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(54) Underwater torch with rechargeable battery pack

(57) The invention relates to an underwater torch with a rechargeable battery pack (2), which is characterised in that the body of the torch comprising the electric bulb with the corresponding reflective parabola, has, at the end opposite that in which the latter is present, a connector (3) of the male type, which can be secured to a connector (4) of the female type, which is integral with the end of a body (2), inside which there is accommodated a rechargeable electric storage battery.

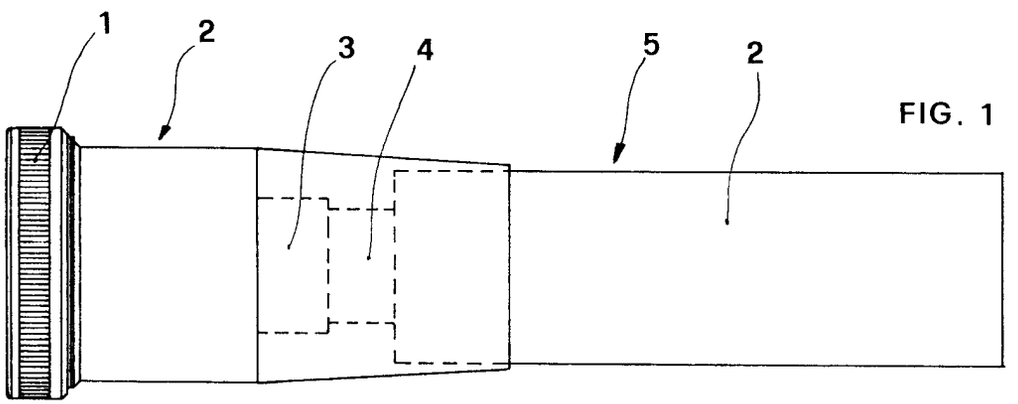

FIG. 1

EP 1 020 680 A2

Description

[0001] The present invention relates to an underwater torch with a rechargeable battery pack.

[0002] It is known that very often in underwater activities, both for amateur and sports use, underwater torches are used in order to light objects, environments, animals or vegetable organisms which are submerged in the water.

[0003] In fact, it is known that at a depth of even only a few meters, the underwater environment is particularly dark, owing to the intrinsic absorption exerted by the water on the light obtained from above.

[0004] It is also known that the absorption of colours by the water is selective, and thus, the colour assumed by the objects which are disposed beneath the surface of the water is very different from that which the same objects would assume when disposed above the surface of the water. This means that use of the said torches is particularly widespread amongst underwater operators.

[0005] However, it is apparent that in order to obtain an underwater torch which is both powerful and has a substantial capacity, it is necessary to accept an increase in the size of the torch itself, which necessarily gives rise to considerable disadvantages.

[0006] At present, according to the known art, there exist underwater torches which are supplied with batteries of a non-rechargeable type, which are inserted in an appropriate receptacle which is disposed inside the outer casing of the torch itself.

[0007] This arrangement is used for torches which do not have a particularly high power level, which have low brightness capacity, and provide quite modest performance levels.

[0008] For heavier usage, use is made of torches which consist of a body which has only the electric bulb and the corresponding reflective parabola, which is connected by means of an electric cable to an external battery pack, which is secured to the weights belt of the underwater diver, or to his air cylinder, or to his jacket. By means of this arrangement, it is possible to provide torches which have considerable electric power. However, in these embodiments also, the torch has some disadvantages which can be summarised as the intrinsic inconvenience of having an electrical connection cable between the body of the torch and the battery pack; in addition, the presence of the latter can unbalance the underwater diver.

[0009] Finally, at the end of the dive, it is obviously necessary to recharge the battery packs, an operation which generally requires from six to twelve hours in order to be completed.

[0010] It will be appreciated that during this period, the torch cannot be used, which is seriously to the detriment of the underwater diver, who, for example, cannot use the same torch for two dives carried out during the same day.

