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

(11) Publication number: **0 114 929**
A1

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **83108905.7**

(51) Int. Cl.³: **A 45 B 3/04**

(22) Date of filing: **09.09.83**

(30) Priority: **26.01.83 JP 9457/83**
28.05.83 JP 80861/83

(43) Date of publication of application:
08.08.84 Bulletin 84/32

(84) Designated Contracting States:
DE FR GB IT

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(54) **Walking cane.**

(57) A walking cane for the blind or the aged which emits warning flashes of light is disclosed. The cane is shaped to have a tubular shaft and a handle having an angled section extending laterally from one end of the shaft to be grasped by the hand of an user. Provided on the cane are two spaced apart light sources, one positioned at intermediate portion of the length of the shaft and the other positioned at such portion behind the user's hand as to be exposed backwardly of the person holding the cane. The former light source is utilized to give a warning by being flashed on and off to the others moving forward upon or passing across the person holding the cane, while the latter to give the same to the others approaching behind that person. Accordingly, these two longitudinally spaced light sources are cooperative to arouse all other persons in the vicinity to take notice of the person holding the cane and therefore to enhance the security of the person holding the cane.

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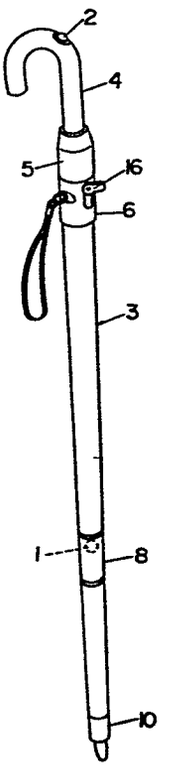
Fig. 1



SPECIFICATION

WALKING CANE

TECHNICAL FIELD

This invention is directed to a walking cane, more particularly to an electrically illuminated walking cane for the blind or the aged.

BACKGROUND ART

Conventional canes of that kind have been basically white finished for being readily seen by others in the vicinity. However, it is only effective in daytime and may be inconspicuous or invisible at night to threaten the security of a blind and an aged person in walking. To this end, there have been provided illuminated canes such as disclosed in U.S. Pat. No. 4,236,544, incorporating a single light source which is controlled to flash on and off when the ambient illumination or light level decreases below a predetermined level for calling the attention of other passengers and drivers on motor vehicles to a passing person holding that cane. In the cane of this type, only one light source is disposed at such middle portion of the length as to be positioned in front of the user when it is in use, so that it can give the warning to the other persons passing transversely of or moving forward upon the person holding the cane but it substantially fails to give the warning to the persons, particularly the drivers on motor vehicles approaching behind the user since the light is concealed by the user oneself from those other persons. Accordingly, the above prior cane is found to be practically ineffective to the other persons behind the user, thus is not safe enough to protect the blind person holding the cane in the ever-worsening traffic scene. Further, the blind person using this prior cane is unable to determine whether the

light is turned on or off and therefore cannot be aware whether he is walking in a dark place or not, such dark condition lowering the visibility of the other persons in the vicinity and making it difficult to ascertain the blind person. Thus, the blind person finds no way to protect oneself against the other persons whose visibility is lowered at such a dark condition and is liable to be exposed to danger which would be avoided if the blind person be aware that he is walking in a dark place which requires more attention to his walking behavior. Still with this arrangement of not being capable of alarming the user whether the cane is lighted or not, it is possible to waste an incorporated battery when the user, after its use, leaves the cane unswitched in such a dark place as to automatically actuate the cane to continue the flashes of light.

DISCLOSURE OF THE INVENTION

The above disadvantages or drawbacks has been eliminated by the present invention which includes a cane shaft, an angled handle extending laterally from one end of the cane shaft, and spaced light sources being operated simultaneously to emit flashes of light. In general, the cane of the type having an angled handle at its one end is normally utilized by a blind or aged person grasping the handle at a location approaching the cane shaft to be inclined forwardly such that the user can easily feel the way with that cane. Accordingly, the outer portion of the angled handle will be left to expose in the backward direction of the person holding the cane, while the cane shaft is positioned in front of that person. The present invention is devised, in view of this manner in which a blind or aged person holds the cane with the angled handle, to provide first and second light sources in spaced relation longitudinally along the cane, one disposed at the

intermediate portion of the length of the cane shaft for emitting the warning flashes of light to the other persons passing across or approaching forward upon the person holding the cane and the other at such portion of the handle to be exposed backwardly of that person for emitting the warning flashes of light to the other persons approaching behind that person.

Accordingly, it is a primary object of the present invention to provide a walking cane for the blind or aged capable of giving the warning not only to the oncoming persons but also to the other persons behind that person holding the cane to enhance the security of the user and protect against the collision by the other persons or the motor vehicles.

In the preferred embodiment of the present invention, both first and second light sources are controlled in response to the ambient illumination level to issue an intermittent flashes of light when the level decreases below a predetermined value, and a warning buzzer is included for alarming the user when the light of sources are operative to flash on and off, so that a sightless user can pay more attention to his walking behavior in a dark place to protect himself against the others lowering their visibility in such dark condition, ensuring the security of the blind walking in a dark place. Also with this feature that the blind person can determine by the audible signal whether the cane is used in a dark place or not, the cane can be prevented from being left unswitched in a dark place when out of use.

It is therefore another object of the present invention to provide a walking cane capable of assuring the security of the blind walking in a dark place as well as preventing an incorporated battery from being wasted when out of use.

In accordance with the one embodiment of the present invention, the buzzer is connected in series with the light

sources so that the user can be immediately informed of any defection of the light sources by the resulting interruption of the audible signal from the buzzer when the cane is used in a dark circumstance, so that he can replace rapidly and safely the defective light sources.

These and other objects and advantages of the present invention will become more apparent from the detailed description thereon taken with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings,

Fig. 1 is a perspective view of a walking cane in accordance with one embodiment of the present invention;

Fig. 2 is an explanatory view showing the common manner of holding the cane by the blind aged person in his walking;

Fig. 3 is an enlarged cross sectional view of a part of the cane as shown in Fig. 1;

Fig. 4 is a schematic illustration in rather mechanical representation showing an electric circuit employed in the above cane;

Fig. 5 is a schematic illustration showing the above electric circuit;

Fig. 6 is a concrete diagram showing the electric circuit of Fig. 5;

Figs. 7 and 8 are enlarged vertical sectional views respectively showing on different cross sections a terminal block and several parts associated therewith employed in the above embodiment;

Fig. 9 is a schematic illustration in rather mechanical representation showing an electric circuit employed in another embodiment of the present invention;

Fig. 10 is a schematic illustration showing the above electric circuit;

Fig. 11 is an enlarged vertical sectional view showing a terminal block and several parts associated therewith employed in the above embodiment;

Fig. 12 is a perspective view showing a further embodiment of the present invention; and

Fig. 13 is an enlarged vertical sectional view showing a principal part of Fig. 12.

