

[54] **TIMEPIECE WITH DIGITAL HOUR
DISPLAY**

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E

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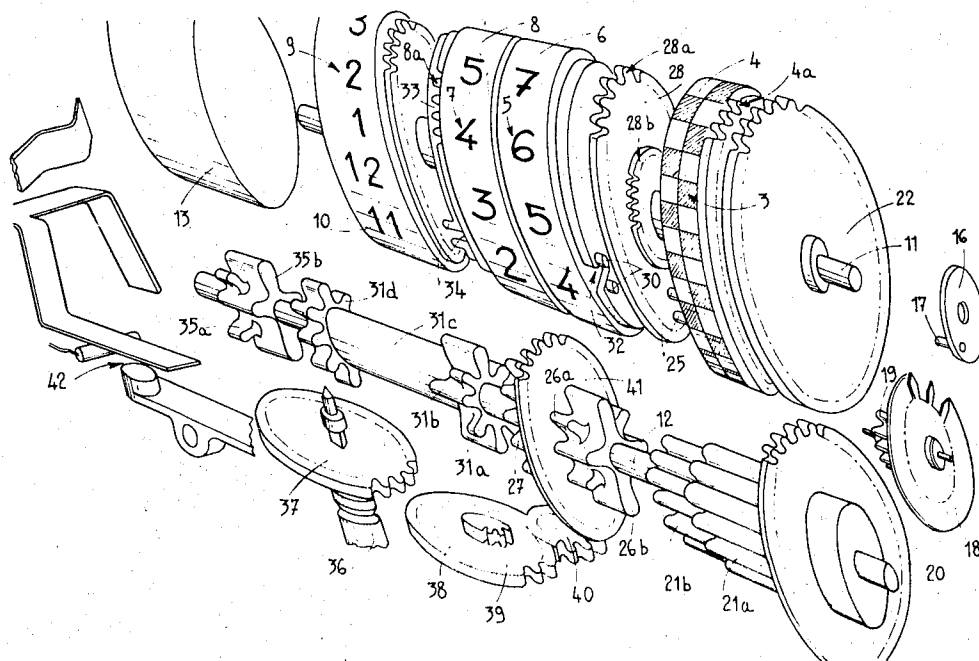
