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(54) **RECHARGABLE SECURITY INTELLIGENT TORCH**

(57) The torch is provided with the necessary means to couple the torch to the helmet in order to form an autonomous light source and at the same time leave the user's hands free. The torch is provided with two independent lamps of which the operation can be automatically switched from one lamp to the other whenever there is an operation fault in one of the two lamps.

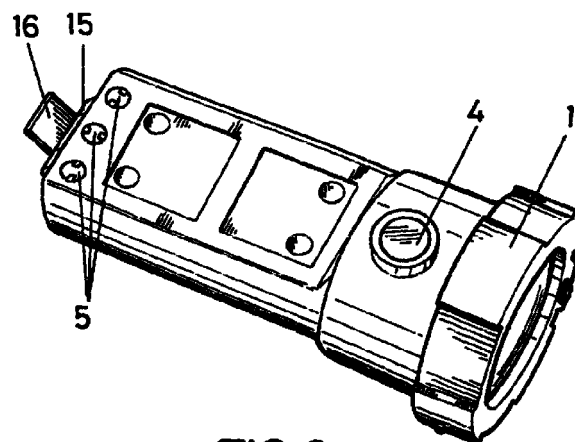


FIG.2

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Description

OBJECT OF THE INVENTION

[0001] The present invention relates to a rechargeable intelligent safety torch especially designed for use in potentially explosive atmospheres, and therefore particularly suited to fire-fighting services and mining.

[0002] The torch is conceived for individual use, with its main characteristic being its versatility for conventional manual use or as an illumination device mounted on a helmet.

BACKGROUND OF THE INVENTION

[0003] Torches are a basic tool for fire fighters and personnel which carry out their work in similar situations, such as miners. Because of the extreme conditions in which this work is performed these torches must have special safety characteristics, as well as a professional standard of technical performance.

[0004] In this sense, these torches must be capable of withstanding and operating properly in hostile atmospheres such as those arising during fire extinguishing, withstanding parameters such as gases, smoke, high temperatures, physical sturdiness, etc.

[0005] Likewise, due to the stress and physical effort which this type of personnel must deal with, this tool must be operated with great ease, particularly when considering that fire fighters work while wearing special gloves, and above all must be comfortable and facilitate manual labour as much as possible.

[0006] No torch is known in the state of the art which, while being held manually, offers the possibility of being coupled to a fire fighter's helmet, thus freeing the hands so that the task may be carried out more efficiently.

DESCRIPTION OF THE INVENTION

[0007] The rechargeable intelligent safety torch allows the above function by being provided with means which, in combination with other means present in the helmet, allow it to be easily coupled to the latter.

[0008] The safety characteristic of the torch is determined by its having two independent light sources, which guarantees illumination in the event that one of these fails.

[0009] Likewise, activation of the torch is made simple by its being provided with a large, sensitive contact-activated button, which makes this operation simple even while wearing protection gloves.

[0010] The battery recharging process is controlled by programmable electronic means which ensure that recharging is carried out in a satisfactory manner, as well as providing detailed information on the charge status each time the torch is turned on. In the event that the charge is at a critical level, a low level warning signal is

given.

[0011] In this manner it is made certain that the torch is always sufficiently charged and ready for an extended use.

DESCRIPTION OF THE DRAWINGS

[0012] As a complement of the description in progress and in order to aid a better comprehension of the characteristics of the invention, a set of drawings is attached as an integral part of the description in which, for purposes of illustration and in a non-limiting nature, the following is shown:

Figure 1 shows a front view of the torch reflector in which the main and auxiliary lamps can be seen.

Figure 2 shows a perspective view from above the torch, in which the button and charging contacts can be seen.

Figure 3 shows a bottom perspective view showing the coupling flange and clip.

Figure 4 is a side perspective view of the fork which is joined to the helmet.

Figure 5 shows a perspective view of the torch with the clip inserted in the fork for coupling it to the helmet.

Figure 6 shows a perspective view of the illumination cone coupled to the torch.

PREFERRED EMBODIMENT OF THE INVENTION

[0013] The illumination devices which comprise the torch are shown in figure 1, where main lamp (2) is at the focus of the parabolic reflector, which projects a concentrated and deep beam of light. Out of the focus is an auxiliary lamp (3), which is powered and operated independently from the main one, and which projects a beam of light directed at the ground which allows the user to see the ground which is being stepped on.

