

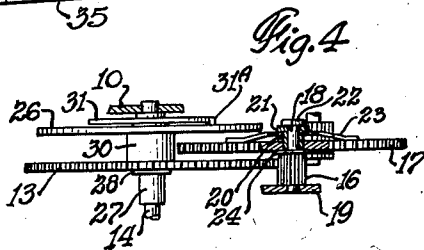
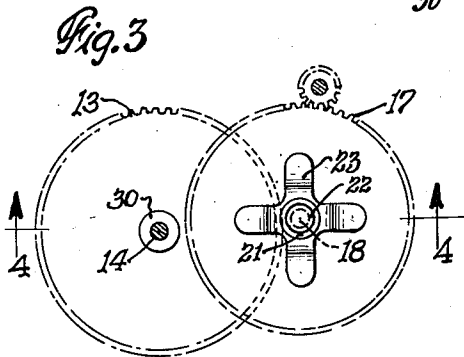
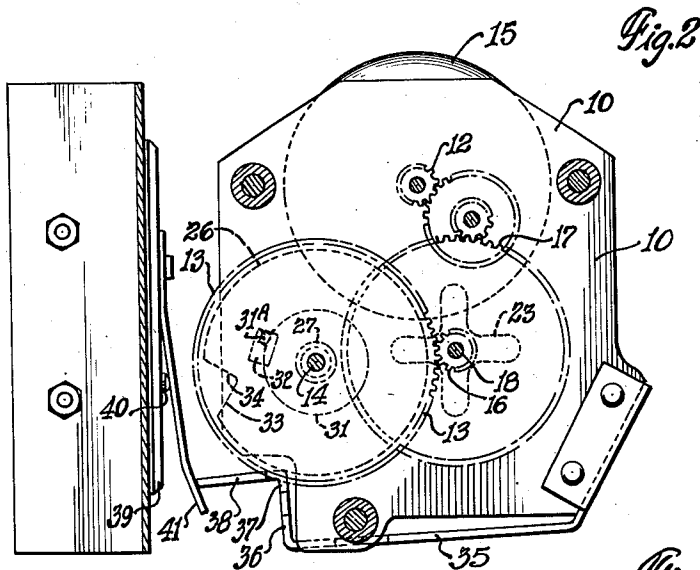
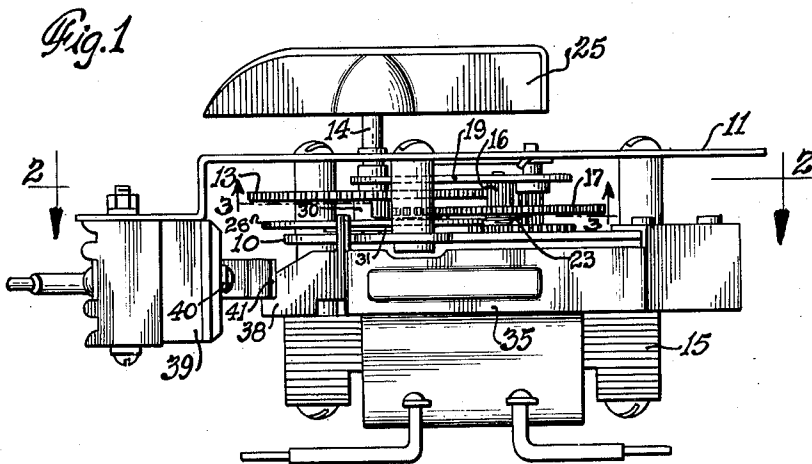
Sept. 5, 1950

