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Saito et al.

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[54] **TIME CORRECTING DEVICE FOR A WATCH HAVING PLURAL TIME-DISPLAYS**

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[52] **U.S. Cl.** **58/42.5**, 58/63, 58/85.5

[51] **Int. Cl.** **G04b 19/22**, G04b 27/02

[58] **Field of Search** 58/73, 85.5, 42.5, 58/43, 63

[56] **References Cited**

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Primary Examiner—George H. Miller, Jr.

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[57] **ABSTRACT**

A correction device for a watch having a plurality of adjustable time displays utilizes a single control element extending externally of the watch and adapted to be manually operated to adjust the plurality of time displays. Operating means operatively associates each of the adjustable time displays with the control element whereby the latter is operable to adjust each of the time displays. By way of example, the control element may be used to adjust a first time display indicating local time and a second time display indicating the hour in a time zone other than that in which the wearer of the watch is located.

3 Claims, 4 Drawing Figures

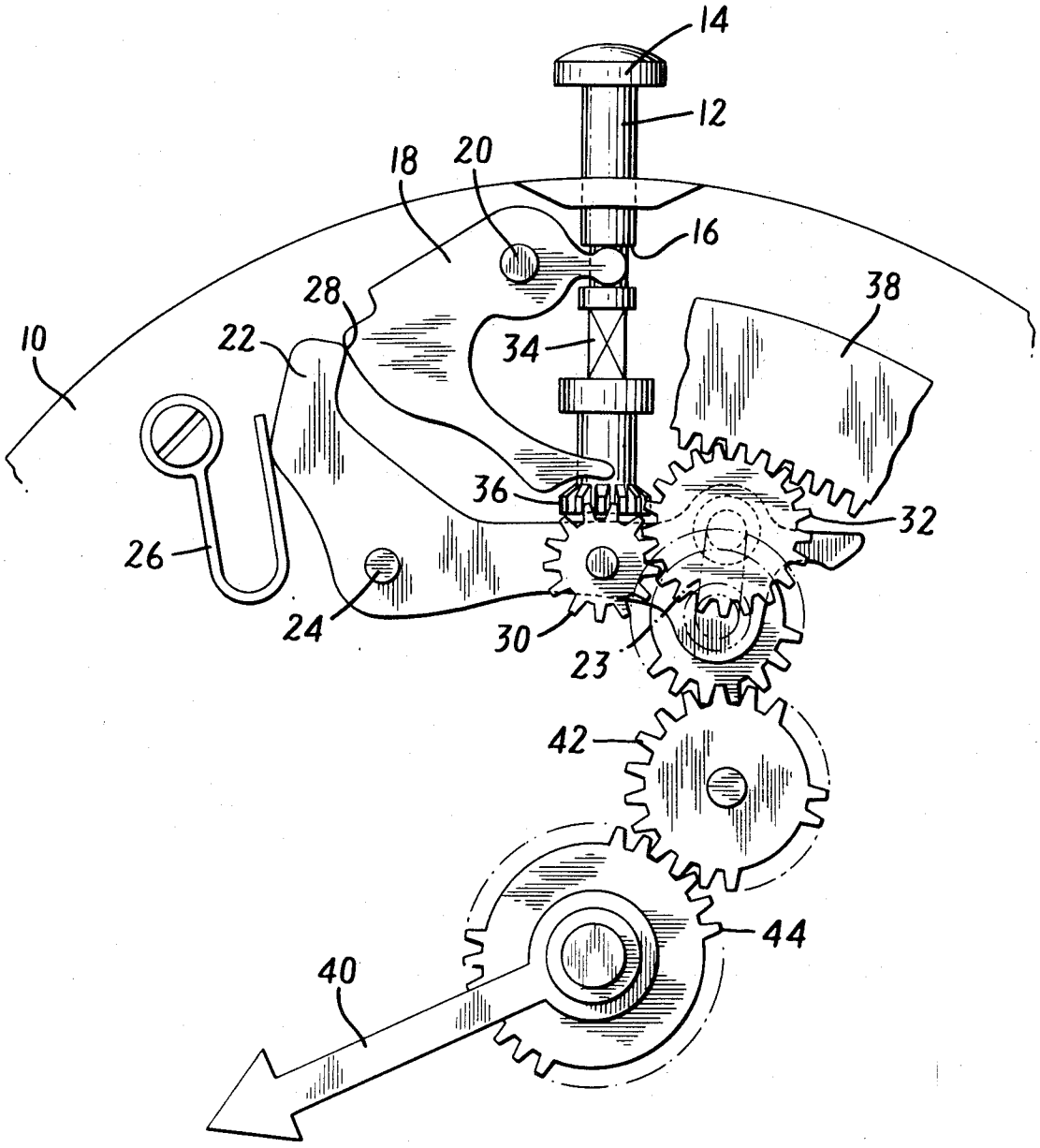


FIG. 1

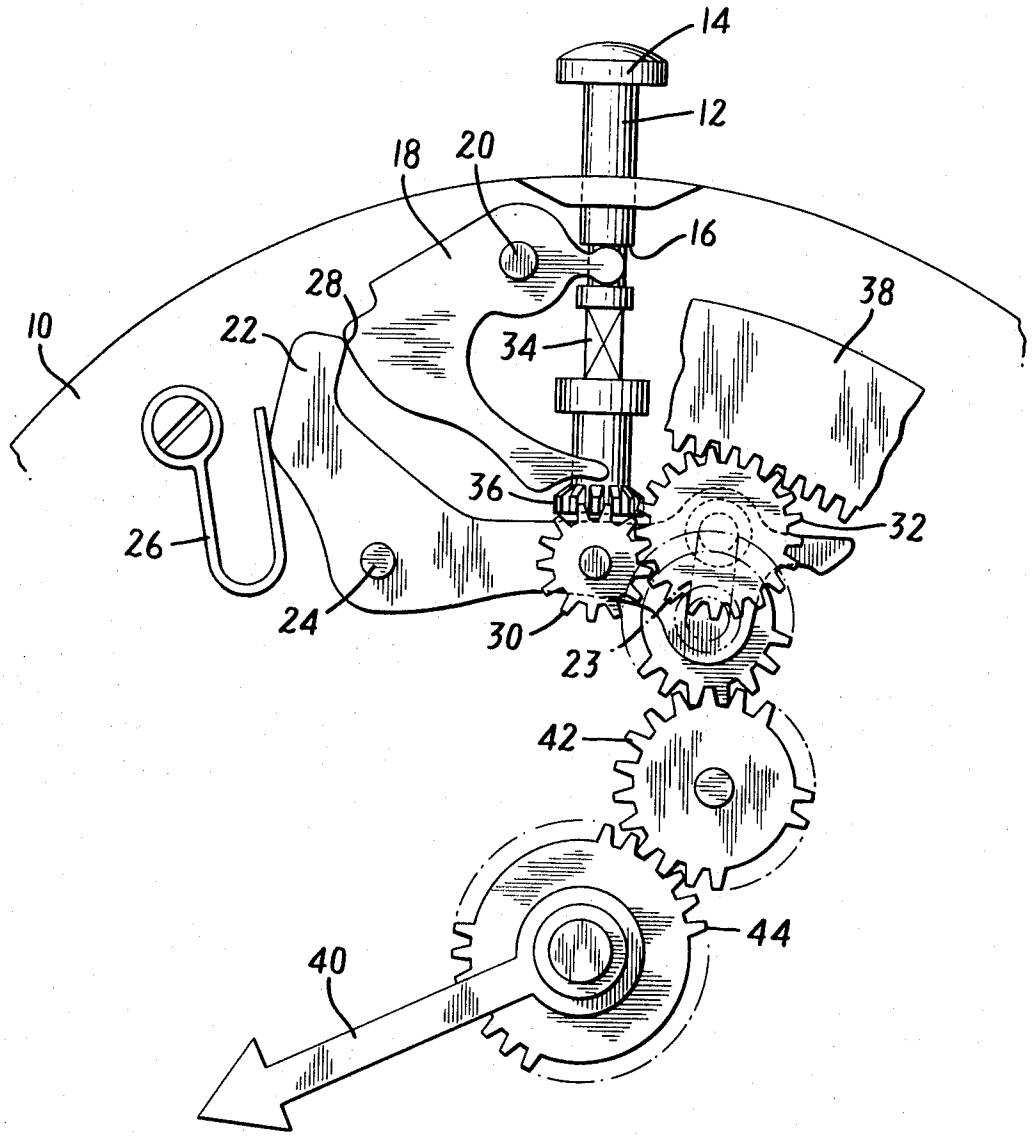


FIG. 2

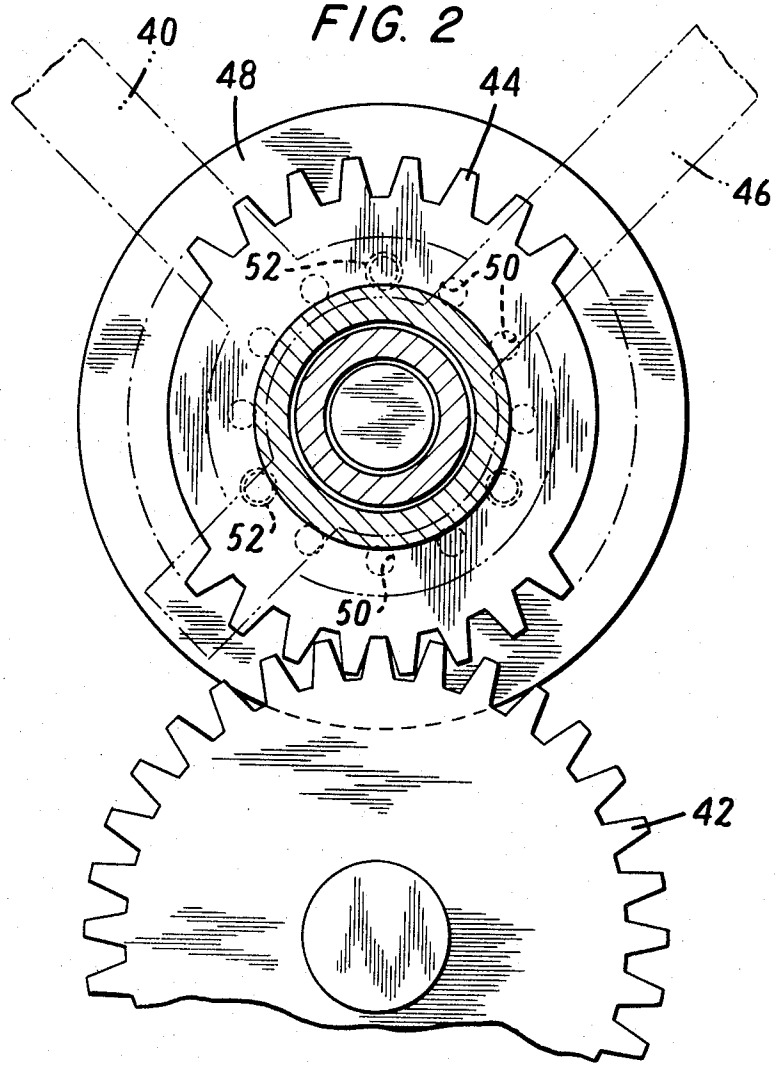
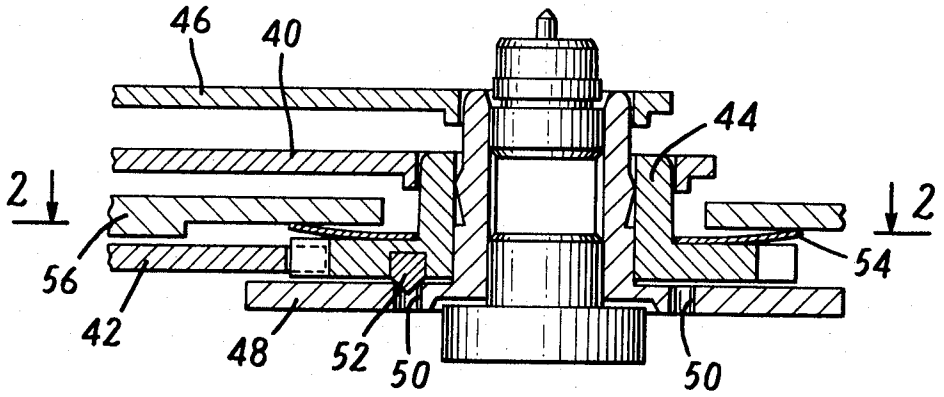


