

May 22, 1951

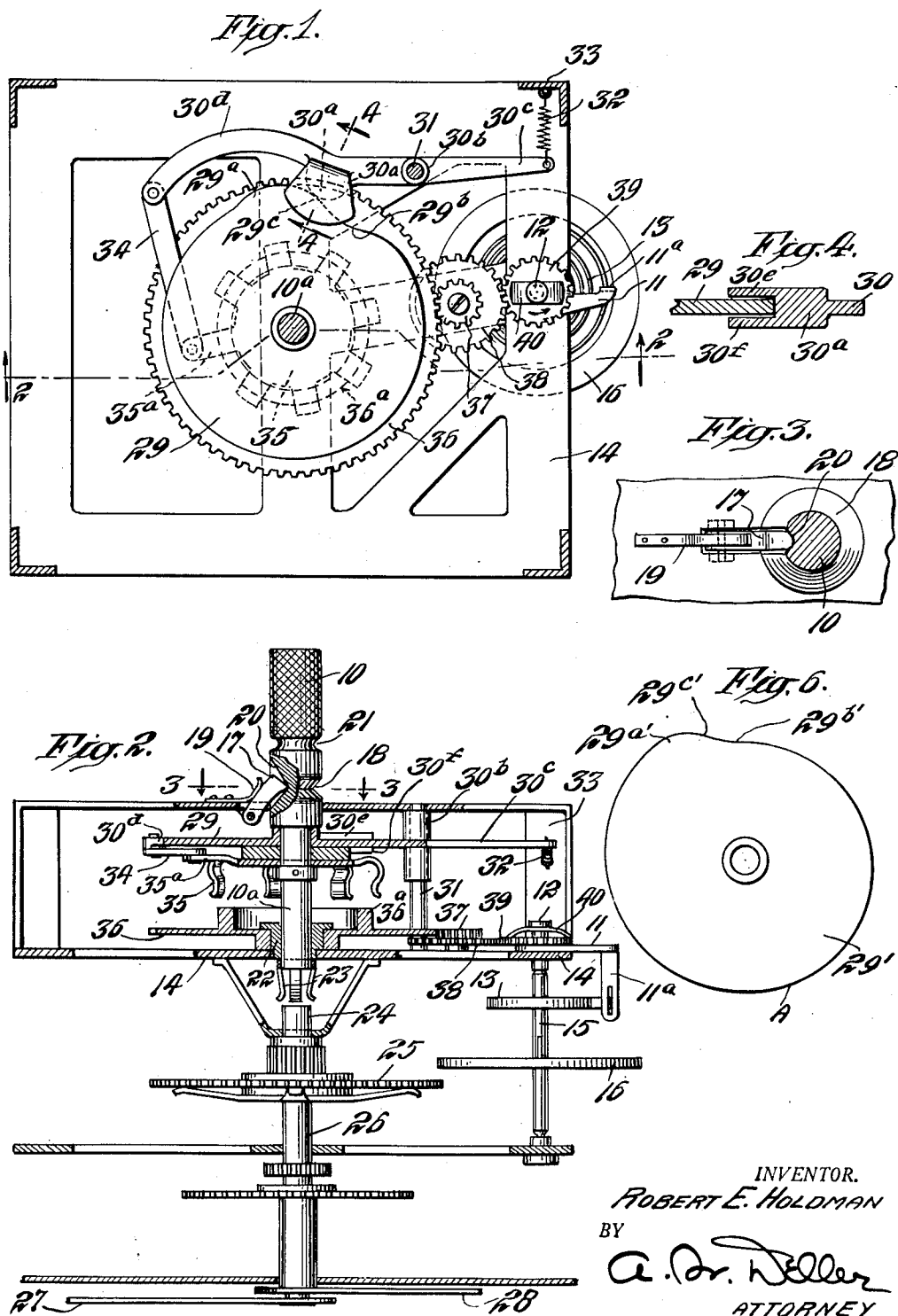
R. E. HOLDMAN

2,554,029

AUTOMATIC SPEED REGULATOR FOR TIMEPIECES

Filed Aug. 7, 1946

3 Sheets-Sheet 1



May 22, 1951

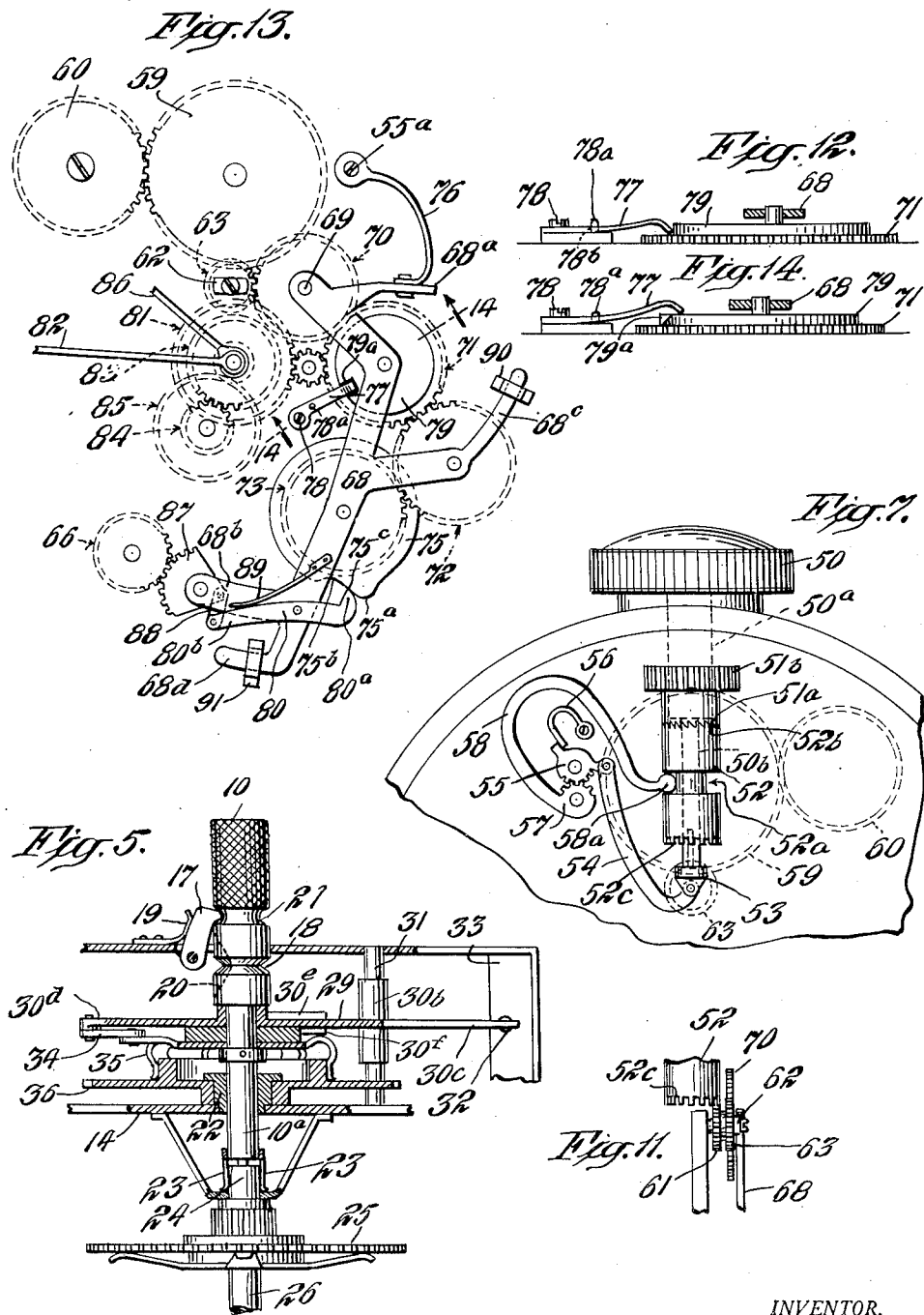
R. E. HOLDMAN

2,554,029

AUTOMATIC SPEED REGULATOR FOR TIMEPIECES

Filed Aug. 7, 1946

3 Sheets-Sheet 2



INVENTOR.
ROBERT E. HOLDMAN
BY
A. P. Weller
ATTORNEY

May 22, 1951

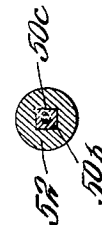
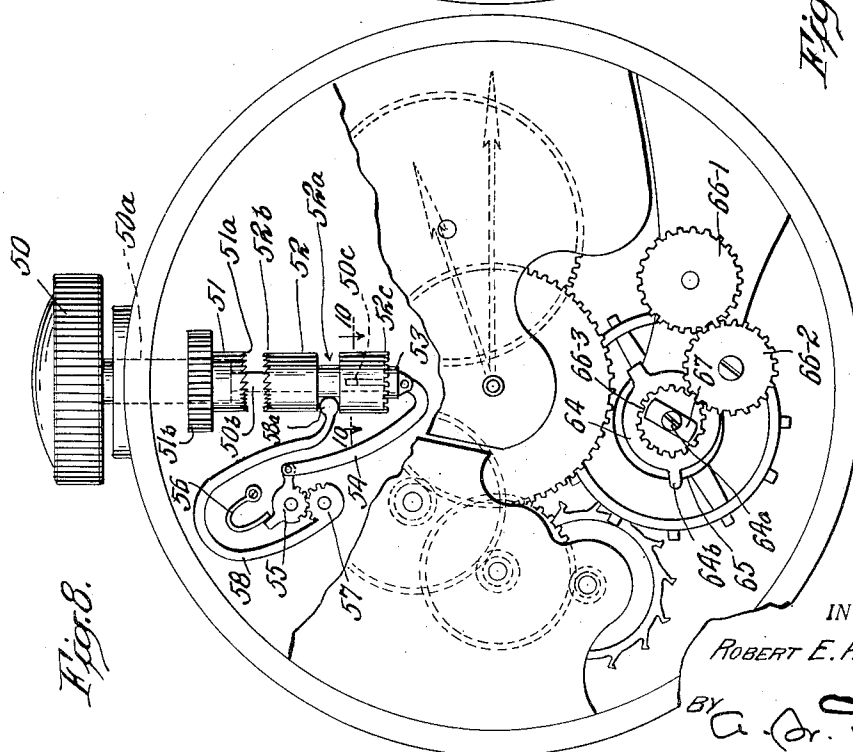
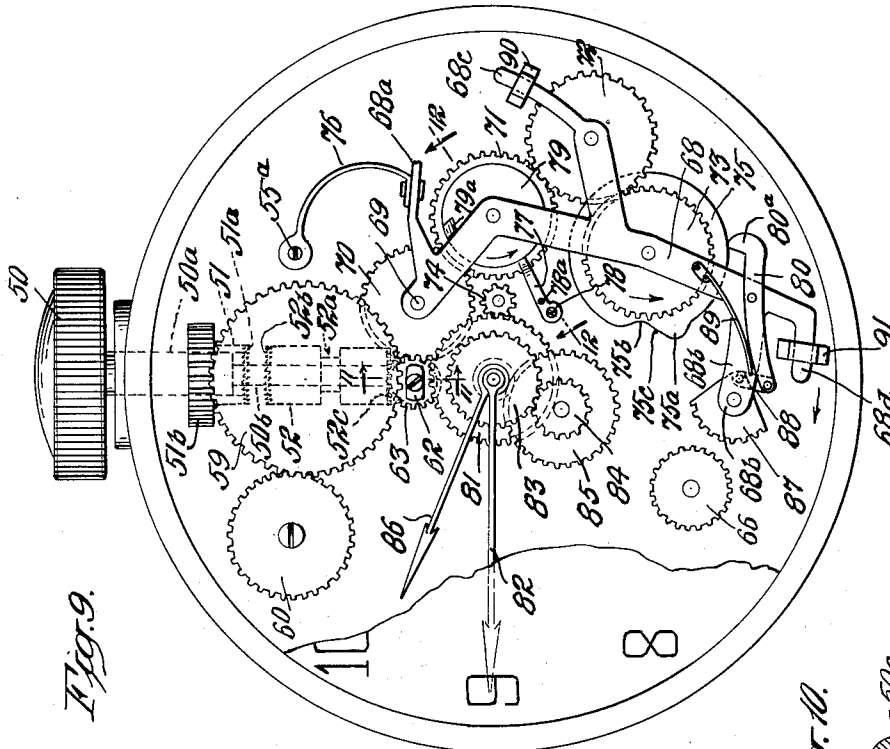
R. E. HOLDMAN

2,554,029

AUTOMATIC SPEED REGULATOR FOR TIMEPIECES

Filed Aug. 7, 1946

3 Sheets-Sheet 3



INVENTOR.
ROBERT E. HOLDMAN

BY *A. Dr. Keller*
ATTORNEY

UNITED STATES PATENT OFFICE

2,554,029

AUTOMATIC SPEED REGULATOR FOR
TIMEPIECES

Robert Ellsworth Holdman, New York, N. Y.

Application August 7, 1946, Serial No. 689,011

15 Claims. (Cl. 58—109)

1

This invention relates to timepieces, and particularly to timepieces equipped with speed regulators for the correction of inaccuracies in time keeping.

An object of the invention is to provide for the automatic adjustment of the speed regulator of a timepiece, such as an ordinary clock or watch, coincidentally with the moving of the hands thereof from incorrect to correct time indicating position.

