

Jan. 19, 1971

E. M. MICHAEL

3,555,809

LONG RINGING KITCHEN TIMER

Filed Dec. 13, 1968

3 Sheets-Sheet 1

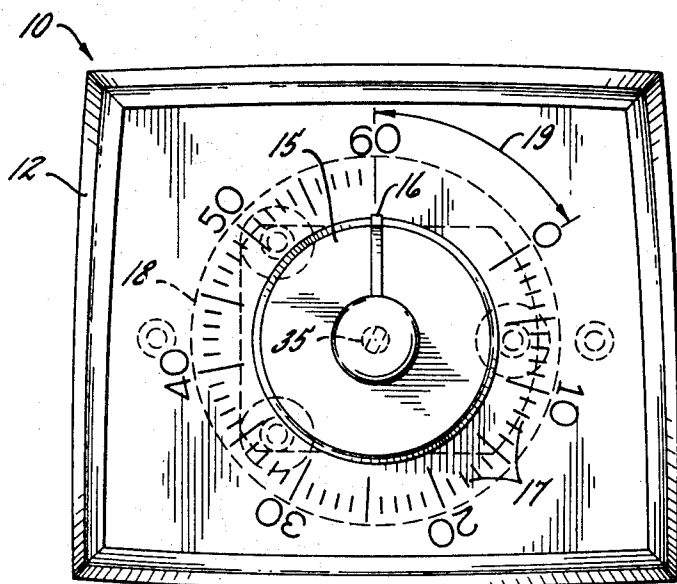


FIG. 1.

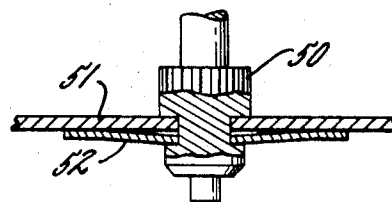


FIG. 3a.

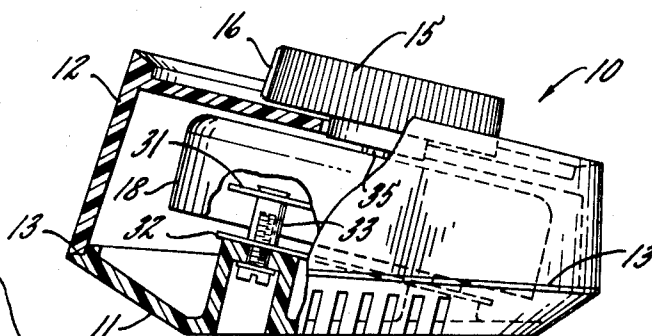


FIG. 2.

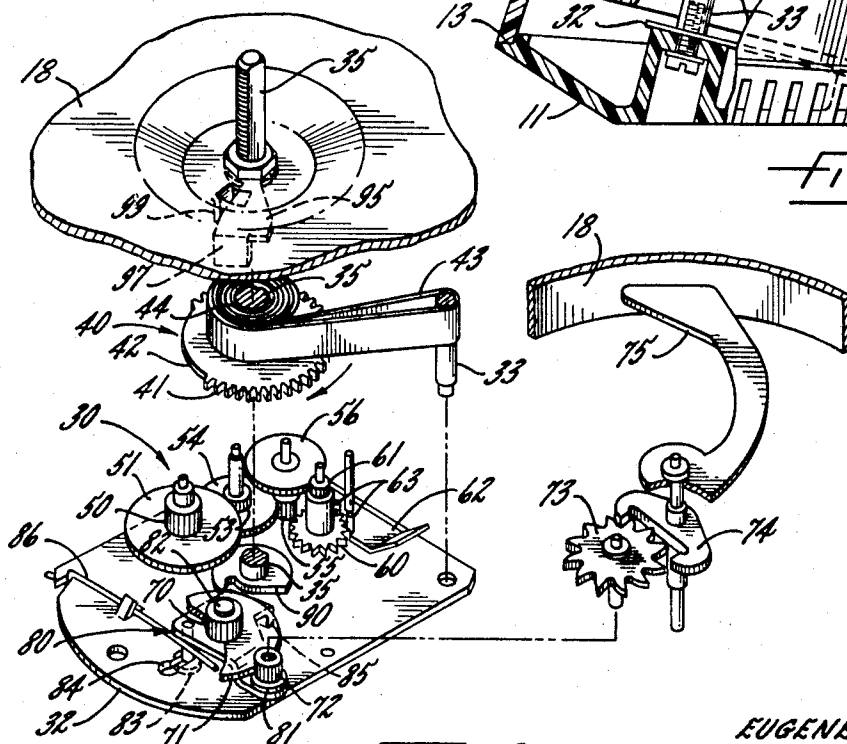


FIG. 3.