MODES FOR CARRYING OUT THE INVENTION

Referring now to the drawings and particularly to Figs. 1 and 8, there is illustrated one preferred embodiment of a walking cane for the blind or the aged comprising a tublar cane shaft 3 having at the middle of the length thereof a first light source 1 and a generally J-shaped handle 4 having at its ridge portion or radially outer edge portion a second light source 2, said handle 4 having an integral stem which is connected to the upper end of the cane shaft 3 by means of a skirt 5 and a sleeve 6. The first and second light sources 1 and 2 are respectively light emitting diode (LED) which are operative by a light responsive switch means 7 to flash on and off when the ambient illumination or light level decreases below a predetermined level. Other lamps such as, miniature bulb, xenon flush lamp, or fluorescent lamp may be employed as first and second light sources. Said cane shaft 3 is a transparent hollow cylinderical member of a substantially uniform diameter made of synthetic resins such as fiber reinforced polyester or fiber reinforced vinyl chloride. The outer surface of the cane shaft 3 is dyed with a white translucent and fluorescent material which is capable of transmitting light except the portion 8 adjacent to first light source 1, such portion 8 being defined between a pair of annular bands 9 secured in spaced relation longitudinally on the middle portion of the length of the cane shaft 3 and being dyed with red

translucent material capable of transmitting red light. Attached to the lower end of the cane shaft 3 is a tip member 10 made of durable synthetic resin such as vinyl chloride. The handle 4 made of acrylic resin or the like stuff material has the integral stem which is force fitted into one end of the skirt 5 made of opaque ABS resin so as to join the handle 4 to the skirt 5. The skirt 5 has at the other end a portion 11 internally threaded for threadably mating with the external thread at one end of said sleeve 6 made of the same opaque material. The upper end of the cane shaft 3 is force fitted within the other end opening of the sleeve 6 and bonded by an adhesive, so that the handle 4 can be removed from the cane shaft 3 by loosening the skirt 5 with respect to the sleeve 6 for replacing a battery 12. The battery 12 comprises a pair of dry cells which are connected in series to provide a power source for first and second light sources 1, 2 as well as for a warning buzzer 14 such as a piezoelectric buzzer or a electromagnetic buzzer disposed within said skirt 5 to issue an intermittent sound in synchronism with said light sources 1 and 2. A battery case 13 for receiving the dry cells is fixedly inserted in the upper portion of the cane shaft 3 with its open end located within said sleeve 6 through which the cells will be accepted and removed. Said buzzer 14 is secured within the skirt 5 at the portion behind said internally threaded portion 11 so that the intermittent beep from the buzzer 14 pass through perforations in the surrounding wall of the skirt 5. Inserted in an electric circuit including the battery 12, the buzzer 14, first and second light sources 1 and 2 is a manual switch 16 which is mounted and partly within the sleeve 6 and which is connected in series with said light responsive switch means 7. The manual switch 16 has a leg 17 which extends through the wall of the sleeve 6 such that the switch 16 rotates about the leg 17 between two

operating positions, i.e., on-position and off-position, the switch 16 being manipulated by a knob 18 projecting on the outer surface of the sleeve 6. Electrical arrangement of the switch 14 will be described in the later paragraph.

Referring now to Figs. 4 through 6, said light responsive switch means 7 comprises a photosensor 20 which is a cadmium sulfide (CdS) cell to detect outdoor illumination, a Schmitt trigger 21, an astable multivibrator 22, a switching transistor 23, and a resistor 24 coupled in series with the cell 20 to determine an illumination level below which the Schmitt trigger 21 responds to the resulting raised input voltage to activate the multivibrator 22 which in turn provides a repetitive low frequency output of about one Hertz so as to cause the switching transistor 23 to conduct the on/off operation, whereby the first and second light sources 1 and 2 issue flashes of light and concurrently the buzzer 14 produces the intermittent beep. These elements are packaged, as shown in Fig. 3, on a printed circuit board 25 mounted on a holder 26 extending integrally from said battery case 13 so that the photosensor 20 will receive the light through the translucent wall of the cane shaft 3. In this embodiment, the above illumination level is set to be 50 lux as measured at dusk so that the flashes of light and the intermittent beep will begin to issue at such dark outdoor illumination level. Other photosensors such as phototransistor or photodiode may be utilized in replace for the above photoconductive cadmium sulfide cell. Axially extended from said holder 26 is an inner tube 27 of transparent material which is coaxially received within the cane shaft 3. The inner tube 27 has therein the LED of first light source 1 at the location corresponding to said portion 8 dyed with the red translucent material and has its free open end closed by a reflective plate 28 which reflects the light from the LED 1 to brighten the whole inner tube 27

particularly the portion near the LED 1, so that sufficient amount of light from the LED 1 will pass through the red portion 8 of the cane shaft 3 and is vividly viewed as red light by the other person in front of a person holding the cane.

The LED of second light source 2, on the other hand, is the one emitting red light and is molded in the handle 4 with its luminescent top being projected thereon at the ridge portion or radially outer portion, such portion including LED 2 being located practically behind the hand of the person grasping the handle 4 when he walks with the assistance of the cane so that LED 2 is exposed backwardly of the person holding the cane, warning the other persons behind that person by the flashes of red light.

Included within said skirt 5 is a concentric terminal block 30, as shown in Figs. 4, 7 and 8. This terminal block 30 has on its side wall three axially spaced conductive rings 31, 32 and 33 and has on its end base a conductive boss 34 which is electrically connected to the adjacent ring 31 and is brought into the abutting contact with the plus terminal of the battery 12 when the skirt 5 is screwed onto the sleeve 6. These three spaced rings, i.e., first ring 31, second ring 32, and third ring 33 are arranged so that when the skirt 5 is engaged with the sleeve 6 they are brought into electrical connection respectively with first contact member 41, second contact member 42, and third contact member 43 all being located on the inner surface of the sleeve 6 in angularly spaced relationship with each other. These spaced rings 31, 32, and 33 extend along the entire periphery of the terminal block 30 so as to be kept in contact with the corresponding contact members 41, 42, and 43 at any angular relationship between the skirt 5 and the sleeve 6 so long as the skirt 5 is sufficiently screwed on the sleeve 6 to attain the abutting relationship between

