

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

3,577,876 5/1971 Spadini 58/90 R X

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FOREIGN PATENTS OR APPLICATIONS

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[57] ABSTRACT

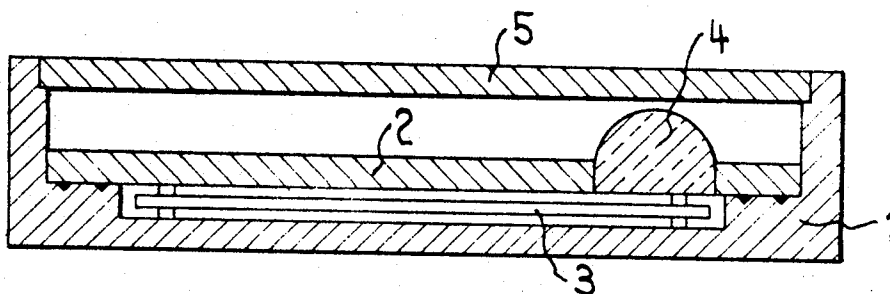
A timepiece comprising a nuclear isotopic power source enclosed in a calotte sealed by a cover. A protecting plate is disposed at a distance from said cover, and at least a part of the mechanism of the timepiece is accommodated in the space between said cover and said protecting plate.

[56] References Cited

UNITED STATES PATENTS

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

3 Claims, 3 Drawing Figures



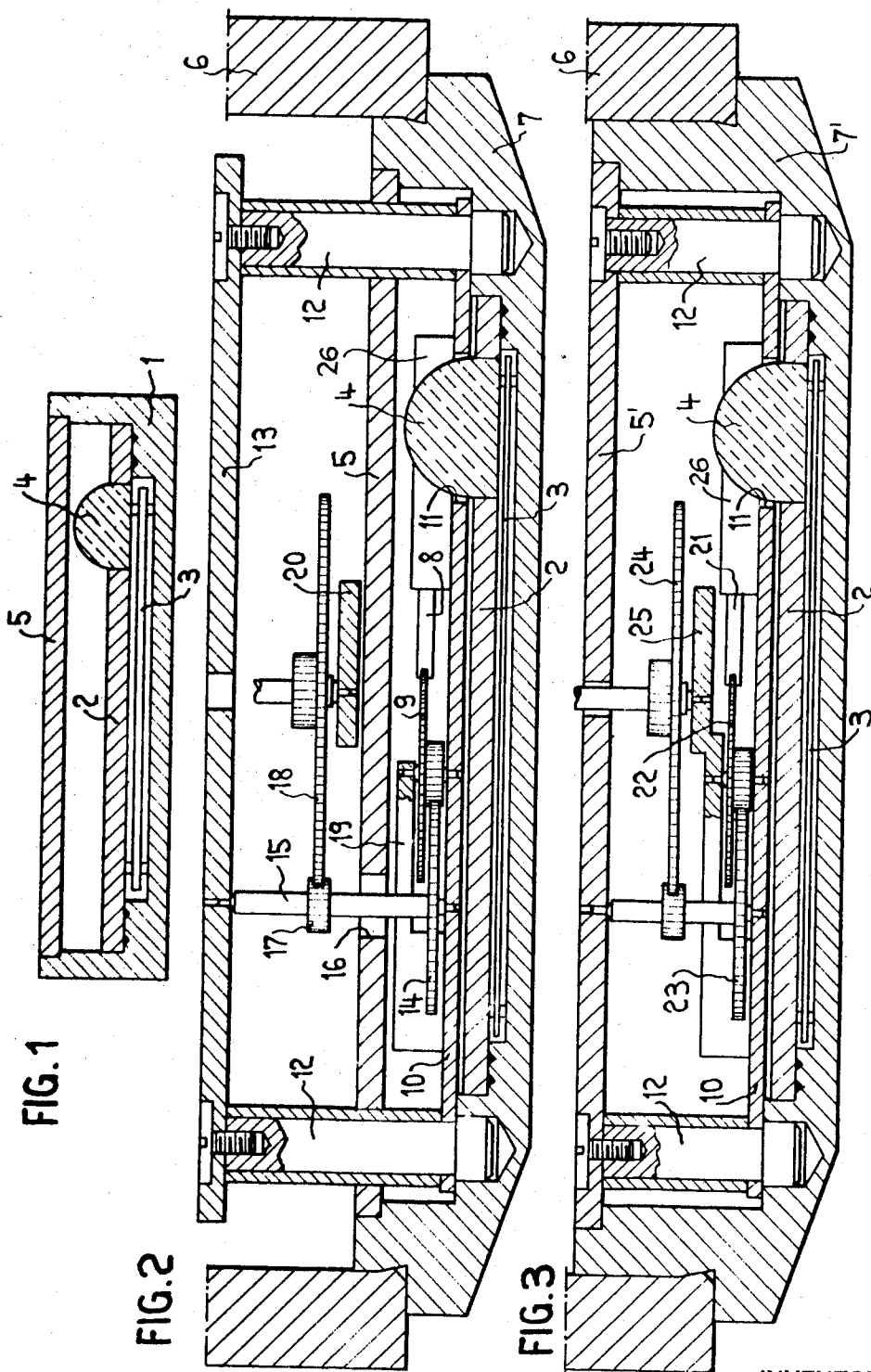


FIG. 1

FIG. 2

FIG. 3

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TIMEPIECE COMPRISING A NUCLEAR POWER SOURCE

BACKGROUND OF THE INVENTION

Electric or electrically 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 isotropic 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 escape 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 isotropic 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. To reduce space requirements, at least part of the timepiece movement mechanism is disposed between the cover and protecting plate. A drive shaft may extend through an opening in the protecting plate without danger of the escape of radiation.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a sectional view of a nuclear isotopic battery of conventional design, and

FIGS. 2 and 3 are sectional views of two embodiments of this invention on an enlarged scale.

DETAILED DESCRIPTION OF THE INVENTION

Having now reference to FIG. 1, a nuclear isotopic battery or source 3 is shown which may be of the type disclosed in U.S. Pat. No. 3,562,613. This battery allows direct conversion of radioactive radiation into electric energy. The battery comprises a sealed screening capsule avoiding any dangerous radioactive radiation outside the capsule.

The envelope of the battery shown in FIG. 1 is formed by a calotte 1 sealed by a cover 2 pressed or soldered onto the calotte 1. The active elements of the battery, 3 not shown in detail, are accommodated in the hollow space left in the calotte. A bead 4 of glass

or crystal formed after evacuation of the envelope seals the aperture of the envelope. A protecting plate 5 disposed above bead 4 is fixed on a shoulder of the wall of calotte 1. This protecting plate 5 protects the bead 4 which is highly sensitive.

The first embodiment of the invention shown in FIG. 2 is a watch comprising a case of which the middle part 6 and the back 7 are shown. The back 7 has the shape of a calotte and corresponds to part 1 of the battery shown in FIG. 1. Elements 2, 3, 4 and 5 correspond to the elements designated with the same reference numerals in FIG. 1. The calotte-shaped back 7 is fixed by a snap joint on the middle portion 6.