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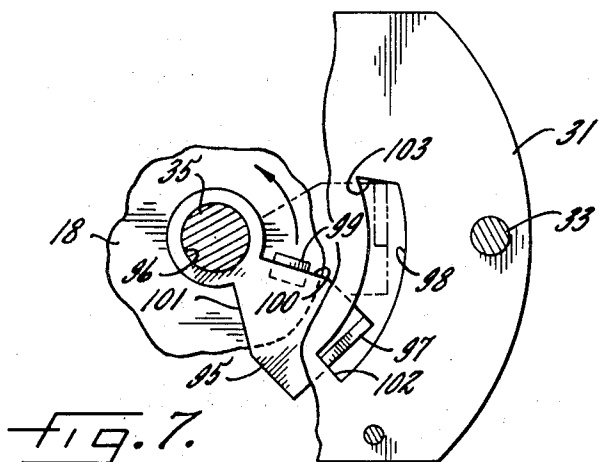
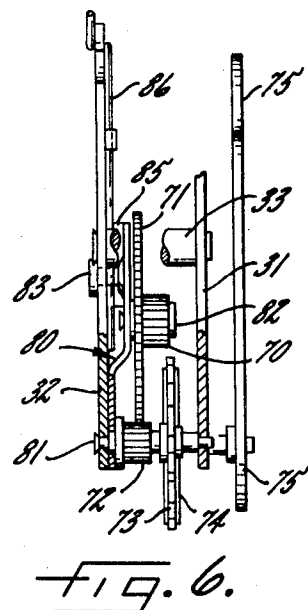
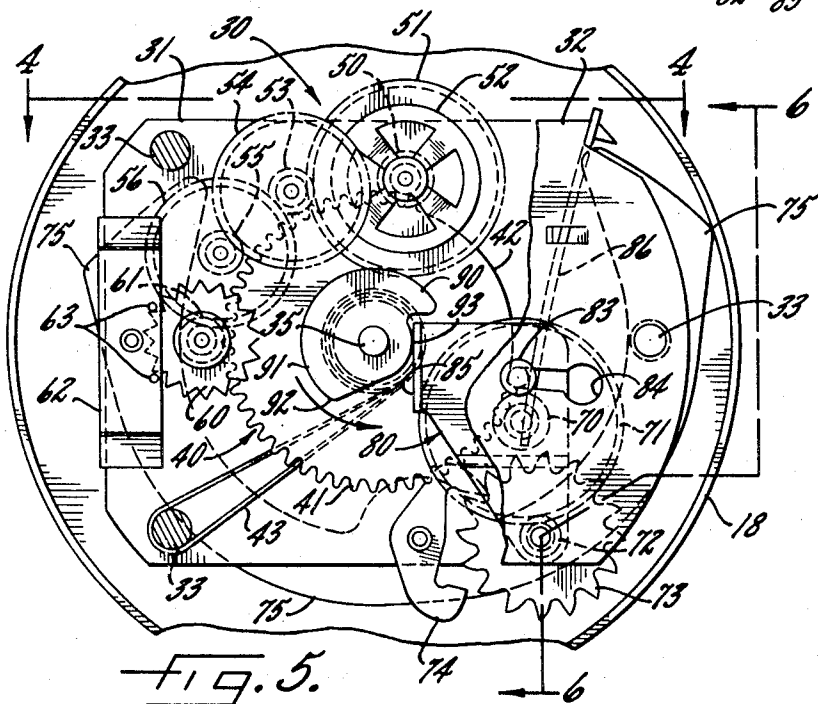
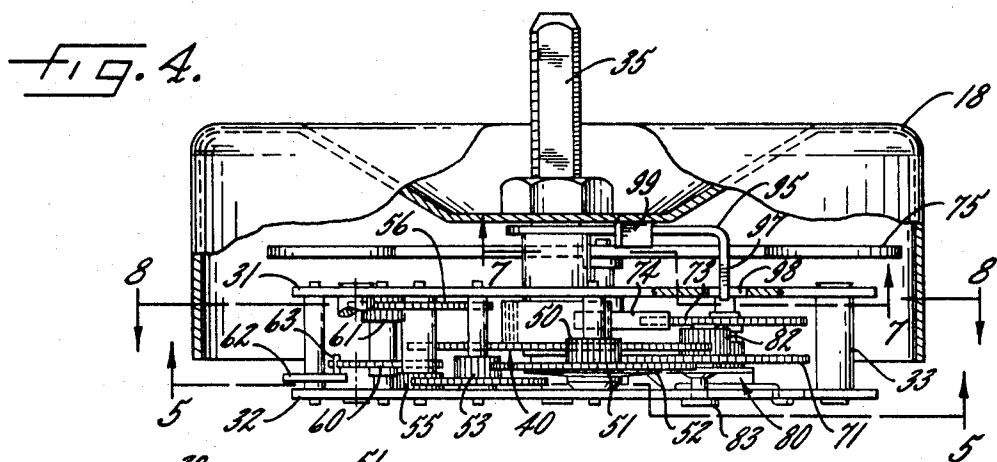
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

