

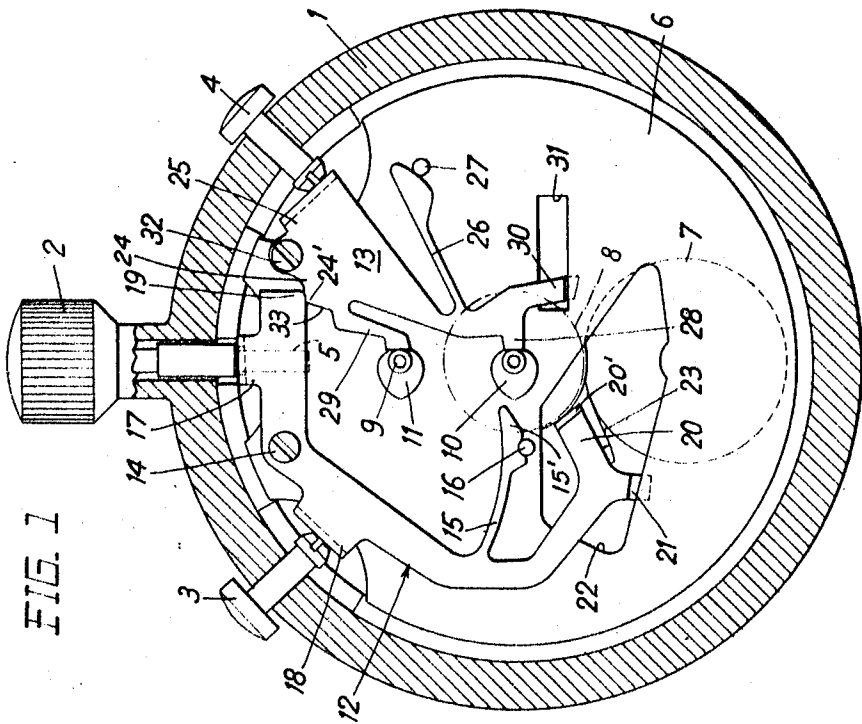
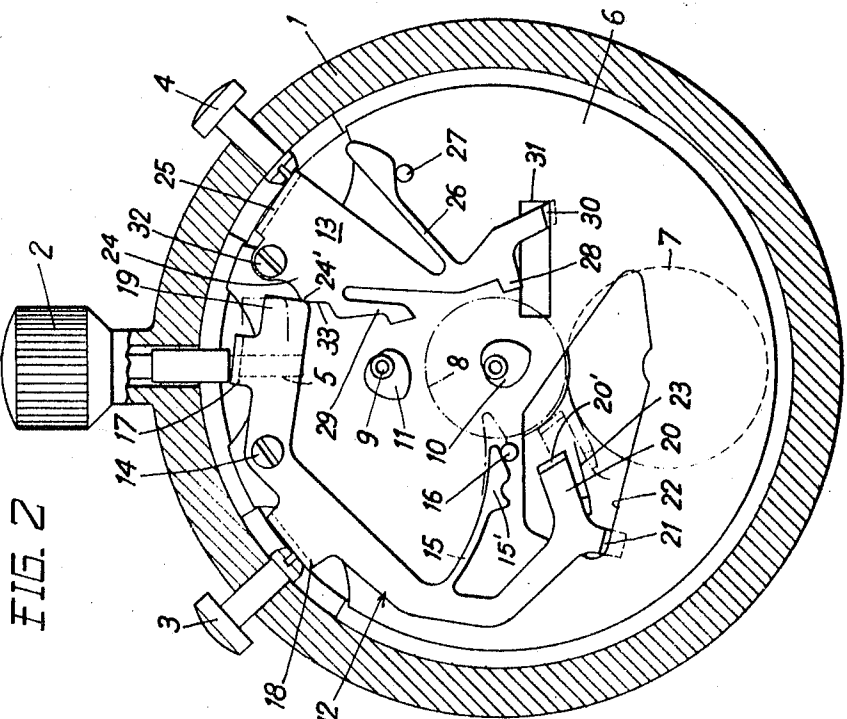
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STOPWATCH CONTROL MECHANISM

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12 Claims

ABSTRACT OF THE DISCLOSURE

A stopwatch control mechanism for actuating the starting, stopping, and resetting of the watch, wherein such actuation is achieved by means of two separately pivoted levers, one of said levers including a braking member for the movement balance and wherein displacement of said member from its braking to its release position relative to said balance imparts a positive starting force to said balance.

