July 16, 1940. R. SARDESON 2,207,947

TIMER STRUCTURE

Filed Nov. 29, 1937 2 Sheets-Sheet 1

Fig.-1.

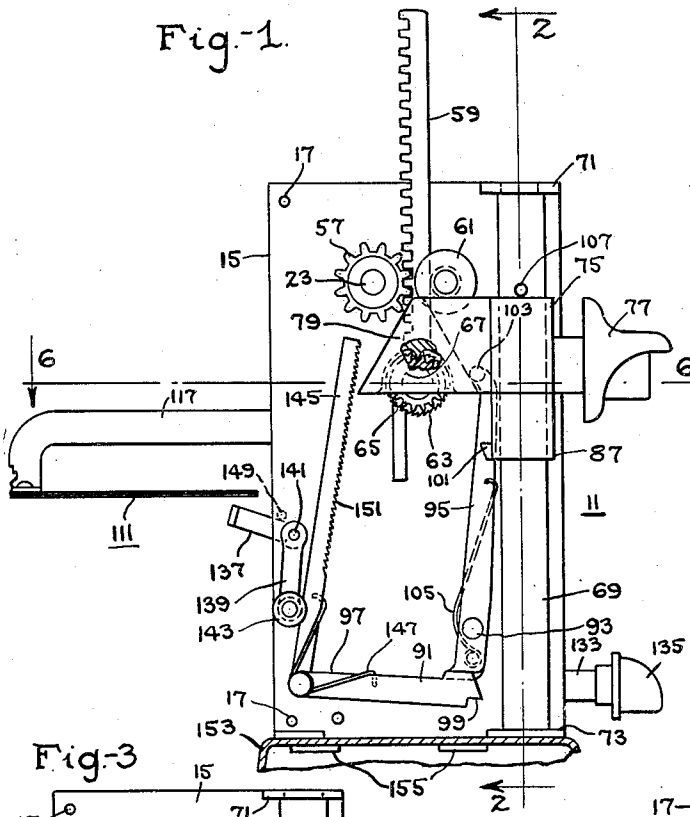


Fig.-2

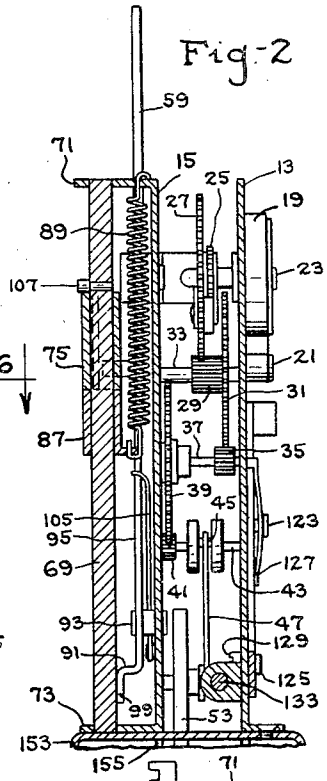


Fig.-3

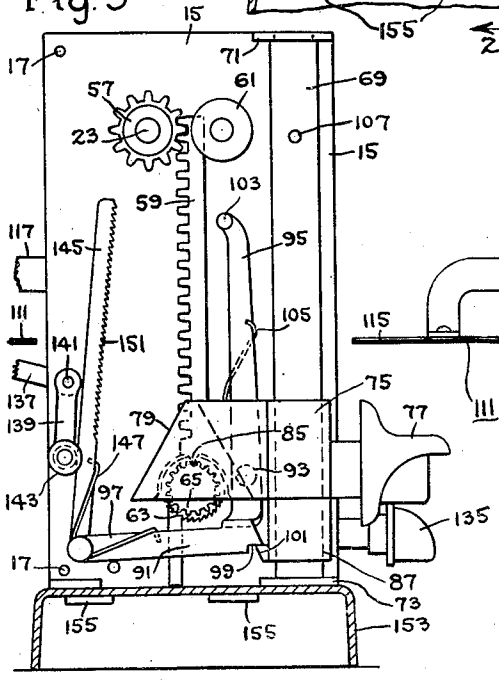
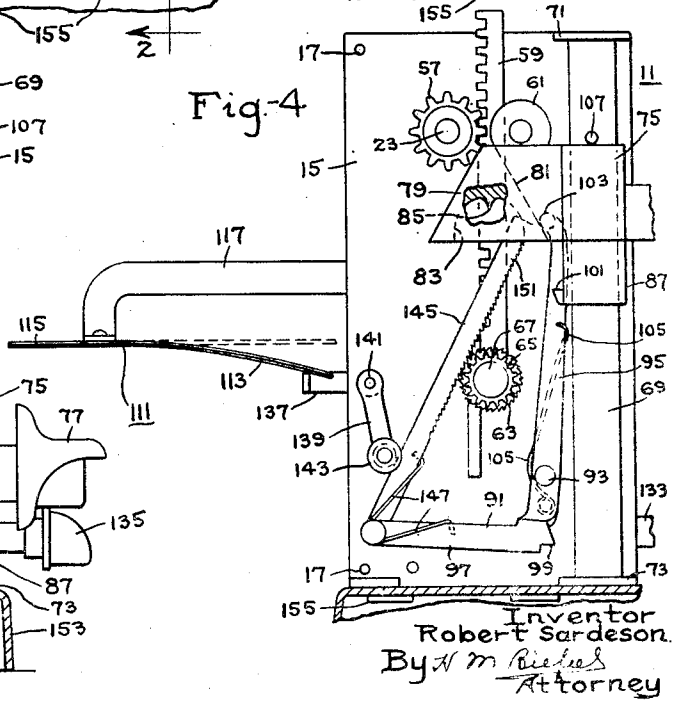