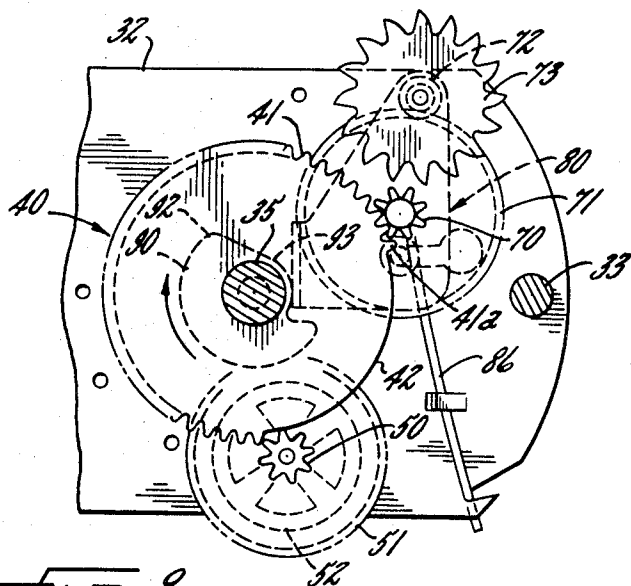


FIG. 8.

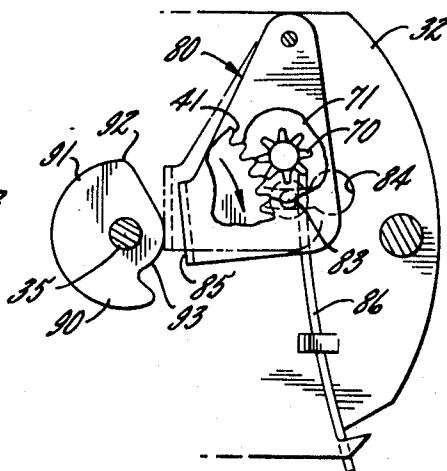


FIG. 8a.

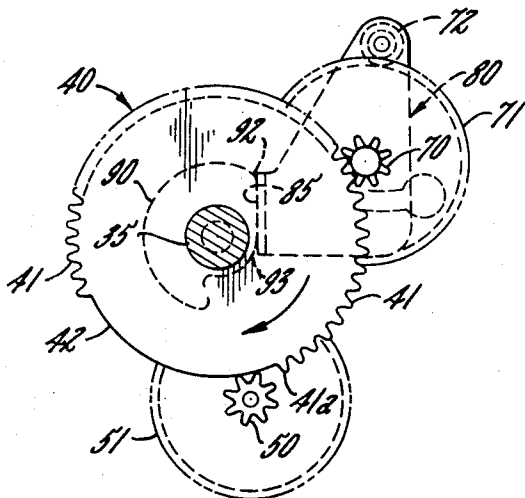


FIG. 9.

