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SECONDS SETTING MECHANISM FOR WATCHES OR CLOCKS

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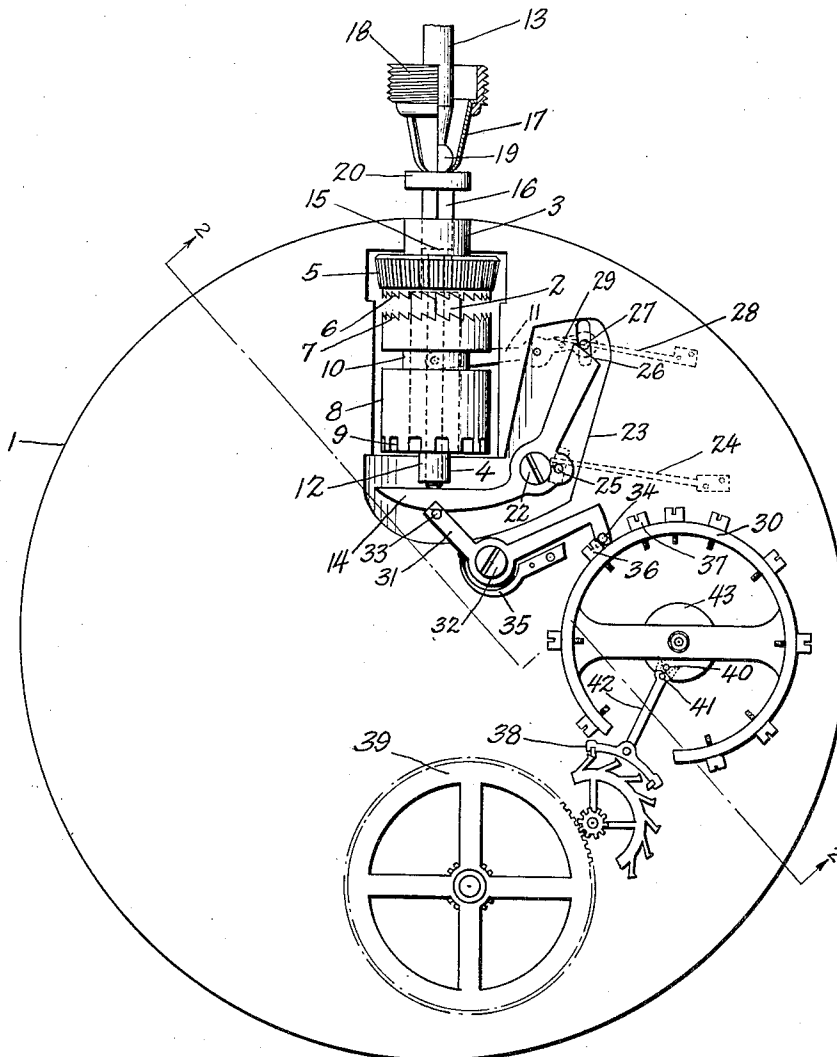


Fig. 1.

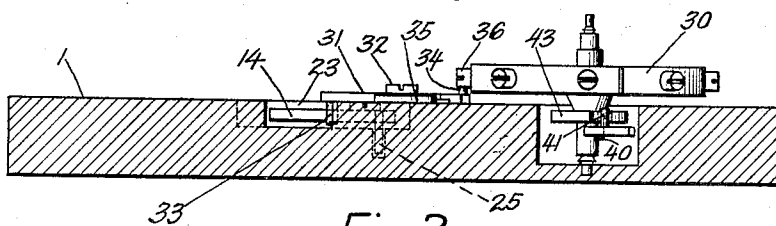


Fig. 2.

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SECONDS SETTING MECHANISM FOR
WATCHES OR CLOCKS

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amended April 30, 1928; 370 O. G. 757)

My invention relates to an improved seconds setting mechanism for clocks or watches controlled from the pendant end thereof. In the watches of the type here under consideration the time is indicated in hours, minutes and seconds. Such watches are commonly provided with a stem winding and setting mechanism controlled from the pendant end thereof which in one position of adjustment enables the setting of the hour and minute hands to indicate the correct time. In carrying out the present invention I associate with any prior art winding and setting mechanism a mechanism whereby it becomes possible to effect a setting of the second hand simultaneously with the setting of the hour and minute hands.

