

[54] **TIMER**

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[22] Filed: **Jan. 3, 1974**

[21] Appl. No.: **430,419**

[57] **ABSTRACT**

A timer including a minutes indicator controlled to move along a stroke in two opposite directions. The dial of the timer has five apertures; the indicator has two colored zones adapted to appear beneath the dial apertures. The indicator may be positioned at a start position and thereafter moved so that the zones will pass behind the apertures to indicate time remaining for an event to occur.

[30] **Foreign Application Priority Data**

Jan. 4, 1973 Switzerland..... 57/73

[52] U.S. Cl. **58/74**

[51] Int. Cl. **G04f 7/04**

[58] Field of Search..... 58/74, 76, 127

[56] **References Cited**

FOREIGN PATENTS OR APPLICATIONS

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6 Claims, 7 Drawing Figures

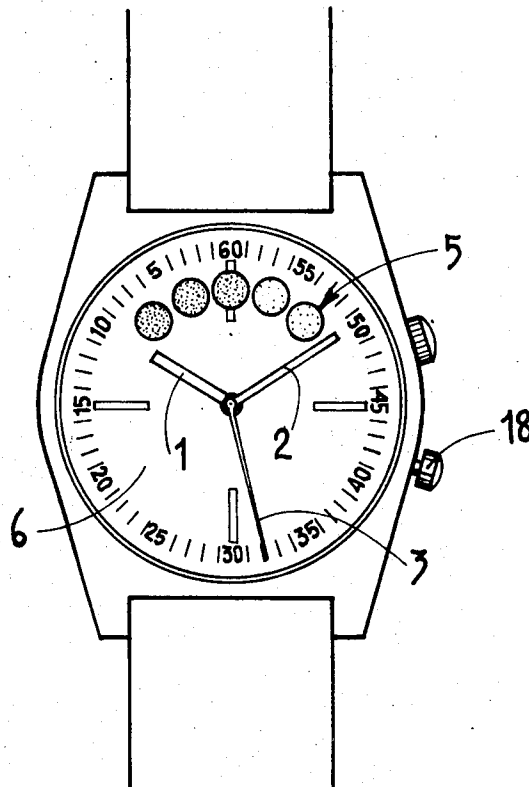


FIG. 1

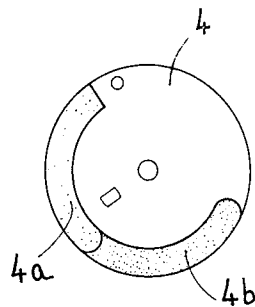
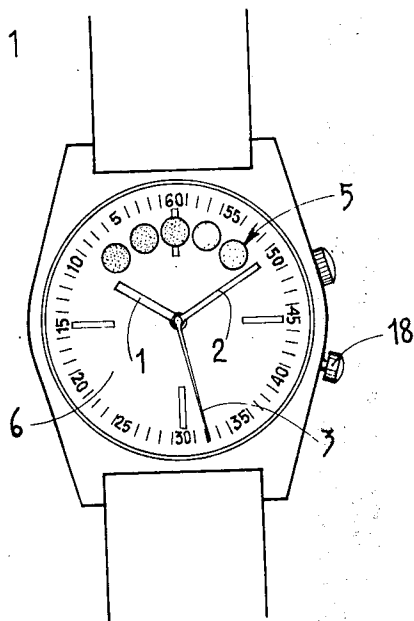