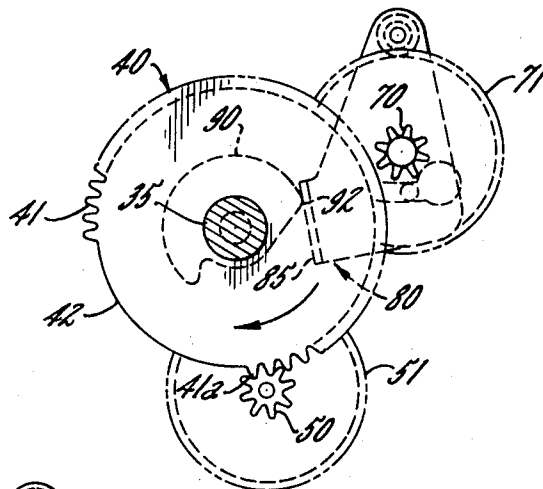


FIG. 10.

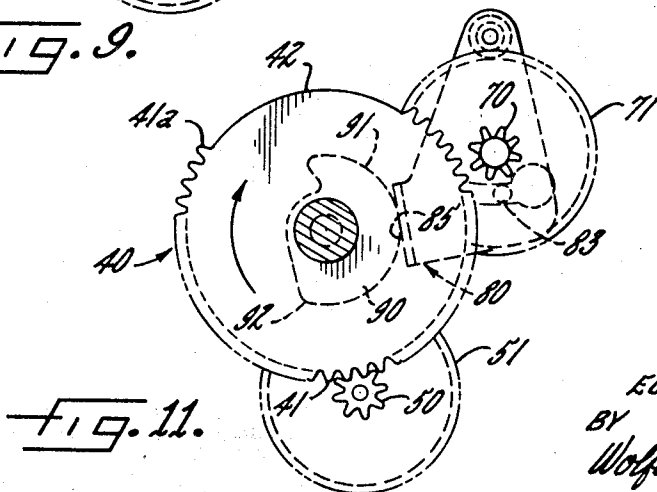


FIG. 11.

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3,555,809

LONG RINGING KITCHEN TIMER

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Int. Cl. G04f 3/02

U.S. Cl. 58—21.13

7 Claims

ABSTRACT OF THE DISCLOSURE

A kitchen timer in which the indicator knob is attached to a main shaft which also has secured thereto the drive spring and a cam. The cam de-clutches the gong drive train while the interval is being timed and engages the gong train at the end of the interval.

Most conventional kitchen timers are arranged to sound a single note on a bell or gong upon expiration of the timed interval. The desirability of providing for repeated ringing at the end of the interval has been recognized but structures to accomplish this either have been relatively complex and expensive or the duration of ring has been limited.

It is an object to provide a long ringing timer which is simple, inexpensive and compact but which is nevertheless highly reliable. It is another object to provide a timer in which the energy for the timer drive train and the energy for sustained ringing is stored in a single spring incident to setting a control knob and in which this energy may be readily apportioned to produce sustained ringing for as long a period, within practical limits, as may be desired.

It is a further object of the invention to provide a long ringing kitchen timer which is easily portable, which may be used for many different purposes including photographic timing, and which may, if desired, be built into ranges and other appliances.

Other objects and advantages of the invention will become apparent upon reading the attached detailed description and upon reference to the drawings in which:

FIG. 1 is a face view of a timer constructed in accordance with the present invention;

FIG. 2 is a side elevation of the timer shown in FIG. 1, with a portion of the housing removed to reveal internal features of construction;

FIG. 3 is a partially exploded and somewhat distorted perspective view of the timer mechanism;

FIG. 3a is a section taken through one of the gears in the mechanism of FIG. 3;

FIG. 4 is an edge view of the mechanism looking along the line 4—4 of FIG. 5;

FIG. 5 is a sectional view looking along the line 5—5 in FIG. 4;

FIG. 6 is a fragmentary section looking along the line 6—6 in FIG. 5;

FIG. 7 is a fragmentary view looking along the line 7—7 in FIG. 4 and showing the limit stops;

FIG. 8 is a top motion view looking along the line 8—8 in FIG. 4 and showing the sector gear and drive pinions in the "at rest" condition;

FIG. 8a is a fragment showing the idle clicking of the gong drive pinion as the setting knob is turned;

FIG. 9 is a stop motion view similar to FIG. 8 and showing the positions of the parts after the setting knob has traversed the gong-sounding sector;

FIG. 10 is a view similar to FIG. 9 showing the disengagement of the gong drive pinion upon slight incremental movement and the beginning of meshing of the time drive pinion; and

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FIG. 11 is a view similar to FIG. 10 but showing additional meshed engagement as the setting knob is moved to a selected set position.