A part of the watch mechanism is accommodated between cover 2 and protecting plate 5. A few wheels such as 8 and 9 are shown, such wheels being driven by a motor 26 not shown in detail, energized by the nuclear source 3. A plate 10 of the watch mechanism has an aperture 11 through which the bead 4 projects upwardly. Plate 10 is mounted on a shoulder of the back 7 and carries pillars 12 supporting a bridge 13, whereby pillars 12 extend through apertures of the protecting plate 5 and are anchored in back 7. The last gear 14 of the mechanism disposed between cover 2 and protecting plate 5 has a shaft 15 extending with clearance through an aperture 16 of the protecting plate 5. Above the protecting plate 5 of this shaft 15 carries a pinion 17 driving other wheels of the watch mechanism such as wheel 18. Auxiliary bridges such as 19 and 20 are provided wherein some wheels of the mechanism are pivoted.

Accommodation of a part of the watch mechanism between cover 2 and protecting plate 5 allows reduction of the thickness of the watch because a portion of the space available between parts 2 and 5 is utilized.

The second embodiment illustrated in FIG. 3 differs from the first embodiment of FIG. 2 by the use of a calotte-shaped back 7' having a higher wall than back 7, and in that the protecting plate 5' is disposed at a greater distance from cover 2. The bridge 13 of the first embodiment (FIG. 2) is omitted and its function is taken over by the protecting plate 5'. In this embodiment the whole watch mechanism is disposed between cover 2 and protecting plate 5'. FIG. 3 shows a number of wheels designated by 21 to 24 and an auxiliary bridge 25. This embodiment has the same advantages as the first embodiment described above, namely obtaining a watch of small thickness.

What we claim is:

1. 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, a protecting plate fixed to said calotte wall in spaced relation to said cover and mechanically protecting said source and closure, a motor powered by said source, and timepiece movement mechanism including gear wheels driven by said motor, said mechanism being at least partially disposed between said cover and said protecting plate.

2. A timepiece according to claim 1 wherein a part only of said mechanism is disposed between said cover and said protecting plate, the last wheel of said part of the mechanism having a shaft extending with clearance through an aperture of said protecting plate.

3. A timepiece according to claim 1 wherein the mechanism is entirely disposed between said cover and said protecting plate.

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