FIG. 2

FIG. 3

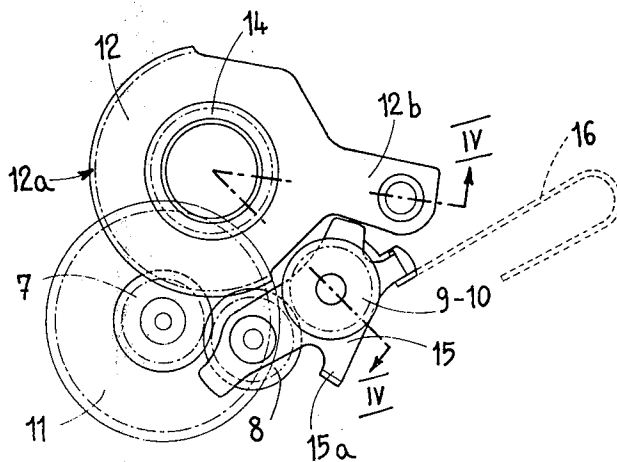
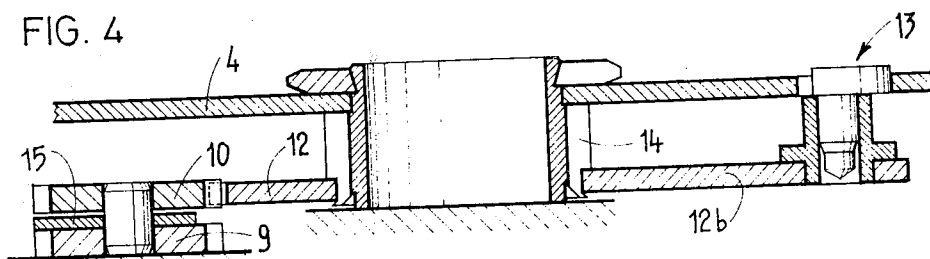