While the invention has been described in connection with a preferred embodiment, it will be understood that the definition of the invention is set forth in the attached claims and that I do not, accordingly, intend to limit the invention to the particular embodiment shown.

Turning now to the drawings, there is set forth a kitchen timer 10 having a housing which includes a base portion 11 and top portion 12 separable at a parting line 13. Mounted above the top portion is a setting knob 15 having an index 16 which cooperates with scale indicia 17. Included within the housing is a cup-shaped bell or gong 18. In use the knob is turned from its illustrated reference position through an initial arc 19 and to a desired setting on the time scale 17 which permits setting of an interval up to sixty minutes in length. As the interval is timed out, the index 16 will move progressively along the scale and, at the expiration of the interval, with the index pointing to zero, the gong will begin repetitious ringing which may, for example, extend over a period of five seconds, but which may be greater than this, until the index is restored to its reference position, at which time the ringing ceases.

Turning attention next to the internal mechanism, indicated generally at 30, a front frame plate 31 and a back frame plate 32 are provided in which the rotating members are journaled, the plates being secured rigidly to posts 33, which may be three in number, to form a box-like structure.

Journaled in central position is a main shaft 35 to which the knob 15 and gong 18 are both secured for rotation as a unit. Also mounted on the shaft for rotation therewith is a gear 40 having a toothed sector 41 and an open sector 42. Coiled around the shaft is a return spring 43 which is anchored to the shaft at its inner end 44 and which is anchored with respect to the frame by bending the outer end about one of the posts 33. When the sector gear 40 is rotated incident to setting the timer, the spring 43 is coiled, in tension, about the shaft 35 the torque exerted by the return spring serving to drive a timing train and a gong train.

Turning attention first to the timer train, it includes a timer drive pinion 50 which is coupled to a gear 51 by means of a friction connection 52. The gear 51 in turn drives a pair of speed multiplying gear couplets including a pinion 53 secured to a gear 54 and a pinion 55 secured to a gear 56. At the end of the timer train an escapement is provided in the form of a star wheel 60 having an associated drive pinion 61 and which serves to oscillate a governor 62 having a pair of pallets 63. It will be apparent, then, that when torque is applied by the sector gear to the timer drive pinion 50, such drive train will rotate at a slow timed rate determined by the design of the star wheel 60 and governor 62. The friction coupling 52 interposed between the pinion 50 and the gear 51 (see FIG. 3a) permits the setting knob to be rotated, by overpowering, without rotating the entire drive train.

For sustained ringing of the gong at the end of the timed interval a gong drive train is provided having an input element in the form of a drive pinion 70 which is engageable with the teeth 41 of the gear 40 and which has an associated speed multiplying gear 71. The latter meshes with a pinion 72 which is close coupled to a star wheel 73 which oscillates a verge 74 connected to a clapper 75. The clapper vibrates against the inside surface of the gong 18.

In accordance with the present invention means including a laterally swingable gong drive pinion is pro-

vided for declutching during the time the timer drive pinion is engaged and for clutching when the timer drive pinion clears the last tooth on the sector gear for sustained ringing of the gong as the main shaft completes its return to reference position. More specifically in accordance with the invention, the gong drive pinion 70 is mounted on a carrier for movement toward and away from the sector gear, and a cam is provided on the main shaft for moving the carrier to the pinion-disengaging position during the time that the timer drive pinion is engaged with the teeth of the sector gear, with the result that the timer drive pinion and gong drive pinion are operated in sequence. As shown in the drawings, the carrier, indicated at 80, is in the form of an arm made of a flat piece of metal arranged closely adjacent the rear frame plate 32 and having a pivot axis 81 which is coaxial with the star wheel pinion 72. The carrier mounts a stub shaft 82 on which the pinion 70 and speed multiplying gear 71 rotate as a unit. The carrier is held in its plane of movement by a headed guide pin 83 which rides in a keyhole slot 84 in the frame plate. Along its front edge, the carrier is provided with a downwardly turned cam follower surface 85. Bias in the engaging direction is provided by a cantilever-mounted spring 86 which bears upon the pin 83.