D. MORRISON
MANUALLY PRESET TIMER

2,521,301

Filed Jan. 2, 1948

2 Sheets-Sheet 1



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Fig. 7

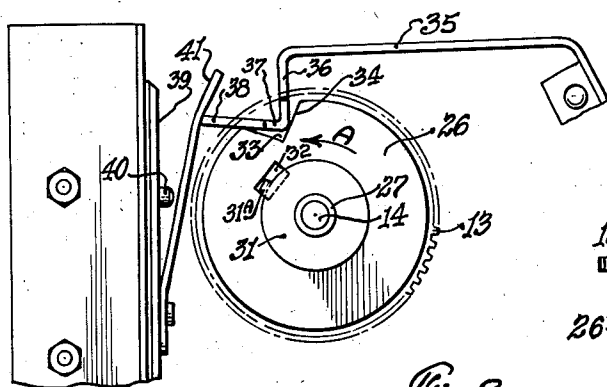


Fig. 5

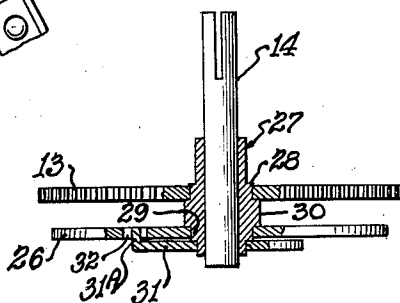


Fig. 8

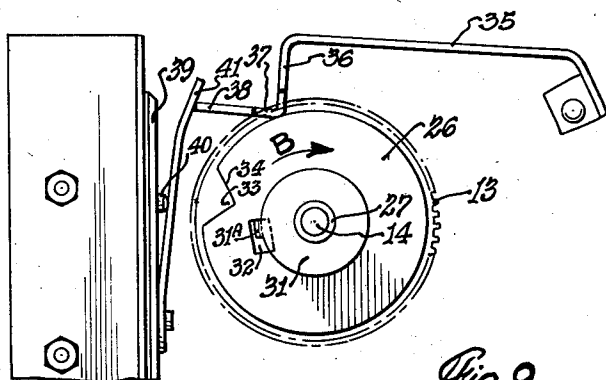


Fig. 6

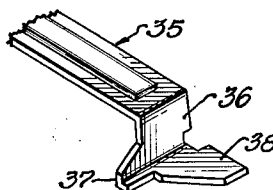
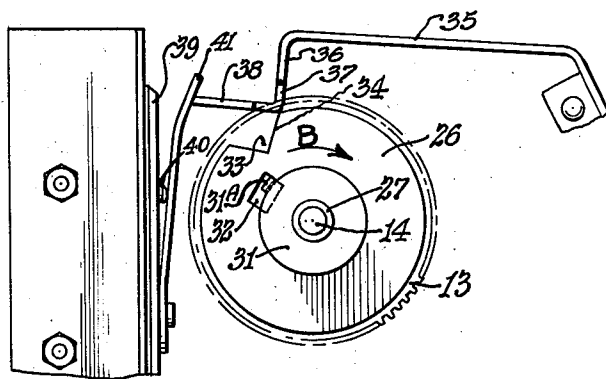


Fig. 9



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2,521,301

MANUALLY PRESET TIMER

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8 Claims. (Cl. 161—1)

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The present invention relates to motor driven timers which operate a switch or the like at the end of a period of time determined by a manually operable setting device, and particularly to that type wherein a pointer of the setting device and a switch controlling cam are both mounted on a shaft driven by the motor to terminate a timed period; a clutch in a gear train between such shaft and the motor permitting the shaft to be turned manually in either direction while the motor remains stationary. One of the difficulties encountered in this type of apparatus is to secure a rapid and accurate termination of the timed period, due to the fact that the same cam surface comes into play both to start and to terminate a measured period. Thus a surface on a conventional cam that lifts a switch-actuating member slowly to begin a period also lowers such member slowly on the return movement of the cam; whereas the termination of the period should be in the nature of a snap action.

The present invention has for its primary object to make it possible to utilize the same surface on a cam to lift a member when the cam turns in one direction and to drop that member instantly on the return movement of the cam, to secure quick opening of a circuit and, in addition, exceptional accuracy in measuring a timed period.

The various features of novelty whereby the present invention is characterized will hereinafter be pointed out in the claims; but, for a full understanding of the invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is a side view of a timer, with the casing removed, embodying the present invention in a preferred form; Fig. 2 is a section on line 2—2 of Fig. 1, looking down; Fig. 3 is a section on line 3—3 of Fig. 1, looking up, and only a part of the gear train being shown; Fig. 4 is an elevational view of the parts appearing in Fig. 3, a portion being a section on line 4—4 of Fig. 3; Fig. 5 is a section, on a larger scale, on line 4—4 of Fig. 3, showing only the cam shaft assembly; Fig. 6 is a perspective view of the free end of the spring arm that is actuated by the cam; Fig. 7 is a bottom plan view of the cam shaft assembly, the switch to be actuated, and an actuator that is controlled by the cam, with the parts in their normal, idle positions; Fig. 8 is a view similar to Fig. 7, showing the cam set

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to determine the length of a period to be timed; and Fig. 9 is a view similar to Figs. 7 and 8, showing the cam in the position which it occupies an instant before it releases the switch actuator.

In the drawings there is illustrated a timer of more or less conventional construction wherein there is a gear train mounted between two parallel plates 10 and 11; the gear train beginning at one end with a pinion 12 and terminating in a gear wheel 13 fixed to a shaft 14 that extends through and is journaled in both of said plates. Pinion 12 is driven by motor 15 in conventional manner. Also, as best shown in Fig. 4, gear wheel 13 meshes with a pinion 16 coaxial with a gear wheel 17 that is positively driven by the motor. Pinion 16 and gear wheel 17 are mounted on the same shaft 18, a stationary stub shaft fixed on a bracket 19, the pinion and the gear wheel being loose on the shaft and being rotatable independently of each other. However, these two gear elements are frictionally held together so that, when the motor is running, they rotate in unison. In the arrangement shown, elements 16 and 17 are mounted on a sleeve 20 surrounding and rotatable on the stub shaft; the sleeve having at one end an external flange 21 that abuts against a head 22 on the free end of the stub shaft. The distance between the flange 21 and the near end of the pinion 16 is greater than the thickness of gear wheel 17; thereby leaving a space between the gear wheel and the flange that is filled by a spring spider 23 which yieldingly presses the wheel against the pinion to cause them to act as the two members of a friction clutch. There is preferably placed between the gear wheel and the pinion a washer 24, made of a different metal.

