United States Patent [19]

Adler et al.

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[45] **Feb. 12, 1974**

[54] **TIMEPIECE HAVING A NUCLEAR POWER SOURCE**

[75] Inventors: **Karl Adler,** Grenchen; **Georges Ducommun,** Feldbrunnen, both of Switzerland

[73] Assignee: **Biviator S. A.,** Grenchen, Switzerland

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[51] **Int. Cl.** ... **G04c 3/00,** G04b 37/00, G04b 37/08

[58] **Field of Search** ..... 29/77–79; 58/23 R, 58/23 BA, 23 C, 50 R, 23, 90; 224/4 R

[56] **References Cited**

UNITED STATES PATENTS

3,562,613 2/1971 Adler ..... 58/23 R

FOREIGN PATENTS OR APPLICATIONS

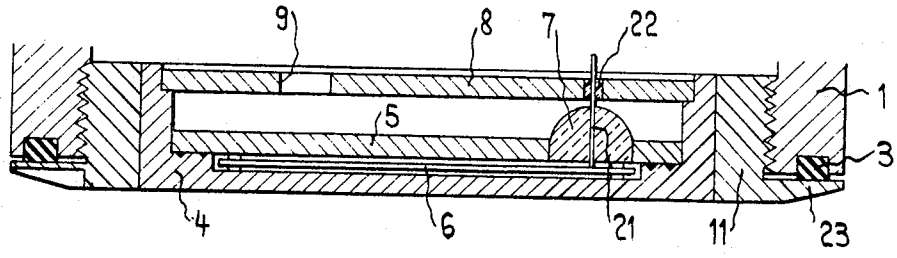
320,421 5/1957 Switzerland 58/23

Primary Examiner—Richard B. Wilkinson
Assistant Examiner—Edith Simmons Jackmon
Attorney, Agent, or Firm—Dwight H. Smiley; Imirie & Smiley

[57] **ABSTRACT**

A timepiece comprising a nuclear power source in a capsule having a sensitive insulation of an output terminal, this insulation and output terminal respectively being protected by a protecting plate forming an intermediate back.

5 Claims, 2 Drawing Figures



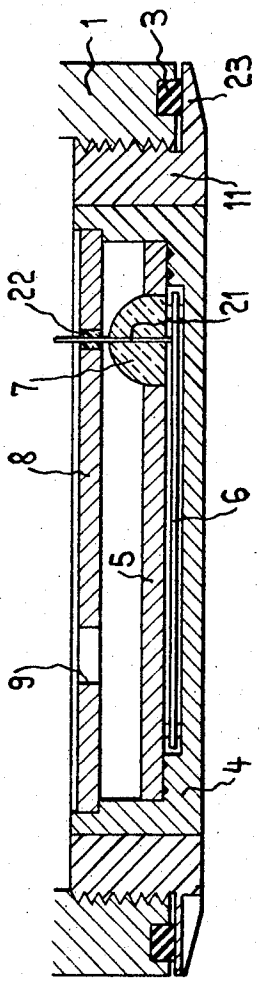


FIG. 1

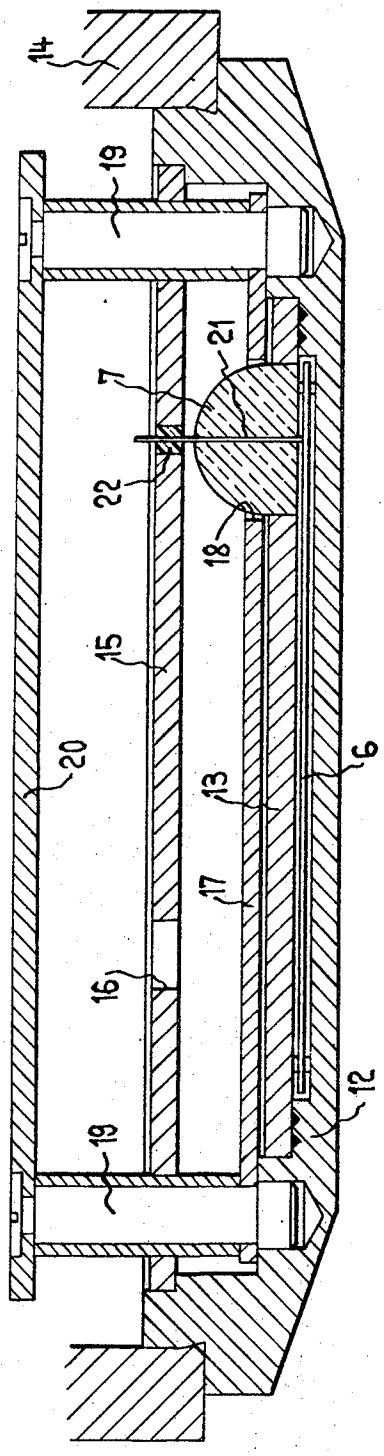


FIG. 2

INVENTORS
KARL ADLER
GEORGES DUCOMMUN
BY Imirie & Smiley ATTYS.

TIMEPIECE HAVING A NUCLEAR POWER SOURCE

BACKGROUND OF THE INVENTION

Electric or electronically powered timepieces, such as watches, comprise a separate battery that is removably positioned within the watch case to enable replacement thereof when the battery power finally is dissipated. In the usual electric battery-operated watch the battery life is approximately one year, more or less, and must be replaced by an expert. During the normal life of a watch of this type the battery will have to be replaced a number of times and, on such occasions, the timepiece must be taken to a watch expert to effect such replacement. Regardless of the nature of the battery the case for the timepiece must be somewhat larger than desirable because the battery is a separate item.