An object is to provide for the above, in certain embodiments, only within a relatively narrow range of time inaccuracy, to minimize the chances of effecting a speed adjustment in instances where the need for resetting the timepiece is due to a running down of the spring mechanism through failure to wind, rather than from any necessity for speed regulation.

A further object is to provide for the accomplishment of the above by means of relatively simple and inexpensive additions to conventional timepiece mechanisms.

A feature of the invention in the attainment of these objects is the provision of cam means furnishing a measure of the extent and nature of adjustment to be automatically effected by the operation of resetting the hands of the timepiece from incorrect to correct time indicating position.

A feature is the provision of means for orienting the position of hand-setting mechanism with that of the cam means, so the operation of setting the timepiece can actually commence only when a given initial relationship is established between the two.

A further feature resides in the making of the cam means in substantially the form of a disc with an irregular circumferential rim, against which is pressed, resiliently, lever mechanism for controlling the transmission of motion to the speed regulator adjustment means in accordance with its displacement radially of the cam disc by reason of the nature and extent of the irregularities of the said circumferential rim thereof.

These and other objects and features of the invention will be more fully understood from the following detailed description of the preferred specific embodiments illustrated in the accompanying drawings, in which:

Fig. 1 represents a view from the rear of a clock equipped with automatic speed regulator adjusting mechanism pursuant to the invention, back wall structure of the clock housing being removed;

Fig. 2, a horizontal section taken along ap-

2

proximately the line 2—2, Fig. 1, side wall portions of the clock housing being removed;

Fig. 3, a detail section taken on the line 3—3, Fig. 2, and drawn to an enlarged scale;

Fig. 4, a detail section taken on the line 4—4, Fig. 1, and likewise drawn to an enlarged scale;

Fig. 5, a fragmentary view corresponding to the sectional view of Fig. 2, but illustrating the hand-setting mechanism and the regulator adjusting mechanism as they appear in the position of orientation immediately prior to the combined hand-setting and regulator-adjusting operation;