FIG. 3



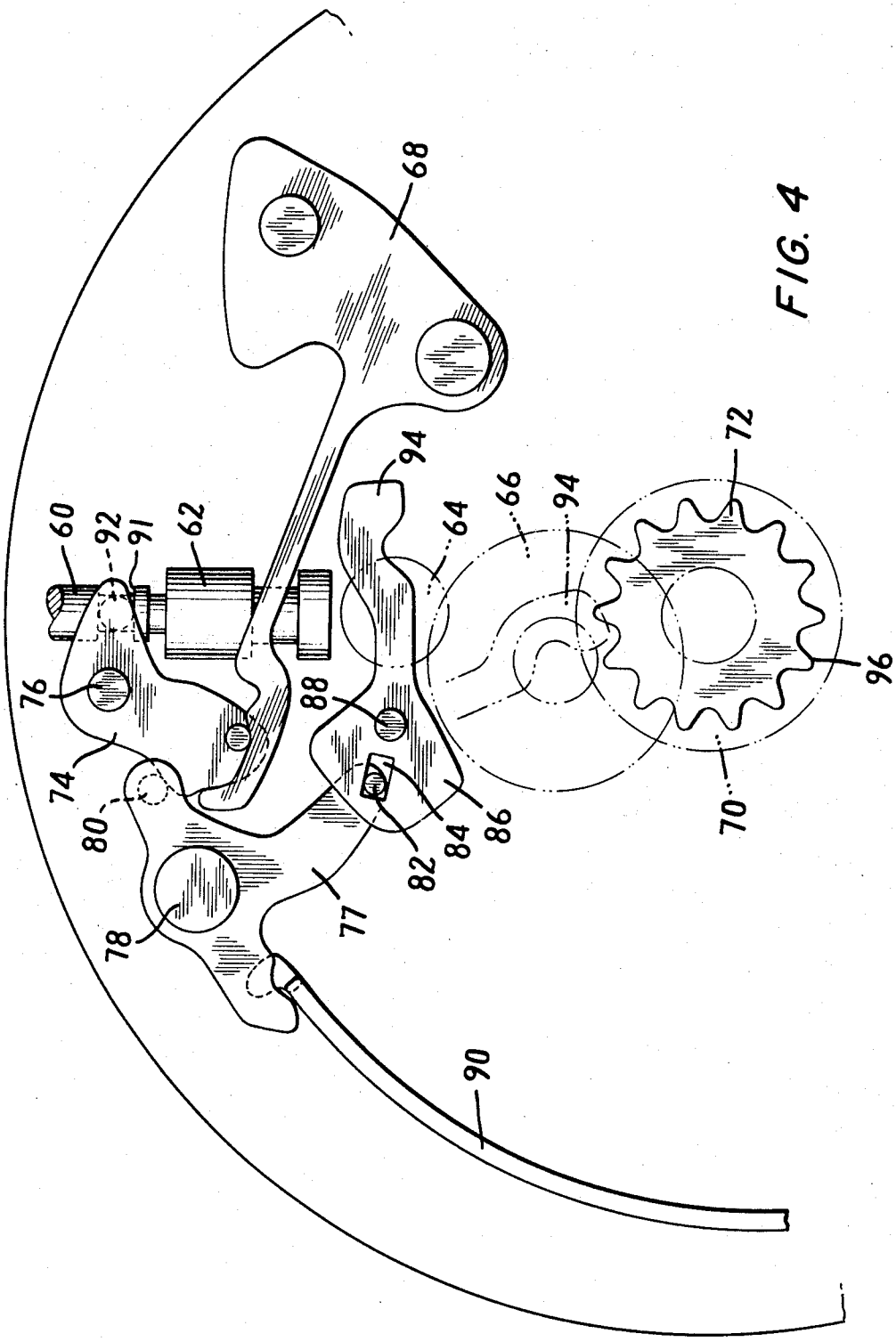


FIG. 4

TIME CORRECTING DEVICE FOR A WATCH HAVING PLURAL TIME-DISPLAYS

BACKGROUND OF THE INVENTION

This invention relates to a time correction device for a watch having a plurality of time displays. The invention is particularly adaptable for use on a watch having a first hour hand indicating local time and a second hour hand indicating the time in another time zone other than that in which the user of the watch is located.