Fig.-4



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TIMER STRUCTURE

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Fig.-5

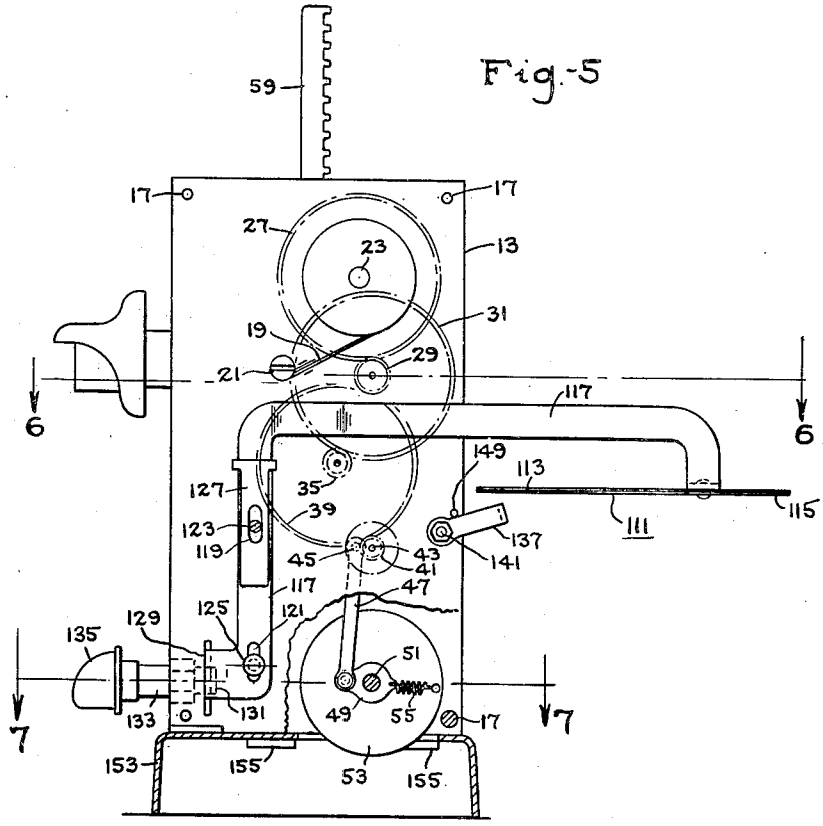


Fig.-6

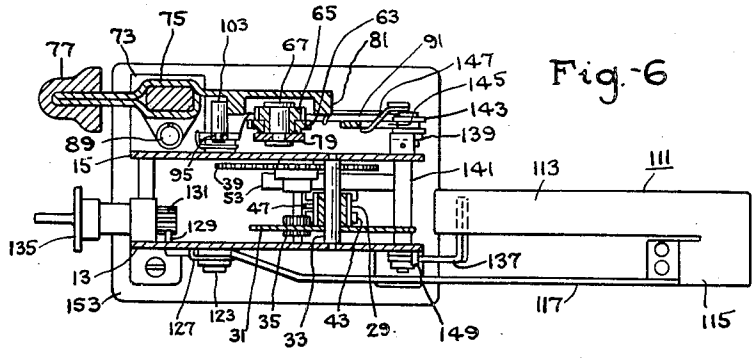
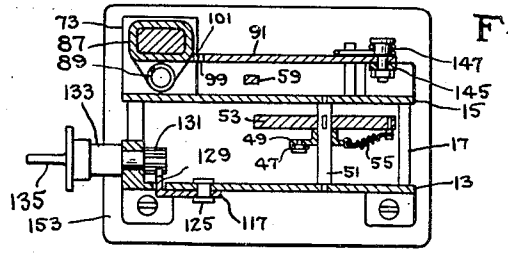


Fig.-7



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UNITED STATES PATENT OFFICE

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TIMER STRUCTURE

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Application November 29, 1937, Serial No. 177,137

6 Claims. (Cl. 161—16)

My invention relates to timing devices and particularly to unitary mechanical timers.

Among the objects of my invention are the following:

To provide a self-contained controller including a mechanical timer; to provide a spring driven timer structure including an actuating means and a mechanism to be actuated or released thereby; to provide a relatively simple and compact self-contained timer structure adapted for association with a toasting or cooking chamber and to provide a unitary mechanical timer structure having means to selectively release a latched mechanism after a pre-determined time interval or after a variable time interval.

Other objects of the invention will more fully appear from the following description and the accompanying drawings and will be pointed out in the annexed claims.

In the drawings,

Fig. 1 is a view mainly in side elevation, but partly in section, of a mechanical timer embodying my invention,

Fig. 2 is a vertical sectional view therethrough taken on the line 2—2 of Fig. 1,

Fig. 3 is a view similar to Fig. 1 showing parts of the timer in the positions occupied by them just after the spring has been wound up and at substantially room temperature,

Fig. 4 is a view similar to Fig. 3 but showing the positions of the parts when the thermostat is heated and just after release of the latch,

Fig. 5 is a view mainly in side elevation, but partly in section, taken from the opposite side of that of Fig. 1,

Fig. 6 is a view in horizontal section therethrough taken on the line 6—6 of Figs. 1 and 5, and

Fig. 7 is a view in horizontal section therethrough taken on the line 7—7 of Fig. 5.

The device embodying my invention is particularly applicable for use with toasters and the device shown in the drawings has been developed with reference to such use. I do not however desire to be restricted to such use as my device is adapted to other similar toasting, cooking or heat treating devices. The device embodying my invention is particularly useful in appliances in which substantially the same operation is to be effected a number of times in succession.

A timer structure designated generally by the numeral 11 includes a rear side plate 13 and a front side plate 15 which plates are spaced apart and held by spacing rods 17, any desired number of which may be utilized and I have shown four such spacing rods.

