United States Patent [19]

Hochstrate

[11] **3,877,217**

[45] **Apr. 15, 1975**

[54] **DIGITAL WATCH SWITCH DETENT DEVICE**

[76] Inventor: **Paul E. Hochstrate,** 16 Lorraine Dr., Bristol, Conn. 06010

[22] Filed: **Sept. 19, 1974**

[21] Appl. No.: **506,369**

[52] **U.S. Cl.** **58/85.5;** 74/527; 74/531

[51] **Int. Cl.** **G04b 27/00;** G05g 5/06

[58] **Field of Search** 58/85.5; 74/531, 527; 200/291

[56] **References Cited**

UNITED STATES PATENTS

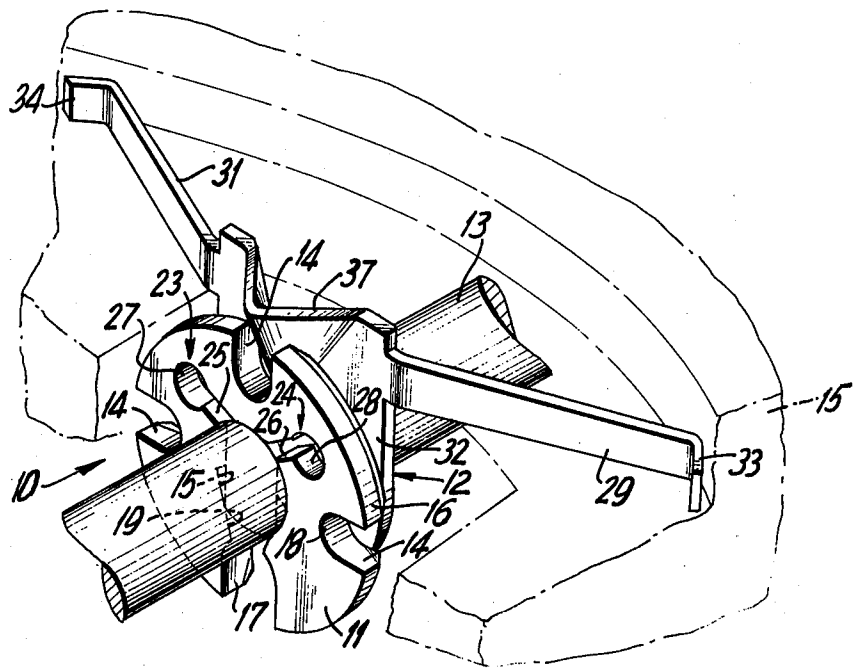
2,674,085	4/1954	Israel	58/85.5
2,869,395	1/1959	Allison et al.	74/527
3,745,762	7/1973	Kocher et al.	58/85.5

Primary Examiner—George H. Miller, Jr.

[57] **ABSTRACT**

A switch detent device for digital watches comprises a detent retaining ring which is snapped onto the watch stem and a detent spring which is mounted on the stem between the detent ring and the watch bezel. The detent retaining ring comprises a member having a plurality of slotted portions on the periphery thereof with one of said slotted portions opening inwardly to a peculiarly shaped gripping configuration for snap mounting on the watch stem. The detent spring comprises a downwardly extending portion having an aperture therein which is engaged by the watch stem and an upper elongated spring portion having a pair of outwardly extending arms and a central protruding member which coacts the grooves in the ring to create a tactile position when the switch is operated. The device provides a simple and economic switch detent mechanism wherein the various switch positions are readily apparent upon indexing of the watch crown.