[0014] These light sources are turned on by button (4), which requires only a slight touch to be activated and which shows a large surface, thus simplifying its use.

[0015] The effect of pressing button (4) on both lamps (2) and (3) is controlled by a programmable electronic circuit located inside the torch and powered by the same batteries, which are recharged by means of three contacts (5) shown in figure 2 with a suitable charger.

[0016] This electronic circuit also controls the battery charging process, informs on their discharge and status, and performs automatic functions which the invention may include.

[0017] These functions are all accessible by means of pulse sequences on button (4) and the duration of these pulses.

[0018] The functions which the torch performs can be classified as:

- a) Manually activated
- b) Automatically activated
- c) Automatically activated information actions

a) Manually activated functions are those related to the normal operation of the torch regarding turning the lamps on and off and are controlled by a cycle of four successive pulses on button (4) in the following manner:

- 1st pulse: turns on main lamp (2)
- 2nd pulse: turns off main lamp (2)
- 3rd pulse: turns on auxiliary lamp (3)
- 4th pulse: turns off auxiliary lamp (3)

The next pulse starts the cycle again, turning on main lamp (2).

This manual control of the torch operation allows to access an intermittent lamp operation by following the same operation cycle, but in the 1st and 3rd pulses, if an intermittent operation of the lamp is desired, button (4) is to be pressed for over 5 seconds, in which case the electronic circuit will make the selected lamp enter this operation mode.

Once in this operation mode, two intermittence speeds can be chosen by simply pressing button (4) to change from one speed to another. To return to normal operation button (4) must be pressed for more than 5 seconds.

b) Functions activated automatically by the electronic circuit are meant for safety of the torch, as the object is detecting any failures in the operation of either lamp and in such event automatically activating the inactive lamp.

Another automatic function performed by this circuit takes place during the battery recharging process, so that when the batteries have reached an optimum charge level the torch is automatically disconnected and placed in a maintenance charge function.

c) Automatic information actions are meant to inform on the charge status of the batteries, so that whenever one of the two lamps is turned on by the pulse sequence described above, the lamp will flash a number of times proportional to the charge level of the batteries according to the following criteria:

- 4 flashes: 100% charged

3 flashes: 75% charged

2 flashes: 50% charged

1 flash: 25% charged

5 **[0019]** When battery lifetime is under 10 minutes there is a warning flash every 15 seconds.

[0020] As regards the physical means provided for coupling the torch to a helmet (13), these can be seen in figure 3, which shows flange (11) and clip (6), which consists of a flexible plate and is set so that it may swivel on hinge (15) on the rear of the torch. This hinge (15) is provided with elastic devices which make clip (6) press against the body of the torch by default, acting as a clip which can be opened manually by its projection (16).

15 **[0021]** Clip (6) can also be used to attach the torch to the user's belt.

[0022] As a complement of these means for coupling the torch to the helmet, on the top of the latter is placed fork (7), represented in figure 4, which consists of a bent metal part, preferably made from aluminium bronze, so that it is provided with an elasticity which makes it suitable to be used as a fork, and so that it is adapted to the surface of helmet (13).

25 **[0023]** The disposition of fork (7) on helmet (13) can be seen in figure 5 and is achieved by means of screwing through orifices (9) on a decorative element of the helmet, so that the latter is not perforated, as otherwise it would lose its quality certification.

[0024] In the fold of fork (7) an orifice (8) has been made in order to fully introduce clip (6) through it so that it is coupled inside fork (7), for which it is necessary to previously separate fork (6) from the body of the torch by pressing on projection (16).

35 **[0025]** This operation is simplified by the elasticity of clip (6) and the attachment is complemented by flange (11) which is attached to recess (10) by applying a slight pressure in order to overcome the geometric relationship between both elements.

[0026] The separation between the two plates which make up fork (7) is maintained by anchoring (12) so that coupling of clip (6) in fork (7) is favoured.

[0027] In this manner the torch is set on the top of the helmet when so required by the user, forming a self-sufficient light source which is joined to the helmet and which frees the hands so that any task may be carried out more easily.

[0028] All that is required in order to remove the torch from the helmet is to invert the above described process.

50 **[0029]** Finally, and as shown in figure 6, illumination cone (14) can be attached to base (1) of the torch so that light signals can be made.