the boss 34 with the plus terminal of the battery 12. Said terminal block 30 is in the form of hollow cylinder with said boss 34 on its end base and has therein two terminals 35 and 36 for connecting the buzzer 14 and second light sources (LED) 2 both disposed on the side of the handle 4, these terminals 35 and 36 being respectively connected to the second and third rings 32 and 33. In the present invention wherein the buzzer 14 is connected in series with first and second light sources (LED) 1 and 2 as shown in Figs. 4 through 6, the buzzer 14 and second LED 2 are connected in series between the second and third rings 32 and 33 on the terminal block 30 as best shown in Fig. 4, and first light source (LED) 1 is connected through said printed circuit board 25 between first and third contact members 41 and 43, while the collector of said switching transistor 23 on the printed circuit board 25 is connected to second contact member 42 and the emitter of the same is connected to the minus terminal of the battery 12. As shown in Figs. 4, 7 and 8, said first contact member 41 is attached to the lower end of the leg 17 of said manual switch 16 so as to be rotated therewith for connecting and disconnecting first contacting member 41 with the ring 31 or the plus terminal of the battery 12, that is, the manual switch 16 is set to on-position when the contact member 41 is turned to abut against the ring 31 and is set to off-position when it is removed from the ring 31. Accordingly, the electric circuit including the manual switch 16, the light sensitive switch means 7, the buzzer 14, first and second light sources (LED) 1 and 2 is completed when the skirt 5 is engaged with the sleeve 6 to bring all the rings 31, 32, and 33 into contacting relationship with the corresponding contact members 41, 42, and 43.

The cane constructed as above can be utilized by a blind person who fumbles the manual switch 16 on or an aged

person. As shown in Fig. 2, it is the practice that the person holding that cane to feel the way therewith will incline the cane forwardly grasping he handle 4 at the portion near the upper end of the cane shaft 3, so that second light source (LED) 2 is to be positioned behind the hand of the person to be exposed backwardly of that person and first light source (LED) 1 is in front of that person. When evening came, for instance, to decrease the outdoor illumination level below a predetermined level or 50 lux for the present embodiment, the photosensor 20 will detect such decrease in the outdoor illumination level to activate the on/off operation of the switching transistor 23, whereby first and second light sources 1 and 2 will begin to issue an flashes of light while at the same time the buzzer 14 will issue an intermittent beep. At this time, first light source 1 blinking in front of the person holding the cane will be recognized by the other oncoming persons and the drivers on vehicles, precisely by the persons approaching forward upon or passing across the person walking with the cane, while at the same time second light source 2 blinking behind the person will be recognized by the other persons or the drivers approaching behind that person, so that the other persons approaching the person holding the cane from all directions can take notice of that person, promoting the safe walking of the blind or aged person holding the cane. The buzzer 14 issuing an intermittent beep in synchronism with first and second light sources 1 and 2 notifies the user that he is now walking in such a dark place which requires more careful walking behavior to protect himself against a trouble. With the arrangement of the buzzer 14 being connected in serial with first and second light sources 1 and 2 in the above embodiment, when either of the two light sources 1 and 2 is broken in the operating

condition the user can immediately sense that effect by the resulting interruption of the beep of the buzzer 14.

Another embodiment of the present invention will be described with reference to Figs. 9 through 11 in which the same reference numerals as used in the preceding figures are used to indicated like parts to avoid the necessity for repeating the relevant discussion. This embodiment adopts, in contrast to the above embodiment, the parallel combination of the buzzer 14, first and second light sources 1 and 2, as best shown in Fig 9. For this purpose the connection at the terminal block 30 somewhat differs from that of the foregoing embodiment, the difference will be easily understood in Fig. 9 when compared with Fig. 4, the former of which is for the present invention and shows that the buzzer 14 is connected between the first and second rings 31 and 32, and second light source (LED) 2 connected between first and third rings 31 and 33 on the terminal block 30. The other features of the present invention is the same as the foregoing embodiment with the exception that a current-limiting resistor 45 and a zener diode 46 are introduced in the circuit, as shown in Figs. 9 and 10, the current-limiting resistor 45 acting to protect first and second light sources (LED) 1 and 2. The zener diode 46 is connected between the collector of the switching transistor 23 and the second contact member 42 to be serially connected to the buzzer 14 in order that the buzzer will cease to operate before the first and second light sources 1 and 2 as the capacity of the battery 12 drops. Accordingly, the user can easily acknowledge the exhaustion of the battery so as to replace the battery with a new one before it fails to operate first and second light sources 3 and 4.

Referring to Figs. 12 and 13, there is shown a further embodiment of the present invention wherein a handle 50 of T-shaped configuration is provided at the upper end of the

cane shaft 53 of the same construction as above. The present embodiment has the same functional arrangement as the foregoing embodiments with the exception of the buzzer which is eliminated from the present invention. The handle 50 is shaped to have a downwardly extending stem 54 the lower end of which joins the cane shaft 53 and a laterally extending grip 55 of hollow member in which a battery 56 and the holder 57 thereof are received. The holder 57 is provided at its one end with a cap 58 screwed onto the open end of the holder 57. The cap 58 being exposed at one end of grip 55 has on its outer surface a slot 59 for receiving a coin for easy operation of replacing the battery 56. Located at the opposite end of the grip 55 is a manual switch 60 which is a slide switch connected in series with the light responsive switch means packaged on the printed circuit board 61 inserted in the cane shaft 53, the light responsive switch means including the photosensor has the same construction as the foregoing embodiments. Light emitting diodes (LED) are likewise employed as first and second light sources 51 and 52, which are serially connected. First light source (LED) 51 is disposed within the cane shaft 53 at the intermediate portion along the length thereof to be adjacent to the red tinted portion 62 through the entire wall of which the light from the LED 51 will pass to warn the oncoming persons by red flashes of light. Second light source (LED) 52 is disposed at the end of the grip 55 in juxtaposition with said battery cap 58, such end of the grip 55 is defined as being far from the stem 54 in such a way that the user will grip the handle 50 at the location approaching the opposite end of the grip 55. Thus, second light source 52 is to be positioned behind the hand of the user so as to be exposed backwardly of the user, warning the other person behind that user.

The above embodiments and particularly the drawings are set forth for purposes of illustration only. It will be understood that many variations and modifications of the embodiment herein described will be obvious to those skilled in the art, and may be carried out without departing from the spirit and scope of the invention.

