Feb. 2, 1954 E. J. DOYLE 2,667,921

TWO-SPEED TIMER

Filed Sept. 20, 1951

FIG. 1

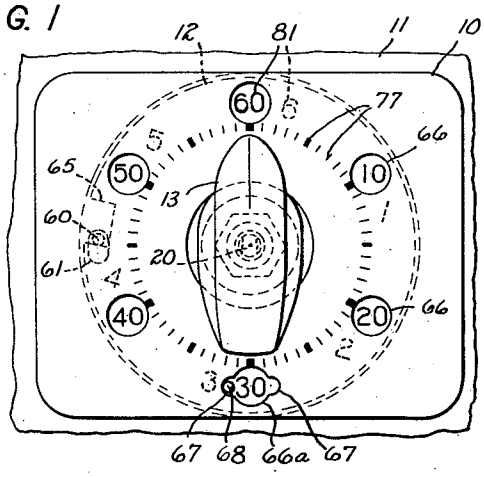


FIG. 2

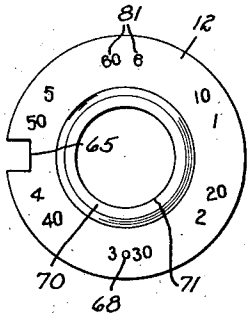


FIG. 3

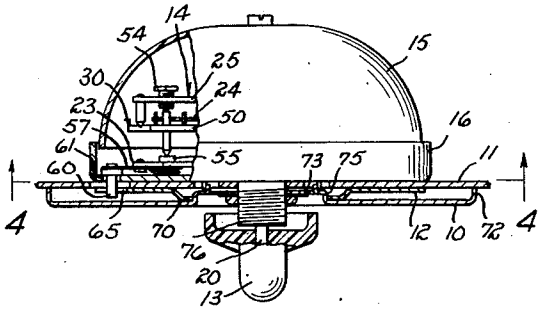


FIG. 4

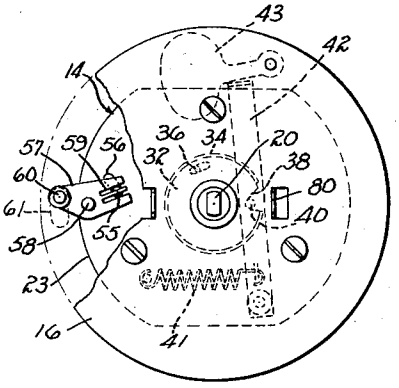


FIG. 5

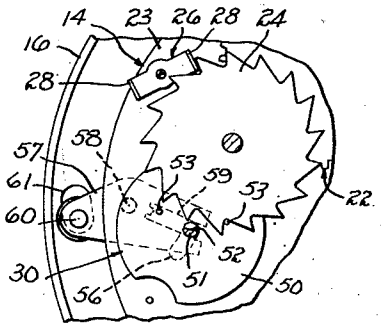


FIG. 6

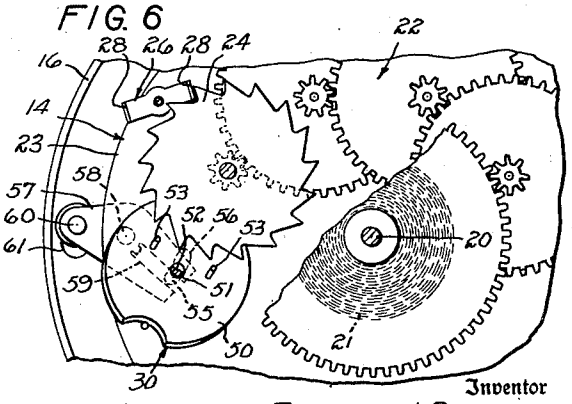
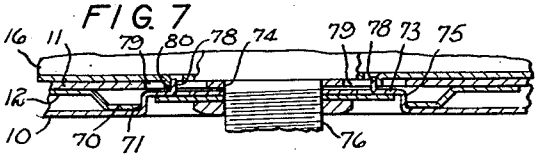


FIG. 7



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TWO-SPEED TIMER

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8 Claims. (Cl. 161—15)

1

This invention relates to clockwork mechanisms and to timers and more particularly to improvements in multi-speed timers.