It will thus be seen that upon providing the shaft 14 with a combined finger piece and pointer 25, to cooperate with the usual dial, not shown, the shaft may be turned manually to set the timer, while the motor remains stationary; the motor then returning the shaft and pointer to the starting point at the end of a predetermined period of time, in the usual way.

On shaft 14, in addition to the gear wheel 13, is a cam 26 in the form of a disc; the gear wheel being fixed to the shaft and the cam being free to move through a limited angle relatively to the shaft. In the arrangement shown, there is pressed onto the shaft 14 a sleeve 27 which varies in diameter to produce two enlarged annular sections 28 and 29 between which is disposed a section 30 of still greater diameter. Gear wheel 13 is pressed

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on section 28 so as to be fixed to the sleeve. Cam 26, which is somewhat thinner than the axial length of section 29, is loose on that section. Pressed onto the sleeve beyond section 29 is a collar 31 that may conveniently be a piece of plate in the form of a disc to permit it to be made in the form of a stamping. This collar keeps the cam from dropping off and it may also be conveniently used to form the driving connection between the cam and the shaft; the collar is shown as being provided with a finger 31^A that projects into a slot 32 in the cam. Slot 32 is of greater length angularly of the shaft than the width of finger 31^A, so that there is a limited lost motion between the cam and the shaft.

The cam is shown as being in the form of a disc having a V-shaped notch or valley 33 in the periphery; one bounding edge 34 for the notch or valley being the cam face. As shown, this cam face makes an angle of about 30° with a radius which it intersects at the periphery of the disc.

Cooperating with the cam is a suitable switch actuator. In the arrangement shown, the actuator is a spring arm 35 fixed at one end, remote from the cam, to plate 10, and extending in or adjacent to the plane of the cam past and in proximity to the latter. The arm is bent at right angles toward the cam opposite the latter, as indicated at 36; the part 36 having thereon a lateral projection 37 in position to drop into the notch in the cam disc when the latter is in the zero or neutral position. A second bend is made in the spring arm to cause flange 36 to merge into an end section 38 that extends ahead parallel with the main body of the arm.

Mounted on plate 11, near the cam and the free end of arm 35, is a switch device 39 of any desired type, conveniently one that tends constantly to open or close, as the case may be, and which is shifted into its other position by arm 35 when the latter is lifted out of the notch in the cam and rides on the unutilized portion of the edge of the cam disc. In the arrangement shown, the switch is of the push button type, its button 40 being operable by a spring lever 41 disposed between the button and the end of arm 35; the lever tending constantly to stand clear of the button and being forced against it only when the actuating arm is lifted by the cam.

It being of course understood that the circuit for the motor is closed when switch 39 is operated in setting the timer, as is customary, and that this switch is normally open, my improved timer operates as follows:

With the parts in their normal, idle positions, as in Fig. 7, the finger piece or pointer is manipulated to turn the cam in the direction of arrow A, through any desired distance. The first result of such movement is to take up the lost motion between the shaft and the cam, if finger 31^A does not happen to be positioned in the slot as shown in Fig. 7. After the slack has been taken up, projection 37 on spring arm 35 rides up along the inclined cam surface 34 until it reaches and rests on the cylindrical portion of the periphery of the cam. The distance through which the cam is turned depends on the time interval to be established between closing and again opening the switch, because the switch remains closed until the cam returns to the starting point.

As soon as the timer is set, the motor starts to turn the cam back, such return movement being indicated by arrows B in Figs. 8 and 9. Fig. 8 may be said to represent either the farthest point to which the cam was turned or some intermediate point in its return movement; since the effective

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angular movement in either direction is almost 360°. In order to reverse the direction of movement of the cam, shaft 14 must turn back far enough to carry finger 31^A from that end of the slot 32 in which it is located in Fig. 7 to the opposite end, as shown in Figs. 8 and 9. Thus the shaft, because of this pin and slot connection, cannot later prevent the cam from jumping ahead a distance determined by the length of slot 33, whenever the cam is ready to do so. Consequently, as soon as the cam passes the point it has reached in Fig. 9, and projection 37 begins to enter the notch in the cam disc, the spring arm through this projection exerts a powerful pressure on cam face 34 in the direction to drive it ahead; and, the disc being free from other restraint, it is driven ahead by a snap action until finger 31^A acts as a stop and projection 37 has settled into notch 33 as in Fig. 7. In other words, the effect on the operation of the switch is the same, in opening, as though cam face 34 were radially or undercut at the moment the lug 37 and the notch or valley in the cam meet upon the return of the cam.