Secured to the lower end of the main shaft in the path of movement of the cam follower surface 85 of the carrier 80 is a cam 90. Such cam has a "high" region 91, a point of drop-off 92 and a "low" region 93, with the point of drop-off being phased so that engagement of the gong drive pinion 70 occurs at the end of the timed interval and just prior to departure of the last tooth on the sector gear from the timer drive pinion. The term "cam" as used herein is employed in the sense of a control element for clutching the gong drive pinion in phase with the end of the timed interval and may take different specific forms while accomplishing the same function.

Prior to reviewing the sequence of operation during the setting and timing cycle, reference will be made to the means for limiting the rotation of the main shaft to substantially one complete revolution. This is accomplished by a stop member 95 which is in the form of a generally flat piece of metal, profiled as shown in FIG. 7, which lies closely adjacent the front frame plate 31 and which has a hole 96 sized to permit free rotation about the shaft 35. The stop member is coupled to the front frame plate by means of a tab 97 which extends at ninety degrees through an elongated slot 98 in the plate. For coupling the stop member 95 to the shaft, a tab 99 is struck out of the end surface of the gong 18. Under normal conditions the tab 99 engages the edge 100 on the stop member, being forced against it by pre-stress in the spring 43, and with reaction force causing bottoming at the end 102 of the slot. As the knob is turned in the counterclockwise direction (in the direction of the arrow in FIG. 7 which is a back view), accompanied by rotation of the gong, the tab 99 leaves the engaged surface 100 on the top member. If the knob is rotated the maximum amount, stop surface 101 is engaged, following which the stop member 95 rotates idly through a short arc until bottoming occurs at the opposite end 103 of the slot in the frame plate. It is to be noted that since the stop member 95 has limited idle movement with respect to the frame plate, a full 360° of rotation may be achieved.

To understand a complete setting sequence, reference is made to the series of stop motion views as set forth in FIGS. 8-11. Initially the gear 40 on the main shaft 35 occupies the position shown in FIG. 8, with the carrier 80 opposite the low portion 93 of the cam. When the setting knob is rotated clockwise, in the direction of the arrow, the gong drive pinion 70 clicks over the teeth 41 on the gear. Such idle clicking occurs by reason of the

fact that the force applied to the pinion 70 is in a direction to produce retreating movement of the carrier 80 against the light force of spring 86. As rotation of the knob is continued, the "end" tooth 41a of the toothed sector 41 (which will also be referred to as the "last" tooth) engages the timer drive pinion 50 as shown in FIG. 9. Only slight additional movement is required to bring the drop-off point 92 on the cam into engagement with the follower surface on the carrier 80, causing the latter to be cammed away as shown in FIG. 10 thereby disengaging, or unclutching, the gong drive pinion 70 from the teeth 41. This condition, shown in FIG. 10, corresponds to the zero point on the time setting scale 18.

Still further rotation of the setting knob to a desired time setting results in increasing depth of engagement of the timer drive pinion with respect to the series of teeth on the tooth sector 41. During such progressive engagement, idle slippage occurs at the friction coupling 52 (see FIG. 3a) so that it is unnecessary for the gear 51 associated with the pinion 50, or the other gears of the timing train, to rotate. The gong drive pinion 70 is maintained "clear" of the gear teeth during this additional, and final, rotation of the gear into its "set" position, since the carrier continues riding on the high portion of the cam. The position illustrated in FIG. 11 corresponds to a scale setting of thirty minutes. During the course of setting movement illustrated in FIGS. 8-11, the return spring 43 is progressively wound to store the energy required for driving of the timer train and for ringing of the gong.

Turning to the "set" position, as has been noted, is not accompanied by rotation of either of the trains, rotation of the timer train being inhibited, or effectively disengaged, by slippage at the friction coupling 52 and rotation of the gong drive train being inhibited by the idle clicking of the gong drive pinion.

When the setting knob is released at the set position, it begins immediately to rotate in the returning direction. Since the drive pinion 50 is engaged, and since the torque applied by the return spring 43 is less than that required to produce slippage at the friction coupling 52, the timing train is actively driven with the rate of return movement controlled by the speed of oscillation of the governor 62 driven by the star wheel 60.