This invention is directed to an improved mechanism for effecting the starting, stopping, and resetting to zero of the indicating hands in a stopwatch.

Known mechanisms of this type comprise a plurality of movable members which usually are arranged in superimposed relationship with respect to each other, the assembly of such an arrangement requiring a high level of skill. As a consequence, not only is the original cost of such a mechanism relatively high but the upkeep thereof is a precarious matter dependent upon the skill and experience of the watch repairman.

It is an object of this invention, therefore to provide a stopwatch control mechanism which is simple to construct, to assemble, and to maintain.

It is a further object to provide such a mechanism which is highly reliable in operation.

It is a specific object to provide such a mechanism consisting of only two movable control members which are not superimposed relative to each other.

It is a further object of this invention to provide a stopwatch control mechanism which includes a simple means for assuring immediate starting of the movement upon actuation of said mechanism from its stop to its start position.

Other objects are those which are inherent or obvious in the disclosed invention, a detailed description of which follows, said description being referred to the accompanying drawing of a preferred embodiment, wherein:

FIGURES 1 and 2 are plan views of an embodiment according to this invention respectively showing the mechanism parts in stop and running positions relative to the watch movement.

A stopwatch having the mechanism of this invention includes a conventional movement 6 housed within a case 1 and including a balance 7, a fourth wheel runner 8, and a minute recording runner 9. Runners 8 and 9 each carry a conventional resetting heart 10 and 11, respectively. Three push members 2, 3, and 4 of the stop watch control mechanism are slidably mounted in respective radially extending bores in said case 1. Push member 2, in addition to its function relative to the control mechanism of this invention, also serves as a winding crown for the movement 6 by being fastened to a conventional winding stem 5 of movement 6.

The control mechanism of this invention comprises only two movable members, namely, levers 12 and 13, each respectively pivotably mounted on the movement frame along parallel axes by shouldered screws 14 and 32.

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Lever 12 serves to control the starting and stopping of the stopwatch parts while lever 13 serves to reset said parts after they have been stopped.

Lever 12 includes first and second arms, 17 and 18, which extend in different radial directions from the pivot axis of said lever. First arm 17 is contacted by push member 2 whereby inward radial movement of said push member causes said lever 12 to pivot clockwise about screw 14, while second arm 18 is contacted by push member 3 whereby inward radial movement thereof causes said lever to pivot counterclockwise. A jumper finger 15 and a shoe finger 20 extend rigidly from second arm 18 and in a generally radial direction relative to the axis of the movement 6. The end of shoe finger 20 includes a brake shoe 20' which, in the position of FIGURE 1, locks the fourth wheel runner 8 in a known manner. Jumper finger 15 includes a shouldered end portion 15' which resiliently cooperates with a pin 16 which is rigidly attached to the frame of movement 6. The cooperation between end portion 15' and pin 16 is such that lever 12 is resiliently held in either the position of FIGURE 1 or that of FIGURE 2, said lever 12 being capable, however, to move from one position to the other through resilient flexing of said finger 15 as its end portion 15' slides along the surface of pin 16.

Finger 20 also carries a flat spring 23 which, in the stop position of FIGURE 1, resiliently bears against the balance 7 to brake same against movement. Finger 20 is also formed with an axially offset lug 21 which passes through opening 22 in the frame plate of movement 6 and rests against the unexposed face of said plate thereby serving to maintain second arm 18 of lever 12 in parallel relationship with said plate. In other words, the purpose of lug 21 is to prevent any distortion of arm 18, especially of finger 20, in an axial direction away from the plane in which said arm and finger are intended to pivot.