I am aware that many types of second hand setting mechanisms for watches have been proposed heretofore. They have, however, been either so complex in their structure as to be of little commercial value or have been decidedly impractical in their nature. Among the prior art arrangements it has been proposed to effect a setting of the second hand by arresting the movement of the seconds wheel, this being accomplished by interposing in its path of movement a stop member actuated by the stem winding and setting mechanism. This arrangement, however, has not proved to be practical. Escapement action is the very heart of a watch or clock and it should not be subjected to sudden stoppage by arresting the movement of one of the train wheels. If this is done the momentum of the balance wheel will be unchecked resulting in a loosening of the roller jewel; and if too much pressure is brought to bear upon the roller jewel, due to the sudden removal of the power from the pallet action, the jewel may be fractured. Furthermore, release of the seconds wheel does not in all instances start the balance motion promptly, thus making it impossible to synchronize the watch with a standard time-piece. Finally, the prior art structure has necessitated the use of a heavy setting lever spring with the result that it has been difficult to hold the watch in a winding position against the action of the spring sleeve in the pendant thereof.

With a view to obviating the prior art deficiencies I have provided a seconds setting mechanism of great simplicity which may be incorporated in all types of pendant setting watches and which does not in any manner interfere with the appearance of the dial or case. The seconds setting mechanism is actuated and controlled by any of the conventional prior art stem winding,

hour and minute hand setting mechanisms and includes a pivotally mounted, spring biased member, one end of which is operable to obstruct the movement of the balance wheel during a setting operation. By directly arresting the movement of the balance wheel during a setting operation any loosening or possible fracture of the roller jewel is effectively eliminated. Furthermore, with this novel arrangement of parts no difficulty is encountered in holding the watch movement in a winding position; and the watch movement starts instantly upon release of the balance wheel thus permitting the synchronization of the watch with a standard time-piece.

In the light of the foregoing, it is among the several objects of my invention to provide a seconds setting mechanism of great simplicity for watches that is operable to obstruct the movement of the balance wheel during setting operations; and to provide a mechanism of the character described that will not adversely effect the operation of or damage the parts of any watch movement with which it is associated.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying sheet of drawings, wherein:

Fig. 1 is a fragmentary plan view of one type of prior art watch movement in which the mechanism of my invention has been incorporated, all parts being shown in the setting position; and

Fig. 2 is a sectional view in elevation taken on the line 2—2 of Fig. 1.

Referring now to Figs. 1 and 2 of the drawing the reference character 1 denotes the main plate of the watch movement on which there is rotatably mounted the longitudinally apertured arbor 2 by means of the bearings 3 and 4. The winding pinion 5 is supported by the arbor 2 and rotates freely thereon, it being provided at one end thereof with clutch teeth 6 which are operable to engage the complementary teeth 7 on the clutch 8. The lower and exterior portion of the arbor 2 is polygonal in shape so as to hold the clutch 8 in sliding but non-rotatable engagement. The clutch is provided at its lower end with teeth 9 for engaging the hour and minute hand setting pinion (not shown) and is annularly grooved at 10 intermediate its ends to receive one end of the clutch lever 11.

A watch stem extends into and through the longitudinal aperture of the arbor 2 and includes the lower and upper portions identified respec-

tively by the reference characters 12 and 13. The lower portion 12 is a push pin which extends about three-quarters of the distance through the arbor, its lower end always being in contact with the setting lever 14 and its upper end abutting against the lower end 15 of the upper portion 13 of the stem. The upper portion 13 of the stem has a part 16 which is polygonal in shape and is received by a polygonal recess of similar contour forming a part of the longitudinal aperture of the arbor 2. By this arrangement it is possible to impart rotary movement to the arbor whenever the crown (not shown) secured to the upper end of the stem 13 is rotated. A slotted spring sleeve 17 is mounted by means of the threaded annular member 18 in the pendant of the watch case, a spherical portion 19 turned on the stem 13 being easily movable to a position within the spring sleeve 17 or to a position exteriorly thereof. When the spherical portion 19 is housed within the spring sleeve 17 as shown the watch movement is in a setting position; and when positioned exteriorly thereof the movement is in a winding position. A shoulder 20 integral with the stem prevents pulling the upper portion 13 thereof completely out the watch case when setting the watch.