7 Claims, 6 Drawing Figures



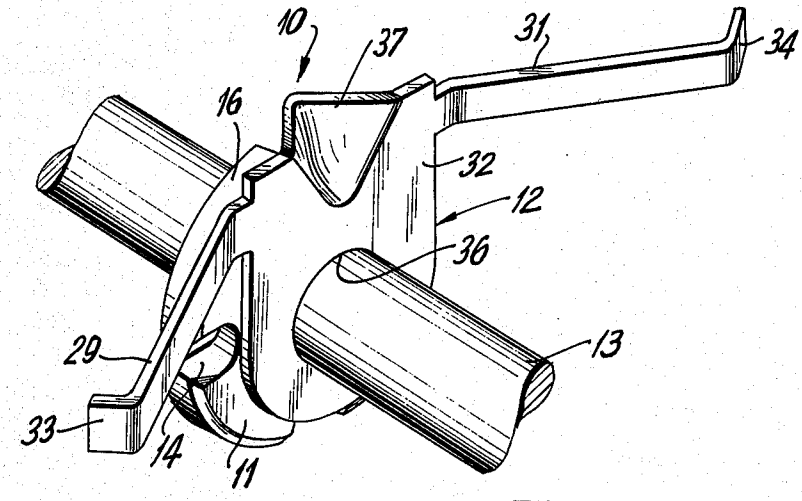


FIG.1

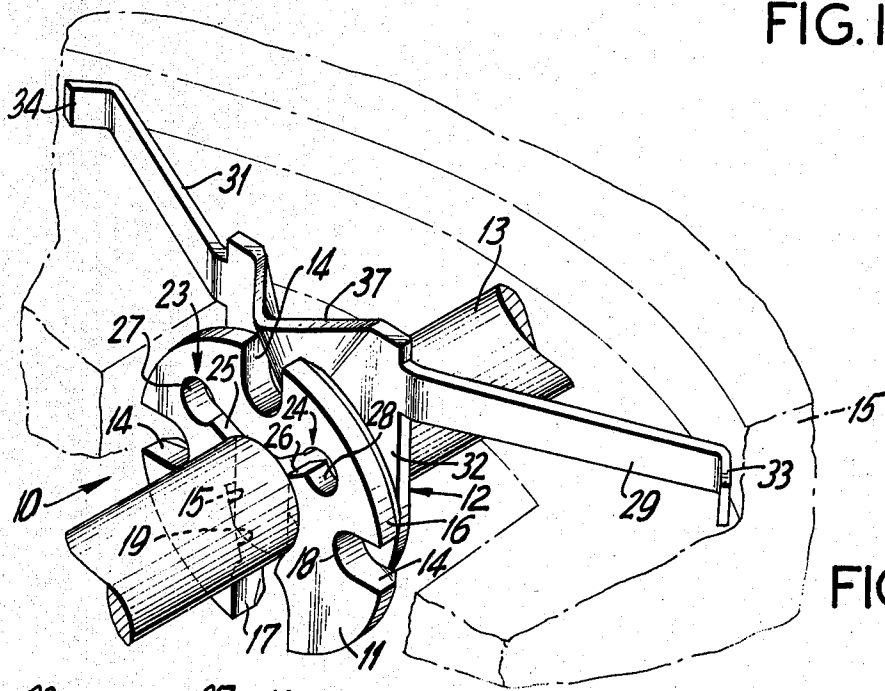


FIG.2

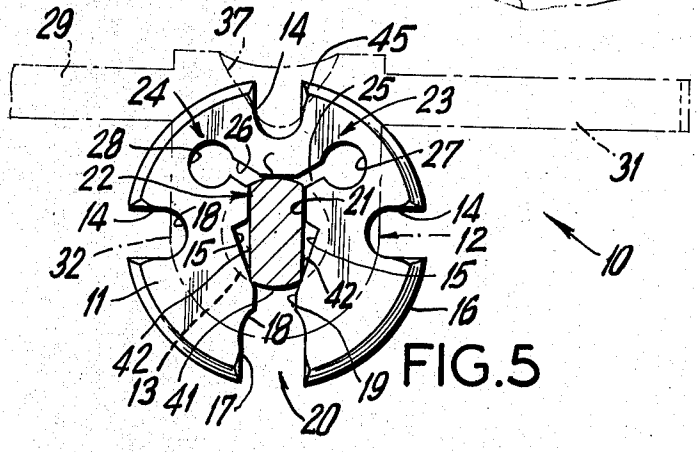


FIG.5

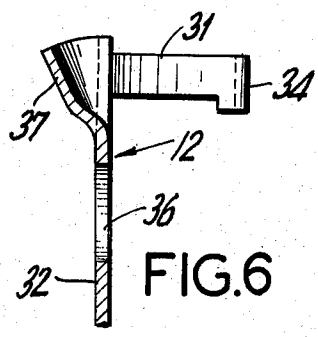
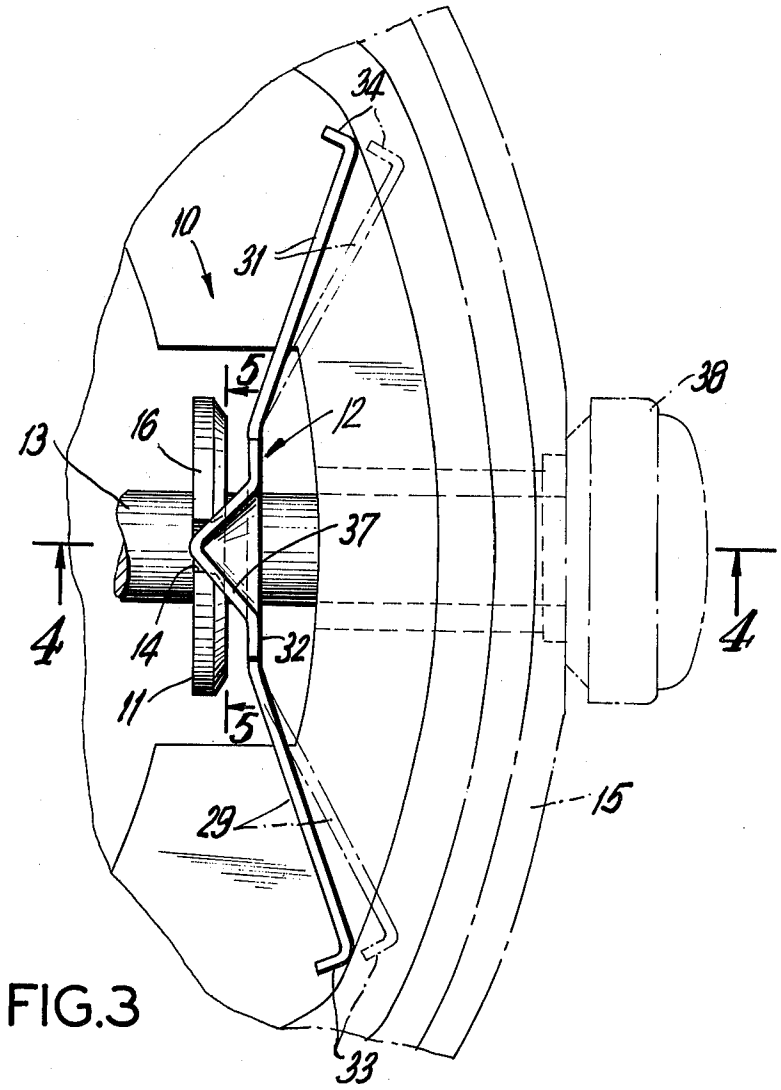


FIG.6


34
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38
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12
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37
4
4
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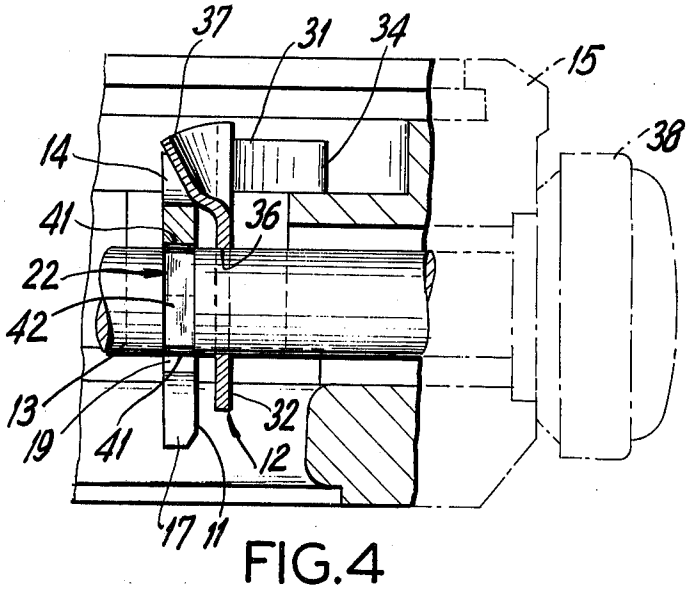
33

FIG.3


37
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11

FIG.4

DIGITAL WATCH SWITCH DETENT DEVICE

BACKGROUND OF THE INVENTION

The present invention relates to digital watches and particularly to a switch detent device for digital watches.

The prior art includes U.S. Pat. No. 2,869,395 to Allison, et al., which issued Jan. 20, 1959 disclosing a rotary switch detent device used in radio and television rotary switch installations. Allison provides a detenting arrangement with a pair of spring arms but of substantially different configuration from the present invention since the patent is directed to use in a totally unrelated field.