First arm 17 of lever 12 includes a nose portion 19 which cooperates with a shouldered portion 24' of lever 13. The resetting lever 13 also includes first and second arms, 24 and 25, which extend in different directions relative to the pivot axis of lever 13 whereby a force exerted against first arm 24 by nose 19 causes counterclockwise pivoting of lever 13 while a radially inward force against second arm 25 by push member 4 causes clockwise pivoting of said lever 13. Lever 13 includes a jumper finger 26 which resiliently cooperates with fixed pin 27 analogously to the aforescribed cooperation between finger 15 and pin 16, and lever 13 also includes an offset lug 30 which extends through opening 31 in the frame plate of movement 6 and which cooperates with the underside of said plate to maintain lever 13 parallel to said plate analogously to the aforescribed cooperation between lug 21 and said plate.

Lever 13 finally is formed with two hammer portions 28 and 29 which respectively cooperate with the heart 10 of the fourth wheel runner and heart 11 of the minute recorder.

The operation of the aforescribed control mechanism is as follows.

In the FIGURE 1 position of the parts, the movement is stopped but ready to be released for recording a time interval. Shoe 20' of lever 12 rests against fourth wheel runner 8 while spring 23 simultaneously rests against the rim of balance 7, runner 8 and balance 7 thereby being held stationary. Simultaneously, hammer portions 28 and 29 of lever 13 rest against hearts 10 and 11, respectively, and are held thereagainst by the resilient action of jumper 26 against pin 27, whereby the corresponding indicating hands are also held at zero indicating positions.

In order to start the movement, the person using the watch exerts an inward pushing force upon starting push member 2 whereby member 2 pushes against first arm 17 of lever 12 and results in clockwise pivoting of lever 12 about screw 14 to the solid line position shown in FIGURE 2. In this new position shoe 20' and spring 23 are spaced away from runner 8 and balance 7, respectively, so that said shoe and spring no longer exert a braking action upon these members. Further, it should be noted that the disposition of spring 23 is such that in moving from its FIGURE 1 to its FIGURE 2 position, it moves tangentially to balance 7 and thereby frictionally pulls balance 7 along and starts counterclockwise rotation thereof. If, therefore, the normal rotational direction of balance 7 is counterclockwise, it is seen that the movement of lever 12 from its FIGURE 1 to its FIGURE 2 position assures the immediate starting of said balance.

Clockwise pivoting of lever 12 also results in nose 19 of first arm 17 pushing against shouldered portion 24' of arm 24 whereby lever 13 pivots counterclockwise about screw 32. Lever 13, therefore, pivots to its FIGURE 2 position, in which it is held by virtue of the resilient coaction between jumper finger 26 and pin 27, and in which hammer portions 28 and 29 are spaced from hearts 10 and 11.

The actuation of the single push member 2, therefore, results in an unlocking of all the movement parts, 7, 8, 10, and 11, which are necessary to measure and record a time interval.

In the running condition of FIGURE 2, the nose 19 of lever 12 bears against an abutment face 33 of first arm 24 of lever 13, thereby preventing lever 13 from being returned to its FIGURE 1 position through inadvertent actuation of push member 4.

The stopping of the movement is effected by simply pushing stop push member 3 inwardly whereby lever 12 is returned to its FIGURE 1 position which corresponds to the dash line position shown in FIGURE 2. The return of lever 12 to this position re-establishes locking engagement of shoe 20' and of spring 23 with runner 8 and balance 7, respectively, and further results in nose 19 sliding away from abutment surface 33 on lever 13 whereby lever 13 is free to resume its FIGURE 1 position excepting that it is held in its FIGURE 2 position by the coaction between its finger 26 and pin 27. It is seen, therefore, that actuation of stop member 3 merely stops the movement by returning lever 12 to its FIGURE 1 position, but does not alter the position of lever 13. In this condition, either of two actuations may be performed: the timing can be resumed as a continuation of the moment of last stopping simply by pushing on starting member 2, or the indicating hands can be reset back to zero simply by pushing on reset member 4.

