(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 312 325 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **88309529.1**

(22) Date of filing: **12.10.88**

(51) Int. Cl.[4]: **F 21 L 11/00**

(30) Priority: **12.10.87 GB 8723932**

(43) Date of publication of application:
19.04.89 Bulletin 89/16

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR IT LI LU NL SE

(71) Applicant: **Webb, Ronald Richard**
Alpha House Timothy's Bridge Road
Stratford-Upon-Avon Warwickshire CV37 9NQ (GB)

(72) Inventor: **Webb, Ronald Richard**
Alpha House Timothy's Bridge Road
Stratford-Upon-Avon Warwickshire CV37 9NQ (GB)

(74) Representative: **Tillbrook, Christopher John**
Chris J Tillbrook & Co 5 Old Rectory Close Churchover
Rugby, Warwickshire CV23 0EN (GB)

(54) Marker light.

(57) A marker or hazard/warning indicator/signal light comprising:
a hollow elongate light tube (10),
incorporating a translucent region (11) in the wall thereof;
a lamp unit (28, 29) receivable within the tube (10),
and alignable with the translucent tube wall region (11);
a base mounting unit (40) for supporting the light tube (10) in a desired orientation, and
for housing a power supply (31, 32) for the lamp unit (28, 29);
a removable peripheral base cone (12) enshrouding a lower portion of the light tube (10) and the base mounting unit (40) therefor.

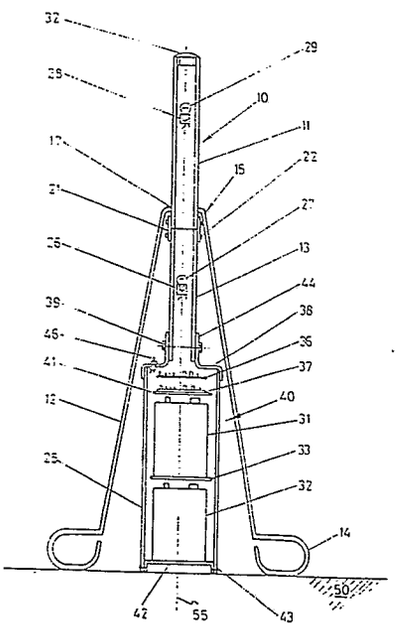

FIG-1

EP 0 312 325 A2

Description

Marker Light

This invention relates to marker or warning and general illumination lights and is particularly, but not exclusively, concerned with the illumination or lighting of traffic warning cones, of which large numbers are in use and embraces a new cone construction and an adaptation of existing cones.

The term traffic is used herein generally to embrace any form of path, route or boundary for movement of any kind, whether road vehicles, or aircraft taxiing on the ground or boat navigation or indeed pedestrian; but the particular applicability is in road traffic, especially motorways and trunk routes where large scale multiple cone use is involved.

Moreover, the expression or designation 'traffic (warning) cone' is hereinafter abbreviated to simply 'cone'.

Existing cones are typically of synthetic plastics material. This means that they are impact resistant, light in weight and thus readily portable (and not unduly heavy in large numbers for transport) and weather-proof and generally durable without maintenance.

They are generally self-colour and/or may have reflective coloured strips affixed to their outer surfaces to enhance their visibility.

Nevertheless, gradual weathering and coating with traffic spray and grime causes progressive deterioration in such colouring and reflectivity.

At night the reduced visibility, even in headlight illumination, particularly when the cones are not directly in the oncoming light path, further cumulatively impairs the cone visibility and hence its warning indicator function.

Warning lights are also known, but generally are separate items to the conventional cone and have typically involved elaborate and expensive special bodies with expensive and fragile lenses, and often with expensive features such as re-chargeable batteries, light-sensitive switches, which mean a significant expense if the light is lost or damaged and reduce the numbers that can economically be purchased at the outset.

If a hazard location justifies an illuminated warning, then the consequences of loss or failure of the warning light - or indeed failure to instal one initially through economic or other constraints, can be that much more severe.

Accordingly, large scale warning marker illumination, whether they be cones or any other shape, has not been practical and even where used has typically not involved every cone.

There is also a great diversity of lighting, and in particular lighting within plastics containers, capsules, sleeves, shrouds or casings, including the entertainment and display lighting fields, where lighting is used for special presentational optical effects.