LIST OF NUMERAL REFERENCES

1 first light source (LED)	30 terminal block
2 second light source (LED)	31 first ring
3 cane shaft	32 second ring
4 handle	33 third ring
5 skirt	34 boss
6 sleeve	35 terminal
7 light responsive switch means	36 terminal
8 portion (in red)	
9 annular bands	41 first contact member
10 tip member	42 second contact member
11 internally threaded portion	43 third contact member
12 battery	
13 battery case	45 current-limiting resistor
14 warning buzzer	46 zener diode
16 manual switch	50 handle
17 leg	51 first light source (LED)
18 knob	52 second light source (LED)
	53 cane shaft
20 cadmium sulfide cell (CdS)	54 stem
(photosensor)	55 grip
21 Schmitt trigger	56 battery
22 multivibrator	57 battery holder
23 switching transistor	58 cap
24 resistor	59 slot
25 printed circuit board	60 manual switch
26 holder	61 printed circuit board
27 inner tube	62 red tinted portion
28 reflective plate	

What is claimed is:

1. A walking cane comprising:
a tublar cane shaft having a translucent section intermediate at its longitudinal ends,
a handle having an angled section extending laterally from one end of said cane shaft,
a first light source disposed within said cane shaft adjacent to said translucent section for emitting flashes of light,
a second light source disposed on said angled section of the handle for emitting flashes of light, the second light source being in such position behind the hand of an user grasping the handle when the cane is in use as to be exposed in the backward direction of the user,
a battery housed within the cane for supplying power to said first and second light sources, and
switching means housed within the cane for connecting the first and second light sources to the battery so as to simultaneously actuate both first and second light sources and for disconnecting them therefrom.

2. The walking cane as set forth in claim 1, wherein said switching means includes a manually operated switch and a light-responsive switch connected in series therewith, said light-responsive switch being actuated in response to the ambient light level to close when the level decreases below a predetermined value.

3. The walking cane as set forth in claim 1, including a warning buzzer disposed within the cane shaft to issue an intermittent sound in synchronism with the flashes of said first and second light sources.

4. The walking cane as set forth in claim 2, wherein said buzzer is connected in series with the first and second light sources.

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Fig. 1

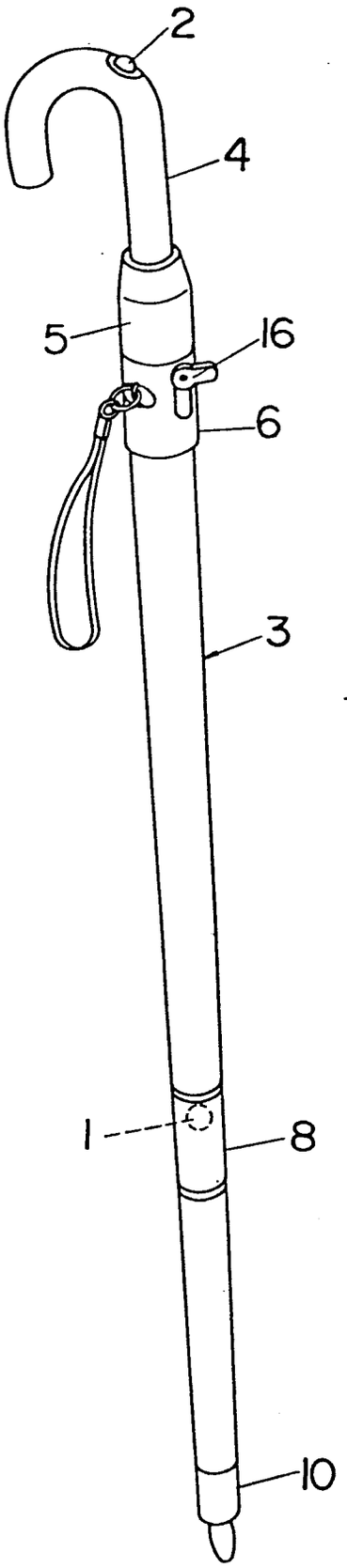
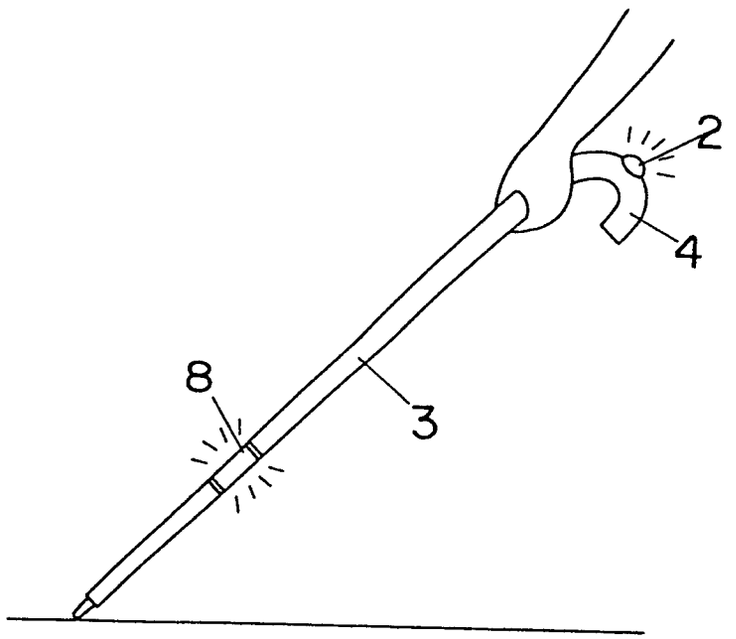