A power device includes a spring 19 which is substantially the same as those used in clock mechanisms, one end of spring 19 being suitably secured to a pin 21 on plate 13 while its other end is secured to a spring shaft 23 which is rotatably mounted in the two plates 13 and 15 in a manner well known in the art. Spring shaft 23 has mounted thereon a ratchet wheel 25 and a pair of pawls shown generally only in Fig. 2 of the drawings, as well as a spur gear 27. No detailed showing is made of the pawls since they are old in the art and operate in the usual manner. Spur gear 27 meshes with a pinion 29 which is rigidly connected with a second spur gear 31, both pinion 29 and gear 31 being secured on a second shaft 33 rotatably mounted in the frame structure including the plates 13 and 15. Spur gear 31 meshes with a pinion 35 fixedly mounted on a third shaft 37 which shaft has fixedly mounted thereon a spur gear 39, meshing with a pinion 41 mounted on a crank shaft 43 having a crank pin 45.

Crank pin 45 has connected therewith one end of a connecting rod 47 the other end of which is connected to one end of a lever arm 49 loosely mounted on a shaft 51 which may be rotatably supported in the plates 13 and 15 and which has fixedly mounted thereon a balance wheel 53. A small helical spring 55 connects the other end of the lever arm 49 with the outer peripheral portion of the balance wheel 53. The details of this balance wheel and its connection with the connecting rod 47 constitute no part of my present invention but are disclosed and claimed in my copending application Serial No. 152,580, filed July 8, 1937, and assigned to the same assignee as is the present application.

Spring 19 can be wound up by means to be hereinafter described and is then adapted to unwind, causing rotation of the spur gears and pinions and reciprocating movement of connecting rod 47 with reciprocal turning movement of the balance wheel 53, the spring being adapted to unwind to substantially its initial condition in a given time interval, that is the mechanical timer thus far described is a constant speed timer. While I have illustrated and described a spring driven timer, my invention is not limited thereto and any equivalent power means, e. g., an electric motor, may be used instead of the spring.

Means for winding up the spring 19 includes a pinion 57 fixedly mounted on spring shaft 23 at that end thereof opposite to the end to which

spring 19 is connected. A reciprocally movable rack bar 59 meshes with pinion 57 and is held in engagement therewith by a grooved roller 61 rotatably mounted on plate 15. At the lower end of rack bar 59 are mounted a ratchet wheel 63 and a spur pinion 65 fixedly secured to each other but rotatable relatively to the rack bar 59 by their mounting on a pin 67. The normal or inoperative position of rack bar 59 is substantially that shown in Figs. 1, 2 and 5 of the drawings, that is in an upward position, suitable stop means being provided to prevent extreme or undesired unwinding of the spring 19 which of course must have some tension even when the timing mechanism is in its run-down or normal inoperative position.

A vertically extending rod or standard 69 is supported by plate 15 and is spaced a suitable distance away from this plate and may be supported by laterally extending lugs 71 and 73 integral with plate 15. While I have shown a particular form of supporting means for the standard 69 I do not desire to be limited thereto. It may be here pointed out that I prefer to make the standard 69 of a cross sectional form other than circular in order to prevent other mechanism slidably mounted thereon from having any appreciable turning movement relatively to the timer structure, while permitting reciprocal movement thereof on the standard 69.

An actuating means for moving the rack bar downwardly and simultaneously winding up the spring includes a carriage 75 having a heat-insulating actuating knob 77 at the front end thereof. The carriage 75 may include an intermediate portion having a contour complementary to that of the cross sectional area of the standard 69 and surrounding and closely engaging the standard, a forwardly-extending portion on which knob 77 is mounted and a rearwardly-extending portion 79 although I do not desire to be limited to this particular design. The rearwardly extending portion 79 of the carriage has a cam 81 mounted thereon at its inner face, which cam is of substantially triangular form particularly as to its outer surface, while it is provided with a recess 83 in its bottom surface (see Fig. 4) having therein a downwardly projecting tooth 85. When carriage 75 is moved downwardly tooth 85 will engage in one of the spaces between the teeth of pinion 65 for a purpose to be hereinafter referred to.