A setting lever 14 is pivotally mounted by the screw 22 or other convenient means on the main plate 1 in a recessed portion 23 thereof. One end of the setting lever as shown is always held in contact with the lower end of the push pin 12 by means of the setting lever spring 24 which bears against the pin 25 rigidly secured to the setting lever. Radial shoulder 26 on one end of the setting lever 14 abuts against a pin 27 rigidly secured to the clutch lever 11. A clutch lever spring 28 bears against a pin 29 secured to the clutch lever 11 and tends to force the clutch lever in a clockwise direction.

The foregoing constitutes the stem winding and setting mechanism for winding the time-piece and setting the hour and minute hands thereof. The mechanism is shown in its setting position wherein the teeth 9 on the lower end of the clutch 8 engage the setting pinion which is not shown. When it is desired to place the mechanism in its winding position the stem portion 13 is pushed inwardly to remove the spherical portion 19 of the stem from its position within the spring sleeve 17 to a position exteriorly thereof. The movement of the stem portion 13 as aforesaid causes a simultaneous movement of the push pin 12 inwardly resulting in a counter-clockwise movement of the setting lever 14 about its screw 22 and against the tension of the spring 24. The pin 27, by reason of its contact with the radial face 26 of the setting lever 14 and the action of the clutch lever spring 28 on the pin 29, moves downwardly resulting in a clockwise movement of the clutch lever 11. This clockwise movement causes the clutch 8 to shift longitudinally of the arbor 2 with attendant engagement of the clutch teeth 6 and 7. The mechanism is now in its winding position, any rotary movement of the stem 13 being transmitted to the winding pinion 5 through the clutch 8. If now the stem is pulled outwardly to the setting position shown in the drawing it is evident that the clockwise movement of the setting lever 14 will cause a counterclockwise movement of the clutch lever 11 resulting in a disengagement of the clutch teeth 6 and 7 and an engagement of the teeth 9 of the clutch 8 with the hour and minute hand setting pinion.

For arresting the movement of the balance wheel 30 during a setting operation there is pivotally mounted on the main plate 1 of the movement a member or lever 31. A screw 32 or any other convenient means serves as the pivot for the lever 31, one end of which is provided with a bearing pin 33 and the remaining end with a balance wheel stop pin 34. A spring 35 suitably secured to the main plate 1 of the watch movement serves to hold the pin 33 in contact with the setting lever 14 in all positions of the latter. It is to be carefully observed that the spring 35 is only of sufficient strength to impart pivotal movement to the lever 31. This is important since the additional force exerted by the spring 35 on the spring sleeve 17 through the setting lever 14 and watch stem 13 is thereby rendered negligible with the result that no difficulty is encountered in maintaining the winding and setting mechanism of the watch in a winding position. Although the end of the lever 31 which is intended to obstruct the movement of the balance wheel in a setting operation is shown provided with a stop pin 34 I do not desire to be restricted to this arrangement. It is evident that the balance wheel 30 might instead be provided with a stop pin operable to engage the lever 31 when it assumed a setting position.

