United States Patent [19]

Piguet

[11] **3,910,362**

[45] **Oct. 7, 1975**

[54] **TIMER**

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[73] Assignee: **Aqustar S.A.,** Geneva, Switzerland

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

[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

385,114 2/1965 Switzerland 58/74

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Attorney, Agent, or Firm—Silverman & Cass, Ltd.

[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.

6 Claims, 7 Drawing Figures

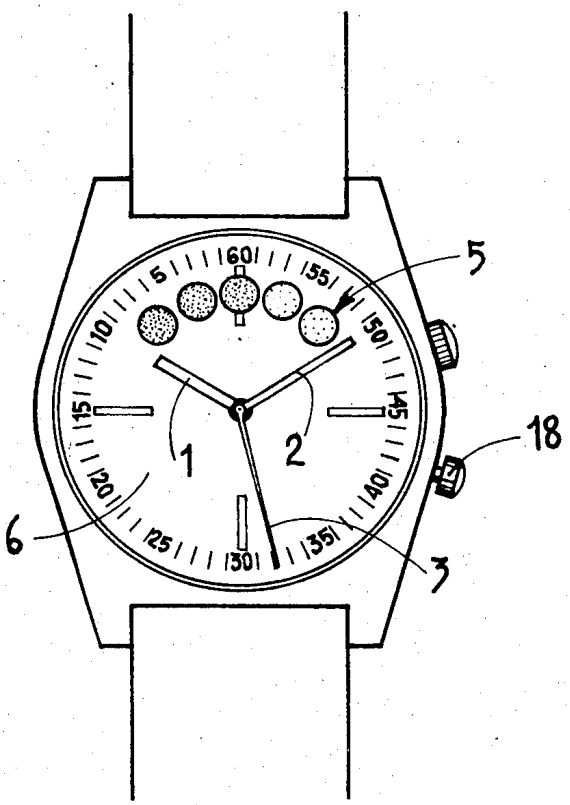
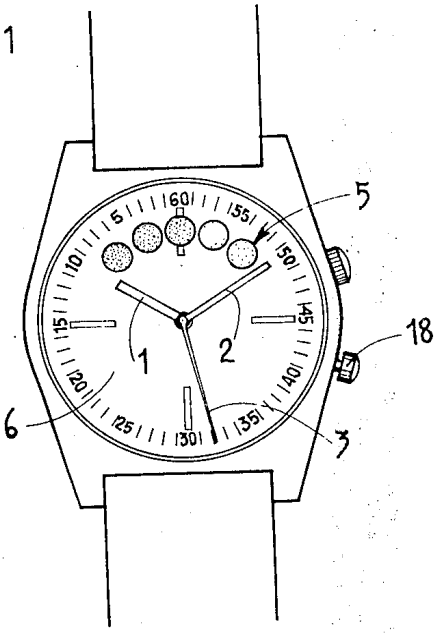


FIG. 1



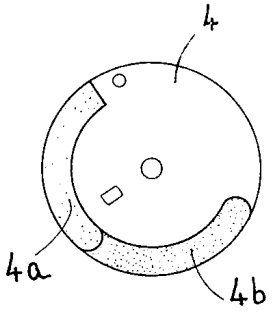


FIG. 2

FIG. 3

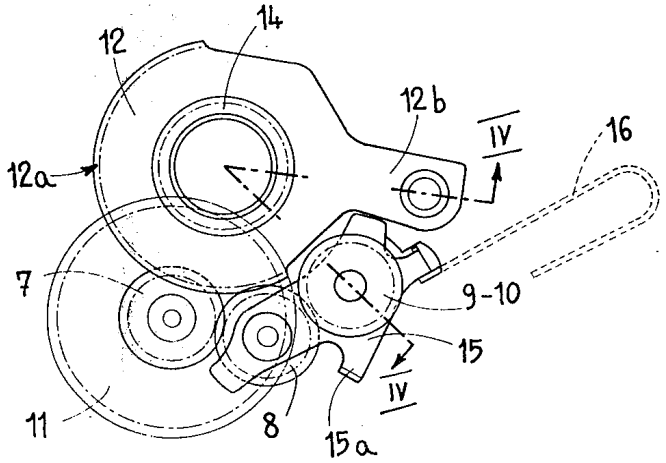
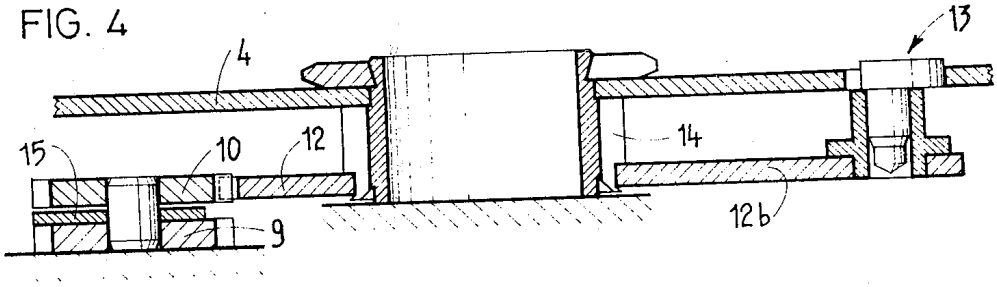