Fig. 2



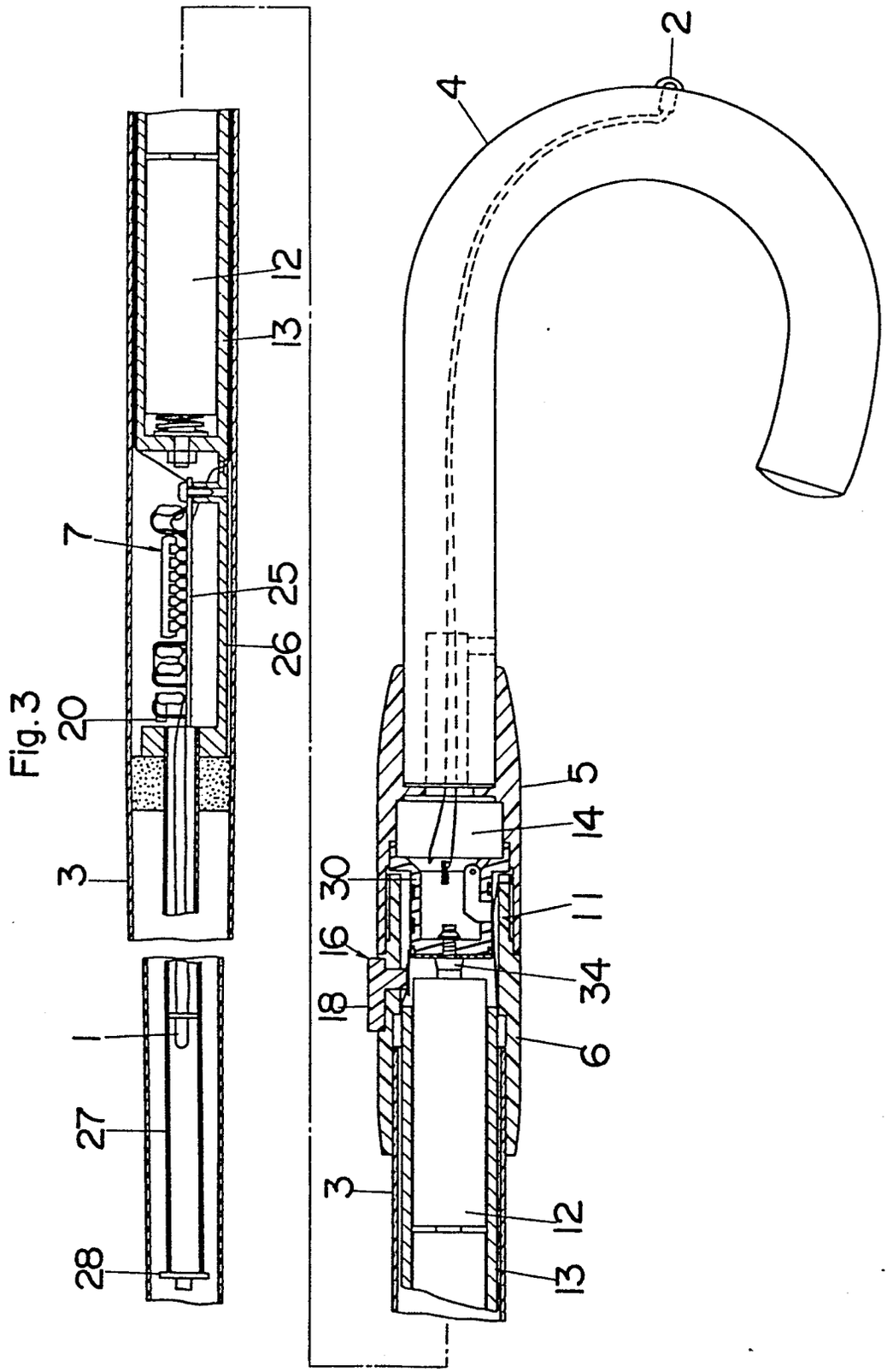


Fig.3

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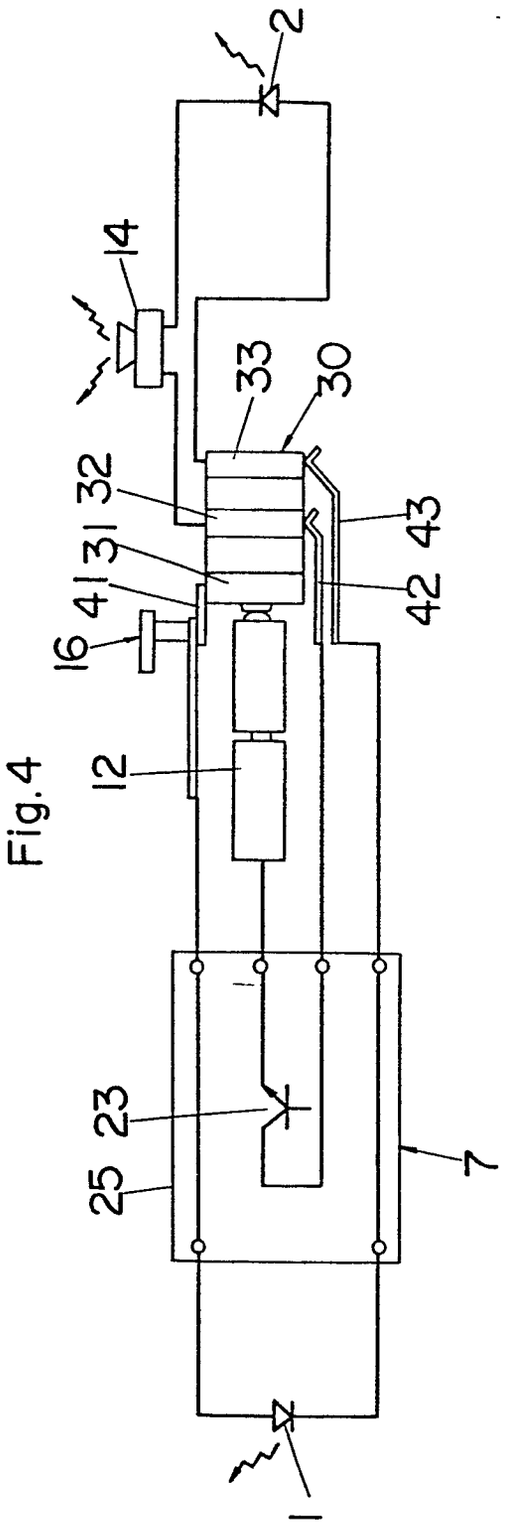

