

[54] DIGITAL WATCH

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[57] ABSTRACT

A digital watch or timepiece with a cam disk seated upon a cannon pinion and provided with an indexing or switching cam for the stepwise indexing or rotation of an hour dial equipped with an indexing or pillar wheel. A security gear is rigidly connected with the pillar wheel, the security gear having teeth which are offset by one half of a tooth spacing with respect to the teeth of the pillar wheel. A circular security disk is rigidly connected for rotation with the cam disk, the security disk being provided with a recess which is symmetrical with respect to a radius directed towards the indexing cam. The recess possesses a size which is just sufficient to insure that in each instance only then, when the cam disk further rotates the pillar wheel, a single tooth of the security gear can pass the security disk.

4 Claims, 2 Drawing Figures

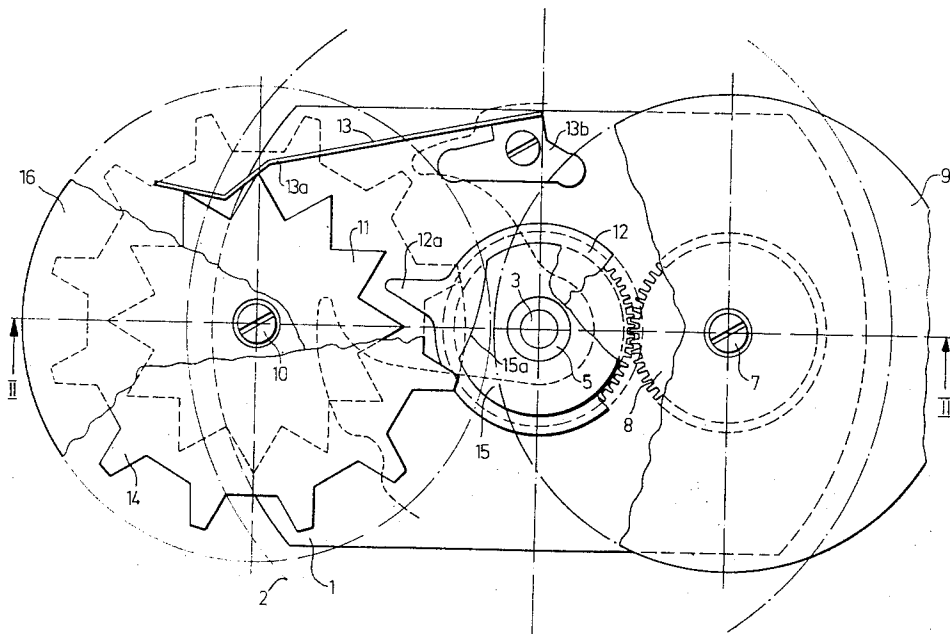
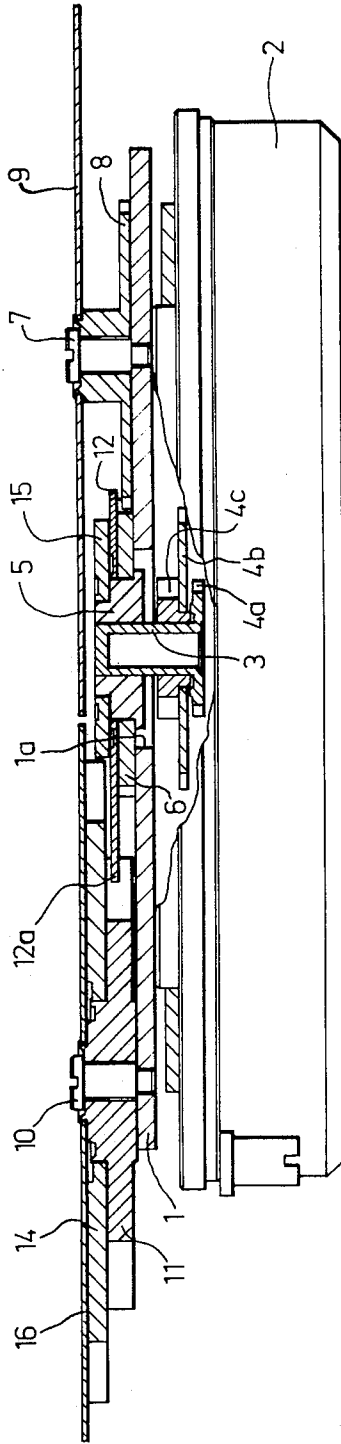


Fig. 2



DIGITAL WATCH

BACKGROUND OF THE INVENTION

The present invention broadly concerns improvements in timepieces and, more specifically, relates to a new and improved digital indicating watch with a cam disk seated upon a cannon pinion and having an indexing or switching cam which serves for the stepwise indexing or rotation of an hour disk provided with a pillar wheel.