FIG. 4



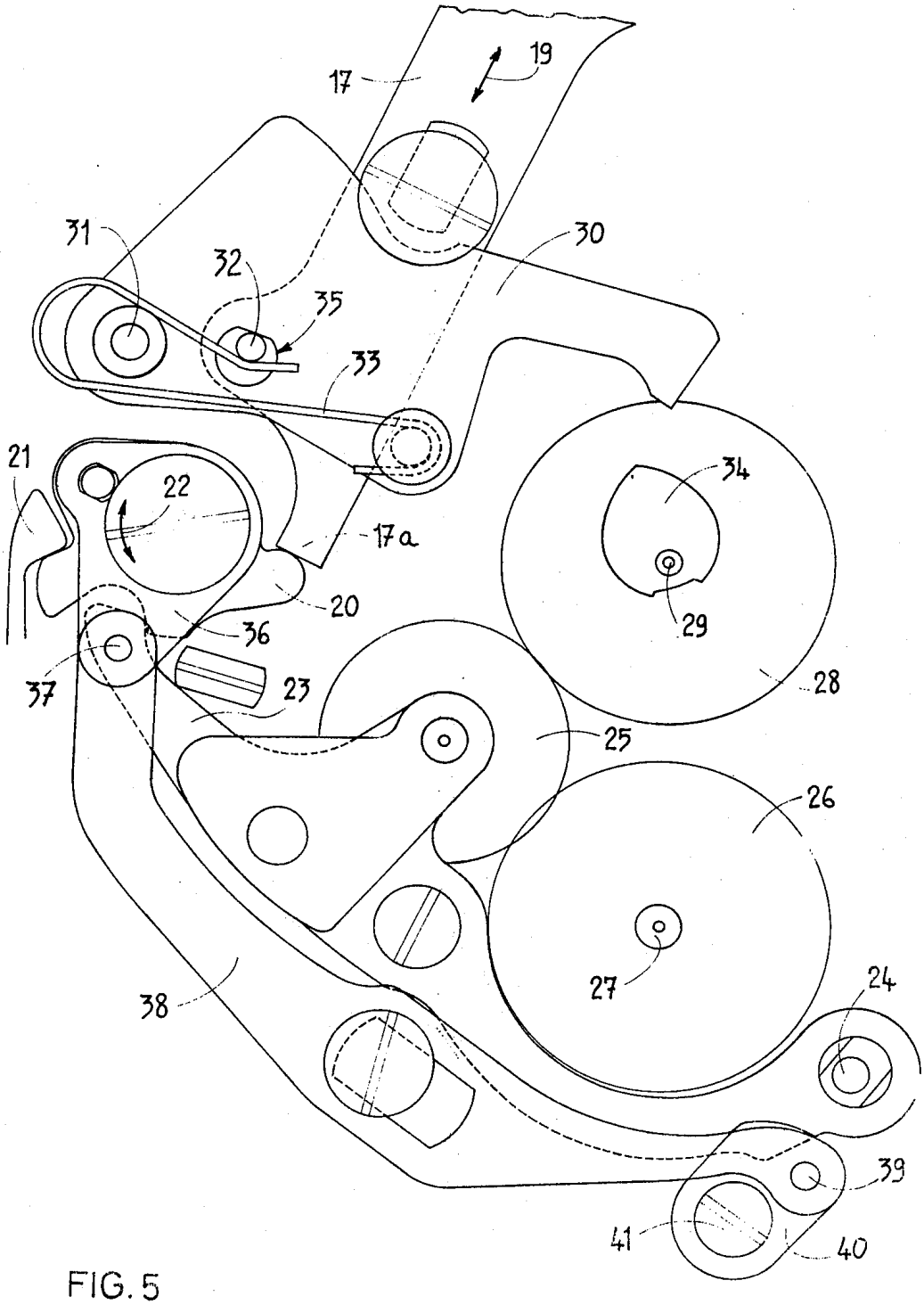

17
19
31
32
35
30
33
21
22
17a
34
20
29
36
37
23
28
25
26
27