[0011] The object of the invention is to provide an underwater torch with a rechargeable battery pack, which is free from the above-described disadvantages.

[0012] The foregoing object is attained, according to the invention as defined in the claims appended hereto, in that the body of the torch which comprises the electric bulb with the corresponding reflective parabola, has, at its end opposite that in which the latter is present, a connector of the male type, which can be secured to a connector of the female type, which is integral with the end of a further body, inside which there is accommodated a rechargeable electric storage battery.

[0013] By this means, the user intrinsically has available an underwater torch with substantial electrical power; however, at the end of the dive, the user can easily detach the battery pack from the remaining part of the torch, in order to recharge the battery.

[0014] At the same time, the user can immediately reuse the torch itself, provided that he has available a further battery pack which is already charged.

[0015] Furthermore, the torch is in the form of a single body, without the presence of the inconvenient connections constituted by the cables in similar embodiments of a known type.

[0016] As set out in the dependent claims appended hereto, the invention also relates to the specific features which are designed to guarantee a quick and easy manoeuvre of connection to one another of the connector of the male type and the connector of the female type, as well as of switching on the torch itself.

[0017] This and other characteristics of the invention are now described in detail hereinafter, with reference to a particular embodiment, provided by way of nonlimiting example, by means of the attached drawings, in which:-

Figure 1 is an overall view of the device according to the invention;
Figures 2 and 3 are two views of the connector of the male type;
Figure 4 is a view in section of the aforementioned connector, according to the line IV-IV in Figure 3;
Figures 5 and 7 are two views of the connector of the female type;
Figure 6 is a view in cross-section of this connector, according to the line VI-VI in Figure 5;
Figure 8 is a view of the aforementioned two connectors, before the step of connection to one another; and
Figures 9 and 10 are two views of the connector of the female type.

[0018] In Figure 1, it can be seen that the invention relates to an underwater torch, which at one end has a ring nut 1, by means of which, in a known manner, closure takes place of the aperture, inside which there is accommodated the bulb with the corresponding reflective parabola, the latter two components not being illus-

trated in the Figure, for the same of simplicity.

[0019] A fundamental characteristic of the device according to the invention consists in the fact that the body 2 of the torch, comprising the electric bulb with a corresponding reflective parabola, has, at the part opposite the latter, a connector 3 of the male type, which can be secured to a connector 4 of the female type, which on the other hand is integral with the end of the body 5, inside which the battery pack 2 is accommodated.

[0020] In Figures 2 to 4 it can be seen that the connector of the male type has a pair of electrical contacts 6 which are disposed inside a cylindrical body 7. Cylindrical body 7 has an annular cavity 8, as well as an extension 9, which also has a cylindrical shape, of the central part which is delimited by the cavity 8. The ends of the contacts 6 are disposed at the end of the extension 9. Around the extension 9, there are also provided seals 10 of the "0-ring" type.

[0021] In Figure 4, it can also be seen that around a portion of the contacts 6 which is disposed inside the cavity 8, provided inside the body of the connector of the male type, there are present resilient means 11, which tend to thrust the contacts towards the exterior of the connector itself, whilst permitting a specific resilient return of the contacts itself inside the body of the connector.

[0022] It will also be noted that in the outer surface of the cavity 8, there are present connection dowels 11, the function of which is described in greater detail hereinafter.

[0023] In Figures 5 to 7, it can be seen that the connector 4 of the female type also has two contacts 12, in which there are designed to be inserted the ends of the corresponding contacts 6 of the connector 3 of the male type.

[0024] It will also be noted that on the outer surface of the connector, there are present shaped ramps 13, in which the connection dowels 11 can be inserted, by means of the methods described in greater detail hereinafter.

[0025] With reference now to Figure 8, it can be seen that in order to connect to one another the two connectors 3 and 4, it is necessary to place the latter such that they are coaxial relative to one another, and such that the axis of joining between the two contacts 6 is perpendicular relative to the axis of joining of the contacts 12.

