

April 29, 1958

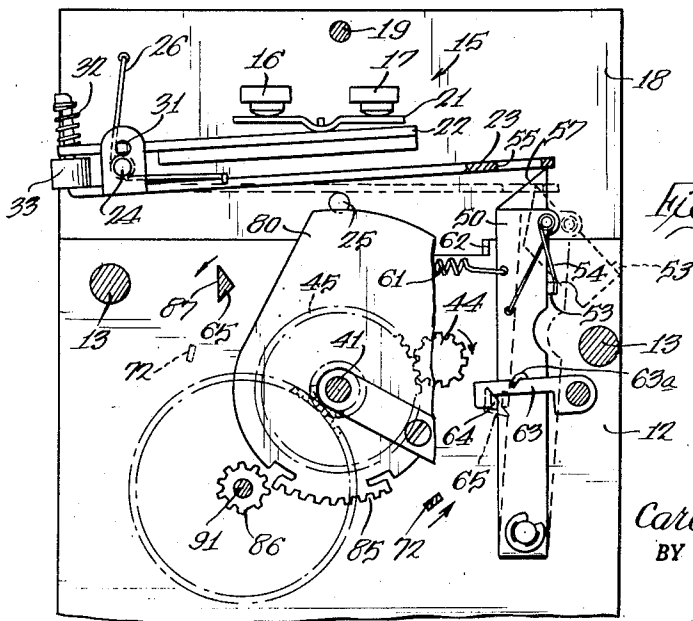
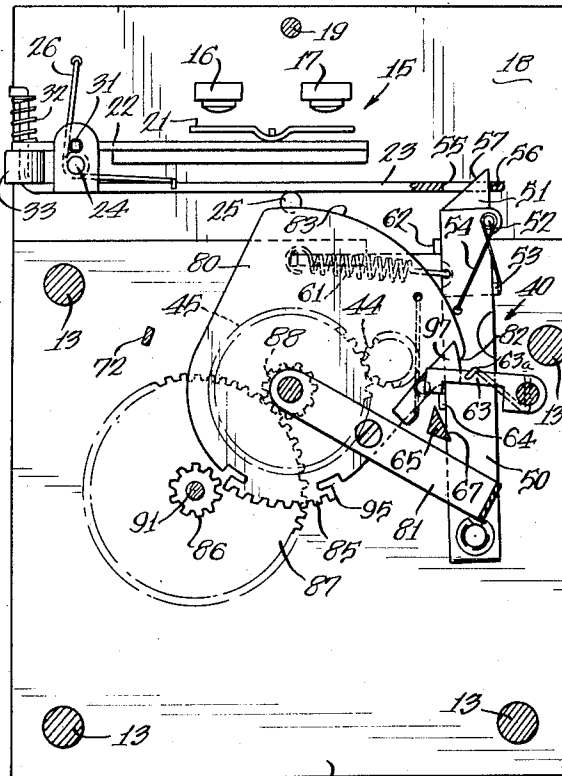
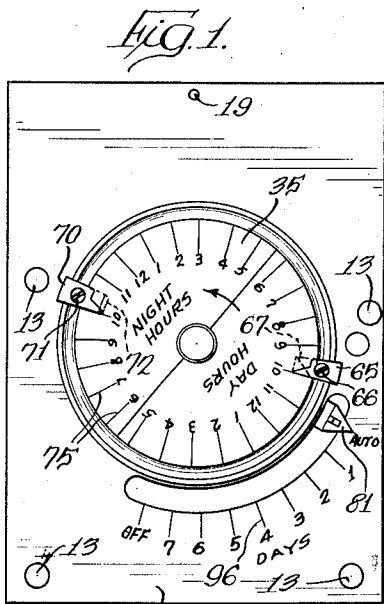
C. J. GOODHOUSE

2,832,856

DELAY MECHANISM FOR SWITCH ACTUATING TIMER

Filed May 17, 1957

2 Sheets-Sheet 1



INVENTOR.
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Att.