By "timers" is meant a mechanism of the type generally used to measure a preselected time interval. A "multi-speed timer" is a timer capable of operation at more than one speed, i. e., the timer may be set to operate at a relatively high speed so as to measure intervals up to one maximum and the timer may also be set to operate at a slower speed so as to measure intervals up to a greater maximum.

It is an object of the present invention to provide a simple, compact, and economical timer construction capable of operation at a plurality of speeds and having means for preventing time setting and measuring errors.

Another object of the invention is to provide a multi-speed timer having easily settable speed selecting means and easily and accurately settable interval selecting and measuring means each of which is readily visible to indicate to even the most casual observer the selected position of the timer.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application of which will be indicated in the appended claims.

In the drawings:

Fig. 1 is a front elevational view of an interval timer which embodies the principles of the present invention;

Fig. 2 is a front elevational view, on reduced scale, of the dial incorporated in the construction shown in Fig. 1;

Fig. 3 is a top plan view of the mechanism shown in Fig. 1 with the front portion of the encasement shown in cross section so as to reveal elements of the clockwork mechanism;

Fig. 4 is a view taken along the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary view of the clockwork mechanism showing details of the escapement included in the mechanism;

Fig. 6 is a view similar to Fig. 5 but showing elements of the escapement in operative positions other than those shown in Fig. 5; and

Fig. 7 is an enlarged horizontal cross-sectional view of the front portion of the timer.

For purposes of exemplification, the timer illustrated in the drawings is of the type which includes a clockworks and which is mounted upon

2

a panel 11 which may comprise a part of a household appliance, industrial mechanism, or otherwise. The panel supports a face plate 10 and dial 12 adjacent its front surface and a conventional setting knob or pointer 13 is arranged to be manually set in relation to the face plate and dial and to be mechanically driven by a clockwork mechanism 14 mounted within a bell 15 disposed rearwardly of the panel 11. The open end of the bell is closed by a cover and clockworks frame support 16 which is attached to the panel by means which will be described hereinafter.

The clockworks 14 is the spring wound type and includes a winding arbor 20 connected to a main spring 21 and extending through the frame support 16 to the front of the panel and face plate to receive the setting knob 13. When the knob 13 has been moved clockwise, as viewed in Fig. 1, to effect a setting of the timer, the main spring 21 is energized thereby to set into operation a gear train 22 which is operatively associated with the winding arbor 20 to return the arbor and setting knob to the original "at rest" position.

The gear train or time train 22 comprises a plurality of intermeshed gear wheels and pinions supported by staffs pivoted between front and rear frame plates 23 and 25. The gear train drives an escape wheel 24 at a relatively rapid rate and a retarding member or clutter 26 is pivotally mounted adjacent the escape wheel to retard the movement thereof and prevent too rapid dissipation of power of the wound main spring. The clutter 26 has a pair of ears 28 at its opposite ends which alternately engage the teeth of the escape wheel 24 in the manner of pallet pins in a conventional escapement. Thus, the clutter oscillates at a rate which is proportional to its mass and the driving force imposed thereon by the escape wheel. The mass of the clutter, of course, determines its moment of inertia and if the clutter inertia is small compared to the driving force of the escape wheel, the clutter will oscillate at a rapid rate and the main spring will dissipate its power at a relatively rapid rate. The moment of inertia of the clutter may be varied according to its mass and in the assembly disclosed, the mass of the clutter is selected so as to permit the main spring to dissipate its power in 6 minutes from the fully wound position. Accordingly then, if the setting knob 13 is manually rotated one complete revolution, it will take 6 minutes for the knob to be rotated under the power of main spring to the original "at rest" or starting position.

The aforedescribed timer mechanism is rendered capable of operation at two speeds by the

incorporation of additional retarding mechanism indicated generally by reference numeral 30. The retarding mechanism 30 is arranged to be selectively shifted between an inoperative position and an operative position wherein the escape wheel 24 will be engaged by the retarding mechanism in much the same manner in which the clutter 26 engages the escape wheel. The details of construction of the retarding mechanism 30 will be described hereinafter but it should be understood that the retarding mechanism is arranged to retard the time train so that the main spring will dissipate its power from a maximum wound position to the unwound condition in 1 hour. In other words, when both the mechanism 30 and the clutter 26 are retarding the escape wheel, it will take 1 hour for the setting knob 13 to be mechanically returned one revolution to the "at rest" or starting position.