Such type watches, which may constitute both wristwatches as well as table clocks or timepieces, are known as such in the art. For blocking the indexing or pillar wheel, they generally embody a small spring which brakes the movement of the pillar wheel. During the normal indexing operation, when same occurs by the indexing cam driven by the watch movement, this blocking mechanism is completely satisfactory. However, if the indicator disks are to be set by hand, then it can happen, — particularly if the watch is set in a hurry, — that not only during each complete revolution of the minute disk the hour disk is advanced by one hour but the latter also might overshoot one or more hours.

SUMMARY OF THE INVENTION

Since this overshooting during setting of the watch is undesired and oftentimes in fact quite annoying, it is a primary object of the present invention to provide a new and improved construction of digital watch which overcomes the aforementioned drawbacks.

Now in order to implement this object and others which will become more readily apparent as the description proceeds, the invention contemplates that a security gear is rigidly connected for rotation with the indexing or pillar wheel. The security gear has teeth which are offset by one half of the tooth spacing from the teeth of the pillar wheel. Further, a circular security disk is rigidly connected with the cam disk and the security disk is provided with a recess which is symmetrical with respect to a radius directed towards the indexing cam. The recess possesses such a size or dimension that only then, when the cam disk further indexes or rotates the pillar wheel, can a single tooth of the security gear pass the security disk.

An advantageous manifestation of the invention contemplates rotatably mounting all of the parts driven by the cannon pinion upon a mounting plate. It is also possible to form a single plastic piece the hour disk, the security gear, and the pillar wheel. As a practical matter, the cam disk can be provided with a gear for driving a minute disk connected with a further gear and the cam disk, the gear and the security disk can likewise be fabricated from a single plastic piece.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIG. 1 is a plan view of an exemplary embodiment of digital watch without the watchcase; and

FIG. 2 is a cross-sectional view of the digital watch depicted in FIG. 1, taken substantially along the line II—II thereof, and wherein the gears are partially somewhat rotated.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Considering now the drawings, it is to be understood that in the exemplary embodiment under discussion the individual components required for the drive of the indicator disks of the digital watch or timepiece of this development are rotatably mounted upon a mounting plate 1 which, in turn, is operatively coupled via any suitable and therefore not particularly depicted means with the actual watch movement 2 which can be of conventional construction. The mounting plate 1 possesses a central bore 1a through which there is guided a cannon pinion 3 which depends from the watch movement 2. Beneath mounting plate 1, in other words, at the side confronting the movement 2, there are concentrically secured three gears 4a, 4b and 4c to the cannon pinion 3, and these three gears are in fact part of the actual watch movement 2 and do not have any influence upon the significant aspects of the invention.

A support bushing or sleeve 5 is mounted upon the cannon pinion 3, extending partially within the mounting plate 1 and partially past such mounting plate. The support bushing 5 is mounted in such a way that owing to the friction which is present it participates in the rotational movement of the cannon pinion. At the lowermost region, in other words, at the region located closest to the mounting plate 1, a gear 6 is rigidly connected for rotation with the support bushing or sleeve 5 in such a manner that there is not present any play between this gear 6 and the mounting plate 1.

Eccentrically of the mounting plate 1 and at a spacing corresponding to twice the radius of gear 6, there is rotatably mounted by means of a threaded bolt 7 a further gear 8. This further gear 8 bears upon the mounting plate 1 and is identical to the gear 6 with which it meshes, therefore providing a transmission ratio of 1:1. At the gear 8, which at its central region is formed to provide a spacer sleeve 8a, there is rigidly mounted for rotation a minute disk 9. This minute disk 9 is thus driven by the cannon pinion 3 via the support bushing 5, the gear 6 and the gear 8.