Watches having two hour hands are generally well-known. As world wide travel has progressed through the advent of air travel, this type of watch has become in greater demand. Thus, a traveler to a foreign country will find it convenient to view his watch and read the local time as well as the time in his native country.

Heretofore, one known watch of this type has employed two winding stems for correcting the two time displays, that is, one stem for correcting the local time and another stem for changing the time of the second hour hand which indicates the time in another time zone. A watch employing more than one protruding stem is not particularly attractive and it would be desirable to avoid the use of two stems. In addition, it is more difficult to waterproof a watch having two rotatable stems protruding from the watch casing.

Accordingly, it is an object of the present invention to provide a correction device for a watch having a plurality of time displays and which employs a single control element or stem for adjusting all of the time displays.

Another object of the invention is to provide an operating mechanism for adjusting a watch with a plurality of time displays wherein the operating mechanism employs a control element which is operable to adjust the various time displays by rotation and displacement of the control element depending upon the particular time display to be adjusted.

A further object is to provide a correction device for a watch which is of a simplified construction and which is inexpensive to manufacture in accordance with mass production manufacturing techniques.

DESCRIPTION OF THE DRAWINGS

Other features and advantages of the invention will be better understood from the following description of examples of the invention, appended claims and drawings in which:

FIG. 1 is a partial diagrammatic view of the operating mechanism of a time correction device according to one embodiment of the invention.

FIG. 2 is an enlarged diagrammatic plan view of the clutch mechanism used in the FIG. 1 embodiment.

FIG. 3 is a partial section view of the clutch mechanism.

FIG. 4 is a partial diagrammatic view of the operation mechanism of a time correction device according to an alternate embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings FIG. 1 shows a portion of a watch 10 having a stem 12 which passes outside of the watch casing and which has a knob 14 adapted to be manually manipulated to adjust the watch. The stem 12 is mounted for rotation and also for longitudinal displacement to effect the desired adjustment as will be further described.

The stem 12 has an annular groove 16 which receives the end portion of a setting lever 18, the latter in turn being pivotally mounted at 20. The arrangement is such that when the stem 12 is moved longitudinally in and out, the setting lever 18 will be pivoted clockwise and counterclockwise respectively, as the end portion of lever 18 is engaged by the sides of the annular groove 16.

A setting gear lever 22 which is operatively associated with setting lever 18 is pivotally supported at 24. Thus, a spring 26 which is in contact with setting gear lever 22 normally biases the latter in a clockwise direction about pivot support 24 whereby the upper leg of setting gear lever 22 is biased into contact with the setting lever 18 as indicated at 28 in FIG. 1. The setting gear lever 22 rotatably mounts a setting gear 30 which meshes with a correction gear 32. The setting gear lever 22 has an opening 23 in which the support for the correction gear 32 is mounted whereby the latter may be displaced along the opening 23 between the upper and lower positions shown in FIG. 1 as will be further described.

The stem 12 has a section 34 which has a square cross section and which is mounted for sliding movement in a corresponding square opening in a clutch gear 36. The clutch gear 36 meshes with the setting gear 30 and the latter in turn meshes with the correction gear 32. The stem 12 is adapted to be displaced longitudinally to the position shown in FIG. 1 wherein the stem 12 is operable to be rotated in one direction to adjust a calender wheel 38 (partially shown) and in another direction to adjust a second hour hand 40.

Thus, in the calender correcting position as shown in FIG. 1, when the stem 12 is rotated clockwise (as viewed from the top) the clutch gear 36 will engage the setting gear 30 which in turn engages the correction gear 32. As the latter is intially rotated clockwise by the setting gear 30, the correction gear 32 will ride up in the opening 23 to the upper position shown in FIG. 1 whereupon, the correction gear 32 will engage the gear teeth on the calender wheel 38 to rotate the latter.