It is seen, therefore, that the disclosed control mechanism provides a highly effective means for starting, stopping, and resetting a stopwatch movement through only two movable levers which are separately pivoted in non-overlapping relationship relative to each other. According to this invention, therefore, the two control levers 12 and 13 may pivot in the same plane. Further, the pivoting action of one of the levers (12) is such that a positive starting force is exerted upon the balance (by spring 23) so as to assure immediate starting thereof.

What is claimed is:

1. A stopwatch comprising indicating members and drive means therefor, a control mechanism for starting, stopping, and resetting said indicating members, said control mechanism comprising: a first and second control member, each having a jumper finger cooperating with a fixed part of the watch frame for resiliently holding each member, said first control member including brake means and being movable between stop and start positions thereof, in said stop position said brake means acting to lock said drive means and in said start position said drive means being free to drive said indicating mem-

bers, said second control member movable between run and reset positions thereof, said run position of said second control member corresponding to said indicating members being free to be driven by said drive means and in said reset position of said second control member said second member holding said indicating members at their zero position, said second control member cooperating with said indicating members whereby said indicating members are reset at zero position by movement of said second member from its run to its reset position, manual actuation means for displacing said first control member from its stop to its start position and vice versa, said first and second control members cooperating with each other whereby said second control member is moved from its reset to its run position by said first member when the latter moves from its stop to its start position, said first control member being movable from its start to its stop position independently of said second control member, manual actuation means for moving said second control member from its run to its reset position, said first and second control members further cooperating with each other whereby the second member is locked by the first member in said running position while said first member is in said start position.

2. The stopwatch of claim 1, wherein said drive means includes a balance of the watch movement and said brake means includes a brake element which cooperates with said balance to lock same when said first control member is in said stop position, said brake element being arranged to move tangentially to and in the same direction as that of the running rotation of said balance when said first control member moves from its stop to its start position whereby said brake element imparts an initial starting force to said balance as a result of the movement of said first control member.

3. The stopwatch of claim 1, wherein said first and second control members are movable between the respective said positions thereof in non-overlapping relationship relative to each other.

4. The stopwatch of claim 3, wherein said first and second control members are movable in a common plane.

5. The stopwatch of claim 4, wherein said first and second control members are both pivoted about respective parallel axes.

6. The stopwatch of claim 1, wherein said drive means comprises the fourth wheel runner, the minute recording runner, and the balance of the movement, said brake means on said first control member cooperating with said fourth wheel runner and with said balance to lock same when said first member is in said stop position thereof.

7. The stopwatch of claim 6, wherein a reset heart is carried by said fourth wheel runner and by said minute recording runner, respectively, said second control member including respective hammer members which cooperate with said hearts to reset said indicating members and to hold same in zero position.

8. The stop watch of claim 6, wherein said first control member is a pivoted lever having first and second arms, said manual actuation means for said first member comprising two separate pusher means each associated with a respective one of said arms for pivoting said lever in respective opposite directions, said second arm carrying said brake means.

9. The stopwatch of claim 8, said brake means comprising a shoe element brakingly engageable with said fourth wheel runner and a flat spring resiliently engageable tangentially against the outer periphery of said balance, said flat spring being arranged to move tangentially away from said balance in the same direction as the running direction of said balance when said first control lever moves from said stop to start position whereby said spring imparts an initial rotational force to said balance upon the occurrence of such movement by said first control lever.

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10. The stopwatch of claim 8, wherein said second control member is pivoted, said manual actuation means for said second control member being adapted to urge said second member in a one pivotal direction, said first arm on said first control member lever being adapted to urge said second control member in an opposite pivoted direction.

11. The stopwatch of claim 10, wherein said first and second control members are both pivoted about respective parallel axes, said control members being pivotally movable between the respective said positions thereof in non-overlapping relationship relative to each other.

12. The stopwatch of claim 10, wherein said second control member includes an abutment surface which bears against a part of said first arm while said first control member is in said start position thereof and while said second control member is in said run position thereof whereby said first arm locks said second control member in said run position, said first control member being pivot-

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able from said start to said stop position thereof whereby said first arm part moves away from said abutment surface on said second control member whereby the latter is no longer locked in said run position by said first arm.

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