Fig. 6, a detail plan view of a differently configured cam wheel which may be employed instead of the one illustrated in the foregoing figures;

Fig. 7, a fragmentary view of a watch equipped with automatic speed regulator and adjusting mechanism pursuant to the invention, the back cover plate being removed and just enough of the mechanism being shown to illustrate the arrangement of parts in the winding and normal running condition of the watch;

Fig. 8, a view corresponding to that of Fig. 7 but illustrating more of the mechanism, and showing the arrangement of parts when the winding stem is pulled out to hand-setting position;

Fig. 9, a view corresponding to that of Fig. 8 but taken from the front face of the watch, a major portion of the dial face being broken away to reveal otherwise hidden parts;

Fig. 10, a detail section taken on the line 10—10, Fig. 8;

Fig. 11, a detail section taken on the line 11—11, Fig. 9;

Fig. 12, a detail section taken on the line 12—12, Fig. 9;

Fig. 13, a fragmentary view corresponding to the view of Fig. 9, but illustrating the arrangement of parts following the turning of the winding stem to the position of orientation where further turning will effect both hand-setting and regulator adjustment; and

Fig. 14, a detail section taken on the line 14—14, Fig. 13.

Referring now to the drawings, and particularly to Figs. 1 through 5 thereof, where the invention is illustrated embodied in one type of clock mechanism having hand-setting means controlled by a knurled stem 10, see especially Figs. 2 and 5, and having, further, a speed regulator which includes the adjustable arm 11 fixed on the spindle 12 and provided with an angularly

3

extending finger 11a whose slotted free end engages the outer coil of the hair spring 13. The spindle 12 is mounted for rotation in the frame member 14, and journals at an end thereof one needle bearing of the spindle 15 upon which is mounted the usual balance wheel 16. Movement of the arm 11 upwardly effectively shortens the hair spring 13, and makes the clock mechanism run faster; movement downwardly effectively lengthens such hair spring, and makes the clock run slower.

During the normal running of the clock, the stem 10 is in the pulled-out position shown in Fig. 2, the pawl 17, however, ordinarily resting in the relatively shallow circumferential groove 18, where it prevents pushing in of the stem. A spring 19 urges the pawl 17 radially inwardly of the stem, and, when the stem is rotated, presses the pawl into the longitudinally extending groove 20 which is deeper than the circumferential groove 18. When the click of the pawl dropping into the groove 20 is heard and also felt during rotation of the stem 10, the operator knows that the stem may be pushed, at that point, into its hand-setting position, the groove 20 being sloped gradually to a second circumferential groove 21 in which the pawl rides during the hand-setting and regulator-adjusting operation, see Fig. 5. It should be noted that the sides of groove 20 are rounded, see Fig. 3, so the pawl pops back into the circumferential groove 18 merely by further rotation of the stem 10 in its pulled-out position.

The stem 10 has an elongated shank 10a journaled in a sleeve bearing 22 which is mounted in the frame member 14, and terminates in a resilient clutch member 23 adapted to frictionally engage the clutch disc 24 of hand-setting mechanism when the stem is pushed in, in the manner afore-explained. Such hand-setting mechanism is conventional, and may comprise a friction clutch 25 operative to transmit rotation to the post arrangement 26 which mounts the minute and hour hands 27 and 28, respectively, and their associated gearing, see Fig. 2.

Pinned or otherwise rigidly fixed to the elongated portion 10a of the stem 10 for rotation therewith is a cam disc 29 having an irregular circumferential rim, the irregularities of which determine the cam action of the disc and the nature and extent of adjustment of the speed regulator 11. As illustrated, see Fig. 1, the rim of the cam disc 29 is irregular over only a minor portion of its circumference, there being an arcuate protruding portion 29a of greater radii than the normal disc radius and an adjoining arcuate depressed portion 29b of less radii than the normal disc radius.

Pressing against the circumferential rim of the cam disc 29, normally at a point 29c disposed between the protruding portion 29a and the depressed portion 29b and of normal disc radius, is the contact nub 30a of a lever 30. Such lever 30 is pivoted intermediate its length, a perpendicular sleeve portion 30b thereof being fitted upon a fixed shaft 31 for the purpose. The sleeve portion 30b is free for rotational movement and for back and forth sliding movement on the said fixed shaft 31. A coil spring 32, anchored at one end to a frame member 33 and attached at the other end to one arm 30c of the lever, urges the contact nub 30a against the cam disc rim, maintaining it always in contact therewith, and a link 34 articulatively connects the other arm 30d of the lever to an

4

arm 35a extending rigidly from a resilient clutch member 35, which latter is freely mounted for rotative movement on the elongated portion 10a of the stem 10.

Accordingly, when the cam disc 29 is rotated by rotation of the stem 10, the lever 30 is displaced substantially radially of the cam disc, either outwardly of the center of the cam disc or inwardly thereof, depending upon whether the rotation is clockwise, considered from the standpoint of Fig. 1, or counterclockwise. This produces a proportional rotation of the resilient clutch member 35 either clockwise or counterclockwise, as the case may be.