When the stem 12 is rotated in a counterclockwise direction (as viewed from the top in FIG. 1) the clutch gear 36 will engage the setting gear 30 which in turn engages the correction gear 32. As the latter is initially rotated counterclockwise by the setting gear 30, the correction gear 32 will ride down in the opening 23 to the lower position shown in FIG. 1 whereupon the correction gear 32 will engage a correction transmission gear 42 which in turn engages a second hour gear 44 on which the second hour hand 40 is mounted. Thus, it will be seen that with the stem 12 in the position shown in FIG. 1, rotation of the stem 12 is one direction will adjust the calender wheel 38 and rotation in the opposite direction will adjust the second hour hand 40.

When it is desired to adjust the conventional first hour hand and minute hand on the watch, the stem 12 is longitudinally displaced from the position shown in FIG. 1, whereupon the setting lever 18 and setting gear lever 22 are rocked out of position to disengage the stem 12 from operative relationship with the correction gear 32 whereupon the stem 12 may be rotated independently of correction gear 32 to adjust the first hour hand and minute hand by conventional means (not shown).

A clutch mechanism which permits independent adjustment of the second hour hand **40** is shown in FIGS. **2** and **3**. The second hour hand **40** is carried on the second hour gear **44**. A first hour hand **46** is carried on a first hour gear **48**. The first hour gear **48** is provided with a plurality of holes **50**. In the drawing, there are 12 holes **50** shown at circumferentially spaced intervals of 30°. The second hour gear **44** carries pins **52** which are also circumferentially spaced at intervals of 30°. The holes **50** and pins **52** are disposed along the same circumferential diameter so that the holes **50** are in general alignment with the pins **52**. A spring **54** disposed between a dial **56** and the second hour gear **44** urges the first and second hour gears **48, 44**; respectively, towards one another in a biasing relationship. The first hour gear **48** is operatively associated with a conventional minute gear train (not shown in the drawings).

It will be observed in FIG. **3** that the lower ends of the pins **52** are tapered. Thus, it will be apparent that when the second hour gear **44** is rotated by the correction transmission gear **42** as previously explained, the second hour gear **44** will be longitudinally displaced slightly so that the pins **52** will come out of their respective holes **50** until the second hour gear **44** has been rotated 30° whereupon the second hour gear **44** will return to its initial longitudinal position and the pins **52** will fall into the next set of corresponding holes **50**. In this regard, it will be observed, that during rotation of the second hour gear **44** as just described, the second hour gear **44** will be displaced slightly axially against the bias of spring **54** as the turning force applied to the second hour gear **44** causes the sloping ends of the pins **52** to engage the edges of the holes **50** and thereupon ride out of the respective hole **50**.

Thus, it will be seen that the second hour hand **40** may be adjusted by the knob **14** on stem **12** without affecting the position of the first hour hand **46**. On the other hand, when the first hour hand **46** is adjusted, the second hour hand **44** is rotated therewith because the spring **54** continues to urge the pins **52** into the respective openings **50**.

FIG. **4** shows an alternate embodiment wherein a stem **60**, clutch gear **62**, setting gear **64**, minute gear **66** and clutch lever spring **68** are arranged in a conventional manner.

A first hour gear **70** and a second hour gear **72** are arranged coaxially and arranged with a clutch mechanism therebetween as described in the previous embodiment. A setting lever **74** is pivotally mounted at **76**. A correction transmitting lever **77** pivotally mounted at **78** is provided with a pin **80** which engages the setting lever **74** and a pin **82** which engages an opening **84** in a correcting finger **86**. The correcting finger **86** is pivoted at **88**. A correction transmitting lever spring **90** normally biases correction transmission lever **77** in a clockwise direction as viewed in FIG. **4**.