FIG. 4



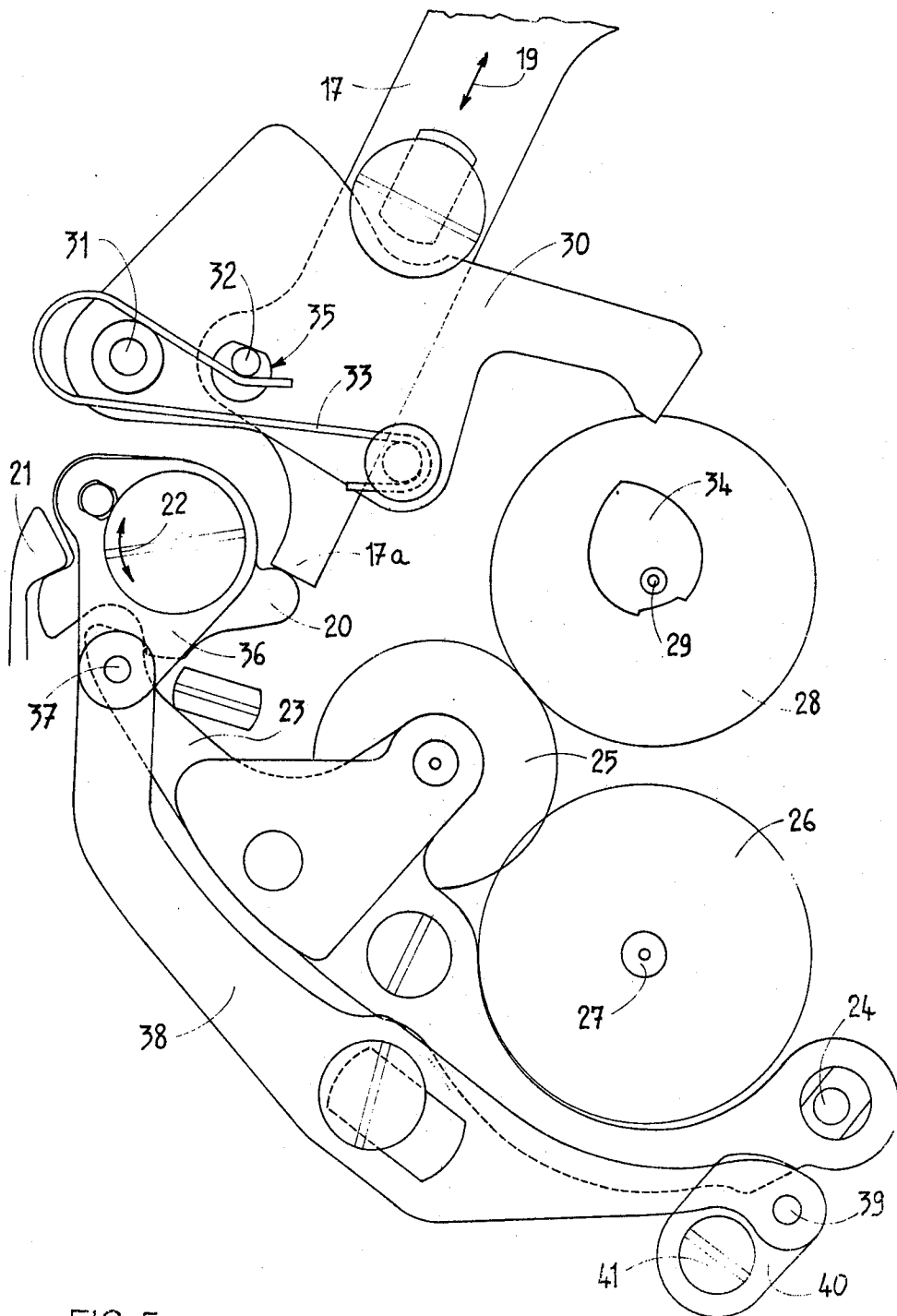


FIG. 5

FIG. 6

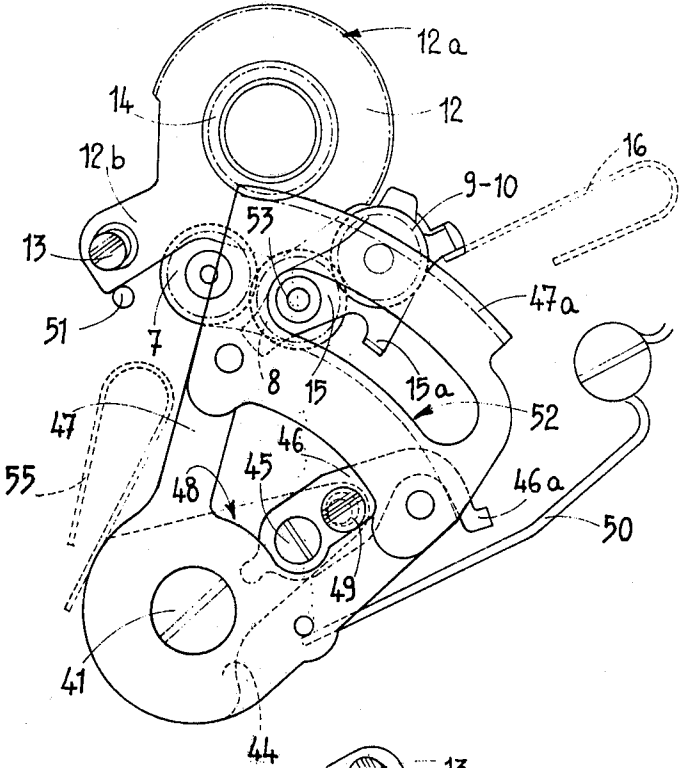
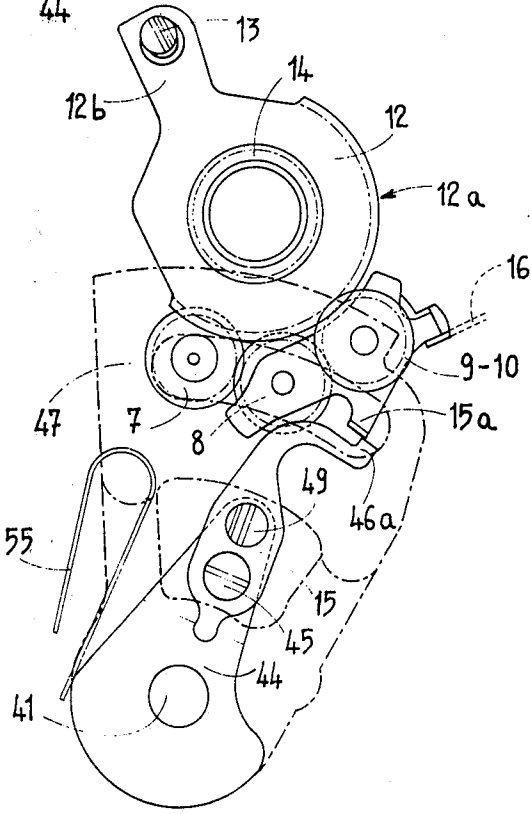