However, this is not designed for the massive-scale use that roadway warning marking involves, for example miles of cones at a time, and is not sufficiently weatherproof, durable, maintenance free and able to operate self-contained without elaborate power supply and switching arrangements.

In addition, there is no readily satisfactory means of attaching the light to cones or otherwise mounting the lights, without their becoming a hazard in themselves because of their increased bulk and weight, or without their making the conventional cones top-heavy and thus unstable - and indeed generally complicating the process of cone erection and layout.

The 'classic' cone shape is precisely that, viz. conical, with a wide stability-affording base, tapering to a relatively narrow nose and presenting a uniform elevational appearance from any direction.

Moreover, interfitting or internesting to facilitate compact stacking, one upon another in successive arrays is possible.

There have also been variants in size, including 'giant' cones as a more prominent warning. A danger can arise with larger, bulkier and heavier cones, despite the use of light weight synthetic plastics materials, of their constituting a collision hazard.

Thus cones may cause damage either upon immediate impact (as opposed to being readily displaced by the slip-stream of adjacent fast-moving and especially heavy traffic - or 'nudged' out of harm's way upon even minor glancing blows) or in being driven as a 'missile' into the path of other traffic.

There is thus always a compromise between the hazard warning function and the barrier control function, without in fact introducing a further hazard by the presence of the cone itself.

Accordingly, simply making the cone larger for enhanced visibility increases its bulk and obstacle presence with conventional cone designs.

Where carriageway width restrictions are severe, the wide base of the cone may intrude unduly into the lanes marked out or designated by the line of cones.

There is however a limit to how much the cone base breadth dimensions can be reduced without impairing the stability, and in particular the 'toppling-resistance' of the cone structure. Thus a tall, narrow cone design rapidly becomes impractical.

Yet increasing the cone height improves visibility both from a distance and at very close quarters when the cone is alongside a vehicle and otherwise sits far below the vehicle 'waistline'.

Alternative cone designs have been proposed to allow lane marking in severe width restrictions and yet incorporate resistance to toppling and displacement without requiring undue impact force to dislodge from their in-situ station.

A typical such narrow cone design takes the form of a cylindrical pillar with a base configured to form a complementary 'snap-action' locking interconnection with a roadway-mounted 'cats-eye'.

This necessitates an elaborate and expensive moulding and the cone is useless for defining a path

on a route where there are no such cats-eyes (or buried reflective marker stations integrated with the road surface).

According to one aspect of the invention there is provided a marker or hazard/warning indicator/signal light comprising:
a hollow elongate light tube,
incorporating a translucent region in the wall thereof;
a lamp unit receivable within the tube,
and alignable with the translucent tube wall region;
a base mounting unit for supporting the light tube in a desired orientation, and
for housing a power supply for the lamp unit;
a removable peripheral base cone enshrouding a lower portion of the light tube and the base mounting unit therefor.

According to another aspect of the invention there is provided:
an indicator lamp comprising:
an elongate hollow sleeve;
the sleeve incorporating translucent and/or transparent wall portions;
one or more individual electrical lamp fittings being removable located within the sleeve;
a demountable electrical connection within the sleeve for effecting connection between the or each lamp fitting and an electrical power supply;
the demountable connection being co-operatively-disposed within a mounting region of the sleeve;
the sleeve mounting region incorporating means for demountable securing the sleeve to an otherwise separate base portion;
the translucent and/or transparent sleeve portions being disposed so that, when illuminated by lamps fitted internally of the sleeve, they are selectively operable or movable to illuminate the mounting base region.

There now follows a description of a particular embodiment of the invention, by way of example only, with reference to the accompanying schematic and diagrammatic drawings, in which:

Figure 1 shows a sectioned elevational view of a traffic cone mounted warning indicator light according to the invention; and

Figure 2 shows a switching circuit for the indicator of Figure 1;

Referring to the drawings, and in particular Figure 1, an indicator lamp 10 comprises a hollow elongate tube, in this example cylindrical (that is of uniform circular section), in multiple axially-aligned and end-interfitting parts - of which an upper part 11 is exposed at the top of an overall cone assembly described later and a lower part 13 intrudes within the body of a cone-shaped base portion 12.