As it is an object of my invention to provide a controller timer which may be actuated either manually or in any other way to initiate a toasting or cooking operation or to wind up or energize the power means exemplified here by spring 19 so that an element of an appliance may be actuated, moved or released after a time interval, I have illustrated such an element by a slidable member 87 comprising a tubular member fitting around the standard 69. As shown slider 87 is positioned below carriage 75 and is adapted to be biased to its normal upper position by a spring 89 one end of which is suitably connected to a lug on slider 87 while the other end is connected to a fixed part of plate 15 at the upper end thereof. I preferably locate the spring 89 between the standard 69 and plate 15. While I have shown a relatively simple slider member 87 I desire it to be understood that this showing is general and is to represent any element or means which is to be reciprocally movable in order to carry out any heating operation requiring a time interval to effect the same, such as a bread slice support in a toaster.

A plural arm latching means 91 is pivotally mounted on plate 15 as by a fixed pin 93 and includes a substantially vertically extending arm 95, a substantially horizontally extending arm 97 and a detent shoulder 99 at or near the junction of the two arms. Slider 87 is provided with a tooth or projection 101 adapted to be moved under the detent shoulder 99 to thereby hold slider 87 and any other parts connected therewith in an operative position.

The upper end of arm 95 has a pin 103 extending laterally from its outer face which pin is adapted to be engaged by one of the outer surfaces of cam plate 81 during upward movement of the rack bar and the cam plate, this position being shown in Fig. 4 of the drawings. Latch 91 is adapted to be held normally in the position shown in Fig. 3 by a spring 105 the design and construction being such that tooth 101 on mechanism 87 can ride past the detent shoulder 99 during downward movement thereof and then under shoulder 99 to be held thereby until released by turning movement of latch 91.

It is obvious from the drawings and from the description thus far that downward pressure on knob 77 by an operator effects downward movement of carriage 75, element 87 and of rack bar 59. This downward movement is continued until, as has just been explained, tooth 101 is moved under shoulder 99 whereby element 87 is held in this position until released after a time interval, spring 19 immediately starting to unwind and causing upward movement of rack bar 59 and of carriage 75 this upward movement continuing until carriage 75 abuts against a stop pin 107 on standard 69. It is further obvious that element 87 may be released from the latch before it would normally be released by engagement of cam 81 with pin 103, by an upward movement of carriage 75 by an operator, which upward movement if continued until cam 81 engages pin 103 will effect release of mechanism 87 from latch 91.

As it is desirable if not necessary in certain cases, to provide thermal means to cause release of the latch after a shorter time interval when a timer of this kind is associated with a toaster, I provide a bimetal element 111 which is preferably though not necessarily of the kind disclosed and claimed in my copending application Serial No. 127,100 now Patent No. 2,171,895 granted Sept. 5, 1939. This bimetal element includes a main bar 113 and an auxiliary or compensating bar 115 the element being supported by the inner end of bar 115 on a bracket arm 117. This bracket arm is adjustably mounted against side plate 13, its form being shown particularly in Fig. 5 of the drawings as generally of L-shape. The vertically extending portion of bracket arm 117 has two elongated slots 119 and 121 therein adapted to slide on pins 123 and 125, a bowed leaf spring 127 being held by pin 123 against the outer surface of arm 117 to press the bracket arm against the outer face of plate 13. At its lower end bracket arm 117 is provided with a laterally extending portion 129 (see Figs. 6 and 7) extending through plate 13, the edge face of which is provided with teeth meshing with a pinion 131 mounted on a manually adjustable shaft 133 having an adjusting knob 135 thereon.

When bimetal element 111 is at normal or room temperature it will be substantially flat or

straight as shown in Fig. 5 of the drawings. The movable end 113 of bimetal element 111 is adapted to engage one arm 137 of an offset bellcrank lever comprising, in addition to arm 137 adjacent to plate 13 a second arm 139 adjacent to plate 15 and a pivot pin 141 which pivot pin is mounted in the two plates 13 and 15 in such manner that it may turn relatively thereto.