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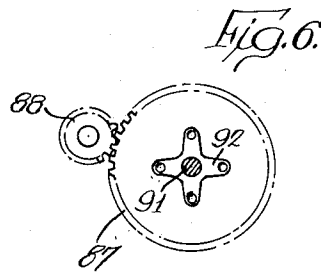
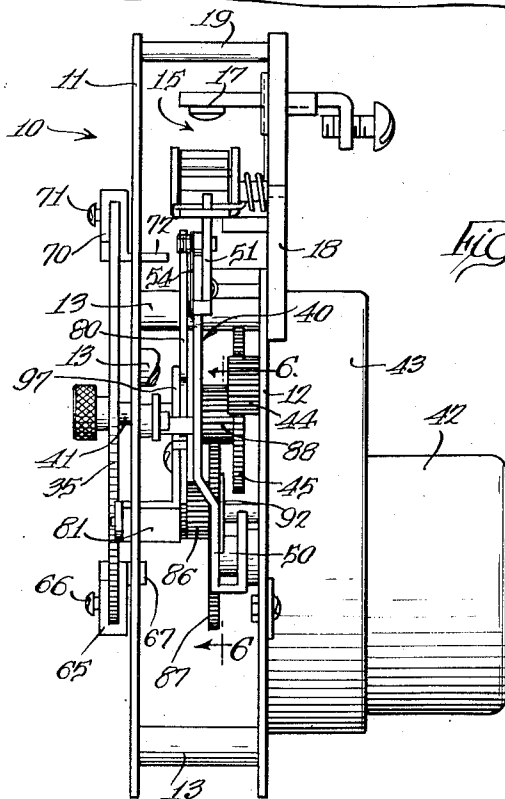
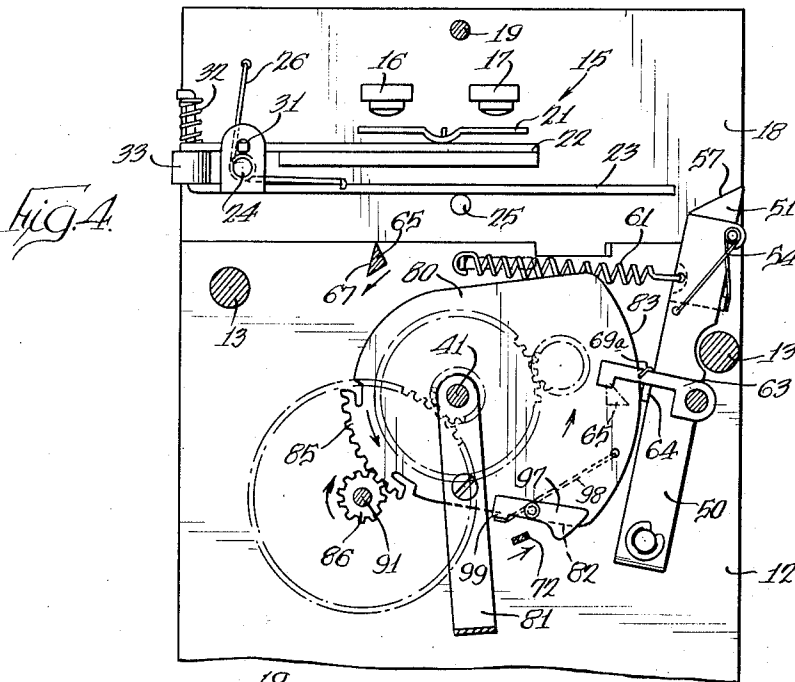
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DELAY MECHANISM FOR SWITCH ACTUATING TIMER

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2 Sheets-Sheet 2



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2,832,856

DELAY MECHANISM FOR SWITCH ACTUATING TIMER

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Application May 17, 1957, Serial No. 659,940

8 Claims. (Cl. 200—39)

This invention relates to switch actuating timers and more particularly to a timer having a delay mechanism permitting a selected time interval to pass before the switch operating cycle is begun.

Switch actuating timers have come into common use for automatically turning on and off, each day, devices such as air conditioners, lights, radios, etc. Such timers usually cycle every 24 hours so that each day at the same time the device is turned on, and then, at another set time, turned off. This mode of operation is quite satisfactory when daily operation is desired, but in many cases there is no need to repeat the cycle each day. Business establishments, which are closed certain days of the week as a matter of routine, often employ timers adjusted to provide for "skipped" days to control the operation of air conditioners and the like on a weekly schedule. However, in the case of businesses not having a regular weekly routine, conventional timers cannot be used.

Therefore, it is the general aim of this invention to provide a novel switch actuating timer capable of operating a switch at selected times during a predetermined repeating cycle and which may be adjustably set to delay beginning the switch actuation cycle for a selected number of days or fraction thereof. It is a more detailed object to provide a switch actuating timer of this character having a simple lever adjustment effective to suspend switch operation for a selectable time interval and then resume the preselected cycle of switch operation.

