

[54] DAY-DATE CALENDAR MECHANISM

[75] Inventor: **Paul Wuthrich**, Watertown, Conn.

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

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[52] U.S. Cl. 58/58

[51] Int. Cl. G04b 19/24

[58] **Field of Search**..... 58/4, 5, 58

[56] **References Cited**

UNITED STATES PATENTS

3,695,029	10/1972	Tripet	58/58
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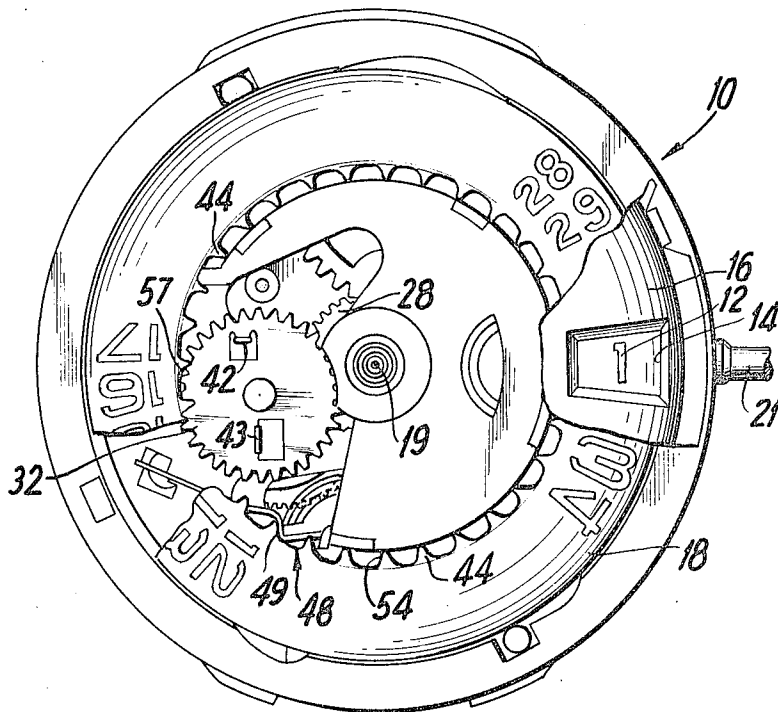
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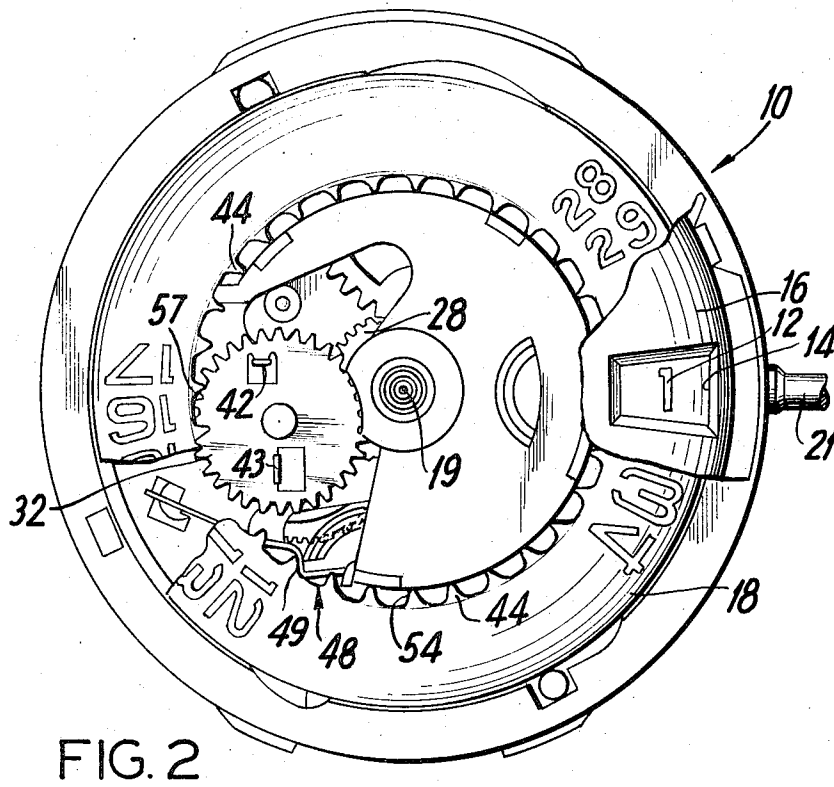
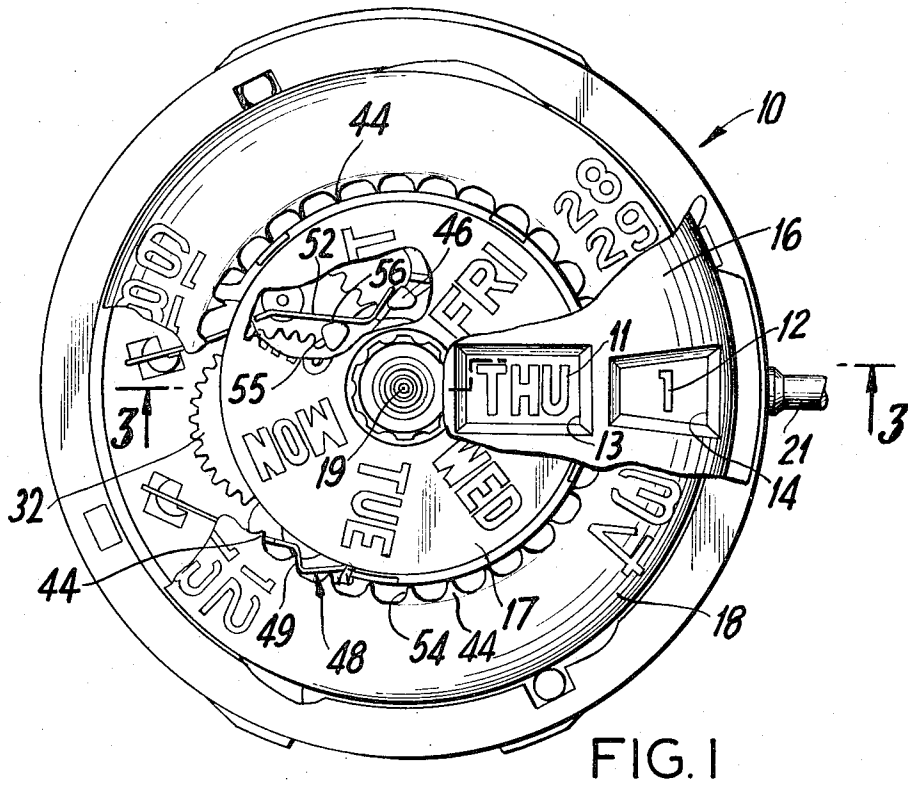
Primary Examiner—George H. Miller, Jr.