After the interval has been timed out and the timer drive pinion moves toward the last tooth 41a, the point of drop-off 92 on the cam 90 is approached, causing the gong drive pinion 70 to be lowered from the position shown in FIG. 10 to the position shown in FIG. 9 in which the pinion 70 is fully meshed with the teeth on the drive gear. As the last tooth 41a "clears" the timer drive pinion 50, the timing train is disengaged and the torque of the return spring is thereafter fully effective to rotate the gong drive pinion 70. It is to be noted that during the driving of pinion 70 (unlike the setting condition during which idle clicking occurred), the direction of force against the pinion 70 is such as to seat the pinion positively in meshed engagement. Rotation of the pinion 70 results in rotation of the gear 71, pinion 72 and star wheel 73 which oscillates the verge 74 to vibrate the clapper 75 against the gong. The ringing is sustained until the drive gear 40 is restored to its initial position shown in FIG. 8 in which the stop tab 99 (FIG. 7) on the gong is bottomed against the stop member 95 to complete the cycle.

It will be apparent to one skilled in the art that while the carrier 80 for the pinion 70 performs a clutching function for the gong drive train under the control of the cam, the interrupted gearing 41 on the gear 40 performs an analogous clutching function for the pinion 50 which powers the timer drive train, the two clutching functions being opposite in phase so that the timer drive train is driven during the initial, timed portion of the return cycle while the gong drive train is driven, in sequence, in the terminal portion of the return cycle.

The term "sustained" ringing has been used to indicate that the gong is rung forcibly for a period of several sec-

onds, sufficiently long, in any event, as to attract attention. It is one of the features of the present construction that the length of the ringing interval may be readily changed, and the available energy apportioned, by increasing the length of the clear sector 42 on the drive gear and by corresponding rephasing of the cam 90 and readjustment of the zero point on the setting scale. Also if desired the length of the ringing interval may be changed by varying the mass of the clapper, the number of teeth on the star wheel and the gear ratio in the gong drive train. With the above teachings in mind, such changes, and the spring torque to be employed, are all well within the scope of one skilled in this art.

It will be apparent that the present timer adequately achieves the stated objects. Setting is a simple matter; a long ringing time is obtained in a device of high accuracy and reliability. The structure is nevertheless, simple, compact and inexpensive, enabling manufacture at a cost which is only pennies greater than timers of conventional design. While the timer is particularly well suited for use in the kitchen, it will be apparent that it has general utility wherever short time intervals, of up to approximately one hour's duration, must be measured and signaled to the user. The construction is convenient to use on a flat surface, with the setting knob being inclined forwardly at an angle, or; if desired, the device may be conveniently mounted on a vertical surface by providing a keyhole suspension opening, or the like, in the base.

While it is desirable to have the two functions, timing and ringing, occur in sequence, with the ringing being initiated as the timer pinion "clears the last tooth" on the sector gear, it will be understood that such term as used herein is not intended to be precise and some variation in one direction or other is permissible without departing from the invention.

I claim as my invention:

1. In a long ringing kitchen timer, the combination comprising a frame, a gong, a main shaft having return spring with means for establishing a reference position and for limiting the rotation to approximately a single revolution, a gear on the shaft having a toothed sector and an open sector with the latter occupying a substantial arc on the gear, a timer drive train having a timer drive pinion and train of gears terminating in an escapement, a gong drive train having a gong drive pinion and terminating in a star wheel, a clapper having a verge engaging the star wheel for vibrating against the gong as the star wheel rotates, manual means for rotating the sector gear from the reference position against the force of the return spring so that the teeth on the gear are progressively engaged with the timer drive pinion as the gear is rotated to a set position, a carrier for mounting the gong drive pinion for movement of the latter toward and away from the sector gear, means for biasing the carrier in the direction of the sector gear, and a cam on the main shaft for (a) moving the carrier to its pinion-disengaging position during the time the timer drive pinion is engaged with the teeth of the sector gear and for (b) releasing the carrier for engagement of the gong drive pinion as the timer drive pinion clears the last tooth on the gear.

2. The combination as claimed in claim 1 in which means are provided for effectively disengaging both of the drive trains during setting movement of the main shaft.

3. In a long ringing kitchen timer, the combination comprising a frame, a gong, a main shaft having a return spring and with means for establishing a reference position, a gear on the shaft having a toothed sector and an open sector occupying a substantial arc on the gear, timer drive train having a timer drive pinion and a train of gears terminating in an escapement, a gong drive train having a gong drive pinion and terminating in a star wheel, a clapper having a verge engaging the star wheel for vibrating against the gong as the star wheel rotates, manual means for rotating the sector gear from the reference position against the force of the return spring so that the

teeth on the sector gear are progressively engaged with the timer drive pinion as the gear is rotated to a set position, clutching means including a cam on the main shaft for disengaging the gong drive train during the time the timer drive pinion is engaged with the teeth of the sector gear and for engaging the gong drive train when the timer drive pinion clears the last tooth of the sector gear to power the clapper for sustained ringing of the gong as the main shaft returns to its reference position.