It is another object to provide a switch actuating timer of the above type which operates effectively from a low power source such as a conventional clock motor. With more particularity, it is an object to provide a timer of this type with a delay mechanism which is completely disengaged from the driving train when the delay period is completed and the cycling switch mechanism is brought into operation, so that the power source drives the mechanisms alternatively and is not required to drive both at the same time.

It is a further object to provide a switch actuating timer of the type characterized above which is simple and sturdy in design so as to be reliable and dependable during long service use. It is a related object to construct a switch actuating timer of this type with simple components not requiring critical forming operations or adjustments so that the unit is economical to manufacture.

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

Figure 1 is a front view of a timer constructed according to the present invention.

Fig. 2 is a sectional view taken beneath the cover plate of the timer shown in Fig. 1 showing the delay and switch operating mechanisms of the timer.

Fig. 3 is a sectional view similar to Fig. 2 showing the operation of the switch mechanism.

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Fig. 4 is a sectional view similar to Fig. 2 showing the operation of the delay mechanism.

Fig. 5 is a side view of the timer illustrated in Fig. 1.

Fig. 6 is a fragmentary sectional view showing the frictional clutch connection utilized in driving the delay mechanism of the timer shown in Fig. 1.

While the invention will be described in connection with a preferred embodiment, it will be understood that I do not intend to limit the invention to that embodiment. On the contrary, I intend to cover all alterations, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

Turning first to Figs. 1 and 5, there is shown a switch actuating timer 10 embodying the invention and comprising front and back frame plates 11 and 12 respectively, rigidly secured together in spaced relation by a plurality of intermediate posts 13. Mounted at the top of the timer is a switch 15 which the timer 10 is effective to operate.

Referring to the switch 15 in greater detail, spaced contacts 16 and 17 are mounted on an insulating plate 18 which is secured to the back plate 12 and is rigidly supported by means of a pin 19 connected to the front frame plate 11. The contacts 16, 17 are closed by a conductor 21 which is carried on an insulating arm 22. In order to swing the conductor 21 into engagement with the contacts 16, 17, a switch operating lever 23 is provided which is pivoted at 24 to the insulating plate 18. The arm 22, on which the conductor 21 is carried, is mounted on the operating lever 23 for swinging movement therewith. The operating lever 23 is normally urged downwardly against a stop 25 by a torsion spring 26, but when the lever 23 is swung upwardly, as in Fig. 3, the arm 22 is carried upwardly to bring the conductor 21 into engagement with, and thereby closing, the contacts 16, 17.

The arm 22 is mounted on the operating lever 23 with a spring-biased lost motion connection so that the conductor 21 will firmly engage the contacts 16, 17 when the lever 23 is operated. To provide the spring-biased lost motion connection in the preferred embodiment, the arm 22 is loosely pivoted at 31 to the operating lever 23 and a helical spring 32 presses the end of the arm 22 against a block 33 carried by the lever. It can be seen that the spring 32 will normally hold the pivoted arm 22 against the block 33 and thus maintain the arm in fixed position with relation to the operating lever 23. When the lever 23 is swung upwardly to close the contacts 16, 17 (see Fig. 3), the arm 22 is carried with the lever 23 until the conductor 21 engages the contacts 16, 17. Thereafter, movement of the arm 22 is prevented and further upward swinging of the operating lever 23 causes the arm to tilt about the pivot 31 and further compress the spring 32. It will be appreciated then that the conductor 21 is firmly urged into engagement with the contacts 16, 17 by the compressed spring 32 when the operating lever 23 is raised.

For the purpose of cyclically operating the switch 15, the timer 10 is provided with a timing disk 35 which cooperates with a switch actuator generally indicated at 40. The timing disk 35 is secured to a central shaft 41 and is uniformly and constantly rotated by a timing motor 42 which drives the disk through a gear box 43, a pinion 44 and a gear 45 secured to the central shaft 41 (see Figs. 3 and 5). In the preferred embodiment the motor 42 is of the synchronous, constant speed type and the gear ratios are selected so that the timing disk 35 cycles, that is, rotates through one complete revolution, every 24 hours.