[0026] The two connectors are then brought close to one another, and the connection dowels 11 are inserted in the corresponding ramps 13.

[0027] The latter are shaped such that, after rotation of approximately 45°, secure fastening to one another of the two connectors is obtained, thus ensuring that the battery pack is secured to the torch itself.

[0028] However, this does not give rise to switching on of the electric bulb, since the electrical contacts 6 and 12 are not yet in contact with one another; on the other hand, in order to give rise to switching on of the bulb, it is necessary to rotate the two contacts relative to one another by a further 45°, which gives rise to perfect alignment and contact with one another of the contacts 6 and 12.

[0029] It will be appreciated that the various manoeuvres are reversible, in the sense that it is possible to switch off the torch by means of rotation relative to one another of the two connectors, in the direction opposite to that previously carried out.

[0030] Further rotation by 45° of the two connectors can give rise to detachment of the battery from the body of the torch itself. The presence of the rings 10 of the "O-ring" type is designed to guarantee tightness against infiltration of water, which would obviously give rise to short-circuiting of the contacts, and switching off of the torch.

[0031] By means of normal design criteria, it is possible to ensure that the torch can be used without any problems to a depth of approximately 100 m.

[0032] From the foregoing description, it can be seen that the user has available a torch from which the battery pack can easily be removed, in order to replace it by another battery pack which is already charged. All of this takes place using means which are extremely simple and convenient for the user.

[0033] The particular arrangement of the means of connection between the male and female connectors also makes it possible to eliminate the presence of corresponding devices for switching the torch on and off, which in practice are incorporated in the devices for connection between the torch and the battery pack.

[0034] The torch can also be supplied by a battery pack which is separate from the body of the torch itself, as in similar arrangements of a known type. In this case, the connecter of the male type must be secured to a connector of the female type, of the above-described type, which acts as a terminal component for an electrical cable which is connected to the battery pack, and is secured in a conventional manner to the belt, the jacket, or the cylinders of the underwater diver. By this means, it is possible to use battery packs with different power levels.

Claims

1. An underwater torch with a rechargeable battery pack, characterised in that the body (2) of the torch, comprising the electric bulb with the corresponding reflective parabola, has, at the end opposite that in which the latter is present, a connector (3) of the male type, which can be secured to a connector (4) of the female type, which is integral with the end of a body (5), inside which there is accommodated a rechargeable electric storage battery.

2. An underwater torch according to Claim 1, characterised in that the connector (3) of the male type has a pair of contacts (6), and the connector (4) of the

female type has a pair of contacts (12), both the connectors being of cylindrical symmetry, around the portion of the connector (3) of the male type which is closest to the torch itself, an annular cavity (8) being provided inside the said chamber, connection dowels (11) being provided, and the connector (4) of the female type being able to be inserted, with its outer surface, in the cavity (8), such that the connection dowels (11) fit into shaped ramps (13) provided on the outer surface of the connector (4) of the female type, in these conditions the axis of connection of the two contacts (6) of the male type being perpendicular relative to the axis which connects the two contacts (12) of the female type, additionally first rotation relative to one another of 45° in a predetermined direction giving rise to secure connection of the two connectors, whereas further rotation by 45°, again in the same direction, giving rise to alignment of the contacts (6 and 12) , as well as to contact with one another, and thus switching on of the lamp, the above-described manoeuvres also being reversible.