Fig.4

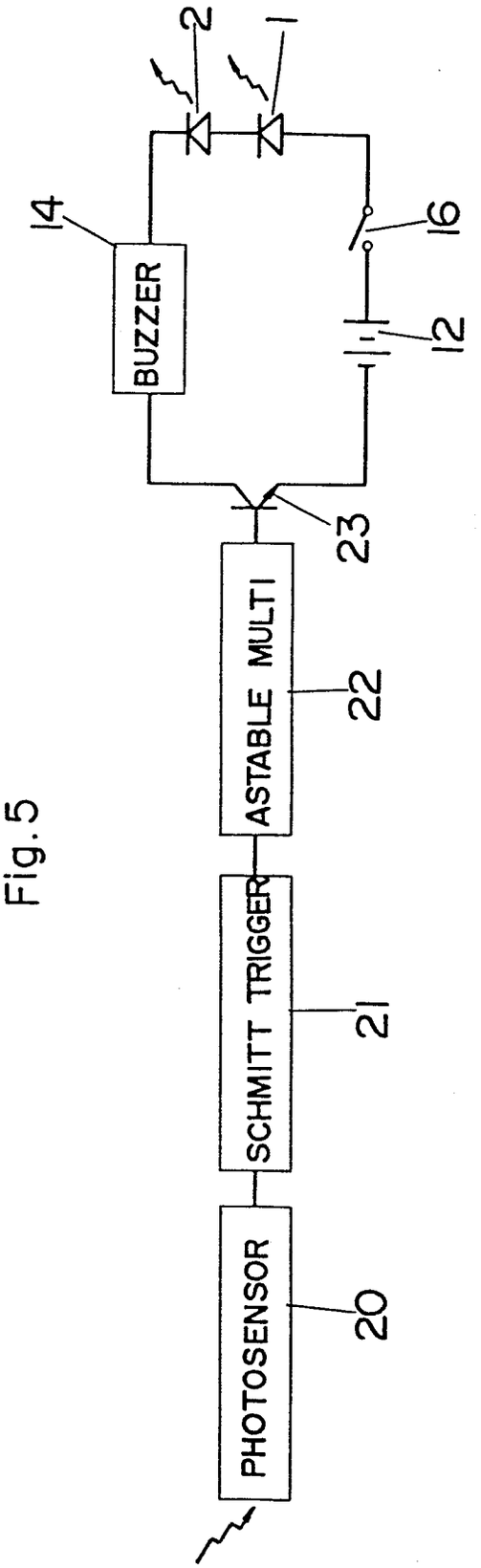

Fig.5

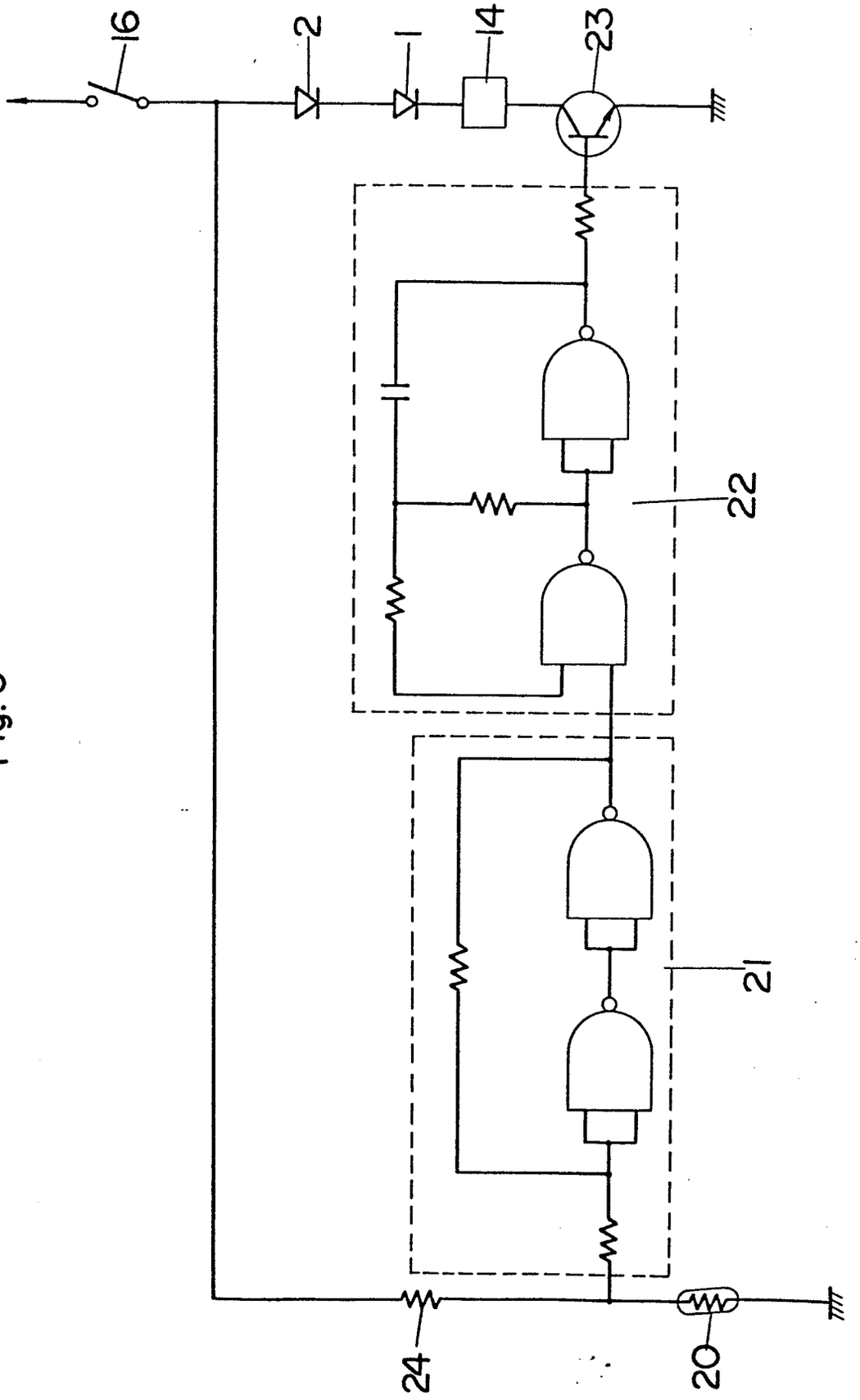

Fig.6

Fig.7

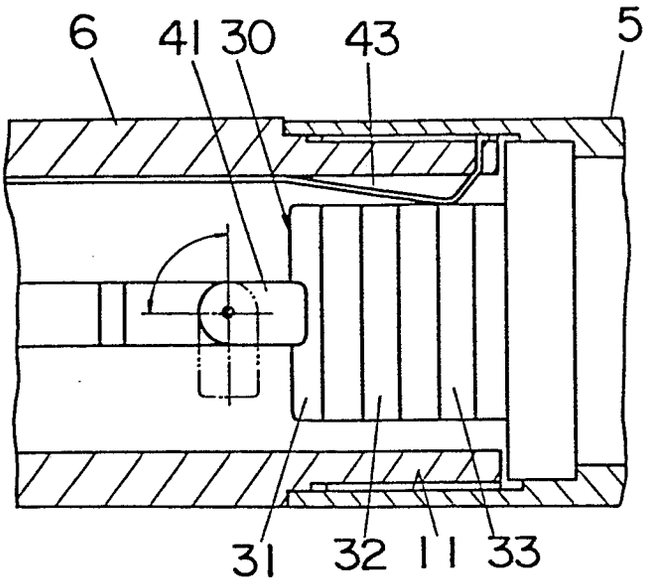

Fig.8

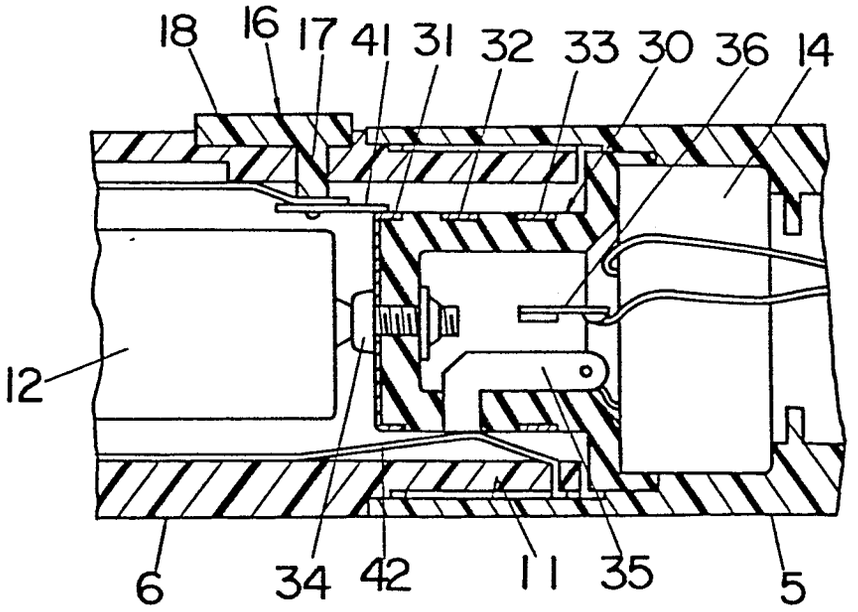

Fig. 9

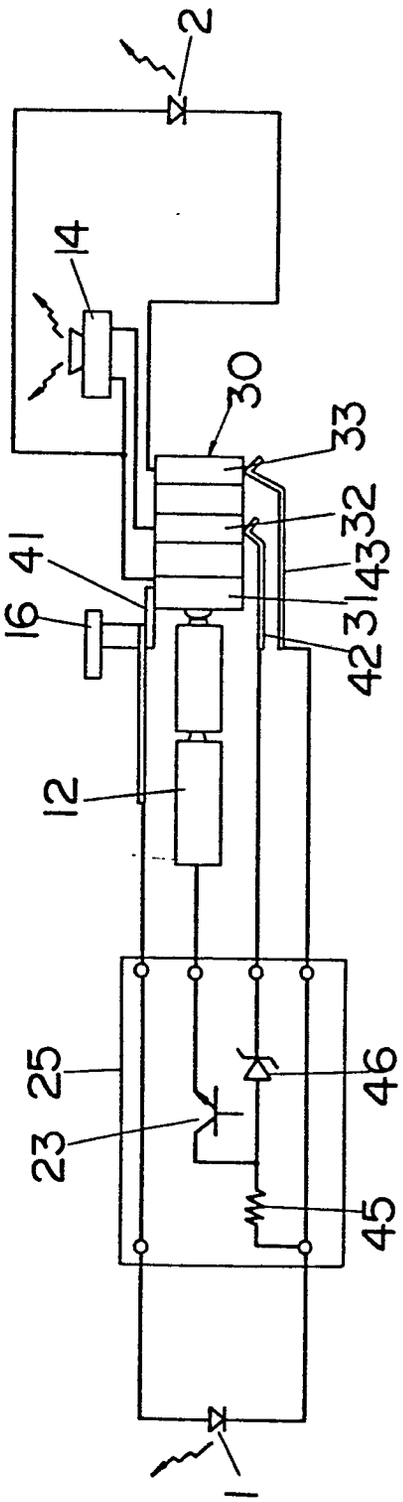