Ditisheim U.S. Pat. No. 2,554,402, issued May 22, 1951 discloses a control for alarm watches wherein the stem positively engages a winding and hand setting mechanism. Also of interest are U.S. Pat. Nos. 3,018,671 to Ogle, Jr., et al., which issued Jan. 30, 1962; 3,340,515 to Lawrence, Jr., which issued Mar. 4, 1969; and 3,127,786 to Wooley which issued Apr. 7, 1964.

In contrast to the prior art above, the present invention is designed to provide a detent switch for use in digital watches which functions in a reliable, simple and expeditious manner and which requires a minimum of relatively inexpensive parts. Present detent mechanisms are generally complicated and add to the assembly cost of a digital watch. While a number of patents have been cited above as of interest, these patents are not intended tok be an all-inclusive list of the patents in this area but merely exemplary of the state of the art.

SUMMARY OF THE INVENTION

The present invention relates to a switch detent device for digital watches which includes a detent retaining ring having a plurality of spaced cutout portions or slots about the periphery thereof with one of said portions extending inwardly to form an opening, the walls of which provide a gripping surface for snap fitting on a watch stem. The device also includes a cooperating detent spring comprising a downwardly extending portion having an aperture therein for mounting on the watch stem and an upper spring portion comprising an outwardly extending arm on each end and a protruding central nose portion for engaging the slots on the ring periphery. The arms each include an angled end portion for engagement with the watch bezel. Thus, when it is desired to provide a switching action in the digital watch, the watch crown on the end of the stem is turned causing the detent retaining ring or snap ring to rotate forcing the spring nose out of the peripheral slot. When the next slot is reached, the nose portion is resiliently urged into engagement with said slot by the spring arms. Consequently, a tactile position is effected when the stem is manually rotated.

Accordingly, an object of this invention is to provide a new and improved switch detent device for digital watches.

Another object of this invention is to provide a new and improved digital watch detent device wherein a retaining ring is engaged by a detent spring in a novel and expeditious manner.

A further object of this invention is to provide a new and improved digital watch switch detent device wherein a particular slotted snap ring adapted for ease of mounting to the stem is engaged by the camming portion of a resilient detent spring during rotation of the stem.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of this invention may be seen more clearly from the following description when viewed in conjunction with the accompanying drawings wherein:

FIG. 1 is a perspective view showing the detent spring in engagement with the detent retaining ring;

FIG. 2 is a perspective view in the opposite direction showing the detent spring in engagement with the detent ring and bezel;

FIG. 3 is a top view of the watch switch detent device with the operation of the spring arms shown in phantom;

FIG. 4 is a view taken along the line 4—4 of FIG. 3;

FIG. 5 is a view taken along the line 5—5 of FIG. 3; and

FIG. 6 is an enlarged view of a section of the detent spring.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring now to the drawings, the invention comprises a switch detent device **10** for digital watches which includes a detent retaining ring **11** and a detent spring member **12.** The switch detent device **10** is intended for use in a digital watch wherein a series of tactile positions are provided when the switch is operated. Specifically, it is intended that the various detent positions be sensed during the indexing operation as the watch stem **13** is rotated.

The detent retaining ring **11** comprises a substantially circular member having a plurality of slots **14** spaced about the periphery **16** thereof. One of said slots **20** is enlarged at the entrance portion **17** but tapers to the same inner base radius **18** as the other slots **14.** The slot **20** also extends inwardly from the radial surface **18** to form a gripping surface for the stem **13.** This gripping surface comprises a narrowed inlet portion **19** and outwardly sloping walls **15** leading to a key portion **21** which engages the upper end of a reduced section **22** of the stem **13.** The reduced stem section **22** comprises curved upper and lower surfaces **41** corresponding to the stem contour and flat parallel side walls **42.** While the upper surface **41** and the upper portion of the side walls **42** fits within the key slot **21,** the lower portion of the shaft section **22** is gripped by the spring-like action of the sloping walls **15.**

The upper portion of key slot **21** includes oppositely situated cutout portions **23** and **24,** each of which include cutout panels **25** and **26** leading respectively to circular cutouts **27** and **28** which are designed to provide resiliency in the ring member **11** to accomodate the insertion of the stem **13** and the gripping thereof by the sloping walls **15.**

The spring member **12** includes a pair of outwardly extending spring arms **29** and **31** which project outwardly from a main body **32.** Each of the spring arms **29** and **31** include a curved end portion **33** and **34** which engage the watch bezel **15.** Spring arms **29** and **31** are shown in dotted lines in the unflexed position before assembly. After assembly, the arms keep the nose portion **37** in the slots **14** and flex when the stem is turned. They also maintain axial force on the stem to keep the crown against the bezel. The curved ends **33**

and 34 prevent the ends of the spring arms from digging into the bezel as they flex.