Claims

- 55
1. Rechargeable intelligent safety torch, particularly suited for use by fire fighters, characterised in that it is provided with the required means for attaching it

to a helmet and thus, with this helmet, make up a self-sufficient light source which frees the user's hands, and in that it is provided with two independent lamps, the operation of one being automatically switched to the other in the event that one fails.

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2. Rechargeable intelligent safety torch, as claimed in claim 1, characterised in that the means for attaching the torch on the helmet consist of an flange on the lower face and a clip formed by a flexible plate, attached so that it may swivel to a hinge which is provided with elastic devices and which is located on the rear of the torch; and in that as a complement to these coupling means a metal part is provided on the helmet which forms a fork which is provided with orifices so that it can be attached to the helmet by screws, and in the bend of which is provided an orifice so that the clip may be fully inserted through it, which once attached remains between the two plates which form the fork, and also in that it is provided with a recess for attaching the torch flange which provides a perfect attachment.
3. Rechargeable intelligent safety torch, as claimed in claim 1, characterised in that the activation and control of the lamps is carried out by means of a single high-sensitivity button by following a pulse sequence, which also allows to control all functions which the torch can perform, all of these functions being controlled by a programmable electronic circuit located inside the torch.
4. Rechargeable intelligent safety torch, as claimed in claim 3, characterised in that the programmable electronic circuit allows the torch, by means of a pulse sequence, to operate in normal illumination mode, using either the main or the auxiliary lamp, or in an intermittent illumination mode, with two possible intermittence speeds.
5. Rechargeable intelligent safety torch, as claimed in claims 3 and 4, characterised in that the programmable electronic circuit automatically controls the battery charging process, as well as informing the user on their charge status each time one of the lamps is turned on, by means of a number of flashes proportional to the battery status, and in that when battery lifetime is under 10 minutes a warning flash is emitted.

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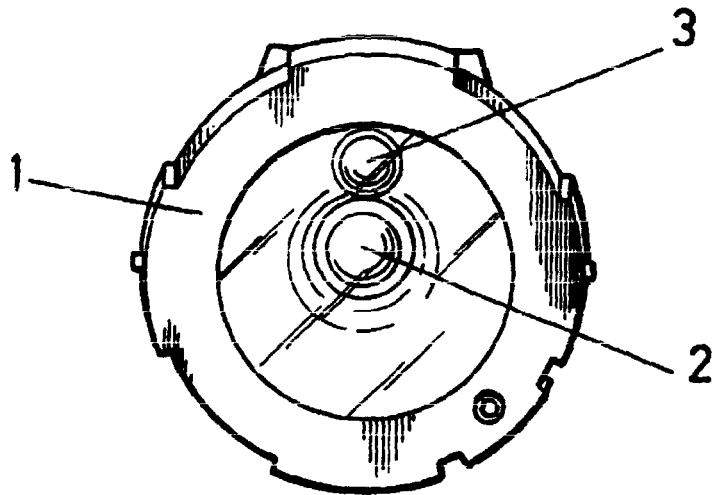