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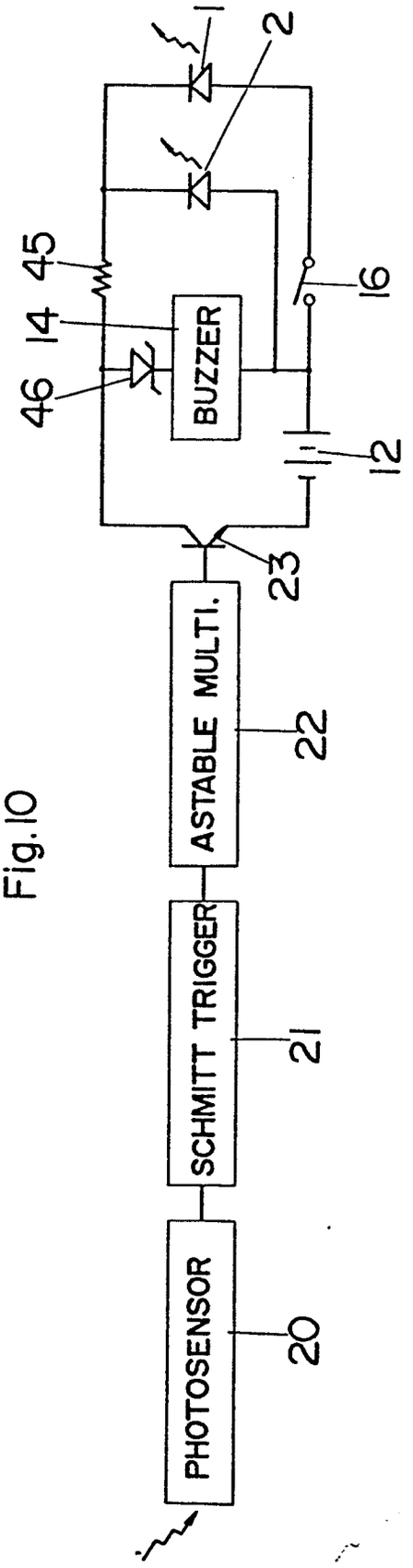
Fig. 10


1
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BUZZER
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ASTABLE MULTI.
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SCHMITT TRIGGER
21
PHOTOSENSOR
20

