alternate positions of said upper casing member.

8. A portable signal light comprising a generally rectangular casing having an open top, a generally rectangular cover adapted to be assembled on said casing in either of two alternate positions providing a closed container, a gaseous discharge tube mounted in outwardly projecting relation on said cover, symmetrically positioned electrical contact means exposed on the inside of said cover, two of said contact means being connected to said tube, a battery unit and a power unit each having a generally square horizontal cross section and being interchangeably positionable in said casing in side-by-side relation, a plurality of contact means exposed on top of each said battery and said power unit and engaging said symmetrically positioned contact means on said cover for completing an energizing circuit from said battery to said power unit and from said power unit to said tube when said cover is assembled in either of said alternate positions on said casing and when said battery and power unit are interchangeably positioned in said casing.

9. A portable signal light comprising a generally rectangular casing having an open top, a generally rectangular cover adapted to be assembled on said casing in either of two alternate positions providing a closed container, a battery unit and a power unit each having a generally square horizontal cross section and being interchangeably positionable in said casing in side-by-side relation, said battery unit having a central contact and a non-central contact exposed on the top thereof, said power unit having a central low-potential contact, a non-central low-potential contact and a marginal high-potential contact exposed on the top thereof, a gaseous discharge tube mounted on said cover and having two electrodes, a central contact on the inside of said cover connected to one electrode of said tube and positioned so as to engage said marginal high potential contact of said power unit when said unit is disposed in either of two alternate positions in said casing and when said cover is assembled in either of said alternate positions, a pair of contacts symmetrically disposed one on either side of said central contact in positions to engage said central contacts on said battery and power unit when said units are interchangeably positioned in said container and when said cover is positioned thereover in either of said alternate positions, means for interconnecting said pair of contact points on said cover, a contact plate disposed about said contacts on said cover, means connecting the other electrode of said tube to said plate, said plate extending over a substantial area of said cover so as to be engaged by said non-central contacts of said battery and power unit in various assembled positions of said units in said casing.

10. A portable signal light comprising a casing member adapted to receive a battery and a power unit in side-by-side relation, a cover for said casing adapted to provide a closed container, a pad of compressible insulating material disposed

adjacent the inside face of said cover, a ground plate confining said pad against said cover, a gaseous discharge tube supported by said plate and projecting outward from said cover, said tube having a pair of electrodes, one of said electrodes being connected to a centrally disposed contact insulated from and exposed through said plate on the inside of said cover, the other of said electrodes being connected to said plate, a pair of electrical contacts insulated from said plate and disposed symmetrically one on either side of said central contact, means for interconnecting said pair of contacts, and means including said interconnecting means to complete an energizing circuit for said tube when said battery unit and power unit are positioned in said casing.

11. A portable signal light comprising a casing member adapted to receive a battery and a power unit in side-by-side relation, a cover for said casing adapted to provide a closed container, a pad of compressible insulating material disposed adjacent the inside face of said cover, a ground plate confining said pad against said cover, a gaseous discharge tube supported by said plate and projecting outward from said cover, said tube having a pair of electrodes, one of said electrodes being connected to a centrally disposed contact insulated from and exposed through said plate on the inside of said cover, the other of said electrodes being connected to said plate, a pair of electrical contacts insulated from said plate and disposed symmetrically one on either side of said central contact, means including a manually operated on-and-off switch for interconnecting said pair of contacts, and means including said interconnecting means to complete an energizing circuit for said tube when said battery unit and power unit are positioned in said casing.

12. A portable flasher light comprising a casing member having an open top, a battery unit and a power unit interchangeably positionable in said casing member, a plurality of electrical contacts exposed on top of each said battery unit and power unit and including a central contact on each unit, a non-central contact on each unit and a marginal contact on said power unit, a removable cover engaging the top of said casing member in either of two alternate positions providing a closed container, a gaseous discharge tube projecting upwardly from said cover, a bail fixedly mounted on said cover and extending over said tube, a second bail pivotally mounted on said casing member and also extending over said tube in a plane generally transverse of the plane of the first said bail, the two bails being arranged to engage each other in upstanding relation encompassing and providing protection for said tube and providing handle means for carrying said light in an upright position, a plurality of contacts symmetrically disposed along a central line inside said cover, a plate disposed about said contacts, said contacts and said plate being arranged to engage said contacts on said battery and power unit for completing an energizing circuit from said battery to said power unit and from said power unit to said tube when said cover is assembled in either of said alternate positions and when said battery and power unit are interchangeably positioned in said casing.

13. A portable light including a casing comprising top and bottom sections, illuminating means mounted on said top section and projecting outwardly therefrom, energizing means for

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said illuminating means within said bottom section, electrical connections including a switch between said energizing means and said illuminating means for controlling the latter, a bail member fixed at opposite points to one of said casing sections extending outwardly therefrom over said projecting illuminating means and in spaced relation thereto, a second bail member pivotally mounted at opposite points on the other casing section extending outwardly therefrom in a plane transverse to the plane of said first-mentioned bail member over said illuminating means in spaced relation thereto and detachably engaged with said first mentioned bail member to serve

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as protecting means for said illuminating means, to removably secure the casing sections together and to provide a carrying handle for the light.

EUGENE C. BRIGGS.

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