A pair of timing disks 32—34 are supported by the arbor 20 at the end thereof opposite the setting knob 13 so that the disks are disposed rearwardly of the frame 25 and within the bell 15. The disk 32 is affixed to the arbor 20 for rotation therewith and the disk 34 is rotatable relative thereto a limited amount determined by a pin and slot lost motion connection 36 between the disks. Each of the disks is provided with a peripheral notch 38 to accommodate a pin 40 projecting from a bar 42 pivotally supported on the rear frame plate 25. A spring 41 secured to a post on the frame plate 25 is attached to the bar 42 so as to pivot the same towards the disks 32 and 34, whereby the pin 40 will be biased into the notch. The upper end of the bar 42 is arranged to thrust against a clapper 43 pivotally mounted on the frame support 16 and when the pin 40 is disposed within the disk notches 38, the clapper 43 is supported in an uppermost position.

In setting the timer to measure a preselected interval, the setting knob 13 is rotated (clockwise in Figure 1) whereby the arbor and timer disks are also rotated so as to cam the pin 40 out of notches 38 so that the pin will engage the periphery of the disks. When the timer is under the mechanical control of the main spring the disks are rotated with the arbor in the opposite direction to return the notches to registry with the pin 40 whereupon the spring 41 snaps the pin into the notches. The snap action of the bar thrusts the freely pivoted clapper upwardly so that the same will engage the bell 15 to give an audible signal at completion of the time interval. Thus the signal is sounded when the setting knob 13 is returned to the "at rest" or starting position.

Turning now to the retarding mechanism 30, attention is directed to Patent 2,543,032, issued February 27, 1951, to Laviana wherein there is disclosed shiftable retarding mechanism generally similar to the mechanism 30. The retarding mechanism includes a pallet member 50 which is mounted for movement toward and from engagement with the escape wheel 24. The pallet is supported on a staff 51 which is provided with a cutout 52 intermediate the ends thereof to provide clearance for passage of the teeth of the escape wheel. The pallet is provided with a pair of pallet pins 53 which alternately engage the escape wheel 24 when the pallet is shifted toward the same for operative association therewith. The pins 53 engage the escape wheel teeth similar to the ears 28 of the clutter 26 so as to retard the speed of the escape wheel and the associated time train 22 whereby the rate at which the power of the main spring is dissipated is materially reduced.

The staff 51 which supports the pallet member is supported at one end in fixed bearing 54 in frame plate 25 and the other end of the staff 51 is pivotally supported in a shiftable bearing 55 which is mounted for sliding movement in a slot 56 in the other frame plate 23. The size of the slot 56 of course governs the movement of the bearing 55 therein and thereby governs the movement of the pallet 50 toward and from the escape wheel 24.

Shifting of the bearing 55 is accomplished by a lever 57 which is pivoted between its ends on a pin 58 carried by the frame plate 23. The inner end of the lever is forked as at 59 to straddle the end of the shiftable bearing 55 which projects through the frame plate 23. The opposite end of the lever is provided with a pin 60 which projects forwardly through a slot 61 in the frame support 16. Thus, movement of the pin 60 within the slot 61 causes the lever 57 to shift bearing 55 toward and from the escape wheel 24 whereby the pallet 50 is shifted to and from operative association with the escape wheel. As viewed in Figs. 1 and 5, when the pin 60 is shifted upwardly in the slot 61, the pallet is shifted towards the escape wheel and when the pin 60 is in the lowermost position in the slot, the pallet is disengaged.

The mass and moment of inertia of the pallet 50 in the present example has been selected to retard the time train by an amount such as will require 1 hour for the main spring to unwind from completely wound condition. It should be understood that the pallet 50 operatively engages the escape wheel simultaneously with the clutter 26 so that it is the combined mass and moment of inertia of the clutter and pallet which determines the maximum time interval to be measured by the aforedescribed timer mechanism. Accordingly then, when the pallet 50 is disengaged from the escape wheel, the timer mechanism will measure a maximum interval of time of 6 minutes and when the pallet 50 engages the escape wheel, the timer mechanism will measure a maximum interval of 60 minutes.