The lower light tube 13 is mounted in the head of a base-unit power supply pack 40, which comprises a cylindrical casing 25 housing re-chargeable battery-packs 31 and 32, with associated control circuit boards 36, 37 mounted on a connecting plate 41 for linking in with the battery terminals.

The battery casing 25 is surmounted by a lid 38 with a hollow cylindrical nose funnel 44 for receiving as a complementary-shaped interfitting connection the lower end of the lower light tube 13, which is demountably secured thereto by a locking fastening pin arrangement 39.

Similarly the upper light tube is demountable secured to the lower light tube 13 by a connector sleeve 21 and a pair of locking pins 22, the entire connection being located within the cone 12, secure form unauthorised tampering and indeed kept protected from the weather and in particular moisture penetrating the light tube joint and seeping into the internal lamp fittings, described later.

The connector collar 21 also inhibits the withdrawal of the light tube assembly from the cone 12, thereby affording additional security. Thus the entire cone assembly can be lifted and moved as a whole by grasping the upper light tube 11.

The illuminating source of the unit 10 comprises multiple individual lamp units 26, 27 and 28, 29 within both the upper and lower light tubes 11, 13 connected by a wiring harness (not shown) to the electrical control circuit boards 36, 37.

A master lamp control on/off switch 46 is mounted in the lid 38, secure from unauthorised operation by being enclosed within or covered by the body of the outer cone 12.

An end cap 32 seals the upper end of the upper light tube 11 and prevents the ingress of moisture and dirt, yet is removable to afford access to the internal lamp fittings - which may be withdrawn as an integrated 'string' to allow bulb inspection, replacement and general testing and maintenance, all without necessarily removing the overall light tube assembly from the cone 12 as a whole. This maintenance in-situ feature is particularly advantageous by allowing the cone to remain in place as a warning in the desired location.

Although individual filament bulbs 27, 29 are shown fitted into respective bulb holders 26, 28, other forms of lamp or light source may be employed - for example, low voltage/low current-consumption fluorescent, neon or even high-intensity discharge tubes. Again, by virtue of the modular construction, the entire lamp source may be changed by simply sliding assemblies within the light tube assembly 10.

The battery power supply may be replaced by removing either the lid 38 on the battery casing 25 or a base 42, secured to the casing 25 by fasteners 43. The entire inner light tube assembly 10 within the cone 12 rests independently on the ground surface 50 and thus minor irregularities in the ground surface may be accommodated by relative axial sliding movement between the cone 12 and the light tube assembly 10, whilst retaining their axial alignment as indicated at 55.

Thus the upper nose 15 to which the cone 12 tapers from its ground-engaging base 14 receives as a close sliding fit the outer walls of the light tube assembly 10, ending with the upper light tube 11 when the installation is complete.

In this way, the cone 12 can simply be slid over the internal light tube assembly 10 and its own slightly wider base unit 40; taking advantage of the progressively increasing internal breadth dimensions of the hollow cone 12 nearer its base.

Accordingly, the light tube assembly 10 can be

free-standing in its own right with a stable base, but with its overall stability and 'visible presence' enhanced by the addition of the surrounding cone base 12, with its wider base 14.

The battery packs 31, 32 may be proprietary cells, preferably sealed units, for reduced maintenance and a snap-action electrical connection (not shown) may be fitted between them and the wiring loom or harness (not shown) connecting them with the switching control circuitry 36, 37 and the lamp array 27, 29.

Such connectors may be incorporated in transverse dividers or load plates 33, 41. The disposition of the casing 25 keeps the batteries 31, 32 upright and spillage-free, but should the cone 12 be toppled, any spillages of battery acid are retained within the casing 25 - an important safety feature.

All of the various 'mechanical' components may be fabricated of synthetic plastics material, for example by extrusions in the case of the light tubes 11, 13 and collar 21 - and even the casing 25, or mouldings in the case of the cone 12, lid 38 and base 42.

Instead of separate components, the upper and lower light tubes 11, 13 may be integrally-moulded as a single entity. Similarly, the base casing 25, with its lid 38 may be integrated with the light tube 10.

It should be appreciated that the cross-section of the light tubes 11, 13 may be varied - for example, a polygonal or segmented section, and similarly the wall thickness may be varied to achieve an enhanced prismatic, reflective, refractive, focussing, diffusion or other desired optical effect.