[57] ABSTRACT

A day-date calendar mechanism comprises a day-date drive wheel having a pair of tabs extending upwardly therefrom. The date wheel is coupled to an hour wheel and driven thereby so that the tabs engage, respectively, one of the 7 day dial teeth and one of the 31 date dial teeth to effect movement of said teeth during a 24 hour period. The mechanism is designed so that the date advances slowly prior to midnight and jumps approximately two-thirds pitch at midnight, while the day advances slowly past midnight and jumps approximately one-half pitch at about 12:40 a.m., thus minimizing the loading on the watch drive means. The day and date may be set in relation to each other since the date does not change when the hands are rotated counterclockwise past midnight while the day indication reverts by one day.

11 Claims, 4 Drawing Figures





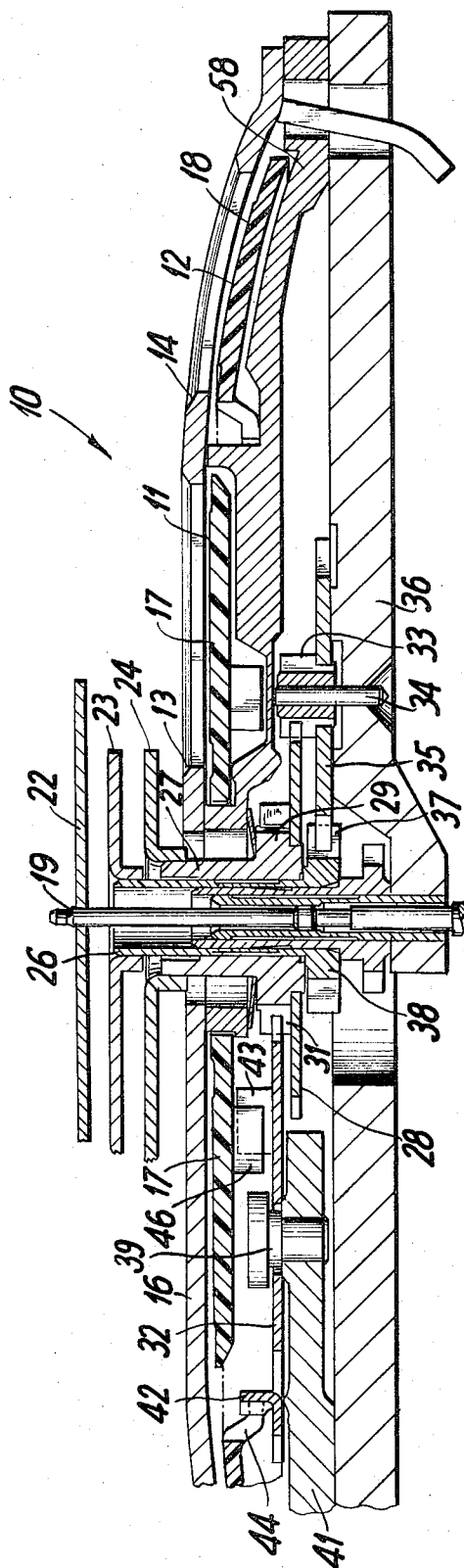


FIG. 3

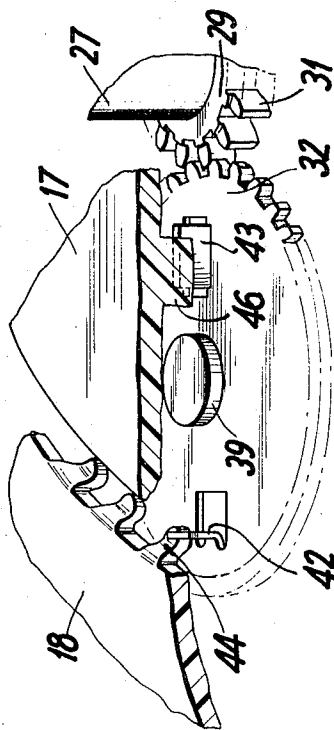


FIG. 4

DAY-DATE CALENDAR MECHANISM**BACKGROUND OF THE INVENTION**

The present invention relates to watches and particularly to day-date watches having means coupled to the movement for indicating the day and date.

The prior art includes various mechanisms for indicating the day and date by means of day and date wheels which are driven by the watch drive means. Typical arrangements are disclosed in U.S. Pat. Nos. 3,695,029 issued Oct. 3, 1972, 3,712,043 issued Jan. 23, 1973 and 3,751,901 issued Aug. 14, 1973. These patents and the prior art in general, however, disclose different and less advantageous means for driving the day and date indicating means than the means proposed herein.

A further problem arises in setting the day and date relative to each other in conventional day-date watches since either both the day and date wheels move together during setting, or a very complex and costly arrangement is required to prevent this problem. The present invention permits setting of the day and date relative to each other in an expeditious and inexpensive manner.

Another disadvantage in many designs arises from the fact that the watch drive means is required to drive both the day and date wheels simultaneously to effect a change with the arrival of a new date. This requires substantially more power than the present invention wherein the date change loads in mechanism prior to midnight while the day change loads the mechanism after midnight.