38
24
39
41
40

FIG. 5

FIG. 6

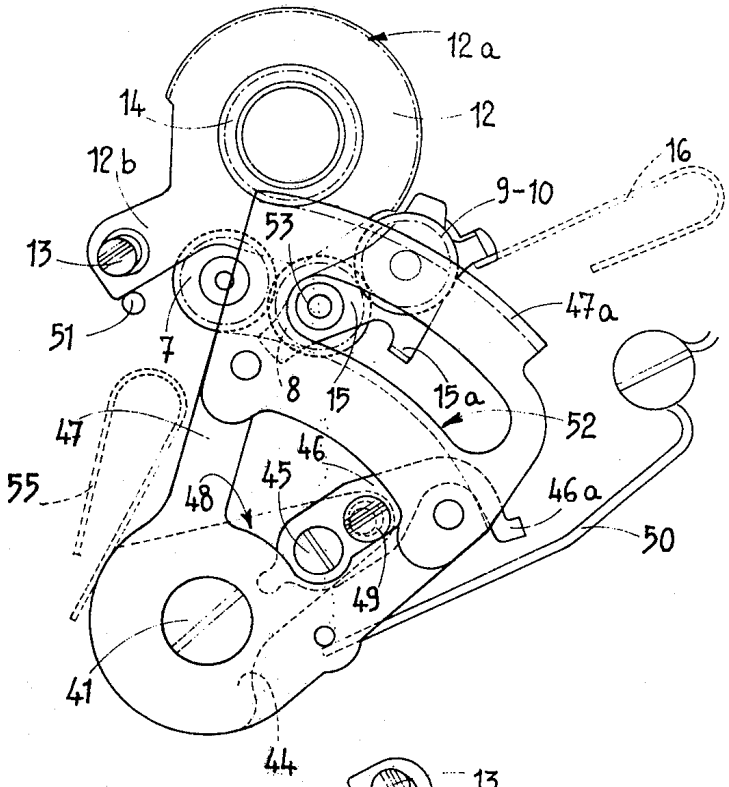
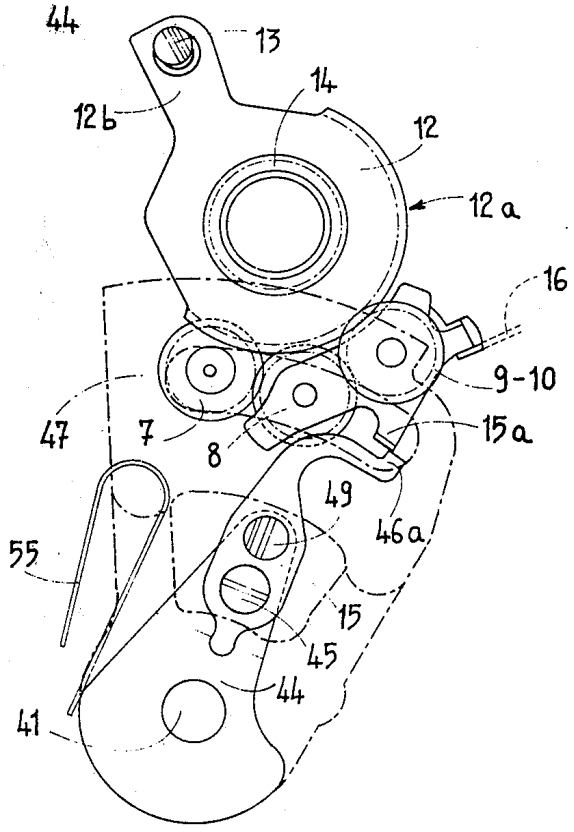