Referring now to the actuator 40 and in particular

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Figs. 2 and 3, it will be noted that the actuator comprises a pivoted arm 50 carrying a camming tip 51 which cooperates with an abutment 56 formed adjacent a hole 55 at the end of the switch operating lever 23. The contacts of the switch 15 are closed when the arm 50 occupies a position with the tip 51 thereon in alignment with the abutment (see Fig. 3), while the contacts are open when the arm is moved to the left and the tip 15 is within the hole 55 (see Fig. 2).

To permit the camming tip 51 to operate the lever 23, the arm 50 is swung to the right and the tip is idly wiped past the abutment 56, and then the arm is returned to the left and the tip is locked with the arm so that a cam edge 57 on the tip will engage the abutment 56 and lift the lever 23 to its contact closing position. To allow the tip 50 to be wiped past the abutment, the tip is pivoted to the arm 50 at a pivot 52. In order to lock the tip 51 with respect to the actuator arm 50, a lug 53 is formed on the tip 51 and is resiliently urged into normal engagement with the back of the arm by a spring 54.

Therefore, as will be seen from the dotted lines in Fig. 3, when the arm 50 is swung to the right the tip 51 pivots for wiping past the abutment 56, but when the arm swings in the opposite direction the tip and arm are rigid with one another because of the engagement of the lug 62 with the arm and thus the inclined cam edge 57 of the tip is effective to cam the operating lever 23 into the contact making position, shown by the full lines in Fig. 3. To hold the actuator arm 50 in the position where its tip 51 is within the hole 55 and the contacts 16, 17 are open, a spring 61 is secured to the arm and tensioned to draw the latter against a stop 62. To hold the arm 50 in its right hand, switch closing, position (Fig. 3) a pivoted latch 63 is provided which is mounted on the frame and which captures a lug 64 formed on the arm, the latch being biased in its latching position by a spring 63a. The arm 50 is thus held in its dead center, switch operating, position against the tension of the spring 61 until the latch 63 is released. Upon release of the latch it will be apparent that the abutment 56 will ride clear of the camming tip 51 as the arm 50 is swung to the left and the operating lever 23 will thus move downwardly opening the contacts 16, 17.

For the purpose of swinging the actuator arm 50 clockwise from its position abutting the stop 62 so that it may be captured by the latch 63, the timing disk 35 is provided with a positionable cam clip 65 (see Figs. 1 and 5) which may be secured at any desired point about the periphery of the timing disk 35 by tightening a set screw 66. The cam clip 65 is C-shaped (see Fig. 5) extending around the edge of the disk and provides an outwardly sloping cam surface 67 adjacent the underside of the timing disk 35 which is effective, upon rotation of the timing disk 35, to engage the lug 64 formed on the actuator arm 50. Thus, upon rotation of the disk, the arm 50 is cammed in a clockwise direction against the resilient force of the spring 61 a distance sufficient for latching of the arm 50 in the switch-closed position.

This sequence of operation is shown in Figs. 2 and 3. In Fig. 2, the inclined surface 67 of the cam clip 65 is shown as it first engages the lug 64. In the dotted line position illustrated in Fig. 3, the inclined surface 67 has moved the arm 50 through a portion of its travel in a clockwise direction, while, in the solid line position in this figure, the cam 65 has passed beyond the lug 64 and the arm 50 has snapped to its latched position under the urging of the spring 61. It can thus be seen that as the cam 65 passes the lug 64, the arm 50 will be swung in a clockwise direction and then released to swing back and be arrested in its latched position, which closes the contacts 16, 17.

In order to unlatch the actuator arm 50 and permit it to swing against the stop 62 and thus open the contacts 16, 17, a positionable tripping clip 70 is adjustably posi-

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tioned on the timing disk 35. The clip 70 is identical to the clip 65, having a set screw 71 threaded into the clip for positioning on the disk, except that the clip 70 is provided with a finger 72 extending beneath the timing disk 35 in position to engage the end of the latch 63 during each cycle of the disk 35. It can be seen that when the finger 72, moving in a counterclockwise direction (see Fig. 3), engages the latch 63, the latch 63 will be swung upwardly, releasing the lug 64, and permitting the actuating arm 50 to swing against the stop 62 under the urging of the spring 61.