Guide plates 30e and 30f advantageously project beyond the contact nub 30a and receive the circumferential margin of the cam disc 29 therebetween for maintaining surface alignment and edge-to-edge contact of said nub 30a with said cam disc 29, see especially Fig. 4.

Arranged to be gripped by the resilient fingers of clutch member 35 when the stem 10 is pushed into the hand-setting position of Fig. 5 is a clutch disc portion 36a of a gear 36, such gear being mounted for rotation on the bearing 22 and being disposed in meshing engagement with the driven gear 37 of a train of gears arranged to properly transmit rotative motion to the speed regulator 11. The said train of gears includes an intermediate gear 38 and a drive gear 39, the latter being mounted on the spindle 12 to rotate freely thereon and being connected in drive relationship therewith by the normally effective safety clutch 40.

Accordingly, when the stem 10 is pushed into the hand-setting position illustrated in Fig. 5, wherein the clutch member 23 engages the clutch 24 for turning the respective time-indicating hands 27 and 28, the coincidental engagement of clutch member 35 with the clutch disc portion 36a of gear 36 effects rotational movement of speed regulator 11a concomitant with the hand-setting rotation of stem 10 and proportional thereto in degree determined by the character of the irregular portion of the circumferential rim of the cam disc 29.

In the illustrated instance above described, the irregular portion of the cam disc 29, made up as it is of the protruding portion 29a and the adjoining depressed portion 29b, is of limited extent. Consequently effective adjustment of the time regulator 11 is carried out only within a relatively narrow range of time inaccuracy, e. g. within a range of ten minutes slow or fast. Ordinarily this range is ample. Thus, should the user forget to wind the clock, and it runs down and stops, thereby necessitating the re-setting of the hands over an interval greater than the given narrow range, no effective adjustment of the speed regulator is made, unless, by chance, the correction is within any hour multiple of any figure within the said narrow range. Should this occur it merely occasions an additional one or more resettings of the clock until the proper position of speed regulator 11 is again achieved.

In this connection it should be noted that rotation of the cam disc 29 to such an extent that either the protruding portion 29a or the depressed portion 29b of its rim passes completely beyond the contact nub 30a, places some rim point with normal radius equivalent to that of the point 29c against said nub 30a, and whatever adjustment of the speed regulator 11 that has been effected by radial displacement of the lever

5

30 has been, what is herein termed, "ineffective," that is, of equivalent radial displacement, both inwardly and outwardly, or vice versa as the case may be, the net effect being zero.

The cam disc 29 is so positioned on the stem 10 that, when pawl 17 drops into the longitudinal slot 20, contact nub 30a rests against point 29c of normal cam disc radius. Thus, the hand-setting mechanism is always orientated with the cam means in a given manner before the hand-setting operation can commence.

As mentioned previously, the cam disc 29 may be configured to produce any desired results in particular instances. For example, the rim of cam disc 29' of Fig. 6 has a depressed portion 29b' which extends circumferentially from the deepest part adjacent the point 29c' of normal cam disc radius, in gradually increasing radii, i. e. in substantially outward spiral formation, to a point "A" of normal cam disc radius located diametrically opposite the point 29c', where the protruding portion 29a' commences and gradually builds up in continuing outward spiral formation to its highest part adjacent the point 29c'. This type of cam disc is especially adapted for clocks commonly used in automotive vehicles, where winding is accomplished electrically at frequent intervals. It provides for regulation over a wide range of inaccuracy of time indication.

As illustrated, the 360 angular degrees of any cam disc is effective over a 360 angular degree sweep of the hands of the timepiece. However the provision of step-up gearing for the hands would make a cam disc effective over several times the 360 degree sweep of the hands, depending upon the gear ratio, if that were to be found desirable in particular instances.

In Figs. 7 through 14 the invention is illustrated as applied to a watch of conventional construction. The structural characteristics of this embodiment are, in many respects, quite different from the foregoing clock embodiment. Nevertheless, the two embodiments share important structural and functional features, and, generically speaking, are very similar.

In Fig. 7 the winding stem 50 of the watch is shown pushed in, which is the normal winding and running position. Such winding stem has an elongated upper portion 50a, which is cylindrical and passes through the tubular driven winding gear 51 for free rotation therewithin. The stem has, further, an elongated lower portion 50b, which is square in right cross-section and has mounted thereon, for free sliding movement longitudinally thereof, the tubular drive winding gear 52, see especially Fig. 10. A headed pin 53, whose shank is cylindrical and extends into a correspondingly cylindrical recess 50c in the stem portion 50b is resiliently urged against the lower end of the stem portion 50b, and follows its movement upwardly when the stem is pulled out into hand-setting position, see Figs. 8 and 9, by means of a link 54 working from a pinion 55 which is maintained under the constant urge of a spring 56.

The pinion 55 meshes with a second pinion 57, from which rigidly extends a lever arm 58 whose rounded head-end 58a rests in an outer circumferential groove 52a formed intermediate the toothed ends of the drive winding gear 52. The urge of spring 56 is transmitted from pinion 55 to pinion 57 and serves to normally maintain the drive winding gear 52 in such a position that its

6

toothed upper end 52b meshes with the toothed lower end 51a of driven winding gear 51.