Arm 139 has a roller 143 mounted thereon at its outer end which roller is adapted to engage with a ratchet lever 145 pivotally mounted on the outer end of latch arm 97 which ratchet lever is biased in a given direction by spring 147. As shown more particularly in Fig. 1 of the drawings a limit of turning movement of ratchet lever 145 is fixed by a stop pin 149 engageable by arm 137 of the bellcrank lever. In the normal position of ratchet lever 145, it and particularly the toothed edge 151 of the lever is out of the path of the return movement of ratchet wheel 63 but when bimetal element 111 flexes in the manner shown in Fig. 4 of the drawings, ratchet lever 145 is caused to turn in a clockwise direction (as seen in Figs. 1, 3 and 4) so that it is in the path of return movement of ratchet wheel 63.

As has already been hereinbefore stated tooth 85 of cam 81 is in engagement with pinion 65 during the downward movement of carriage 75 and of rack bar 59 but in addition thereto this interlocking of the tooth and the pinion continues during the return or upward movement of carriage 75 caused by the unwinding of spring 19 and transmission of such movement through pinion 57 to rack bar 59 to cause upward movement of the latter. It is thus evident that, when engagement of ratchet lever 145 and ratchet wheel 63 occurs, ratchet lever 145 is carried or moved in a generally upwardly direction thereby causing a turning movement of plural arm latching means 91 about its pivot 93 in a manner to effect release of mechanism represented by slider 87 therefrom with consequent quick upward movement of element 87 and carriage 75 because of spring 89.

It is further evident that as soon as slider 87 engages with carriage 75 the latter is moved quickly upward independently of the relatively slow movement of rack bar 59 so that tooth 85 is disengaged from pinion 65 whereby turning movement of ratchet wheel 63 and pinion 65 on their supporting pin is permitted so that ratchet wheel 63 can travel idly along ratchet lever and so that the spring 19 may unwind fully if permitted to do so by the operator who may of course immediately start another operation of the timer and of the mechanism controlled thereby. The details of the ratchet lever, plural latching means are disclosed and claimed in my copending application Serial No. 130,926 now Patent No. 2,147,386 granted Feb. 14, 1939 to which further reference may be made.

As has already hereinbefore been stated the timer mechanism illustrated operates at substantially constant speed, but a variable time interval of release may be obtained by actuation of knob 135. If knob 135 is turned to effect downward movement of bracket arm 117 and of bimetal element 111 the latter will be caused to engage arm 137 sooner than would be the case if bracket 117 and bimetal arm 111 were moved upwardly. Turning movement of ratchet lever 145 into engagement with ratchet wheel 63 and consequent actuation of latching means 91 and release of element 87 will therefore be effected sooner than would otherwise be the case. It is evident therefore that release of element 87 may be effected either at the end of a fixed time interval as when the thermostat 111 remains at its normal or room temperature, in which case the detent is moved by engagement of cam plate 81 with pin 103. Release of the latch or detent may be effected after a shorter time interval, the length of which decreases with increase of temperature of bimetal element 111, this release being effected by movement of ratchet lever 145 in a generally upward direction when engaged with ratchet wheel 63 while the latter is being moved upwardly and its rotation prevented. This elevation of lever 145 rocks the plural arm latch 91 by reason of the pivotal connection of lever 145 with the second latch arm 97. It is obvious that a variable speed timer may be used in place of the constant speed timer shown, without departing from the essence of the invention.

I have shown, in certain of the figures of the drawings, a device or appliance with which the unitary timer hereinbefore described may be operatively associated, having a base 153 and the timer as provided with integral depending portions 155 on one or more of its side plates. These portions 155 are adapted to extend through suitable openings in the upper flat part of base 153 to thereby interlock the timer structure with the device.