Fig.11

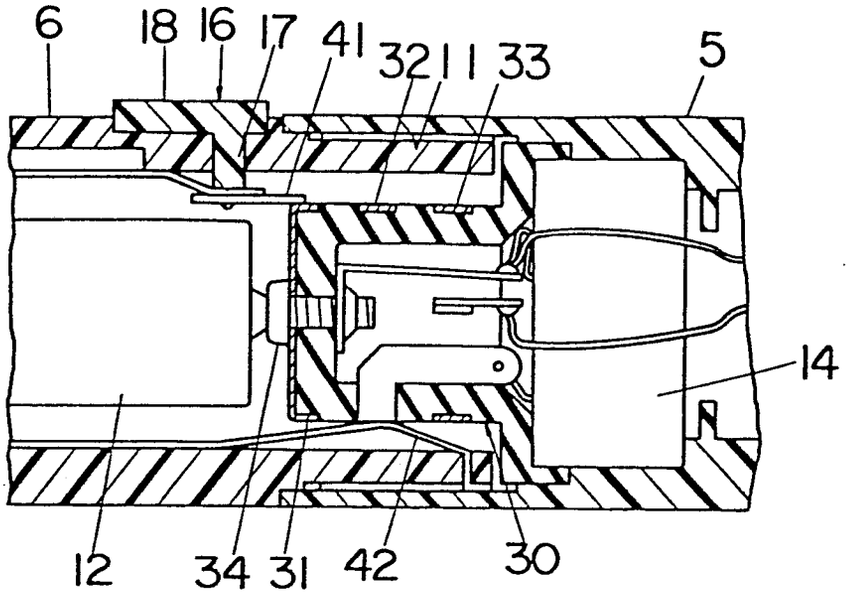

Fig.12

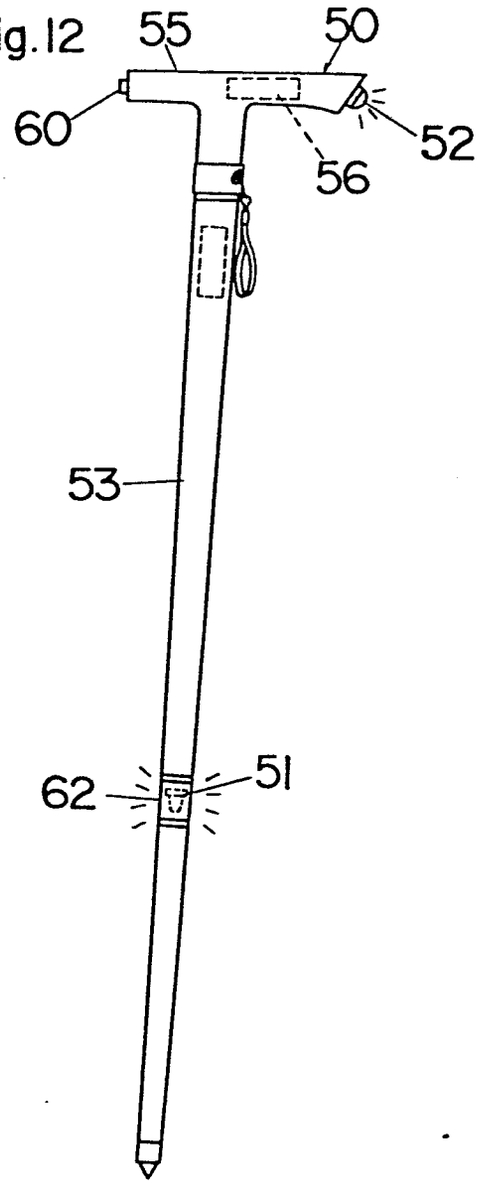

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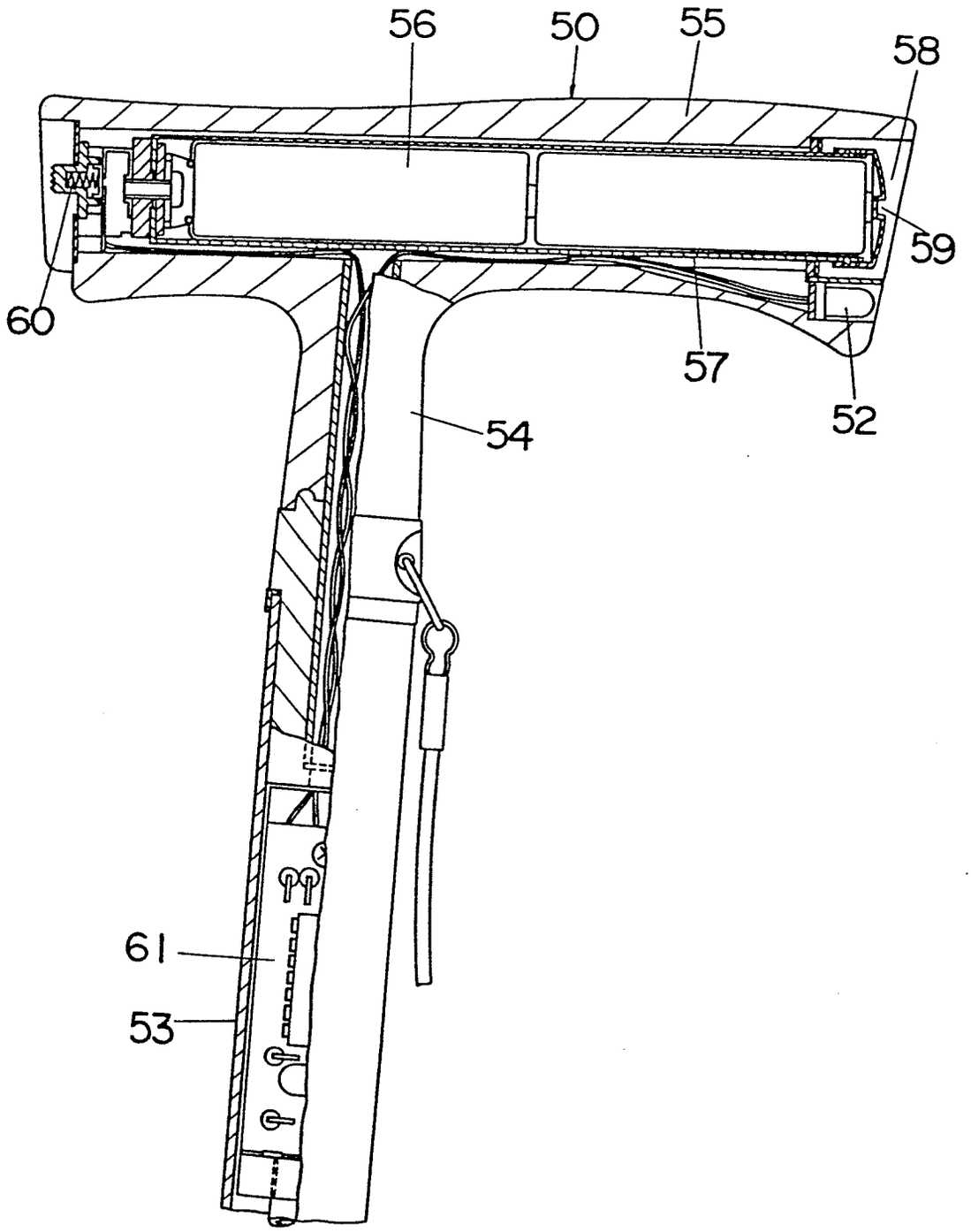
Fig. 13



European Patent Office

EUROPEAN SEARCH REPORT

0114929
Application number

EP 83108905.7

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	DE - A1 - 2 907 530 (SEICHTER) * Pages 1-3 * --	1,3,4	A 45 B 3/04
X	DE - A1 - 2 655 215 (PRITZL) * Fig. 1,2 * --	1	
X	AT - B - 96 712 (PAUFLER) * Fig. 1,2,3,4; claims * --	1,3,4	
X	GB - A - 747 976 (MILLER) * Fig. 1,2 * --	1,3,4	
X	US - A - 4 062 371 (BOLEN) * Fig. 1,2 * --	1,3,4	TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
D,A	US - A - 4 236 544 (OSAKA) * Fig. 1,2 * ----	1	A 45 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	11-04-1984	NETZER

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