3. A pair of connectors, respectively of the male and female type, as defined in Claim 2.

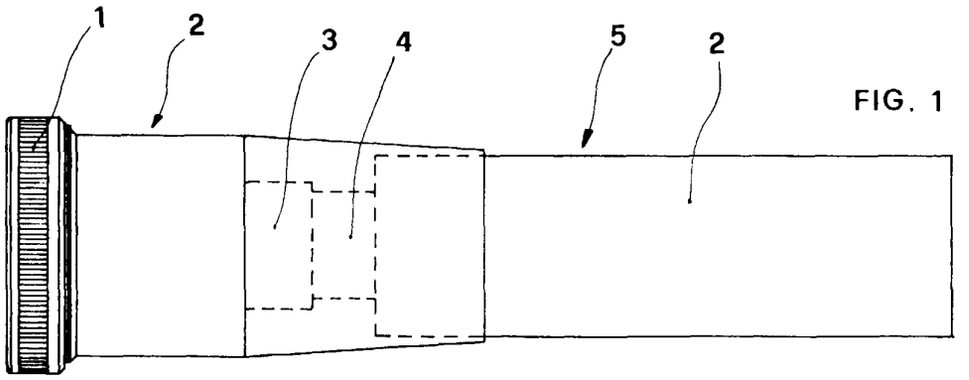

FIG. 1

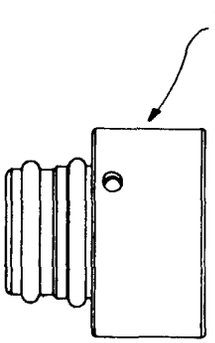

FIG. 2

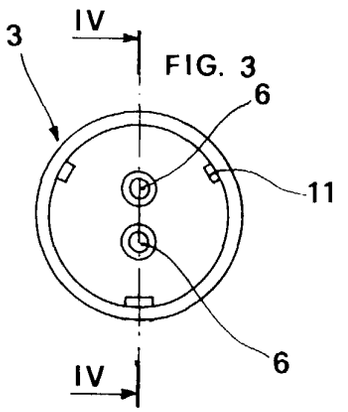

FIG. 3

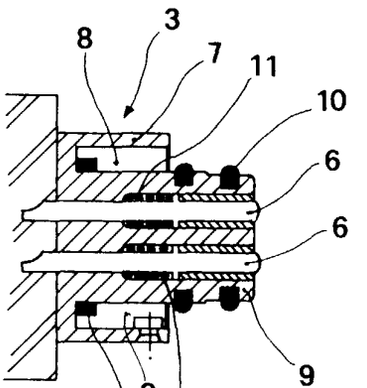

FIG. 4