It has been discovered that a radioactive or nuclear isotopic power source may be provided as a battery for providing the power for driving an electric watch, as disclosed in U.S. Pat. No. 3,562,613, but the nuclear power source must be included within a vacuum sealed case having a closure to enable the evacuation of the interior and a protecting plate protecting such closure from damage and the loss of vacuum with attendant possible excape of radiation and this enclosing structure is space consuming and, although such power source will normally last the life of the timepiece, as a separate battery it does not reduce the space requirements.

SUMMARY OF THE INVENTION

According to the present invention, a nuclear isopic power source may be enclosed within a calotte surrounded by a wall and constituting a part of the casing for the timepiece. The power source is located within the calotte which is enclosed by a cover within the casing and sealed to the calotte wall, which cover has an aperture to enable evacuation of the chamber formed by the calotte and cover, which thereafter is sealed by a closure. A protecting plate is fixed to the calotte wall in spaced relation to the cover to mechanically protect the cover and closure. A drive shaft for the timepiece movement mechanism within the casing may extend through an opening in the protecting plate without danger of the excape of radiation.

BRIEF DESCRIPTION OF THE DRAWING

FIGS. 1 and 2 are diametrical sectional views of two embodiments, respectively.

DETAILED DESCRIPTION OF THE INVENTION

The watch of the first embodiment (FIG. 1) includes a case of which is shown a caseband **1**, in which is screwed a tubular piece **11** constituting a part of the back of the watch-case. This tubular piece **11** has an external flange **23** which compresses a water resistant gasket **3**. The glass of the watch-case and the movement of the watch are not represented.

The watch includes a nuclear isotopic power source of the type described, e.g. in U.S. Pat. No. 3,562,613. Such a power source constitutes a system for direct conversion of radioactive radiation power into electric power. The power source consists of a water resistant screened caspule which prevents any dangerous radioactive radiation to the outside.

The isotopic power source comprises an envelope formed by a calotte **4** and a cover **5**, the latter being pressed or soldered in a water resistant manner on the calotte **4**. In the cavity of the calotte **4** are fitted the active elements of the power source which are denoted by the reference numeral **6** and are not described in detail. Numeral **7** designates a glass or crystal bulb which permits making a vacuum inside of the source and which afterwards is hermetically sealed. The join between this bulb **7** and the cover **5** is also perfectly water resistant. A protection plate **8**, disposed above the bulb **7** is fixed by any suitable means on a shoulder of the wall of the calotte **4**. This protection plate **8** presents a hole **9** allowing e.g. to introduce a shaft of a gear of the watch. It protects also the bulb **7** mechanically and constitutes an intermediate back. A conductor **21** connects the active elements **6** of the power source with a piece of the watch movement; it is embedded in the bulb **7**, goes out of the latter and passes through an isolated socket **22**, driven into the protection plate **8**. The bulb **7** with its conductor **21** constitutes an isolated outlet of the capsule containing the isotopic power source.

In a modified embodiment, the bulb **7** might be made from plastic material, but in any case it is very delicate piece which does not support any shock or high pressure. That is why it must be protected by the plate **8**.

The calotte **4**, constituting a part of the envelope of the power source, is fitted in the tubular piece **11** and constitutes a part of the back of the watch-case. The other part of the back of the watch-case is formed, as already said,by the tubulair piece **11** itself.

In the second embodiment (FIG. **2**), the power source includes an envelope formed by a calotte **12** and a water resistant cover **13**. The calotte **12** forms itself the back of the watch-case, on which the case-band **14** is snap-fitted. A protection plate **15**, constituting an intermediate back and presenting a hole **16** is disposed above the bulb **7** and is fixed on a shoulder of the back **12**. A pillar-plate **17** of the watch movement, presenting a hole **18** for the passage of the bulb **7**, is fixed on a shoulder of the back **12** and carries pillars **19** which in turn support a bridge **20**. The pillars **19** go through holes in the protection plate **15** and are anchored in the back **12**.

What we claim is:

1. A timepiece comprising a casing for housing a timepiece mechanism, an evacuated capsule containing a nuclear isotopic power source enclosed in said casing and having a mechanically sensitive seal for the vacuum in the capsule, and a protection plate in said casing for protecting said seal from mechanical displacement, said plate constituting an intermediate back of said casing and separating said capsule from the timepiece mechanism.

2. A timepiece comprising a casing including a calotte surrounded by a wall, a cover within said casing and sealed to said calotte to define a chamber therebetween, said cover having an aperture to enable evacuation of said chamber, a closure sealing said aperture to maintain a vacuum in said chamber, a nuclear isotopic power source within said vacuum chamber, and a protecting plate fixed to said calotte wall in spaced relation to said cover and mechanically protecting said source and closure.

3. A timepiece according to claim **2**, wherein the seal between said calotte and cover is water resistant.

4. A timepiece according to claim **3** said calotte constitutes a part of the back of the case of the timepiece.

5. A timepiece according to claim **3** wherein said calotte forms the back of the case of the timepiece.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,791,134 Dated February 12, 1974

Inventor(s) Karl Adler & Georges Ducommun

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Claims:

Claim 4, line 1; after "claim 3,", insert -- wherein -- .

Signed and sealed this 6th day of August 1974.

(SEAL)
Attest:

McCOY M. GIBSON, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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