A spur gear portion 51b of the driven winding gear 51 meshes with an intermediate gear 59 which, in turn meshes with a winding gear 60, all in conventional fashion. Thus, when in the position of Fig. 7 the winding stem 50 is rotated in the proper direction the watch is wound in conventional manner.

When the winding stem 50 is pulled out into the hand-setting position of Figs. 8 and 9, the headed pin 53 follows the lower end of the stem upwardly under the urge of spring 56, and, by rotating pinion 57, causes the drive winding gear 52 to disengage from driven winding gear 51 and to slide down the stem portion 50b to the position illustrated in Figs. 8 and 9. In that position, the lower crown gear end 52c of drive winding gear 52 meshes with a gear 61, see especially Fig. 11, which transmits rotation through a friction clutch 62 to a gear 63, the first of a train of gears making up part of the motion-transmitting means operative between the hand-setting means and the adjusting means for the speed regulator of the watch.

The speed regulator is conventional; it includes a disc 64, Fig. 8, fixed to a spindle 64a on which it may be rotated, and has a finger 64b which engages the outer loop of the hair spring 65 of the watch. A gear 66—3 freely mounted on the spindle 64a for rotative movement, and connected to the same by a friction safety clutch 67 for transmitting the rotative movement thereto, is driven by a train of gears 66—2; 66—1, Fig. 8, and 66, Fig. 9, the latter arranged to be engaged and driven by a gear portion of the regulator adjusting means of the invention, hereinafter described.

The gear train making up part of the aforesaid motion-transmitting means between the winding and hand-setting stem 50 of the watch and the regulator adjusting means is driven by reason of the meshing engagement of the lower toothed end 52c of drive winding gear 52 with the first gear 63 of the train. Such train includes a plurality of gears mounted for rotation on a floating frame 68, which is pivoted at 69 to swing through a limited stroke; and includes, further, a gear 70 freely mounted for rotation on the pivot 69 and in mesh with the gear 63. The gears mounted on the frame 68 comprise gears 71, 72, and 73, the gear 71 being in mesh with gear 70 and being adapted to make and break meshing engagement with a hand-setting drive pinion 74 in accordance with the change in position of the frame, the gear 73 carrying in fixed relationship therewith a cam disc 75, and the gear 72 being intermediate the two gears 71 and 73, meshing with both and serving to transmit rotation from the former to the latter.

The floating frame 68 has an arm 68a secured to one end of a spring 76, whose opposite end is fast on the stub shaft portion 55a of pinion 55. Such spring 76 is substantially untensioned when the stem 50 is in the normal pushed-in winding position of Fig. 7, but, through the rotational movement of pinion 55, is tensioned when the stem 50 is pulled out to the hand-setting position of Figs. 8 and 9. The tension of spring 76 urges frame 68 toward the left in Fig. 9, and would ordinarily swing it in that direction on its pivot 69 were it not for the stop action of a resilient finger 77, fastened at 78 and restrained from rotation by pin 78a and corresponding hole 78b and bearing directly against the rim of a disc 79 made

fast to and carried by the gear 71, see Figs. 9 and 12.

The disc 79 has a notch 79a formed in its rim for the reception of the finger 77, such notch having the sloping formation shown in Fig. 14 leading to the flat outer face of the disc. Thus, when rotation of the stem 50 in its pulled out position of Figs. 8 and 9 rotates the gear 71 to the position shown in Fig. 13, where the notch 79a registers with the resilient finger 77, the spring 76 is effective to push frame 68 to the left, finger 77 riding up the sloping bottom of the notch to a riding position on the flat outer face of the disc 79, see Fig. 14. The user would have this action indicated to him by the hands, which previous to the action would not be controlled by the winding stem, becoming controlled in the conventional manner. It should be noted that the spring 53 is stronger than the spring 76.

The cam disc 75 has, in this embodiment, substantially the same rim irregularities as the cam 29 of the preceding embodiment, and in the registering position of the finger 77 relative to the notch 79a, explained above, the contact nub 80a of a lever 80 rests against the point 75c, of normal cam disc radius, disposed between the arcuate protruding portion 75a and the adjoining arcuate depressed portion 75b, see Fig. 13. This is the position of orientation between the hand-setting mechanism of the watch and the cam means.

The hand-setting mechanism includes a gear 81 to which the minute hand 82 of the watch is affixed. Such gear 81 is in mesh with the pinion 74, and in the position of the parts as just described where the frame 68 has swung to the left under the pressure of spring 76, gear 71 being moved into mesh with the pinion 74, rotation of the stem 50 will effect a corresponding rotation of the gear 81. Reduction gears 83, 84, and 85, respectively, transmit the rotation in suitable reduced degree to hour hand 86. Accordingly, rotation of the stem 50 effects a corresponding setting of the time-indicating hands of the watch.