FIG. 7



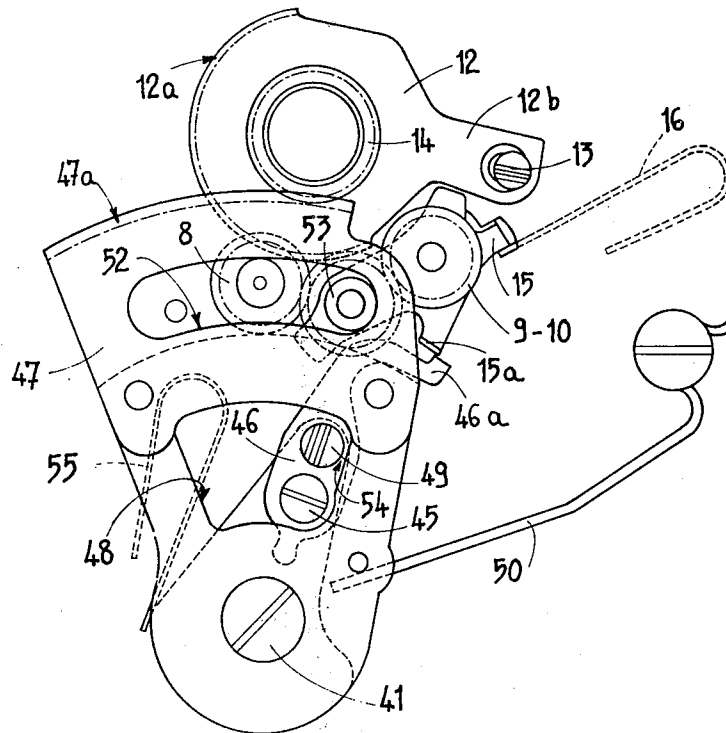


FIG. 8

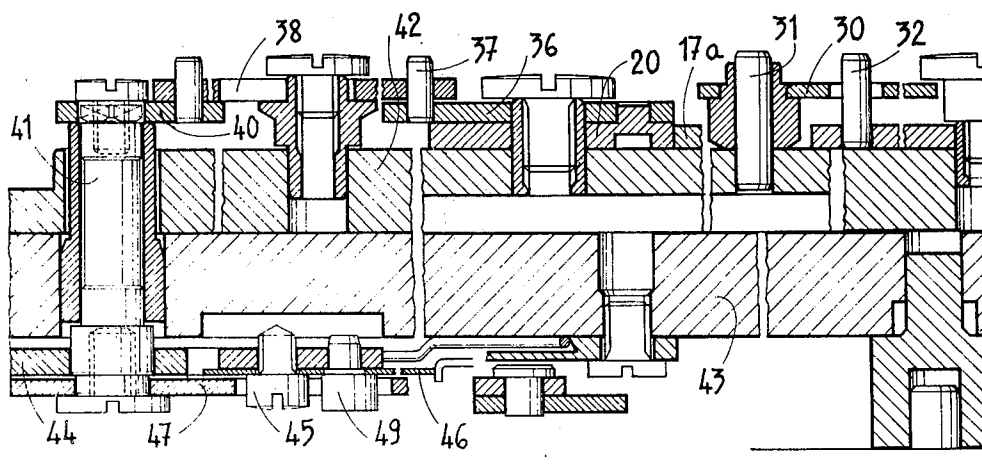


FIG. 9

BACKGROUND OF THE INVENTION

The present invention relates to a timer comprising a minutes indicator arranged in such a way as to permit the counting of a limited number of minutes.

Such timers are known. They are used in sports, especially for the regattas, and permit the user to know precisely, and by means of a very suggestive indication, the time which remains until a contemplated event, for instance the start of a race, occurs. In the known embodiments of these timers, the minutes indicator is frictionally driven, so that the operation of these timers, especially when the timer becomes old, is not reliable.

The object of the present invention is to provide a construction which produces a much greater running reliability.

SUMMARY OF THE INVENTION

The timer constructed according to the present invention is characterized by the fact that the minutes indicator is controlled by a control mechanism which itself is operated on the one hand manually and on the other hand by means of a resilient driving device, the arrangement being such that the control mechanism, once operated manually, drives the minutes indicator in one sense while, operated by the resilient driving device, drives the minutes indicator in the opposite sense; the connecting device between the gearing of the movement and the said indicator comprising means such that, at the ends of the strokes of the said indicator, this connection is interrupted, the whole in such a way that by operating manually the control mechanism, against the action of the resilient driving device, one brings the minutes indicator into one of its extreme positions, i.e. the starting position, in which its connection with the gearing of the movement is interrupted, and that, when one ceases to act manually on the control mechanism, the resilient driving device moves the minutes indicator so as to reestablish its connection with the gearing of the movement.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings show, by way of example, one embodiment of the object of the invention.