12a
14
12
12b
16
9-10
53
13
47a
51
7
8
15
15a
52
47
46
55
45
48
46a
50
49
41
44

FIG. 7


13
14
12b
12
12a
16
9-10
47
7
8
15a
49
46a
55
15
45
44
41

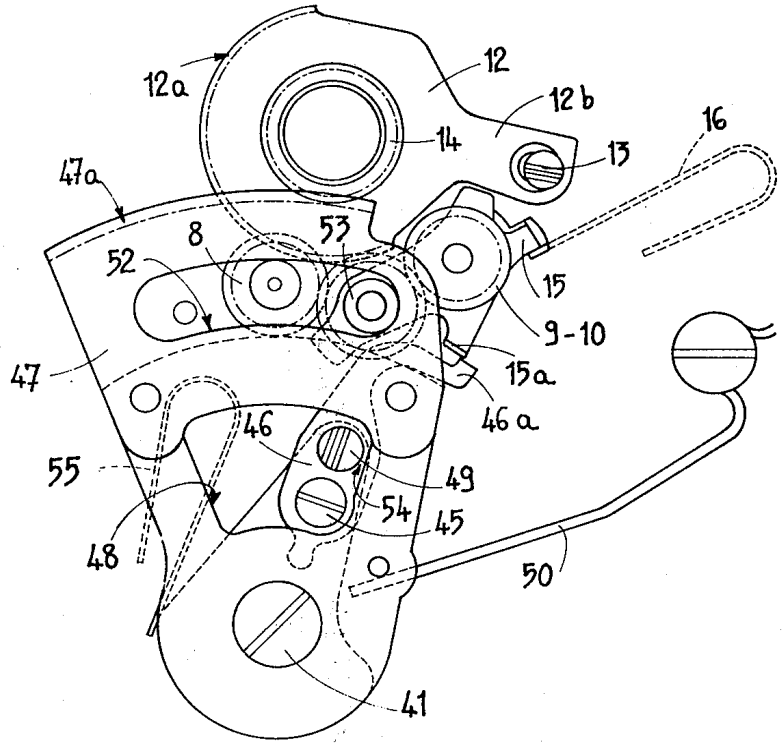

12a
12
12b
16
14
13
47a
8
53
52
15
9-10
47
15a
46a
46
55
49
54
45
48
50
41

FIG. 8

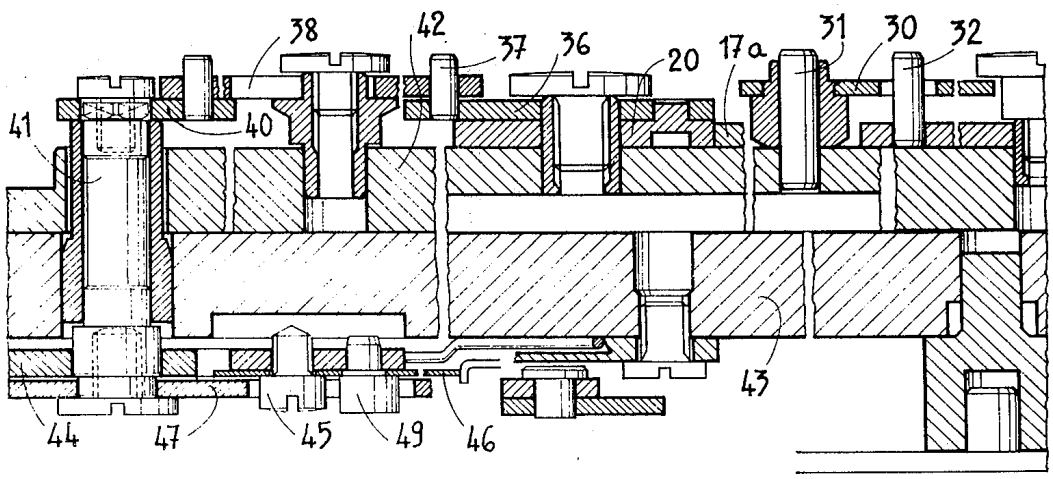

38
42
37
36
20
17a
31
30
32
41
40
43
44
47
45
49
46

FIG. 9

TIMER

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 oridinary 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 **4***a* and **4***b*, 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 **12***a* 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 **12***b* 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 **12***a* 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 **17***a*, 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 tha 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 **47***a*, 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 **12***b* bearing against a stationary rest abutment **51.** In this position, the toothing **12***a* 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 **12***a* 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 **46***a* 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 **4***a* and **4***b* 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 **47***a* of the toothed sector **47,** under the effect of the control spring **50** since, as shown by FIG. **8,** in this position the toothing **12***a* 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 **46***a* 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 **12***a* 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

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 toothing 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 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 toothing 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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