The means for adjusting the speed regulator of the watch is actuated by the aforementioned lever 80. It comprises a sector gear 87 pivoted to a lower arm 88b of the frame 68, and connected to the work arm 88b of the lever by a link 88. A spring 89 pressing against the arm 88b of the lever constantly urges the contact nub 82a against the rim of the cam disc 75, and, when the cam disc is rotated by the rotation of stem 50, the irregularities 75a and 75b of its circumferential rim will displace the contact nub 82a substantially radially outwardly of the cam disc or radially inwardly thereof, depending upon the direction of rotation of the stem. Since movement of the frame 68 to the left, as explained heretofore, carries the sector gear 87 into meshing engagement with the speed regulator adjusting gear 63, any radial movement of the contact nub 82a of the lever 80 which is transmitted to the sector gear 87 by the link 88, will effect a corresponding adjustment of the speed regulator.

To facilitate and control the swinging movement of floating frame 68 upper and lower guide arms 83c and 83d, respectively, working in respective guideways 90 and 91, may be provided.

Since movement of the frame 68 to the left from its position of Figs. 8 and 9 both throws gear 71 into meshing engagement with the hand-setting gear 74 and gear sector 87 into meshing engagement with the speed regulator adjusting gear 66, as shown in Fig. 13, rotation of the stem 50 will simultaneously effect correction of the set-

ting of the time indicating hands 82 and 86 and proper adjustment of the speed regulator of the watch.

Thereupon, pushing in of the stem 50 to the normal winding and running position shown in Fig. 7 will, by the incidental rotation of the pinion 55 acting through its stub shaft 55a on spring 76, move the frame 68 to the right and permit the resilient finger 77 to snap back into its normal stop position of Fig. 12.

Whereas this invention has been illustrated with respect to preferred specific embodiments thereof it should be understood that various changes in such specific forms and that various other forms may be constructed by those skilled in the art without departing from the spirit and generic purview of the invention as defined in the following claims.

I claim:

1. In a timepiece having hand-setting means and a speed regulator equipped with adjusting means, mechanism for automatically regulating the timepiece coincidentally with the resetting of the hands from incorrect to correct time indication, comprising a cam disc mounted for rotation, said cam disc being circumferentially configured in accordance with the adjustment desired through any angular degree of its rotation; means for effecting rotation of said cam disc coincidentally and proportionally with the rotation of the hands of the timepiece to correct time indication; lever means operatively associated with said cam disc; means for transmitting motion from said lever means to the said regulator-adjusting means; and resilient means urging said lever means against the said circumferential surface of the cam disc, so movement will be imparted to said speed regulator in accordance with the movement of said lever means radially of said cam disc as determined by the circumferential configuration thereof.

2. Mechanism as set forth in claim 1, wherein there is provided means for orienting the hand-setting mechanism of the timepiece with said cam disc prior to the hand-setting operation thereof.

3. In mechanism for automatically regulating a timepiece, a cam disc mounted for rotation, said cam disc being circumferentially configured in accordance with the extent of regulating adjustment desired through any angular degree of its rotation; lever means operatively associated with said cam disc; and resilient means holding said lever means constantly against the circumferential surface of said cam disc.

4. In a timepiece having hand-setting means, including a manually manipulative stem, and having, further, a speed regulator equipped with adjusting means, mechanism for automatically regulating the timepiece coincidentally with the resetting of the hands from incorrect to correct time indication, comprising a cam disc mounted upon said stem for rotation therewith, said cam disc being circumferentially configured in accordance with the extent of regulator adjustment desired through any angular degree of cam disc rotation; a lever, and means resiliently urging said lever against the circumferential surface of said cam disc; an engaging part rotatably mounted on said stem and linked to said lever for rotation thereby; a complimentary engaging part rotatably mounted on said stem for engagement by the first-named engaging part when the said stem is displaced longitudinally into hand-setting position; means connected with the second-named engaging part for transmitting rotation

thereof to the said adjusting means of the speed regulator; and means locking the said stem against longitudinal displacement except at a given circumferential location suitably oriented with said cam disc.

5. Mechanism as set forth in claim 4, wherein means are provided on the stem for engaging the hand-setting mechanism of the timepiece when the stated engaging parts are in engagement, and for disengaging therefrom when the latter are moved out of engagement.

6. Mechanism as set forth in claim 4, wherein the stem-locking means comprises two longitudinally spaced, circumferential grooves formed about the stem, the said grooves being connected by a longitudinal notch whose position is suitably oriented with the cam disc, and a pawl resiliently pressed against the stem within the zone comprehended by said grooves.

7. In a timepiece having hand-setting means, including a manually manipulative winding and hand-setting stem arrangement longitudinally shiftable from winding position to hand-setting position and vice-versa, and having, further, a speed regulator equipped with adjusting means, mechanism for automatically regulating the timepiece coincidentally with the resetting of the hands from incorrect to correct time indication, comprising a pivoted frame; resilient means normally maintaining said frame in a given position; means associated with said stem arrangement for urging said frame from its said given position when the stem arrangement is shifted into hand-setting position; a cam disc rotatably mounted on said frame, said cam disc being circumferentially configured in accordance with the extent of regulator adjustment desired through any angular degree of cam disc rotation; a lever pivoted on said frame structure, and resilient means urging said lever into contact with the circumferential surface of said cam disc; means operatively associated with said lever for engaging the said regulator-adjusting means; means for transmitting rotation of said stem arrangement in its hand-setting position to said cam disc; means normally holding said frame in its said given position against the urging of said stem-associated means; and means suitably oriented with said cam disc for releasing said frame-holding means during rotation of said stem arrangement, movement of said frame from its given position effecting engagement of said lever-associated means with said regulator-adjusting means.