Other prior art of interest are U.S. Pat. No. 3,710,567 issued Jan. 16, 1973 which discloses a date changing means including a pin carried on a gear which engages a day indicating means and U.S. Pat. No. 3,036,424 issued May 29, 1962 which discloses cam means for engaging the teeth on the date wheel. The background prior art also includes U.S. Pat. Nos. 3,664,120 issued May 23, 1972, 3,716,984 issued Feb. 28, 1973 and 3,775,965 issued Dec. 4, 1973, which together with the prior art cited above, are merely cited as of interest and are not intended to be an inclusive listing of pertinent patents.

SUMMARY OF THE INVENTION

The present invention pertains to a day-date calendar mechanism including a day-date wheel having a pair of tabs extending upwardly therefrom at predetermined locations. The day-date wheel engages an hour wheel which is coupled to the watch drive means. As the day-date wheel rotates during the operation of the watch in each 24 hour interval, one of the tabs engages a tooth on the day dial and the other tab engages one of the teeth on the date dial. The mechanism is designed so that the load on the watch drive means is distributed with the date change loading the mechanism prior to midnight, and the day change loading the mechanism during a predetermined period after midnight. As a further advantage, when the hands are rotated counterclockwise past midnight, the date indication does not change but the day indication reverts by one day. This permits rapid setting of the correct day and date relative to each other.

Accordingly, an object of this invention is to provide a new and improved day-date timepiece.

Another object of this invention is to provide a new and improved means wherein the day and date may be simply and readily set relative to each other in a day-date watch.

A further object of this invention is to provide a new and improved day-date calendar mechanism for timepieces wherein the load on the drive means caused by the day and date change is distributed to lessen the peak load.

BRIEF DESCRIPTION OF THE DRAWINGS

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

FIG. 1 is a top view of the day-date watch comprising the invention with portions cut away to illustrate the interrelationship of parts;

FIG. 2 is a top view of the watch comprising the invention with the day indicating means removed and portions cut away to illustrate the interrelationship of parts;

FIG. 3 is a cross-sectional view of the invention taken along the line 3—3 of FIG. 1; and,

FIG. 4 is a partial perspective view of the date wheel in engagement with the day and date dials.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, the invention comprises a day-date watch 10 having indicia 11 and 12 for indicating respectively the day and date which are visible through windows 13 and 14 in the dial 16. The day indicia 11 indicating the seven days of the week are located about a day dial 17 while the date indicia 12 indicating the thirty one days of a month are located about a date dial 18. The dials 17 and 18 are mounted for rotation about drive shaft or arbor 19, as will be described later in greater detail, with the smaller day dial 17 located internally of the date dial 18. The dials 17 and 18 are also coupled to the stem 21 and may be manually rotated thereby for setting the correct day and date.

The watch 10 also includes a second hand 22, a minute hand 23 and an hour hand 24 coupled to arbor 19 in a conventional manner to indicate time as the drive means (not shown) activates the arbor 19. The minute hand 23 is coupled to the arbor 19 through pipe 26 while the hour hand is coupled through pipe 27. An hour wheel 28 is mounted about a lower enlarged portion 29 of the pipe 27 which results in a complete rotation of the wheel 28 every 12 hours. The hour wheel 28 also engages gear 33 mounted on shaft 34 which extends upwardly from bridge member 36. Gear 33 further meshes with gear 37 on the lower portion 38 of pipe 26 by means of meshing gear 35.

The lower hour pipe portion 29 also includes gear means 31 which engages a day-date drive wheel 32 to effect a 2:1 speed reduction so that the day-date wheel 32 rotates at one revolution per day. The day-date wheel 32 is mounted for rotation about supporting means 39 which, in turn, is supported by member 41. The day-date wheel 32 includes a pair of precisely positioned tabs 42 and 43 extending upwardly therefrom to engage date dial teeth 44 and day dial teeth 46 respectively. The date dial teeth 44 are located about the inner periphery of date dial 18 and extend downwardly therefrom. There are 31 teeth 44 representing the maximum number of days in a month. One of said teeth 44

is engaged by the date wheel tab 42 to advance the date indicia 12 slowly prior to midnight. The date 12 advances for about one-third pitch prior to midnight under the restraining action of spring member 48 and jumps the remainder or two-thirds pitch at midnight as the shoulder portion 49 of spring 48 slips over the engaged tooth 44. Thus, the tooth configuration is designed so that, in combination with the associated mechanism, a date change occurs in a predetermined manner.