4. The combination as claimed in claim 3 in which the gong drive pinion is mounted for lateral movement into and out of engagement with the teeth on the sector gear and in which the cam on the main shaft is phased to produce disengagement of the gong drive pinion during the time that the timer drive pinion is engaged with the teeth of the sector gear and to produce engagement as the timer drive pinion clears the last tooth on the sector gear.

5. In a long ringing kitchen timer, the combination comprising a frame, a gong, a main shaft having a return spring and with means for establishing a reference position, a main gear on the shaft having a toothed sector and an open sector occupying a substantial arc on the gear, a timer drive train having a timer drive pinion and train of gears terminating in an escapement, a gong drive train having a gong drive pinion and terminating in a star wheel, a clapper having a verge engaging the star wheel for vibrating against the gong as the star wheel rotates, manual means for rotating the sector gear from the reference position against the force of the return spring so that the teeth on the gear are progressively engaged with the timer drive pinion as the gear is rotated to a set position, a clutching mechanism including a laterally swingable gong drive pinion having means including a cam on the main gear for de-clutching during the time the timer drive pinion is engaged with the teeth of the sector gear to disable the clapper and for clutching when the timer drive pinion clears the last tooth to power the clapper for sustained ringing of the gong as the main shaft completes movement to its reference position.

6. In a long ringing kitchen timer, the combination of a supporting base, a horizontal frame secured thereto, a main shaft generally centered in the frame having a return spring and means for establishing a reference position with respect to the frame, a main drive gear on the shaft having a tooth portion, a timer drive train having a timer drive pinion and a train of gears terminating in an escapement, a gong drive train having a gong drive pinion and terminating in a star wheel, a gong of cup shape secured to the upper end of the shaft and enclosing the frame, a clapper enclosed within the gong and having a verge engaging the star wheel for vibrating against the gong, manual means rotatable with the gong for rotating the main drive gear from the reference position against the force of the return spring so that the teeth on the gear are progressively engaged with the timer drive pinion as the gear is rotated to a set position, means for inhibiting rotation of the timer drive train and gong drive train during setting movement, and clutch means including a cam mounted on the shaft, a cam follower engaging the cam and coupled to the gong drive pinion for engaging and disengaging the latter, the cam having a high portion so phased as to disengage the gong drive pinion during the time that the timer drive pinion is in mesh with the main drive gear for timing out of the set time interval and having a low portion so phased as to engage the gong drive pinion upon completion of the timing out of the interval for sustained ringing of the gong as the main drive gear completes its movement back to the reference position.

7. In a long ringing kitchen timer, the combination comprising a frame, a gong, a main shaft having a return spring with means for establishing a reference position, a gear on the main shaft having a toothed sector and an open sector, a timer drive train having a timer drive pinion and terminating in an escapement, a gong drive train

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having a gong drive pinion and terminating in a star wheel, a clapper having a verge engaging the star wheel for vibrating against the gong as the star wheel rotates, manual means including a setting knob for rotating the sector gear from the reference position against the force of the return spring so that the timer drive pinion traverses the open sector and thereafter is progressively engaged with the teeth on the toothed sector as the gear is rotated to a set position, the timer drive train including means for inhibiting rotation of the timer drive train as the gear is rotated to its set position, a pivoted carrier for mounting the gong drive pinion, means for biasing the carrier in the direction of the sector gear so that the gong drive pinion clicks idly over the toothed sector during setting movement of the gear but is rotationally driven by the toothed sector during the return movement of such gear, and a cam on the main shaft in the path of movement of the carrier and having a high portion and a low portion so phased as to produce disengagement of the gong drive pinion during the time that the timer drive pinion is en-

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gaged with the teeth on the sector gear and engagement of the gong drive pinion as the timer drive pinion clears the last tooth of the gear sector for sustained ringing of the gong as the main shaft completes return movement to its reference position.

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U.S. Cl. X.R.

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