With respect to the cannon pinion 3 and diametrically opposite the threaded bolt 7, there is likewise rotatably mounted upon the mounting plate 1 by means of a threaded bolt 10, but at a somewhat greater spacing from the central cannon pinion, a pillar or indexing wheel 11. The height of this indexing or pillar wheel 11 corresponds to approximately twice the height of the gear 6. Above the gear 6 there is rigidly mounted for rotation at the cannon pinion 3 a cam disk 12 with a switching or indexing cam 12a which radially protrudes from this otherwise circular disk 12. The switching cam 12a cooperates with the indexing or pillar wheel 11. This indexing wheel 11 possesses twelve teeth 11a which are uniformly distributed about its periphery and between which can engage the indexing cam 12a. During each complete revolution of the cannon pinion 3 the indexing cam 12a indexes the indexing or pillar wheel 11 by one tooth. As a braking mechanism to safeguard against unintentional rotation, there is provided a brake spring 13 or equivalent structure, consisting of a tangentially directed arm 13a which resiliently bears upon the teeth 11a of the indexing or pillar wheel 11 and this arm has a flexed tip 13c and an attachment flange 13b.

Upon the indexing or pillar wheel 11 there is attached a concentric security gear 14 which bears at its underface against the top surface of this pillar wheel. Its twelve teeth 14a are constructed at the tips so as to possess a substantially trapezoidal configuration and are offset through the spacing of one-half of a tooth with respect to the teeth 11a of the indexing or pillar wheel 11. Hence, always exactly at the center between two radii directed towards the teeth 11a of the pillar wheel 11, there is always disposed a radius which extends towards the teeth 14a of the security gear 14.

Approximately at the same height as the security gear 14, calculated from the location of the mounting plate 1, there is rotatably arranged a security disk 15 upon the cam disk 12, and one face of this security disk 15 bears against such cam disk 12. This security disk 15 consists of a circular disk having a recess 15a. This recess is located symmetrically with respect to the radius of the disk which extends in the direction of the indexing or switching cam 12a. Further, such recess 15a possesses a shape which approximates that of a circular segment, however with a "secant" which is convexly curved with respect to the center point of the disk. The depth or width respectively of this recess 15a is just so large that the teeth 14a of the security gear 14 can pass when they are located approximately symmetrically with respect to a connection line between both centers of rotation. Since however the security disk rotates together with the pillar wheel only a single tooth of the security gear can rotatably move past the security disk when the cam 12a moves the pillar wheel because the tooth following the tooth which has moved therepast then bears against the periphery of the security disk and can no longer further rotate. When this happens the braking spring 13 again retains the pillar wheel 11 in such a manner that play is maintained between the security disk 15 and the teeth of the security gear 14.

In this manner, the hour disk 16 which is rigidly secured for rotation and coaxially bears upon the security gear 14, during each complete revolution of the minute disk 9, can only further rotate by the amount of one tooth or one hour respectively. Even with direct setting of the indicator disks by means of non-illustrated indicator setting stems or shafts, it is not longer possible for one or more hours to be overshot.

In the drawings, all gears and disks have been individually depicted for the sake of preserving clarity in the illustration and in order to be able to better explain

their function. In practice, there is preferably employed plastic as the material for the components, with the result that the entire construction is considerably simplified. Thus, for instance, the support bushing 5, the gear 6, the cam disk 12 and the security disk 15 can be fabricated from a single plastic piece. Similarly, the pillar wheel 11, the security gear 14 and the hour disk 16 can also be formed of a single plastic piece. It is advantageous for the gear 8 and the minute disk 9 if they are formed of separate components since their shape for fabrication reasons is not as favorable as the other components. The mounting plate 1 of course does not constitute an absolutely required component, rather merely facilitates the construction.

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto, but may be otherwise variously embodied and practiced within the scope of the following claims. Accordingly,

What is claimed is:

1. A digital indicating watch comprising a cannon pinion, an hour disk, a pillar wheel provided for said hour disk, a cam disk equipped with an indexing cam seated upon the cannon pinion and serving for the step-wise indexing of said hour disk provided with said pillar wheel, a security gear rigidly connected for rotation with the pillar wheel having spaced teeth, said security gear having spaced teeth which are offset by one-half of the tooth spacing from the teeth of the pillar wheel, a substantially circular security disk rigidly connected for rotation with the cam disk, said security disk having a recess which is substantially symmetrical with respect to a radius directed towards the indexing cam, said recess having a size such that only when the cam disk further rotates the pillar wheel can a single tooth of the security gear pass the security disk.

2. The digital watch as defined in claim 1, further including a mounting plate upon which are rotatably mounted all components driven by the cannon pinion.

3. The digital watch as defined in claim 1, wherein the hour disk, the security gear and the pillar wheel are formed of a single plastic piece.

4. The digital watch as defined in claim 1, further including a minute disk equipped with a gear means, and a gear for driving the minute disk via the gear means, and wherein the cam disk together with the gear and the security disk is formed of a single plastic piece.

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