The day dial 17 includes seven teeth or tabs 46, which correspond to the days of the week, projecting downwardly from the dial 17 to be engaged by tab 43. The date wheel tab 43 engages and drives one of the teeth 46 every twenty four hours to effect a day change in the window 13. The engaged tooth 46 is driven against the restraining action of spring member 52 in a manner whereby the day 11 starts advancing slowly past midnight and jumps one-half pitch at about 12:40 a.m. This action is effected by the tooth design in combination with the associated elements of the mechanism including the tab arrangement. Thus, the date change loads the watch calendar mechanism prior to midnight and the day change comes into play after midnight. This lessens the peak load on the mechanism.

The day dial 17 and the date dial 18 are supported by member 58 within the watch 10. Both the day dial 17 and the date dial 18 including their respective teeth 46 and 44 may be molded from plastic material. Other elements of the watch 10 may appear in the drawings, but since they are conventional and not germane to the invention, they have not been described in detail.

An important feature of the present invention is the fact that the correct day and date may be readily set relative to each other. When the hands 23 and 24 are manually rotated counterclockwise past midnight, the date indication does not change but the day indication reverts by one day. Fast manual advance may be achieved by rocking the hands 23 and 24 back and forth between midnight and 9:00 p.m.

As can be seen in the drawings, the date tab 42 is positioned on the date wheel 32 so that the leading edge engages a rearwardly sloping face 54 of a date dial tooth 44 to advance the date. When the date wheel 32 is rotated clockwise, the tab 42 slides over the slope 57 of the date dial teeth 44 so that the date indication remains the same. On the other hand, the day tab 43 which is positioned on the day-date wheel 32 to engage a day dial tooth 46, contacts said tooth both in a forward and reverse direction due to the substantially evenly sloped configuration of the tooth faces 55 and 56. Thus, the day change occurs when the hands 23 and 24 are rotated counterclockwise.

More specifically, the teeth 46 of the day dial 17 lie in substantially the same plane as the teeth 44 of the date dial 18. This is possible since the tab 42 on the day-date wheel 32 engaging the date dial 18 during its rotation passes in the plan view behind one of the day dial teeth 46. It may also be observed that the tabs 42 and 43 lie in planes which are substantially at right angles to each other. As a final point, the tab arrangement is rather economical since the tabs 42 and 43 may be merely punched or formed upwardly from the day-date wheel 32 eliminating the necessity of numerous additional parts of a precise nature to effect the day and date change.

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 embodiments.

What is claimed is:

1. A day-date watch including drive means to rotate the hands of the watch comprising:

- an hour wheel coupled to the watch drive means to make a complete rotation every 12 hours,
- a day-date wheel coupled to the hour wheel and driven thereby to make a complete rotation every 24 hours, said wheel including an upwardly projecting day tab and an upwardly projecting date tab,
- a day dial having indicia thereon and including a plurality of downwardly extending teeth positioned on the face thereof, one of said teeth being engaged by the day tab during each 24 hour period to rotate said day dial, and,
- a date dial having indicia thereon and including a plurality of internal teeth corresponding to the days of a month, said teeth extending downwardly and having rearwardly extending faces which are engaged by the date tab to be rotated in a forward direction during normal operation of the watch and which are not engaged by the date tab during movement of the tab in a reverse direction during a setting operation so that the date may be set relative to the day.

2. A day-date watch including drive means to rotate the hands of the watch comprising:

- an hour wheel coupled to the watch drive means to make a complete revolution every 12 hours,
- a day-date wheel coupled to the hour wheel and driven thereby to make a complete rotation every 24 hours, said wheel including an upwardly projecting date tab and an upwardly projecting day tab, said day tab and said date tab project upwardly in planes which are substantially at right angles to each other,
- a day dial having indicia thereon and including a plurality of downwardly extending teeth positioned on the face thereof, one of said teeth being engaged by the date tab during each 24 hour period to rotate said day dial, and,
- a date dial having indicia thereon and including a plurality of downwardly projecting internal teeth, one of said teeth being engaged by the date tab during each 24 hour period to rotate said date dial.