FIG. 1 is a plan view of a timer provided with a minutes indicator intended for the counting of a limited number of minutes.

FIG. 2 is a plan view of the minutes indicator.

FIG. 3 is a plan view, on an enlarged scale, of a detail of the timer, showing the driving, by the gearing of the movement, of the minutes indicator.

FIG. 4 is a sectional view of a detail, taken along the line IV—IV of FIG. 3 in the direction indicated generally, on an enlarged scale.

FIG. 5 is a plan view of a part of the control mechanism of the minutes indicator as well as of the seconds indicator.

FIGS. 6, 7 and 8 are plan views, taken on the same scale as that of FIG. 3, of a detail of the timer; more precisely, of a part of the control mechanism of the minutes indicator, represented respectively in its starting position, in its running position and at the end of its stroke, and

FIG. 9 is a sectional view of a part of the control mechanism.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The timer represented comprises, in addition to the ordinary hands of hours and of minutes, designated respectively by 1 and 2, a direct-drive secondshand 3, able to be reset to zero, by means of a control mechanism which is disclosed hereafter. The timer also includes a disc shaped minutes indicator 4, able to count a limited number of minutes and presenting, to this effect, two peripheric zones 4a and 4b, differently coloured, appearing successively in five apertures 5 provided in the dial 6, of the timer. The disc shaped minutes indicator 4 is stopped automatically at the end of its stroke and can be brought back into its starting position by means of the above mentioned control mechanism.

The disc 4 is driven by the timer movement by means of a gear train comprising four pinions 7, 8, 9 and 10 (FIG. 3) the first three ones of which are in meshed engagement with each other and the last two ones of which are coaxial and rigid one with the other. The pinion 7 is coaxial and rigid with a third wheel 11 of the movement, while the pinion 10 meshes with the toothing 12a of a toothed sector 12, coaxial with the disc 4 (FIG. 4), with which it is rendered rigid by means of an eccentric device 13 carried by an arm 12b of the toothed sector 12. While acting on the eccentric device 13, one can adjust slightly the relative position between the minutes indicating disc 4 and the toothed sector 12. It is to be noted that the sector is rigid with the pinion 14 (FIG. 4) constituting a distance piece between the sector and the disc 4, the purpose of which will be indicated hereafter, and which constitutes the last element of the cinematic chain of the control mechanism.

The driving device of the minutes indicator 4 connected through the gearing of the movement comprises moreover a coupling device including a lever 15 articulated on the frame coaxially with the pinion 8, and which carries the two coaxial pinions 9 and 10, between which it is interposed. Pinion 9 is in constant meshed engagement with the pinion 8 and pinion 10 is capable of meshed engagement with or disengagement from the toothing 12a of the sector 12 according to the position occupied by the lever 15. A spring 16 acts on lever 15 for maintaining it in the position in which the pinion 10 is meshed with the sector 12.

The control mechanism, operable manually, comprises a slider 17, operable by means of a pushbutton 18 (FIG. 1). The slider 17 (FIG. 5) moves in the direction of the arrow 19. Slider 17 operates, by means of a beak 17a, a cam or shuttle 20, submitted to the action of a return spring 21, which effects thus an oscillating movement according to the arrow 22. The cam 20 acts on a lever 23, articulated at 24 on the frame of the movement, and which carries a wheel 25 steadily meshing with a wheel 26 secured on the axis 27 of the seconds wheel of the movement. The wheel 25 is meshed, when no pressure is exerted on the push-button 18, that is to say when it occupies the position represented in the drawing, with a chronograph wheel 28, the axis 29 of which carries the seconds hand 3. When pressure is exerted on the push-button 18, the slider 17 is moved towards the bottom of FIG. 5, thus rotating the cam 20 in the clockwise direction, against the action of its return spring 21, and urges the lever 23 to rotate in the opposite sense, thus releasing the wheel 25 from the