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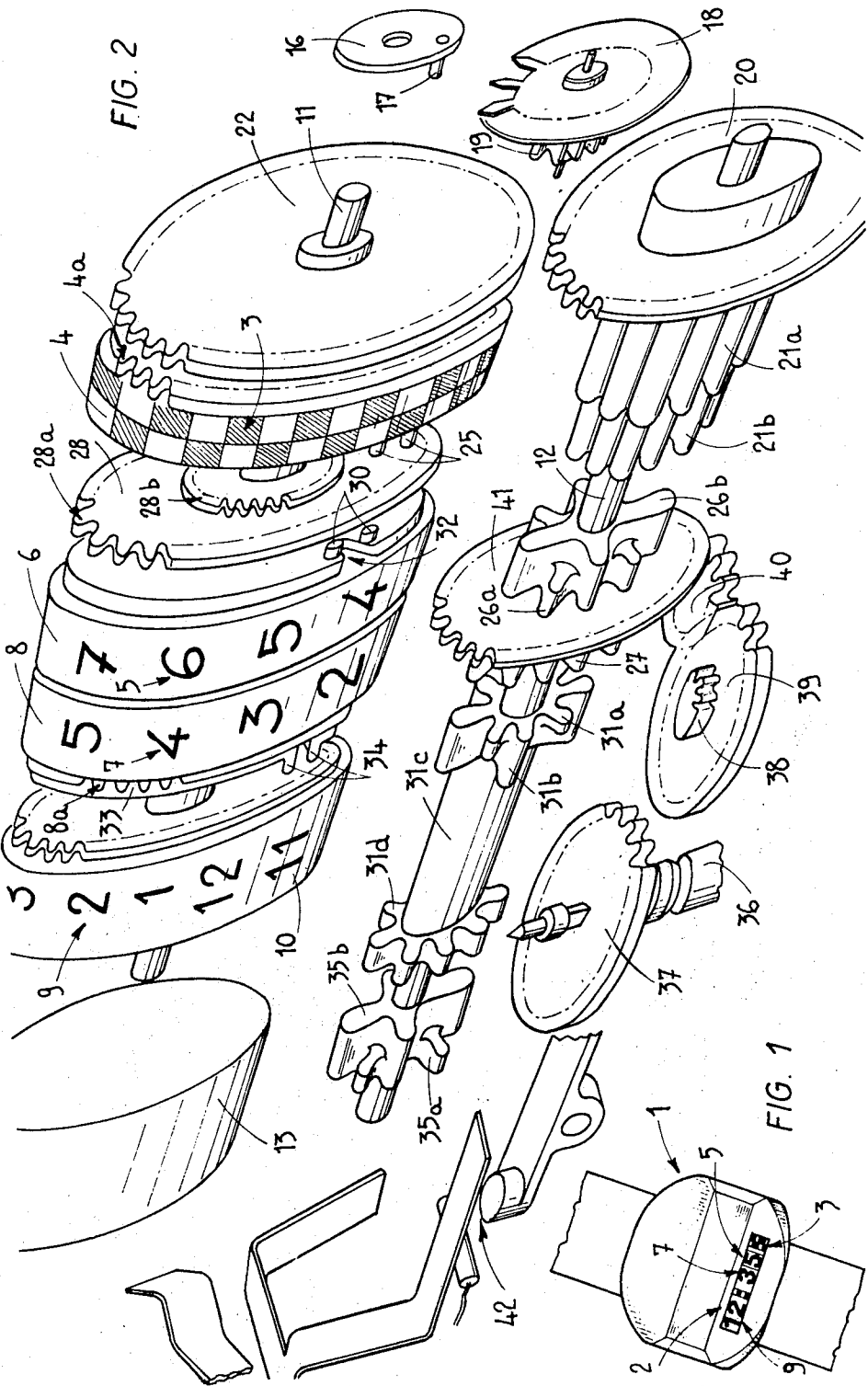
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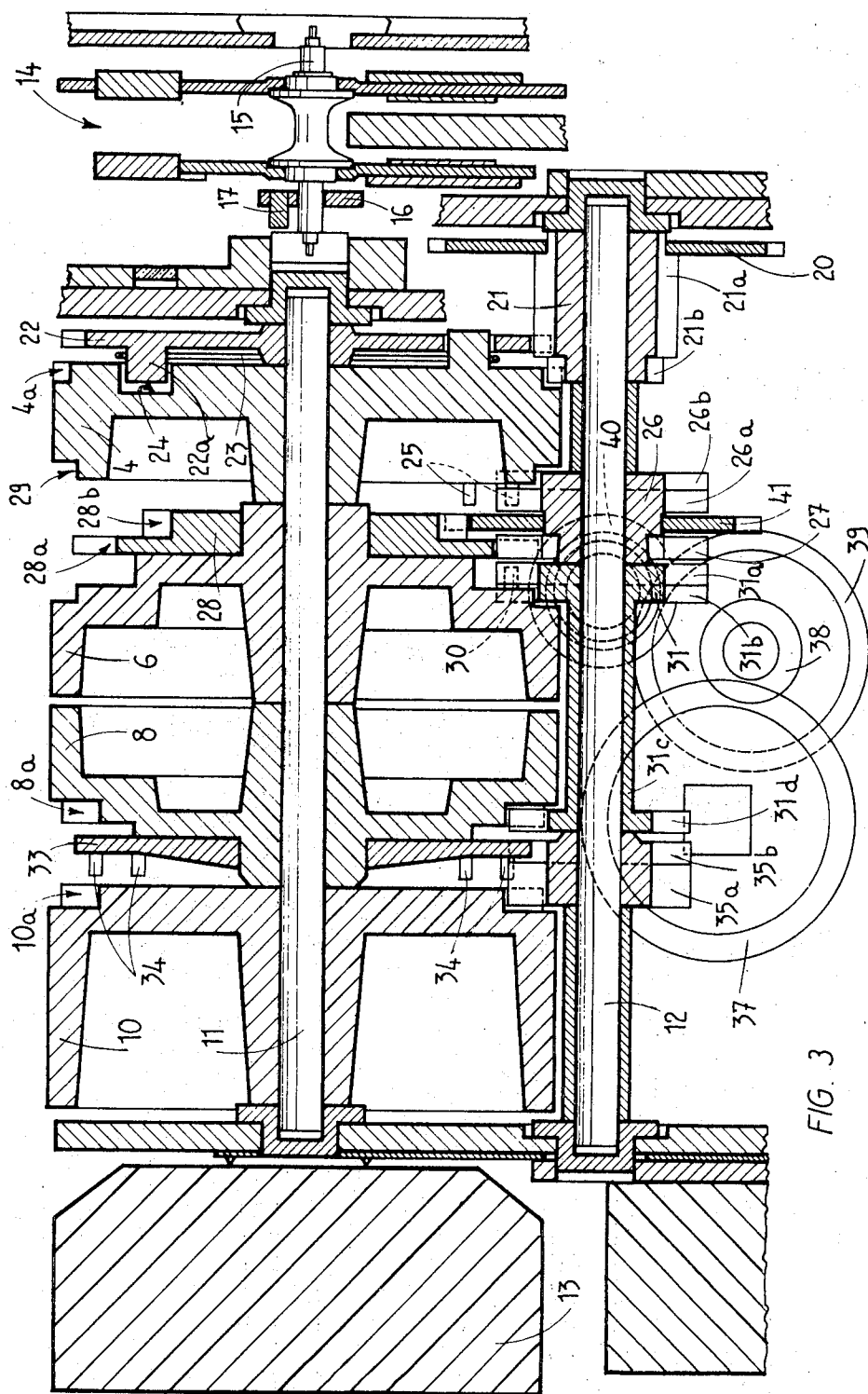
ABSTRACT