3. A day-date watch in accordance with claim 2, wherein:

- the teeth of the day dial lie in substantially the same plane as the teeth of the date dial and said day tab is located closer to the periphery of the date wheel than the day tab so that the teeth of the day dial and date dial may be in substantially the same plane.

4. A day-date watch including drive means to rotate the hands of the watch comprising:

- an hour wheel coupled to the watch drive means to make a complete rotation every 12 hours,
- a day-date wheel coupled to the hour wheel and driven thereby to make a complete rotation every 24 hours, said wheel including an upwardly pro-

jecting day tab and an upwardly projecting date tab,

- a day dial having indicia thereon and including seven downwardly extending teeth corresponding to the days of the week positioned on the face thereof, one of said teeth being engaged by the day tab during each 24 hour period to rotate said day dial, said downwardly extending teeth having substantially evenly sloped faces which are engaged by the day tab to be rotated in a forward direction during normal operation of the watch and being capable of being rotated in a reverse direction by the day tab to effect a day change during a setting operation, and,
- a date dial having indicia thereon and including a plurality of downwardly projecting internal teeth, one of said teeth being engaged by the date tab during each 24 hour period to rotate said date dial.

5. A day-date watch in accordance with claim 4 wherein:

the date dial includes thirty one internal teeth corresponding to the days of a month, said teeth extending downwardly and having rearwardly extending faces which are engaged by the date tab to be rotated in a forward direction during normal operation of the watch and which are not engaged by the date tab during movement of the tab in a reverse direction during a setting operation so that the date may be set relative to the day.

6. A day-date watch in accordance with claim 5 wherein:

the watch further includes separate resilient restraining members one engaging the teeth of the day dial and the other engaging the teeth of the date dial, and,

wherein the teeth of the date dial are dimensioned to engage the date tab and be advanced for about one-third pitch prior to midnight and to overcome the resilient members and to jump the rest of the pitch at midnight, and,

wherein the teeth of the day dial are dimensioned to engage the day tab and be advanced starting at about midnight for one-half pitch and then to overcome the resilient member and to jump the rest of the pitch prior to 1:00 a.m.,

whereby the loading on the watch drive means due to the day-date change is distributed to lessen the peak loading.

7. A day-date watch including drive means to rotate the hands about an axis of the watch comprising:
a day-date wheel coupled to the drive means to effect

a rotation thereof every 24 hours, said wheel including a day tab and a date tab extending outwardly therefrom,

a day dial, having day indicia thereon, mounted for rotation about the axis of the watch,

a date dial, having date indicia thereon, mounted externally of the day dial for rotation about the axis of the watch, and,

wherein the day dial is engaged by the day tab to load the drive means prior to midnight and the date dial is engaged by the date tab to load the drive means after midnight.

8. A day-date watch in accordance with claim 7 including:

means to change the day indicia relative to the date indicia by permitting rotation of the day dial in a counterclockwise direction while the date is inhibited from said rotation.

9. A day-date watch in accordance with claim 7 wherein:

the day dial and the date dial each include a plurality of teeth laying in substantially the same plane below the dials to be engaged by the day tab and date tab respectively to effect a day and date change in the indicia during the operation of the watch.

10. A day-date watch in accordance with claim 7 wherein:

the watch further includes manual setting means, coupled to the date wheel, and,

wherein the day dial includes means engaged by the day tab during a setting operation to effect a day change by movement of said dial in a counterclockwise direction and wherein the date dial is not de-
tented by the date tab when the date tab is moved in a counterclockwise direction so that the day and date may be readily set relative to each other.

11. A day-date watch in accordance with claim 10 wherein:

the day dial includes gear means having a predetermined configuration to be engaged by the day tab during a setting operation in a counterclockwise direction and during normal operation of the watch in a clockwise direction, and,

the date dial includes gear means having a predetermined configuration to be engaged by the date tab during normal operation of the watch in a clockwise direction and said gear means not being engaged when the date tab is moved in a clockwise direction during a setting operation.

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