wheel 28. Simultaneously, a return-to-zero-hammer 30, articulated at 31 on the frame of the movement, is operated by a control pin 32, carried by the slider 17, and which operates by the intermediary of a control spring 33 carried by the hammer. The hammer 30 acts on a return-to-zero heart 34 carried by the shaft 29 of the chronograph, so that, at the same time that the hammer is released, the seconds hand 3 is returned to zero. It is sufficient to slack off the pressure exerted on the push-button 18, so that, under the action of a return spring (not shown), the lever 23 resumes its initial position, bringing the wheel 25 back in engagement with the wheel 28, and, thereby, restarting the seconds hand 3. It is to be noted that the pin 32 carried by the slider 17 passes with play through an opening 35 provided in the hammer 30, so that it is thus possible to continue the displacement of the slider 17 even when the hammer has already brought the heart 34 into the zero position, the spring 33 ensuring an elastic connection between the slider and the hammer.

The cam 20 is rigid with a second cam or shuttle 36, on which is articulated at 37 a connecting rod 38 operating the minutes counter. The rod 38 is itself articulated at 39 on a stop-lever 40 articulated in at 41 on the frame of the movement; more precisely between the barrel bridge and the base-plate designated respectively by 42 and 43. The stop lever 40 is mounted on a square shaped part of its axis of articulation 41 (FIG. 9) so that it drives this axis in rotation. The axis 41 carries, at its opposite end, forced thereon, a control lever 44 carrying itself, secured thereon by a screw 45, a small plate 46 the purpose of which will be indicated hereafter (FIG. 6, 7 and 8). The axis 41 carries moreover, freely mounted thereon, an element 47 having the shape of a toothed sector, provided with an opening 48 traversed by a pin 49 carried by the lever 44. Thus the lever 44 operates with play, by the intermediary of the pin 49, the toothed sector 47 which has a certain degree of freedom of movement and the toothing of which, designated by 47a, is meshed with the pinion 14 rigid with the toothed sector 12 controlling the minutes indicator 4. The toothed sector 47 is submitted to the action of a control spring 50 which urges the sector to move in the counter clockwise direction, that is to say, in the sense opposite to the sense in which it moves when it is operated manually.

The timer disclosed and represented operates as follows:

When pressure is exerted on the push-button 18, the slider 17 acts on the cam 20 which operates the lever 23 to separate the wheel 25 from the wheel 28, thus interrupting the driving of the seconds hand 3. The slider 17 acts also on the hammer 30 which cooperates then with the heart 34, bringing back to zero the seconds hand 3. This hand is maintained in this position so long as pressure is exerted on the push-button 18.

Simultaneously, the cam 36, rigid with the cam 20, operates the rod 38 which controls the stop lever 40 and produces rotation of the lever 44 in the clockwise direction. Lever 44 drives by means of the pin 49, the toothed sector 47 to bring it into the position represented in FIG. 6, in which the toothed sector 12 occupies one of its extreme positions, with its arm 12b bearing against a stationary rest abutment 51. In this position, the toothing 12a of the toothed sector 12 is separated from the pinion 10, the connection between the toothed sector and the gearing of the movement being

thus interrupted; the indicator 4 then occupies its initial starting position.

When the user ceases to press on the push-button 18, it starts again instantaneously the seconds hand 3, as indicated previously, and also releases the lever 44 which moves then in the counter clockwise direction, under the action of the return spring 21 acting on the cam 20, for occupying the position represented in FIG. 7. During this displacement, the pin 49 of the lever 44 leaves the right edge, as seen in the drawing, of the opening 48 provided in the toothed sector 47, to release the sector 47. The control spring 50 then displaces slightly the sector 47 in the counter clockwise direction until the toothing 12a of the toothed sector 12 meshes with the pinion 10, in a position from which the indicator 4 of the minutes is driven by the gearing of the movement, the sector 47, always being controlled by the action of the spring 50, being thus "piloted" by the movement. It is to be noted that, during running of the indicator 4 (position of FIG. 7), the lever 15 is blocked in its working position by a beak 46a of the small plate 46 carried by the lever 44 and which constitutes a locking member.