The material itself, in particular its translucency or transparency may be chosen accordingly. Thus a translucent lower tube 13 allows greater ambient light penetration which illuminates the cone 12 itself and with the choice of a translucent cone material, the entire cone material is lit up with a 'body glow' effect.

On the other hand, the upper tube 11 could be translucent and of self-colour or tint, to allow introduction of a colour coded lighting, for example amber for general hazards or blue for police warnings.

Referring to Figure 2, an electronic switching circuit, for turning the bulbs successively on and off, comprises a semiconductor multivibrator array of a pair of PNP and NPN transistors connected 'back-to-back' to achieve oscillatory feedback through a path of a series-coupled resistor 74 and electrolytic, polarity-conscious capacitor 73, which together define the switching rate - that is the transistors 71, 72 being repeatedly turned on and off, by periodic charging and discharging of the capacitor 73 through the series chain of resistors 74, 75.

A lamp bulb 80 is connected in the supply path of a driver transistor 72 of the coupled pair across the power supply 77, comprising a 6 volt (battery) source, not shown. Overall switching is controlled by the on/off switch 46, which isolates both transistors 71, 72 from the supply 77. With the component values indicated, a switching cycle repetition rate of between 120 and 150 per minute for a 150 mA consumption bulb is achieved; this having been found to be the optimum rate for an effective warning indication.

This otherwise routine circuitry has been pared down to a minimum of components for low cost and reliability in long term unattended working in adverse exposed temperature and humidity fluctuating conditions without adjustment of the pre-set switching frequency.

Individual switching circuits may be provided for different sets of lamps to provide an independent back up or a contrasting flashing frequency or phase, say between the illumination of the upper and lower light tubes 11, 13.

The circuit boards 36, 37 may incorporate charge control for the batteries 31, 32 and their entirety may be encapsulated in a weatherproof plastics block.

For ancillary, emergency use, the upper light tube 11 may incorporate a self-contained disposable or re-chargeable battery pack (not shown) so that it can be removed, conveniently by a snap-action or other quick-release connection fitting, from the lower light tube 13 and wielded as a manual warning and/or illumination aid.

An electrical quick-release connection between the upper and lower light tubes 11, 13 would restore the main battery supply 31, 32 to the former when replaced and could thus re-charge any re-chargeable supplementary cells therein.

Indeed, a whole series of 'stackable' interconnectable light tubes could be provided, in order to form a tall, slim, (thus offering minimal wind resistance and not unduly moved by the slip-stream of adjacent passing vehicles) warning pillar, which retains the stability of the heavier power supply base 40 and the supplementary breadth of the enshrouding base cone 12.

With such a lighting pillar, the heights of pillars on successive cones in a particular layout could be varied in a predetermined fashion to achieve a special supplementary optical effect, rather like that of varying road marking spacings which have enhanced effect when viewed at faster speeds and thus a more pronounced warning function.

In addition, the upper light tube could take the form of an angled connector or T-piece, enabling the light tubes on successive adjacent cones to be connected - and share their individual reserve power supplies.

In this way, symbols, letters and/or numbers could be formed by appropriately convoluted light tube arrayed between support tubes and cones. For example, the standard warning triangle symbol could be displayed in the requisite red colour.

General tube lighting with self-contained power supplies, is taught in my copending UK patent application no. 8724017.

Provision may also be made for connecting the cone lighting system to an alternative (emergency) power supply - even a vehicle electrical supply.

The configuration of light tube and cone according to the invention still enables cones to be stacked; that is 'empty' cones can be piled one-upon-another on a base unit with a light tube in place (that is the basic arrangement, as illustrated in Figure 1) - with the light tube of the bottom unit forming a common

axial support stem extending through the noses of successive piled cones.

Indeed, one or more supplementary cones stacked upon a base cone and integral light tube or stem adds to the bulk and weight of the overall cone assembly and provides a cone with enhanced stability and physical presence - useful, for example, when guiding heavy traffic creating larger attendant slip-stream effects.

A quick-release combined electrical and mechanical connection 39,44 between the lower light tube 13 and the base power pack 40 and its casing 25 may also be provided in a similar fashion to that for the connection 21 between the upper and lower light tubes 11, 13 themselves.