In accordance with the present invention means are provided for conveniently shifting the retarding mechanism 30 to select the rate of operation of the timer and to readily indicate the selected condition of the timer and to facilitate accurate setting of the timer to measure the desired interval. The means referred to above includes the dial 12 which is mounted for limited rotary movement relative to the panel and face plate, as will appear hereinafter. The dial 12 is provided with a peripheral notch 65 which straddles the lever pin 60 projecting through the notch 61 provided in the frame support and through an aperture provided in the panel. As will be noted from the drawings, the dial is disposed between the front face of the panel and the face plate 10 is provided with a plurality of evenly circumferentially spaced dial viewing apertures 66. The lowermost of these apertures 66a is provided with diametrically opposed notches 67 which accommodate movement of a pin 68 affixed to the dial 12 and extending forwardly therefrom. Thus, the pin 68 may be engaged or gripped by one's fingers to effect shifting of the dial relative to the face plate and panel. When the dial is shifted by moving the pin 68 between the opposed notches 67, the side walls defining the peripheral notch 65 engage the lever pin 60 so as to move the same within the slot 61 and

effect the aforedescribed movement of the pallet 50 toward and from the escape wheel 24.

The dial is provided with two sets of numerical indicia 81 viewable in sets through the face plate openings 66 corresponding to the position of the dial and the position of the pallet. The first set comprising the numbers "1" to "6" is viewable when the pin 69 engages the righthand notch 67 which corresponds to the lowermost position of the lever pin 69 whereby the pallet 50 is disengaged and the timer may be set to a maximum interval of 6 minutes. When the pin 68 is in the lefthand notch 67, the set of indicia comprising the numbers "10" to "60" are viewable in the openings 66 and the lever pin 69 is in the uppermost position whereby the pallet is engaged with the escape wheel to render the timer capable of a maximum setting of 60 minutes.

The dial is arranged to be shifted in the aforedescribed manner by providing the same with an outwardly extending annular boss 70 which defines a central opening 71. The face plate 10 is provided with a peripheral flange 72 which engages the panel 11 so as to space the face plate therefrom and the face plate is also provided with an inwardly facing boss 73 having a generally cylindrical periphery 75 which fits within the dial opening 71 so as to journal the dial for rotation therearound. However, rotation of the dial relative to the face plate is limited to the two viewable positions as described above.

The face plate boss 73 is provided with a central opening 74 which receives a forwardly extending threaded nipple 76 secured to the frame support 16. The nipple 76 accommodates the forwardly extending end of the arbor 20 so that the setting knob and pointer 13 may be secured thereto in any conventional manner. Thus, the setting knob 13 is positioned to sweep the face plate 10 and may be viewed in association with the dial indicia to indicate the set position of the timer and to indicate the time remaining in a selected interval. To this end, the face plate may be provided with calibrations 77 arranged between the dial viewing openings 66 for greater accuracy in rosetting and reading the instrument.

The aforedescribed elements of the timer are secured in assembled relation by threading a nut on the nipple 76 against the front surface of the face plate. The face plate is provided with a pair of rearwardly extending ears 78 which engage within panel openings 79. The openings 79 also receive ears 80 extending forwardly from the frame support 16 so as to engage against the face plate ears in side-by-side relation and thereby prevent rotation of the face plate and rotation of the frame support relative to the panel.

Accordingly then, there is provided in accordance with the present invention a multi-speed timer having a dial which may be manually shifted to effect changes in the speed of operation of the timer and to simultaneously change the viewable dial indicia whereby the timer may be accurately set to measure a desired interval of time. The set condition of the timer as to speed of operation and as to the selected interval will be apparent to even a casual observer whereby errors in conditioning the timer and in setting the timer are substantially eliminated.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above

description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

1. In combination with a timer having means for shifting the operating speed thereof, a movably mounted dial having a plurality of sets of indicia thereon, means interengaging said dial and speed shifting means to move said shifting means from one operative position to another when said dial is moved a predetermined amount, a face plate covering said dial and having a plurality of spaced apart apertures, and manually operable means associated with said dial for moving the same relative to said face plate whereby said indicia may be brought into registry with said face plate apertures in sets and said interengaging means will cause the speed shifting means to be moved into the operative position corresponding to the set of indicia in registry with the face plate apertures.