The watch movement is shown in a setting position the pin 34 of the lever 31 having entered the space between the balance screws 36 and 37, it being assumed that the balance wheel is in its counterclockwise phase of oscillation. As soon as the balance screw 37 contacts the pin 34 the watch movement will be stopped thus terminating instantly the motion of the pallet action 38 and, among other things, the motion of the fourth wheel or seconds wheel 39 to the arbor of which is secured the second hand. The minute and hour hands of the watch are now set to indicate the proper hour and minute, the minute hand, however, being set somewhat in advance of the time of the standard time-piece with which the watch is to be synchronized. When the standard time-piece indicates the same time as that of the watch the stem 13 is pushed inwardly, thus instantly allowing the balance wheel to resume its oscillations and the watch movement to assume its normal operation. It will be observed that as the stem 13 is pushed inwardly the setting lever 14 moves in a counter-clockwise direction about its screw 22. Since the lever 14 abuts at all times against the pin 33 of the lever 31 this lever will likewise move in a counter-clockwise direction about its pivotal support 32 thus moving the stop pin 34 from a position of engagement with the balance screw 37 to a position where it no longer obstructs the movement of the balance wheel 30. Conversely, a pulling of the stem outwardly permits a clockwise movement of the lever 14 from its winding position to the setting position shown in the drawing. Since the lever 31 is biased into engagement with the lever 14 by the spring 35 it will also move in a clockwise direction so that the pin 34 carried thereby may obstruct and arrest the movement of the balance wheel 30. Since the spring 35 is only of sufficient strength to impart pivotal movement to the lever 31 it is evident that the balance wheel 30 cannot be damaged.

By arresting and obstructing the movement of the balance wheel 30 there is no possibility of damaging any part of the watch movement; and the movement furthermore starts instantly upon removing the lever 31 from its obstructing or set-

ting position. If instead, however, the movement of the fourth wheel of the train or the seconds wheel 39 is arrested not only will the watch movement fail to start instantly but also the roller jewel 40 may be loosened or fractured. This may be made clear from an examination of the drawing. If the movement of the seconds wheel 39 is arrested during a setting operation its obstruction may take place when the balance wheel 30 is on a return trip. The power being suddenly removed permits the safety or guard pin 41 carried by the pallet fork 42 to wedge against the side of the roller table 43 supported by the arbor of the balance wheel and carrying the roller jewel 40. This wedging action results in a delayed starting of the watch movement if it starts at all and thus prevents a synchronization of the watch with a standard timepiece. Again the sudden stopping of the seconds wheel 39 may occur just as the roller jewel 40 enters the horns of the pallet fork 42 or just prior thereto thus permitting the pallet fork to swing at will with the momentum of the balance wheel 30 unchecked. This action results either in a loosening of the roller jewel 40 or in a fracture of the jewel itself which may be costly.

According to the provisions of the patent statutes I have set forth the principle and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically illustrated and described.

The invention herein described and claimed may be used and/or manufactured by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

I claim:

1. In a watch movement, a stem, a setting lever which in all of its positions is in contact with said stem, a balance wheel, a pivotally mounted

member for arresting the movement of the balance wheel, one end of said member contacting the setting lever and the other end thereof being adapted to arrest the movement of the balance wheel when the watch movement is in a setting position, and resilient means for keeping the first mentioned end of said member in contact with the setting lever, said means having only sufficient strength to impart pivotal movement to the member.

2. In a watch movement, a stem, a setting lever which in all of its positions is in contact with said stem, a balance wheel provided with peripheral screws, a pivotally mounted member for arresting the movement of the balance wheel, said member having at one end thereof a pin which contacts the setting lever and at the other end thereof a pin which is adapted to be positioned in the path of movement of the peripheral screws on the balance wheel when the watch movement is in a setting position, and resilient means for keeping the first mentioned pin of the member in contact with the setting lever, said means having only sufficient strength to impart pivotal movement to the member.

3. In a watch movement, a winding and setting mechanism, a balance wheel and a mechanism for arresting the movement of said balance wheel during a setting operation, the said last mentioned mechanism including a pivotally mounted non-resilient member for arresting the movement of the balance wheel, one end of said member contacting the winding and setting mechanism and the other end thereof being adapted to arrest the movement of the balance wheel when the watch movement is in a setting position, and resilient means for keeping the first mentioned end of said member in contact with the winding and setting mechanism, said means slidably engaging said member and having only sufficient strength to impart pivotal movement thereto.

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