A digital timepiece having a plurality of coaxially mounted drums to display the hours and minutes of time. At least two drums have their respective driving members positioned on only one side with opposite sides of the drums closely spaced for minutes display. A driving axis positioned parallel to the drum axis carries a plurality of driving pinions. The drums and pinions cooperate for successive movement of the hours and minutes drums.

3 Claims, 3 Drawing Figures







TIMEPIECE WITH DIGITAL HOUR DISPLAY

BACKGROUND OF THE INVENTION

The object of the present invention is to provide a timepiece with digital hour display, with coaxial rotative drums.

SUMMARY OF THE INVENTION

The timepiece of the invention is characterized by the fact that the driving members of at least two of said drums are positioned on only one side of each drum, so that the oppositely facing sides of each drum, are free, thus permitting close juxtaposition of the two drums. The several drums of the timepiece drive themselves successively by the intermediary of rotative connecting members positioned on a common geometrical axis which is different than but parallel to, the axis on which the drums are mounted. Each drum, except for the drum mounted on the end of the shaft, carries at least one driving finger which, once per revolution, drives a pinion rigidly connected to a wheel in meshed engagement with a toothing which is rigidly connected to the next drum.

BRIEF DESCRIPTION OF THE DRAWING

The drawing shows, by way of example, one embodiment of the timepiece of the invention.

FIG. 1 is a perspective view of an electric wrist-watch with the digital hour display of the invention.

FIG. 2 is a diagrammatic exploded perspective view, on an enlarged scale, of a portion of the movement of the watch of FIG. 1, and

FIG. 3 is a longitudinal sectional view of the portion of the movement shown in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The watch represented in FIG. 1 is designated generally 1. The watch casing is provided with an elongated window 2 in which appears a design 3 carried by a drum of animation 4. A drum 6 carries the FIGS. 5 indicating the minutes units; a drum 8 carries the FIGS. 7 indicating the tens of minutes; and a drum 10 carries the FIGS. 9 indicating the hours (units and tens) of the timepiece. As shown in FIGS. 2 and 3, the several drums 4, 6, 8 and 10 are coaxial, being loosely mounted on a common drum shaft 11.

The several drums drive themselves successively by the intermediary of rotative connecting members, disclosed in detail hereafter, which are coaxial and loosely mounted on a common shaft 12 parallel to the drum shaft 11.

The source of current for operating the watch 1 is constituted by a cylindrical battery 13 positioned, coaxial to the shaft 11. The battery 13 supplies current to an electronic circuit, not shown, which causes the balance wheel 14 (seen in FIG. 3) to oscillate in a known manner. Balance wheel 14 is mounted on shaft 15 which is coaxial to drum shaft 11. As a modification, the shaft 15 of the balance-wheel 14 could be positioned parallel to the drum shaft 11 without being coaxial thereto.

The balance-wheel 14 operates plate 16 having a pin 17 to drive counting wheel 18 provided with pinion 19 (see FIG. 2). Pinion 19 meshes with wheel 20 which is loosely mounted on shaft 12 and which has a pinion 21

formed thereon. A magnet, not shown, operates on the counting wheel 18 to maintain the same, each time when it is stopped, in a position such that wheel 18 is driven by pin 17 only during part of the been nevertheless represented in this position for the clearness of the drawing.

The pinion 21 has a double toothing, 21a and 21b, these two toothings having the same number of wings but being of different moduli; Toothing 21a meshes with a wheel 22 connected to the drum 4 by a spring 23, and toothing 21b meshes with the toothing 4a provided on the drum 4. The toothing 4a is interrupted on a portion of the circumference of drum 4 such that the wheel 22 and the drum 4 are driven at very slightly different speeds by the pinion which, that produces the winding of the spring 23. When the non-toothed portion of the drum 4 moves opposite the toothing 21b of the pinion 21, the drum 4 effects a sudden jump under the action of the spring 23. The relative movement between the drum 4 and the wheel 22 is limited by a stud 22a of wheel 22 engaged in a recess having the shape of an arc of circle 24 provided in the face of the drum 4 positioned opposite the wheel 22.