It will be noted that the lost motion between the cam and its shaft must be great enough to insure that the spring arm may snap fully into its switch opening position before the connection between the cam and its shaft can interfere.

While I have illustrated and described with particularity only a single preferred form of my invention, I do not desire to be limited to the exact details thus illustrated and described, but intend to cover all forms and arrangements that come within the definitions of my invention constituting the appended claims.

I claim:

1. In a manually pre-set timer, a rotatable shaft, an element on the shaft for manually adjusting the same, a cam mounted on the shaft so as to provide between them a lost motion and to cause the cam to travel with the shaft whenever the shaft is turned far enough in either direction to take up the lost motion, a yieldable member supported in position to bear on the cam with considerable pressure, and said cam containing a valley into which said member drops when brought into registration therewith, one side of the valley being inclined to cooperate with said member to raise the latter out of the valley when the shaft is turned in the setting direction and to drive the cam ahead quickly when the shaft is turned back to the starting point.

2. A timer as set forth in claim 1, wherein the yieldable member is a spring arm anchored at one end and having thereon, remote from such end, a projecting cam-engaging part.

3. In a manually pre-set timer, a rotatable shaft, an element on the shaft for manually adjusting the same, a disc mounted on the shaft so as to provide between them a lost motion and to cause the disc to travel with the shaft whenever the latter is turned far enough in either direction to take up such lost motion, a yieldable member supported in position to bear on the edge of the disc with considerable pressure, and the disc containing in the edge thereof a notch into which said member drops when brought into registration therewith, one side of the notch being inclined to cooperate with said member to move the latter out of the notch when the shaft is turned in one direction and to drive the cam ahead quickly when the shaft is returned to the starting point.

4. A timer as set forth in claim 3, wherein the

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inclined edge of the notch lies at an angle of about 30° to a radius which it meets at the edge of the disc.

5. In a manually pre-set timer, a rotatable shaft, an element on the shaft for turning it manually, a disc loose on the shaft and having a pin and slot connection therewith to create a lost motion between them upon turning the shaft, a spring-pressed member mounted in position to bear on the edge of the disc and exert considerable pressure, the disc having in the edge thereof a notch into which said member drops when it registers therewith, one bounding edge of the notch constituting a cam to cooperate with said member to raise the latter out of the notch or turn the disc relatively to the shaft depending on the direction in which the shaft turns.

6. In a manually pre-set timer, a rotatable shaft, an element on the shaft for turning it manually, a disc mounted on the shaft so as to provide a lost motion between them and to cause the disc to travel with the shaft whenever the latter is turned far enough in either direction to take up the lost motion, a spring arm anchored at one end and having thereon a projection remote from that end to bear on the edge of the disc with considerable pressure, said disc containing in the edge thereof a notch into which said projection drops when brought into registration therewith, one side of the notch being inclined to cooperate with said projection to lift the latter out of the notch when the shaft is turned in the setting direction and to drive the disc quickly ahead when the shaft is turned back to the starting point, and a switch device positioned in proximity to the free end of said arm for actuation by the latter when said projection moves out of the notch.

7. In a device of the character described, a rotatable shaft, a sleeve fixed on the shaft and having near one end a short section of larger diameter than the adjacent end section and being of still larger diameter inwardly from the aforesaid sections, a disc loose on said short section,

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a collar fixed on said end section, a pin and slot connection between said disc and said collar to create a lost motion between them upon turning the shaft, a spring-pressed member mounted in position to bear on the edge of the disc and exert considerable pressure, the disc having in the edge thereof a notch into which said member drops when it registers therewith, one bounding edge of the notch constituting a cam to raise said member out of the notch when the disc is turned in one direction and to drive the disc ahead quickly when the disc is turned in the other direction until the projection is again brought back to the notch.

8. In combination, a rotatable shaft, an element on the shaft for turning it manually, a motor, a gear train connecting the motor and the shaft and including a friction clutch, a disc mounted on the shaft so as to provide a lost motion between them and to cause the disc to travel with the shaft whenever the latter is turned far enough in either direction to take up the lost motion, a spring arm anchored at one end and having thereon a projection remote from that end to bear on the edge of the disc with considerable pressure, said disc containing in the edge thereof a notch into which said projection drops when brought into registration therewith, one side of the notch being inclined to lift said projection out of the notch when the cam is turned in one direction and to drive the disc ahead quickly when the disc is turned in the other direction until the projection is again brought back to the notch.

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