FIG.1

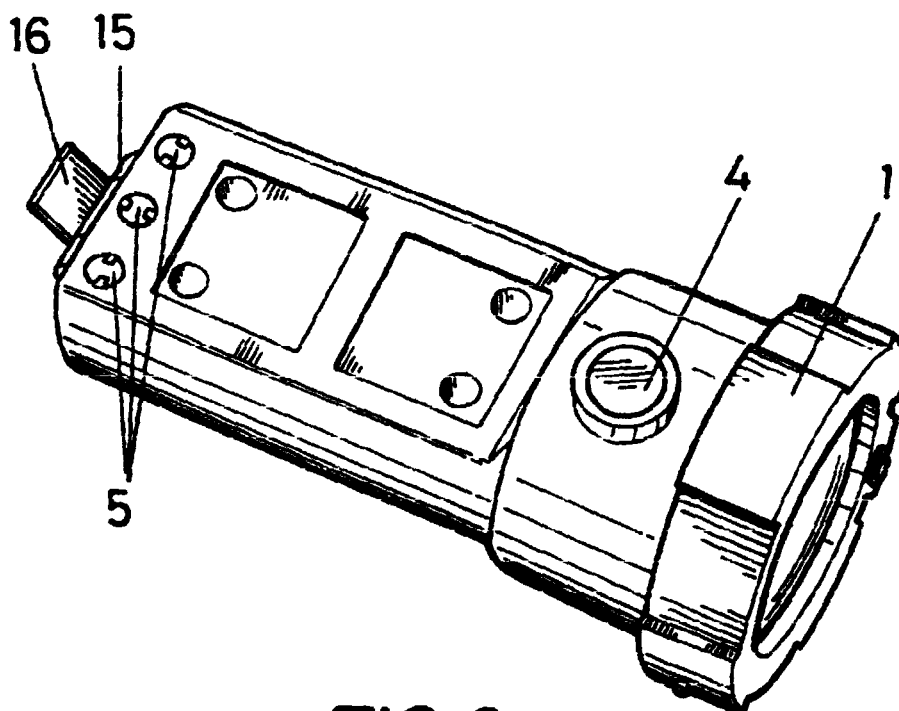


FIG.2

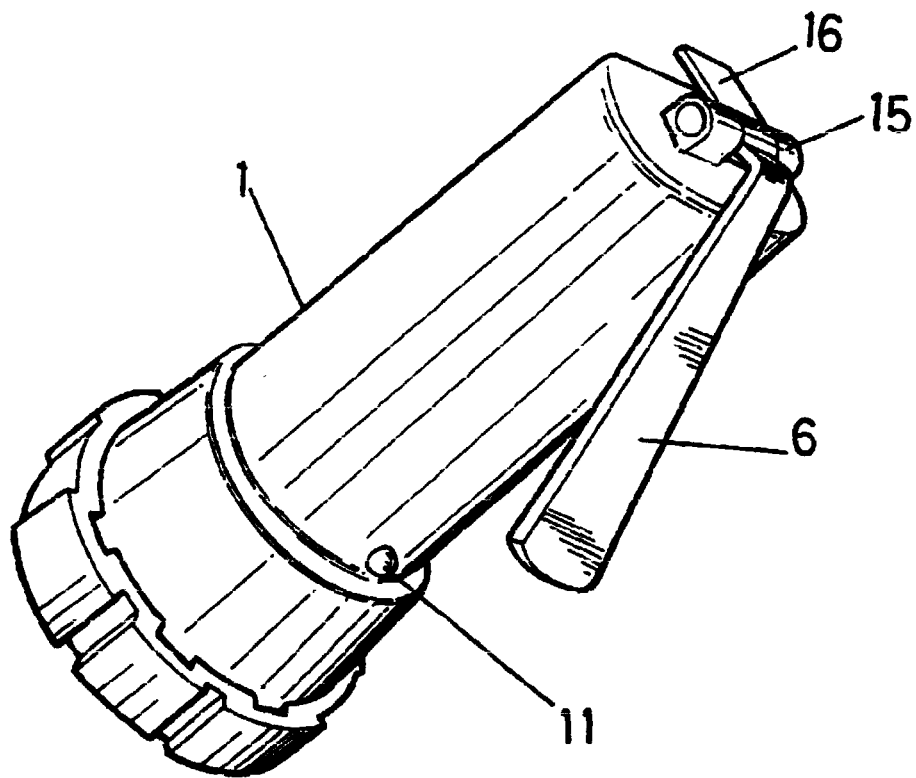


FIG. 3

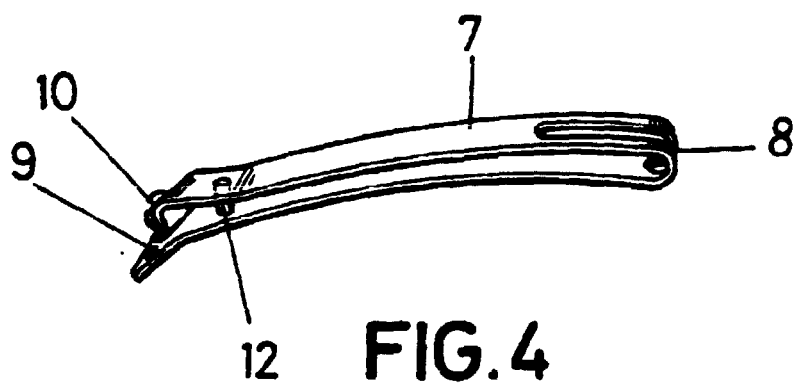


FIG. 4

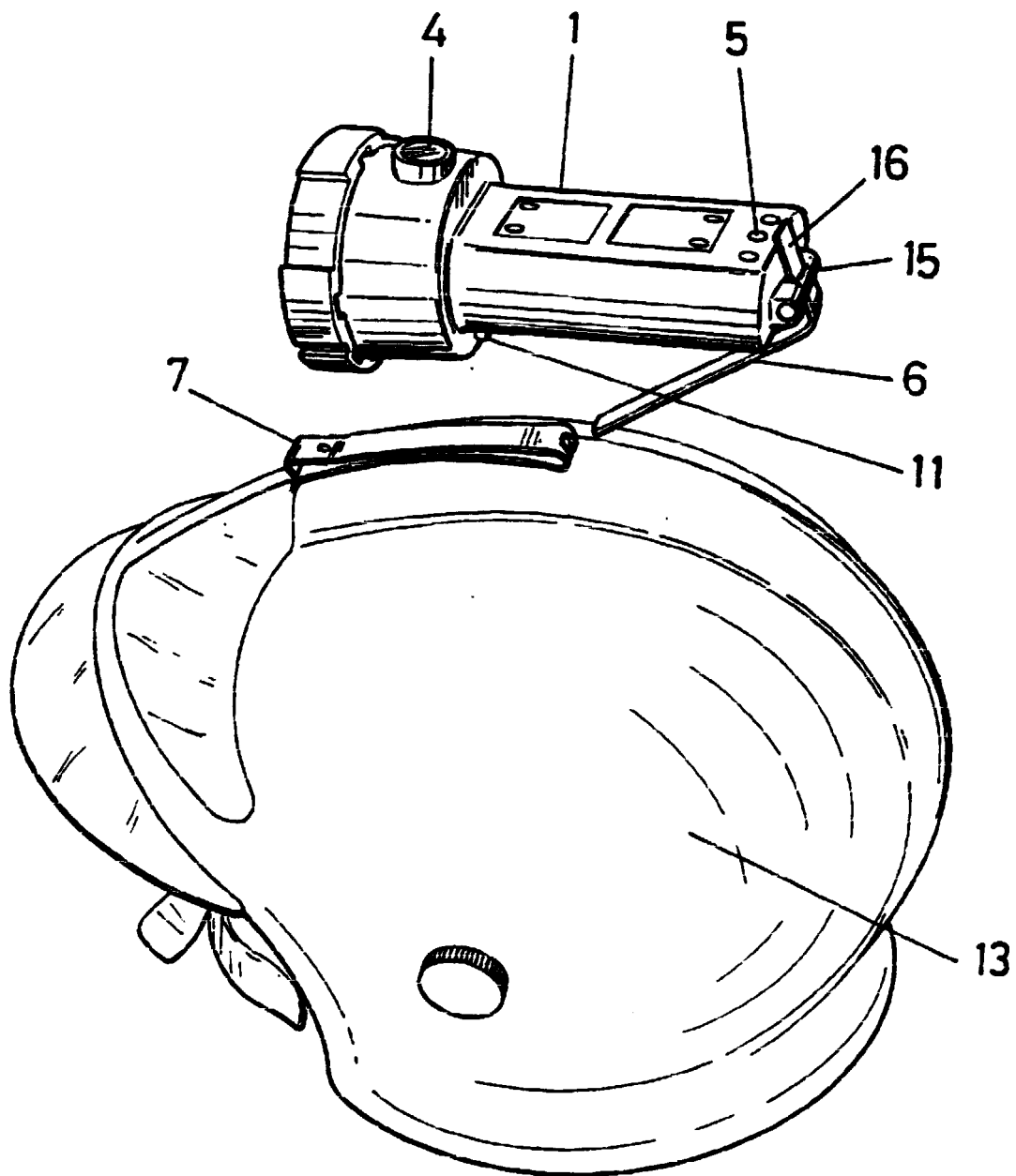


FIG.5

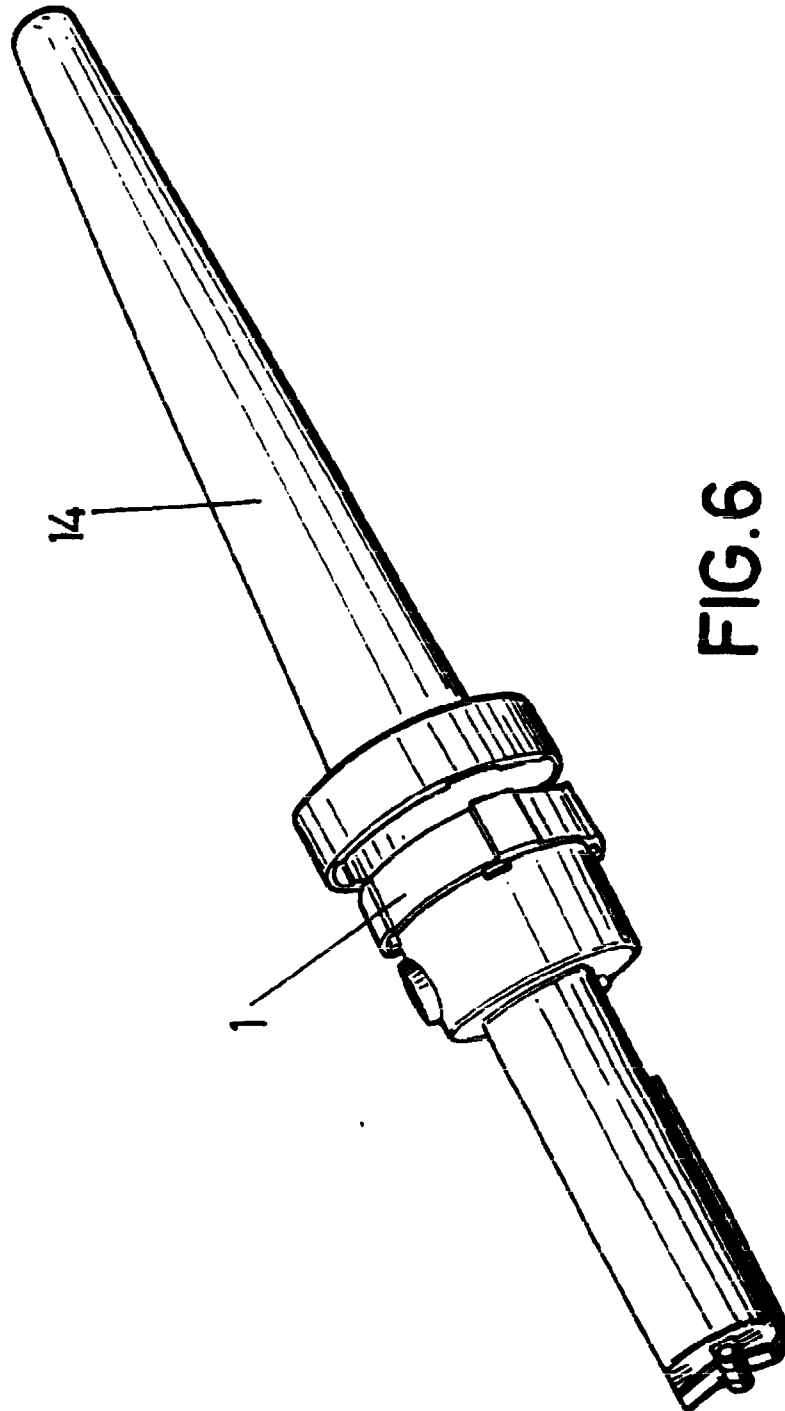


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES/98/00263

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 F21L 9/00, 15/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 F21L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI, CIBEPAT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4803605 A (SCHALLER et al.) 7 February 1989 (07.02.89), column 2, lines 6-32, figure 3	1
A		3,4
Y	US 4998187 A (HERRICK) 5 March 1991 (05.03.91) column 1, line 56-column 2, line 6, figure 2	1
A		2
A	US 4793007 A (BARNETT) 27 December 1988 (27.12.88) column 1, line 59-column 2, line 39, figures 1,3	1,2
A	US 4876632 A (OSTERHOUT et al.) 24 October 1989 (24.10.89) figure 5, abstract	5
A	US 4225906 A (GULLIKSEN et al.) 30 September 1980 (30.09.80) whole document	1,2
Y	WO 9504896 A (BRITISH TECHNOLOGY GROUP Ltd.) 16 February 1995 (16.02.95) abstract, figure 6	1
A		2

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z" document member of the same patent family

Date of the actual completion of the international search

28 August 1998 (28.08.98)

Date of mailing of the international search report

28 December 1998 (28.12.98)

Name and mailing address of the ISA/

S.P.T.O.

Authorized officer

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INTERNATIONAL SEARCH REPORT

International application No. PCT/ES/98/00263
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3883777 A (MORITA) 13 May 1975 (13.05.75) column 1 line 53-column 2, line 2, column 2, line 42-column 3, line 9	1

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