It may here be pointed out that the device disclosed and claimed in the present application differs in certain essential details from other similar devices in that the timer structure is a unitary or self-contained one supporting not only the thermal element but also a standard on which is slidably mounted a carriage as well as an element or member adapted to be held in predetermined latched position during an operation and to be released after a predetermined or variable time interval. In case the device embodying my invention is applied to a toaster, the element may be the bread slice support. I am fully aware of other mechanisms, for instance toasters in which the toaster structure itself carries the standard or standards on which a carriage is slidably mounted and on which standards are also mounted bread slice supports or means connected to bread slice supports. The device embodying my invention thus provides a simplified construction effective for the same purposes as the earlier devices referred to hereinbefore but has the advantage of greater adaptability for association with other cooking devices and can be inserted therein or mounted thereon and removed therefrom as a unit. The timer assembly can be assembled as a unit and tested as to its operation, before being mounted in or on an appliance to be controlled thereby.

It may be further pointed out that the use of a standard having a cross sectional form other than circular permits of using only a single standard which will have the necessary directive effect of holding the reciprocable mechanism, which may be a bread slice support when the timer assembly is operatively associated with a toaster, in proper operative relationship relatively to the toaster. This makes for ease in assembly of the timer on and with a cooking or toasting device.

It is evident that modifications may be made in the device shown and described while remaining within the spirit and scope of my invention and I desire that all such modifications shall be included in the appended claims.

I claim as my invention:

1. A controller assembly for mounting on an appliance to govern an operation of an element

of said appliance, said assembly comprising a power driven timer structure, a single standard of non-circular cross-sectional shape mounted on and supported solely by said timer structure at one side thereof, an element of said appliance supported solely by said assembly, movable between two opposed limit positions and biased to one of said positions, said element having a portion mounted on the standard and guided solely thereby in its reciprocal movements, a detent on the assembly for holding said element in its other limit position and an actuator movably mounted on and supported solely by said standard and arranged to operatively engage said element to move it against said bias to its other limit position and into operative engagement with said detent, said actuator being effective during said movement to energize said power driven timer and being returnable to its initial position by the timer and effective during its return movement to cause release of said detent.

2. A mechanical timer assembly for causing movement of an element after a time interval, said assembly including a frame, a spring, a single standard of non-circular cross-sectional shape supported by said frame at one side thereof, an element reciprocally movable on said standard and supported and held in proper operative position solely by said standard, means supported solely by the frame for biasing said element to one limit position, a carriage slidable on said standard and supported solely thereby adapted to be moved manually in one direction to move said element to its other limit position and connected to simultaneously wind up said spring, said carriage being returnable in the other direction by said spring as it unwinds and a detent on the timer to hold said element in said other limit position, release of said element being effected by the action of said carriage on said detent during return movement of said carriage.

3. A timer as set forth in claim 2 in which the cross sectional shape of said standard is other than circular to prevent lateral turning movement of said element thereon.

4. A unitary mechanical timer assembly for causing release of an element after a time interval, said assembly including a frame, a spring driven gear train therein, a single standard supported by said frame at one side thereof in substantially fixed position relatively to the frame, said standard having a polygonal cross sectional area, an element reciprocally slidable on said standard supported solely thereby and prevented from turning movement relatively to the timer by inter-fitting engagement with said standard, a spring connected to said timer frame and to said element for biasing the same to a position at one end of its sliding movement, a detent, a carriage reciprocally slidable on said standard manually actuable to move said element in one direction into engagement with said detent and connected to simultaneously wind up the timer spring and movable in the opposite direction by the timer as the spring unwinds and causing the detent to release said element at substantially the end of its movement in the opposite direction.

5. A controller assembly as set forth in claim 1 in which the cross sectional area of said standard is of polygonal shape and the contour of the element portion mounted on the standard is complementary thereto.

6. A timer assembly as set forth in claim 2 including a thermally-actuable element supported solely by said timer assembly for cooperating with said timer to vary the length of time during which said reciprocally movable element is held by the detent, said length of time decreasing with increase of temperature of the thermally-actuable element.

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