For example, a variant of a plug-and-socket, or push and twist interlock 'bayonet' connector may feature in such a quick-release fitting.

Additional coloured translucent sleeves may be slid over the emergent upper light tube 11, either in axially-spaced array or as a series of annular lenses or filters, to achieve different optical effects, for a given base unit. In order to facilitate this, the upper light tube 11 may be transparent for increase light transmission from the inner lamps to outside.

The casing 25 has sufficient spare capacity to house spare parts, such as bulbs 27, 29.

Provision may be made for an optional 'high output intensity' mode, for example to switch from 'passive' self-illuminating warning operation to a general outside illumination or floodlighting for emergency use, for example at the scene of an accident all the adjacent light cones could be switched to temporary 'flood' mode. This could be assisted by pulling the light tube assembly 10 upwards to expose a translucent section of the lower light tube 13 normally concealed within the cone base 12.

The power supply base unit could be used as a general-purpose emergency power pack by unplugging the light tube assembly and connecting an alternative apparatus or implement, for example a portable emergency breathing or nebulizer unit to assist an accident victim, or a heated garment.

Alternatively, an ancillary power supply socket could be fitted to allow the lighting mode to remain in use. Cumulatively, the reserve supply from multiple cone base packs could offer a significant emergency power source, which with transformer assistance, could run a higher voltage and power unit.

For their own re-charging purposes, the bases 42 of the power pack 40 casings 25 could incorporate a push-fit connector, so that by simply inserting the pack 40 in a charger base unit with a complementary connection, re-charging would start automatically and would be cut-out electronically upon a full charge being achieved or when the pack was withdrawn for use.

A state-of-charge warning indicator could be incorporated in the pack 40, for example, a slower (less power-consuming) lamp flashing mode could be initiated, or the lower tube lights extinguished at low residual charge levels to prolong lighting life.

Reverting to the specific apparatus of Figure 1, a preferred operating arrangement is with the lower light tube 13 transparent and the cone 12 translucent, the lamps 27 located therein being operated either intermittently or continuously by the associated control circuitry (say, on board 37); whereas the upper light tube 11 is translucent of a desired warning colour, for example, amber, and the lamps 29 located therein are operated in a flashing mode by the associated control circuitry (say, on board 36).

The upper and lower light tubes 11, 13 may run independently from different batteries 31, 32, or the latter may be linked together as a common power supply.

By the use of an overall internal illumination, regardless of any supplementary optical enhancements as previously mentioned, the cone is visible from any approach angle. Thus, unlike many existing warning beacons, no special orientation or direction of emergent light beams in relation to oncoming traffic is required. This remains so should the cone be dislodged or even tipped over by collision impact.

By the provision of a more substantial, multi-stage, battery pack, increase overall light output can be secured, offsetting any deleterious effects of traffic grime films, which may nevertheless be readily washed off, since the internal lamps and power supply are shielded from the elements. In any event, the upper light tube 11 is kept further from the road surface than with other designs and thus remains clearer of traffic spray.

Light-spreader panels may be secured to the upper light tube 11, for example, as lateral diffuser wings, conveniently fitted into slots in the side walls thereof, in order to provide a more prominent illuminated 'target' beacon.

Indeed, the cross-section of the upper light tube 11 itself may be varied, for example, by provision of a fatter barrel-shaped upper region, in the manner of a lantern. In that regard particularly, the unit may function as a general decoration or ornament at festivals or events, in addition to any marking or warning function.

Chains, wires or ropes may readily be secured to the upper light tube 11 to form a continuous line barrier supported on individually-illuminated posts. The line may itself comprise a flexible, internally-illuminated, translucent-walled tube, conveniently supplied with power from the battery packs inside the posts.

The end-cap 32 may incorporate an on/off control switch or may conceal the same located just below if ease of access is needed.

Claims

1. A marker or hazard/warning, indicator/signal light comprising:
a hollow elongate light tube (10),
incorporating a translucent region (11) in the wall thereof;
a lamp unit (28, 29) receivable within the tube (10),
and alignable with the translucent tube wall

region (11);
a base mounting unit (40) for supporting the light tube (10) in a desired orientation, and
for housing a power supply (31, 32) for the lamp unit (28, 29);
a removable peripheral base cone (12) enshrouding a lower portion of the light tube (10) and the base mounting unit (40) therefor.