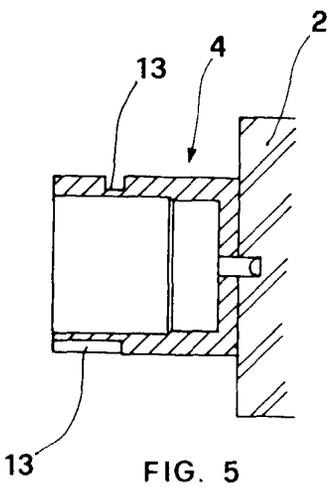

FIG. 5

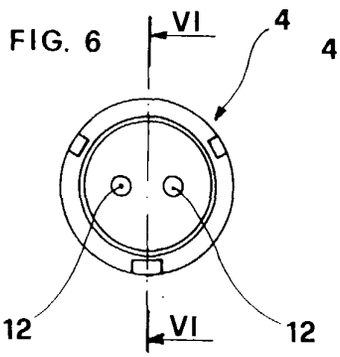

FIG. 6

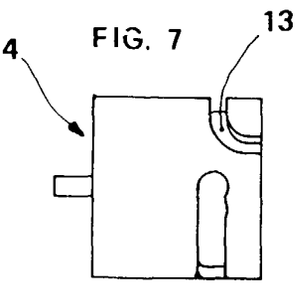

FIG. 7

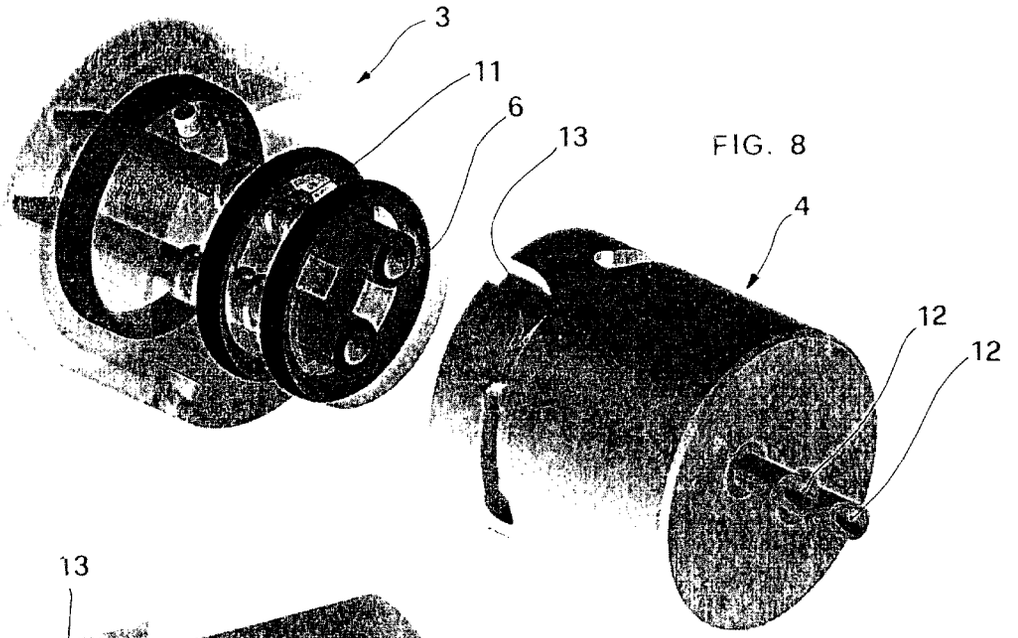

FIG. 8

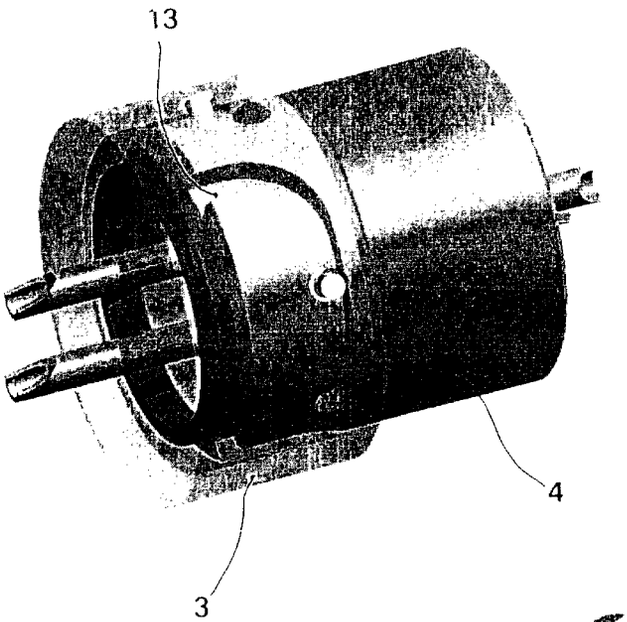

FIG. 9

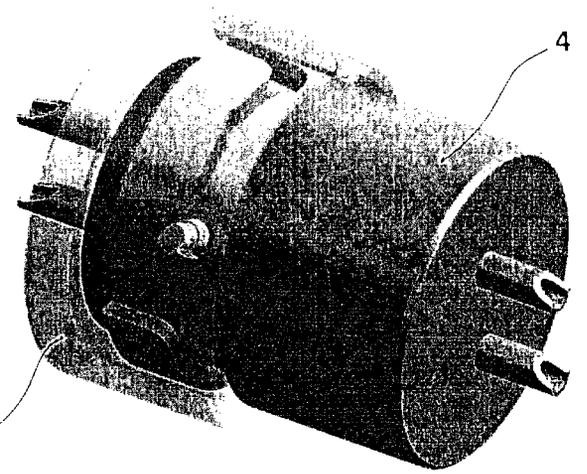

FIG. 10