The main body 32 includes a lower portion having an aperture 36 which encircles the stem 13 and an upper nose portion 37 which projects outwardly from the body 32 to engage the slots 14 in the periphery of the ring 11. The nose portion is sloped from the body 32 to provide a cam surface to facilitate engagement with the slots.

As best shown in FIGS. 2 and 3, the nose 37 of the spring 12 engages one of the slots 14 due to the spring arms 29 and 31 pulling inwardly against the bezel 15. Turning the stem 13 cams the spring nose 37 completely out of the slot 14 to permit indexing to the next slot 14 or 20 facilitated by a champfer 45 on the edges of the slots. It is, of course, possible to attain the desired action with a non-retractable stem wherein the nose 37 is retracted from a slot 14 or 20 merely by rotating the stem 13.

It is thus to be noted that the present invention provides a detent switch action in a digital watch when the crown 38 on the end of the stem 13 is turned causing the detent ring or snap ring 11 to rotate forcing the spring nose 37 out of a peripheral slot 14 or 20. When the next slot 14 or 20 is reached during indexing of the stem 13, the nose portion 37 is resiliently urged into engagement with the slot 14 or 20 by the spring arms 29 and 31. Therefore, a tactile positioning arrangement is achieved in an expeditious manner by manual rotation of the stem 13.

The construction of the retaining ring 11 with the open slot 20 permits ease of mounting ring 11 to stem 13 by merely snapping it in place. Once mounted, the entrance portion 17 which served for attaching the ring then serves as one of the detent slots similar to slots 14 for cooperating with the detent spring.

While the invention has been explained by a detailed description of certain specific embodiments, it is understood that various modifications and substitutions can be made in any of them within the scope of the appended claims which are intended also to include equivalents of such embodiment.

What is claimed is:

1. A switch detent device for digital watches having a stem extending into the watch case comprising:

a detent retaining ring having a plurality of spaced slots about the periphery thereof and a central gripping portion which is mounted about the stem, and,

a detent spring member including a body portion having an aperture therethrough which encircles the stem and a pair of outwardly extending spring arms which contact the watch case, said spring member having a protruding nose portion which engages the slots in the ring during indexing of the stem to establish various tactile positions.

2. A switch detent device in accordance with claim 1 wherein:

the central gripping portion of the ring comprises a narrow entrance portion at the base of one of said slots leading to intermediate outwardly tapered wall portions and a narrow end portion to engage a reduced section of the stem.

3. A switch detent device in accordance with claim 2 wherein:

the reduced stem section engaging said spring includes a pair of straight side walls and curved upper and lower portions, the upper portion engaging the narrow end portion of the ring.

4. A switch detent device in accordance with claim 2 further including:

a pair of circular apertures and a connecting slot leading to each aperture on opposite sides of the gripping aperture, thereby providing resiliency in the ring to open and close about the stem.

5. A switch detent device in accordance with claim 2 wherein:

the spring arms each curve outwardly from said nose portion on opposite sides of the spring and include curved end portions which contact the watch case.

6. A switch detent device in accordance with claim 2 wherein:

each of the slots include a curved base portion of the same radius and the slot leading to the gripping portion is arranged to accomodate insertion of the stem as well as to cooperate with said nose portion in one of said tactile positions.

7. A switch detent device in accordance with claim 2 wherein:

the nose portion of the ring comprises a protruding nose extending outwardly from the ring and sloped toward its greatest protrusion at the upper surface of the spring member, the sloped walls of said nose portion acting as cam surface to facilitate engagement with the slots.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,877,217 Dated April 15, 1975

Inventor(s) Paul E. Hochstrate

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

On the cover sheet insert:

[73] Assignee: Timex Corporation, Waterbury, Conn.

Signed and Sealed this

twenty-ninth Day of *July 1975*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
U.S. GOVERNMENT PRINTING OFFICE: 869-930

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