2. An indicator light, as claimed in Claim 1, wherein the lamp unit is controlled by a switching circuit so as to operated intermittently as a flashing warning at a predetermined rate to enhance the warning perception thereof.

3. An indicator light, as claimed in either of the preceding claims, wherein the elongate tube walls are varied in thickness to achieve a diffusion and/or focussing optical effect by selective reflection and refraction.

4. An indicator light, as claimed in any of the preceding claims, wherein the tube is orientated upright and an upper tube portion is of translucent material and a lower tube portion is transparent to illuminate translucent walls of the base cone.

5. An indicator light, as claimed in any of the preceding claims, wherein the tube and base mounting are adapted to fit proprietary cones.

6. A traffic warning cone illumination adaptor comprising an indicator light as claimed in any of the preceding claims.

7. An indicator light, as claimed in any of the preceding claims, wherein an upper tube portion is removable with its own self-contained power supply to function as an ancillary manual warning indicator.

8. An indicator light, as claimed in any of the preceding claims, with a selectively-operable high light intensity output mode to function as a general local illumination aid.

9. An indicator light, as claimed in any of the preceding claims, wherein the tube and base are integrally-moulded as a unitary assembly.

10. An indicator lamp comprising:
an elongate hollow sleeve;
the sleeve incorporating translucent and/or transparent wall portions;
one or more individual electrical lamp fittings being removable located within the sleeve;
a demountable electrical connection within the sleeve for effecting connection between the or each lamp fitting and an electrical power supply;
the demountable connection being co-operatively-disposed within a mounting region of the sleeve;
the sleeve mounting region incorporating means for demountable securing the sleeve to an otherwise separate base portion;
the translucent and/or transparent sleeve portions being disposed so that, when illuminated by lamps fitted internally of the sleeve, they are selectively operable or movable to illuminate the mounting base region.

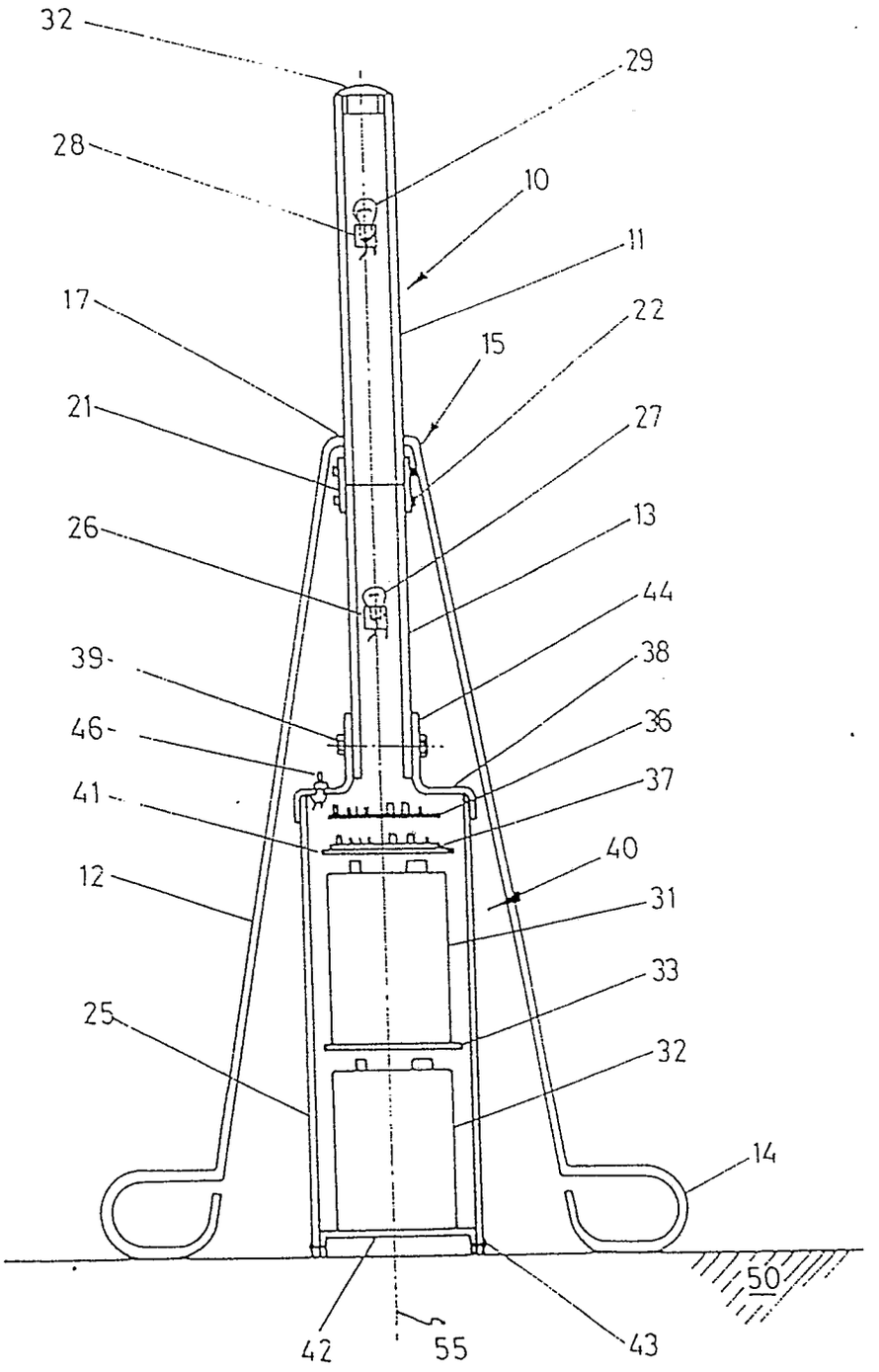
32
29
28
10
11
17
22
15
21
27
26
13
44
39
38
46
36
41
37
40
12
31
33
25
32
14
50
42
55
43