In FIG. **4**, the stem **60** is shown in a neutral position. If the stem **60** is pushed in from the neutral position, the setting lever **74** will be rocked clockwise as the edges of an annular groove **91** in stem **60** engages a pin **92** on setting lever **74**. Rocking setting lever **74** clockwise will cause correction transmitting lever **77** to rock counterclockwise and correction finger **86** to rock clockwise so that the end **94** of correction finger **86** will be displaced from the position shown in full lines in FIG. **4** to the position shown in broken lines in FIG. **4**. In being so displaced the end **94** of correction finger **86** will engage the teeth **96** on the second hour gear **72** to thereby rotate the latter the desired increment, for example, 30° which corresponds to one hour on a normal watch dial.

When the stem **60** is released the springs will cause the various parts to return to the neutral position, that is the position shown in FIG. **4**. Depressing the stem **60** once again will, of course, cause the operation to repeat whereby the second hour gear **72** is advanced another desired increment.

From the above description it will be seen that a plurality of time displays may be corrected by a single operating element or stem. Thus, in one position of the stem, the latter may be rotated in one direction to adjust the calendar wheel, and while still in the same longitudinal position, rotated in the opposite direction to adjust the second hour hand, that is, the hour hand which indicates the hour in a locality other than that in which the user of the watch is located. When the stem is longitudinally displaced from the last mentioned position, the operative relationship between the stem and the calender wheel and the second hour hand is disengaged and the stem may be rotated to adjust the local time, that is to adjust the hour and minute hand indicating the local time.

One advantage of the construction and arrangement described above is that by using only a single stem, it is possible to reduce the likelihood of damage to the watch due to moisture or water. In this regard it is pointed out that entry of water into a watch most frequently occurs through the stem. Thus, where there is only one stem, there is less likelihood that moisture or water will enter into the casing of the watch. Thus the use of a single stem improves the water resistance of the watch and also simplifies the structure of the watch casing.

The stem in the watch of the present invention may be longitudinally displaced into three different positions or steps wherein in the second step, the second hour hand is adjusted and in the third step the first hour hand is adjusted. When the latter adjustment is made the second hour hand rotates with the first hour hand. Thus, in the case of a high precision watch such as a quartz crystal watch, the wearer has only to pull the stem to the second step when correcting the time during travelling abroad. The watch may be constructed so that a clicking sound will be given off when the stem is moved from one position to the other. In this way, it will be easier to determine the longitudinal position of the stem and the particular adjustment for which the stem is about to be made. The clicking sound or resistance to longitudinal displacement of the stem may be greater in passing from one position than to another.

It will be observed that when correcting the second hour hand, the watch continues to run without interruption so that there is no lost time on the watch when this adjustment of the second hour hand is being made. In the present invention, in one position of the stem, the latter is rotated in one direction to adjust the calendar, and in the opposite direction to adjust the second hour hand. When the stem is displaced longitudinally in another position, the watch may be adjusted in a conventional manner.

Due to utilizing reverse rotation of calendar correction and reciprocation of the stem, the second time display can be adjusted independently of conventional

hand setting or in case of a watch which is wound by rotating the stem, independently of the winding operation.

What is claimed is:

1. A correction device for a watch having a plurality of adjustable time displays, comprising a control element extending externally of said watch and adapted to be manually manipulated to adjust said plurality of time displays, and operating means operatively associating each of said adjustable time displays with said control element whereby the latter is operable to adjust each of said time displays, wherein said operating means comprises a setting lever operable to be pivoted by longitudinal displacement of said control element, a setting gear lever, biasing means urging said setting gear lever into engagement with said setting lever, a setting gear rotatably mounted on said setting gear lever, and a clutch gear rotatable by said control element, said clutch gear driving said setting gear which in turn rotates a correction gear.

2. A correction device for a watch having a plurality of adjustable time displays, comprising a control element extending externally of said watch and adapted to be manually manipulated to adjust said plurality of time displays, and operating means operatively associating each of said adjustable time displays with said control element whereby the latter is operable to adjust each of said time displays, wherein said operating means comprises a correcting finger and lever means operatively connected between said control element and said correcting finger whereby longitudinal displacement of said control element pivots said correcting finger, and means operatively connected between one of said time displays and said correcting finger operable to rotate said one time display upon pivotal movement of said correcting finger.

3. A correcting device according to claim 2 wherein said means operatively connecting said lever means with said control element comprises a plurality of pivotal levers and spring means biasing said levers in a predetermined rotational direction.

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