8. Mechanism as set forth in claim 7, wherein the stem-associated means for urging the frame from its given position comprises rotatable means arranged to be rotated to a limited extent by the longitudinal shifting of said stem from winding to hand-setting position, and wherein the resilient means normally maintaining the frame in its given position connects said rotatable means with the frame.

9. Mechanism as set forth in claim 7, wherein a train of gears mounted on the frame serves to transmit rotation from the stem arrangement to the cam disc, and wherein one gear of said train meshes with a hand-setting gear when the frame is moved from its given position.

10. Mechanism as set forth in claim 7, wherein a train of gears mounted on the frame serves to transmit rotation from the stem arrangement to the cam disc; wherein the frame-holding means comprises a disc concentric with and fixed to one of the gears of said train, and a resilient

finger having one of its ends anchored and its other end pressing against the rim of said disc; and wherein the releasing means comprises a notch in the said rim of the disc, sloping toward the free face of the disc so said resilient finger is allowed to spring radially of the disc and onto the said free face thereof when the said notch is brought into registry therewith.

11. Mechanism as set forth in claim 7, wherein the lever-associated means comprises a sector gear linked to the lever, and wherein guides are provided for the frame so said sector gear will be brought into mesh with a regulator-adjusting gear upon movement of the frame from its given position.

12. In a timepiece having a main drive mechanism, hands, and a speed regulator; a normally stationary cam mounted for movement independently of the main drive mechanism and having a fast time surface portion, a slow time surface portion immediately adjacent thereto, and a point of normal time surface directly therebetween; a speed regulator adjuster resiliently biased into constant bearing engagement on said cam and movable thereby in degree determined by engagement with the respective surface portions of the cam; hand setting means including an element shiftable between a first position of normal timepiece operation and a second position for effecting movement of the hands from incorrect to correct time indication, said cam being movable by the hand setting element for shifting the positions of its time surface portions relative to the speed regulator adjuster, said cam also being movable by the hand setting element during hand setting manipulation thereof coincidentally with the movement of the hands to correct time indication whereby simultaneously and proportionally to move the speed regulator adjuster in accordance with the configuration of the cam.

13. In a timepiece having a main drive mechanism, hands, and a speed regulator; a normally stationary cam mounted for movement independently of the main drive mechanism and having a fast time surface portion, a slow time surface portion immediately adjacent thereto, and a point of normal time surface directly therebetween; a speed regulator adjuster resiliently biased into constant bearing engagement on said cam and movable thereby in degree determined by engagement with the respective surface portions of the cam, hand setting means including an element shiftable between a first position of normal timepiece operation and a second position for effecting movement of the hands from incorrect to correct time indication, said cam being movable by the hand setting element for shifting the positions of its time surface portions relative to the speed regulator adjuster, said cam also being movable by the hand setting element during hand setting manipulation thereof coincidentally with the movement of the hands to correct time indication whereby simultaneously and proportionally to move the speed regulator adjuster in accordance with the configuration of the cam, and means preventing movement of the cam coincidentally with time correction movement of the hands until the cam is first shifted to place its said normal time surface point in bearing registry with the speed regulator adjuster.

14. In a timepiece having a main drive mechanism, hands, and a speed regulator; a normally stationary cam mounted for movement independently of the main drive mechanism and having a fast time surface portion, a slow time sur-

11

face portion, and a point of normal time surface portion therebetween; a speed regulator adjuster resiliently biased into constant bearing engagement on said cam and movable thereby in degree determined by engagement with the respective surface portions of the cam, hand setting means including an element shiftable between a first position of normal timepiece operation and a second position for effecting movement of the hands from incorrect to correct time indication, a driving member operative by actuation of the hand setting element when in said second position, means for moving said cam to shift the surface portions of the cam relative to the point of bearing engagement with the speed regulator adjuster, and means establishing an operating connection between the cam and said driving member when the speed regulator adjuster bears on the normal time surface point of the cam between said fast time and slow time surface portion whereby the cam is driven coincidentally and proportionally with the movement of the hands to correct time indication to engage its fast or slow time surface portion with the regulator adjuster and thus change the speed of the main drive mechanism in accordance with movement of the regulator adjuster under influence of said cam surface portions.

15. In mechanism for automatically regulating a timepiece; cam means movable in unison

12

with the time indicating means of the timepiece during movement of said time indicating means from incorrect to correct time indication; said cam means including an adjustment-effecting surface portion operative throughout any possible extent of movement of said time indicating means from incorrect to correct time indication; means associated with said cam means and movably responsive to the configuration of the adjustment-effecting surface portion thereof; and means for transmitting the adjustment movement of said cam associated means to the speed regulator of the timepiece.

ROBERT ELLSWORTH HOLDMAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
218,224	Boynett	Aug. 5, 1879
1,835,391	Haefliger	Dec. 8, 1931
1,951,010	Deck	Mar. 13, 1934
1,958,825	Kaufmann	May 15, 1934

FOREIGN PATENTS

Number	Country	Date
152,942	Switzerland	June 16, 1932