FIG.-1

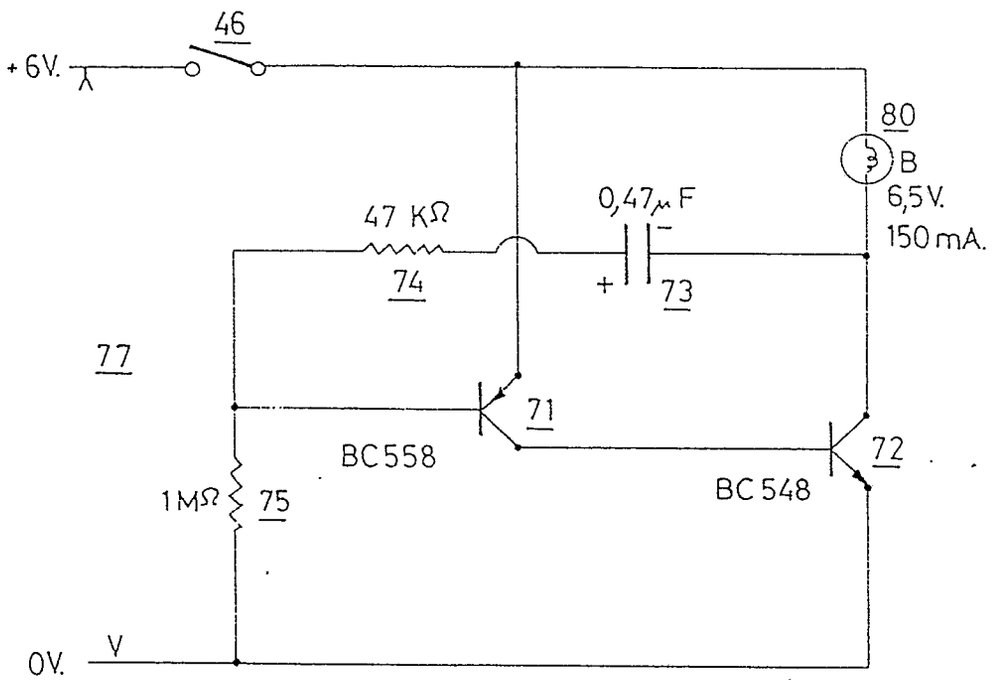
46
+6V.
80
B
6,5V.
150 mA.
47 KΩ
74
0,47μF
73
77
71
BC558
72
BC548
1MΩ
75
0V.
V

FIG- 2