When the 10 minutes necessary so that the two zones 4a and 4b of the minutes indicator 4 have passed under the openings 5 of the dial 6 are elapsed, the indicator 4 reaches the end of its stroke, that is to say the position represented in FIG. 8, in which the sector 47 bears, by the extremity of an elongated aperture 52 provided therein, on a stationary abutment 53 coaxial with the pinion 8. The toothed sector 12 reaches this position while being driven by the toothing 47a of the toothed sector 47, under the effect of the control spring 50 since, as shown by FIG. 8, in this position the toothing 12a of the toothed sector 12 has just left the pinion 10 thereby to effect driving by means of the gearing.

It is to be noted that, in this position at the end of the stroke, a slight play must remain, at 54, between the pin 49 and the right edge of the opening 48, so that at the next operation of the push-button 18, the lever 44 can move alone, without driving the toothed sector 47, on a small distance, in a movement during which the beak 46a of the locking member 46 releases the lever 15. This play can be adjusted owing to the fact that the pin 49 is eccentric. Thus, when the toothed sector 12 effects its running to bring it back into its starting position, under the effect of the toothed sector 47, the lever 15 is free, so as to permit the pinion 10 to unclick automatically so that it is not driven by the toothing 12a of the toothed sector 12 during the back movement of the toothed sector.

It is to be noted that a return spring 55 acts on the lever 44 when the lever occupies the position represented in FIG. 7, for producing on the lever a torque to absorb the plays the control mechanism could present, from the cam 36 up to the lever 44.

What I claim is:

1. A timer including a geared movement, a resilient driving device and a minutes indicator arranged to permit counting of a limited number of minutes, the timer comprising, a control mechanism to control movement of the minutes indicator along a stroke between two extreme start and stop positions, said control mechanism being alternately operable manually in one direction or by said driving device in a direction opposite to that effected by manual operation thereof, a connecting device positioned between the movement gearing and the

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minutes indicator, the connecting device including means to interrupt connection between the movement gearing and the minutes indicator at the end of the stroke of the minutes indicator, whereby upon manual operation of the control mechanism the minutes indicator is moved to its start position at which the minutes indicator is disconnected from the movement gearing and upon release of the control mechanism the driving device moves the minutes indicator to thereby connect the minutes indicator with the movement gearing.

2. A timer as claimed in claim 1 in which the control mechanism includes a toothed sector for operating the minutes indicator, the toothed sector being connected to the control mechanism with play therebetween to permit a degree of free movement between the sector and mechanism, the toothed sector also being moveable by said driving device such that upon manual operation of the control mechanism the toothed sector is moved to a first extreme position thereby moving the minutes indicator to its start position and upon release of the control mechanism the toothed sector becomes disengaged from the driving device to effect movement of the minutes indicator by its connection with the movement gearing, said toothed sector being displaced by the movement gearing until the minutes indicator reaches the end of its stroke whereupon the tothing of the toothed sector is disconnected from the movement gearing.

3. A timer as claimed in claim 1 including a seconds indicator connected to the movement gearing by a coupling device, the seconds indicator including a reset to

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zero device, the coupling device being controlled by a portion of the control mechanism, whereby upon manual operation of the control mechanism the seconds indicator is disconnected from the movement gearing and returned to zero and upon release of the control mechanism the seconds indicator is coupled to the movement gearing to rotate permanently.

4. A timer as claimed in claim 1 in which the connecting device includes a coupling device such that upon manual operation of the control mechanism and movement of the minutes indicator to its start position the coupling device is uncoupled to thereby interrupt connection between the minutes indicator and the movement gearing.

5. A timer as claimed in claim 4 in which the minutes indicator is rotatable around its stroke, the coupling device including a spring-biased movable pinion urged normally into its coupled position, whereby rotation of the minutes indicator to its start position effects uncoupling of the movable pinion.

6. A timer as claimed in claim 5 in which the connecting device includes a toothed sector adapted for meshed cooperation with the movable pinion and the connection between the minutes indicator and the movement gearing is interrupted at the ends of the stroke of the indicator when the sector tothing becomes unmeshed from the movable pinion, the driving device acting at the end of the stroke of the minutes indicator upon said toothed sector to bring the indicator into its stop position at the end of its stroke.

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