Due to the above disclosed arrangement, the drum 4 which carries the decorative design 3 rotates step by step, but at a relatively high frequency, so that the design 3 moves continuously in the window 2. Rotation of drum 4 permits the user of the watch to ascertain at any time that the watch is not stopped. On the other hand, the instantaneous jump effected by the drum 4, once per revolution, causes an instantaneous jump of the minutes units drum 6 because, at the moment when the drum 4 effects the said instantaneous jump, a pair of driving fingers 25 carried by drum 4 engage the toothing 26a of a pinion 26 loosely mounted on the shaft 12 and drive it on two teeth. The pinion 26 is rigidly connected to wheel 27 in meshing engagement with the toothing 28a of wheel 28 rigidly connected to the hub of the drum 6. The arrangement is such that drum 6 makes one jump per minute.

It is to be noted that the pinion 26 is provided with a second toothing 26b, the number of the wings of which is half the number of wings of the toothing 26a. Toothing 26b cooperates with an annular recess 29 of the drum 4 to lock pinion 26. However, the wings of the toothing 26b engage a radial notch (not shown) in the drum 4, once per revolution, and at the moment when the pins 25 of the drum 4 act on the toothing 26a. This arrangement permits rotation of the pinion 26 at the rate of one tooth of the toothing 26b, or of two teeth of the toothing 26a.

The drum 6 carries two driving pins 30, similar to the pins 25 of the drum 4, and which cooperate with a pinion 31 having a double toothing 31a and 31b, similar to the pinion 26. The pinion 31 is provided with a hub 31c extending beyond the drum 8 and which carries, at its extremity, a toothing 31d in meshed engagement with a toothing 8a of the minutes tens drum 8. The gearing ratio is such that the drum 8 moves step by step by reason of one step each ten minutes.

The drum 6 is also provided with a notch 32, visible in FIG. 2. The wings of the toothing 31b of the pinion 31 engage notch 32 during the rotation of toothing 31b.

The hub of the drum 8 carries a plate 33 provided with two pairs of, diametrically opposed pins 34, which act, twice per revolution, on a pinion 35 pro-

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vided with a double toothing 35a and 35b, similar to the pinions 26 and 31. The toothing 35a meshes with a toothing 10a of the hours drum 10. The gearing ratio is such that hours drum 10 moves one step once per hour.

It is to be noted that the driving members of the two drums 6 and 8 are situated on only one side of said drums, so that the other sides of the drums, which are opposite to each other, are free. This arrangement permits close juxtaposition of these two drums which together indicate the minutes.

The movement also comprises a setting mechanism comprising a control stem 36 (FIG. 2) passing through the bottom of the watch casing. Stem 36 is rigidly connected to a wheel 37, in meshing engagement with a pinion 38 rigidly connected to a wheel 39. Wheel 39 meshes with an intermediary wheel 40. Which in turn meshes, by means of a bevel pinion, with a wheel 41 loosely mounted on the hub of the pinion 26 and which meshes with a second toothing, 28b, of the wheel 28. Thus, the setting does not act on the animation drum 4.

When stem 36 is pulled into its setting position, it operates by an arrangement not shown to close an electric switch 42 (FIG. 2) so as to stop the running of the movement when the setting is effected.

The watch as represented in the drawings is an electric watch, but the invention could also be applied to an electronic watch.

What I claim is:

1. A timepiece for digital time display comprising:
 - A. a plurality of drums rotatively and coaxially mounted on a drum axis, the drums having indicia for hours and minutes of time,
 - B. each drum having a toothed driving member associated therewith and at least two of the drums having their respective driving member positioned on

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only one side thereof with the opposite sides of said two drums being juxtaposed,

- C. a driving axis positioned parallel to the drum axis and having a plurality of toothed driving pinions mounted coaxially thereon, there being at least one driving pinion for driving each respective drum, each driving pinion

- i. except the last one on the driving axis being rigidly connected with a respective toothed wheel in meshed engagement with the corresponding drum driving member,

- ii. having a first set of circumferentially spaced teeth and a second set of alternatively spaced teeth,

- D. each of said drums except the last one on the drum axis having a driving finger rigidly secured thereto such that once per revolution of the drums each driving finger drives its associated pinion through a revolution of one of said first teeth and corresponding wheel to thereby drive the next successive drum on the drum axis.

2. A timepiece as claimed in claim 1 in which each drum has a recess about the circumference thereof for mating engagement with a tooth of its respective pinion, whereby after driving a drum through a revolution of one of said first teeth the pinion is locked by engagement of a tooth in the recess.

3. A timepiece as claimed in claim 1 in which there is an hours drum and a tens of minutes drum, the tens of minutes drum having at least two driving fingers provided thereon, said driving fingers being positioned diametrically opposed the next spaced hours drum whereby the tens of minutes drum influences movement of the hours drum upon each half revolution of the tens of minutes drum.

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