2. In combination with a timer having means for shifting the operating speed thereof from a relatively fast rate to a relatively slow rate, a rotatably mounted dial having two sets of indicia thereon, one of said sets of indicia representing a period of time corresponding to said fast rate of speed and the other of said sets representing a period of time corresponding to said slow rate of speed, a face plate covering said dial and having a plurality of circumferentially spaced apart apertures, means operatively connecting said dial and the speed shifting means and manually operable means on said dial for rotating the same relative to said face plate whereby said indicia may be brought into registry with said apertures in sets.

3. In combination with a timer having means for shifting the operating speed thereof, a rotatably mounted dial having circumferentially spaced apart indicia arranged in sets along one side face thereof, a face plate covering said dial and having a plurality of circumferentially spaced apart apertures, means operatively connecting said dial and the speed shifting means, and manually operable means associated with said dial for rotating the same relative to said face plate whereby said indicia register with said apertures in sets corresponding to the speed of operation of the timer.

4. In combination with a timer having means for shifting the speed of operation thereof including an actuating lever, a rotatably mounted dial having circumferentially spaced indicia arranged in sets along one side face thereof and having a peripheral notch straddling the actuating lever, a face plate covering said dial and having a plurality of circumferentially spaced apart apertures, and manually operable means associated with said dial for rotating the same relative to said face plate to shift the actuating lever whereby said indicia register with said apertures in sets corresponding to the speed of operation of the timer.

5. In combination a timer of the type having a clockwork mechanism mounted on a frame and having control means for changing the speed of operation of the mechanism, a face plate se-

cured in spaced relation to said frame, said face plate having a circular boss adjacent the frame, a generally annular dial interposed between said face plate and said frame and journaled on said boss, said dial having indicia circumferentially spaced along one side face thereof and arranged in sets, means on said face plate defining a plurality of circumferentially spaced openings for viewing the indicia in sets, manually operable means on said dial extending through one of said openings for shifting the dial between a plurality of viewable positions, and means interconnecting said dial and the control means whereby movement of the dial effects a change in the speed of operation of the clockwork mechanism.

6. A multi-speed timer comprising a frame, a clockwork mechanism mounted on the frame and including an escape wheel operable to cause said mechanism to operate at a predetermined speed, a pallet selectively movable into engagement with the escape wheel to retard the movement thereof whereby said mechanism will operate at a speed slower than said predetermined speed, means for shifting said pallet toward and from said escape wheel including motion transmitting means movably supported by said frame, a dial movable relative to said frame between a plurality of viewable positions, and means on said dial engageable with said motion transmitting means whereby movement of said dial will effect movement of said pallet.

7. A multi-speed timer comprising a frame, a clockwork mechanism mounted on the frame and including an escape wheel operable to cause said mechanism to operate at a predetermined speed, a pallet selectively movable into engagement with said escape wheel to retard the movement thereof whereby said mechanism will operate at a

speed slower than said predetermined speed, a dial moveable relative to said frame, means associated with said dial having a plurality of openings for viewing the same, said dial being movable between a plurality of positions relative to said last mentioned means, and means interconnecting said dial and said pallet whereby movement of said dial will effect movement of said pallet.

8. A multi-speed timer comprising a frame, a clockwork mechanism mounted on the frame and including an escape wheel operable to cause said mechanism to operate at a predetermined speed, a pallet selectively movable into engagement with the escape wheel to retard the movement thereof whereby said mechanism will operate at a speed slower than said predetermined speed, a dial rotatably mounted relative to said frame and having circumferentially spaced indicia arranged in sets along one side face thereof, a face plate covering said dial and having a plurality of circumferentially spaced openings for viewing the indicia, said dial being movable relative to said face plate between a plurality of positions whereby said indicia are viewable in sets, means interconnecting said dial and said pallet whereby movement of said dial will effect movement of said pallet, and manually operable actuating means on said dial for rotating the same.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,999,126	Gardner	Apr. 23, 1935
2,543,032	Laviana	Feb. 27, 1951