To briefly summarize the operation of the device thus far described and which causes cyclic operation of the switch 15, it will be understood that the motor 42 rotates the timing disk 35 at a uniform speed in a counterclockwise direction. In the preferred embodiment, the disk 35 completes one revolution every 24 hours. The cam clip 65 is secured at the periphery of the disk 35 to the hour of the day at which it is desired to close the contacts 16, 17, and the tripping clip 70 is similarly secured at the hour at which it is desired to open the contacts 16, 17. Suitable indicia 75 may be inscribed on the outer surface of the disk 35 to facilitate the adjustable positioning of the lug 65 and the trip 70.

As the disk 35 steadily rotates, the cam surface 67 on the clip 65 is brought into engagement with the lug 64 to swing the actuating arm 50 in a clockwise direction. This causes the camming tip 51 to tilt about its pivot 52 and wipe past the abutment 56 formed on the switch operating lever 23. When the cam 65 passes the lug 64, the spring 61 pulls the released actuating arm 50 in a counterclockwise direction and the lug 64 is caught by the latch 63 to arrest the return motion of the arm 50. As the released arm 50 returns in a counterclockwise direction, the inclined surface 57 on the camming tip 51 engages the abutment 56 and urges the operating lever 23 upwardly. When the actuator arm 50 is latched, the abutment 56 is poised on the end of the tip 51 and the contacts 16, 17 are closed.

As the timing disk 35 continues its uniform rotation, the finger 72 of the clip 70 will engage and swing the latch 63 upwardly to release the lug 64 and permit the actuating arm 50 to swing against its stop 62 under the urging of the spring 61. This will move the tip 51 from beneath the abutment 56 and will permit the operating lever 23 to move downwardly under the urging of its spring 26 and thus open the contacts 16, 17.

In accordance with the present invention, the timer 10 is provided with a delay mechanism comprising a positioning disabling member, which may be adjustably turned from an inactive to a selected active position for disabling the switch 15, and a drive mechanism for coupling the disabling member to the timing motor so that the disabling member is progressively returned to its inactive position to restore the switch to its normal cyclic operation after a predetermined time delay. In this way, the switch 15 may be rendered inoperative for a selected period determined by the distance the disabling member is moved from its inactive position and the time that it takes for the same to be returned to its inactive position. In the present embodiment, the disabling member, which may be conveniently referred to as a blocking cam, comprises a rotatable cam 80 loosely mounted on the central timer shaft 41 and having a positioning lever 81 rigidly fixed thereto so that it may be manually swung from its inactive position. The cam 80 is provided with a rise portion 82 which is effective, when the cam is swung in a clockwise direction, to engage the lug 64 formed on the actuator lever 50 and thus urge the actuating lever to the right. Forming a continuation of the cam rise portion 82 is a dwell section 83 of substantial length which is effective to hold the lug well out of the path of the cam 65, note the dotted line position of the cam in Fig. 4.

Thus, when the lever 81 is swung downwardly, the

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lug 64 will ride up the inclined surface 82 onto the dwell portion 83 of the cam 80, and the actuator 40 will be disabled and unable to respond to the normal cyclic operation caused by the clips 65, 70. However, when the cam 80 and its positioning lever 81 are in their upper, inactive positions they are out of the path of movement of the actuator arm 50 and its lug 64, and the switch 15 can then be normally operated by the clips.

It is a feature of the invention that the drive mechanism for returning the cam 80 to its inactive position, after it has been moved downwardly manually to disable the actuator 40, is powered by the timing motor 42 in such a manner that the engagement and disengagement of the drive mechanism with the timing motor 42 does not disturb the uniform rotation of the constantly cycling timing disk 35. In the illustrated embodiment, the drive mechanism for uniformly returning the cam 80 to its inactive position comprises a cam segment 85 formed integrally with the cam, and a constantly rotated pinion 86 positioned to engage the gear segment 85 when the cam 80 is swung from its inactive position. To constantly rotate the pinion 86, a gear wheel 87, mounted concentrically with and connected to the pinion, is positioned in geared engagement with a second pinion 88 that is secured to the gear wheel 45 and thus constantly rotated by the motor 42.

To interrupt normal rotation and permit the pinion 86 to be positioned when the gear segment 85 is swung in a clockwise direction into engagement with the pinion, a friction clutch is interposed in the drive between the motor 42 and the pinion 86. In the preferred embodiment, the frictional clutch is provided by mounting the gear wheel 87 loosely on a shaft 91 to which the pinion 86 is secured. A four-armed spring 92 is secured to the shaft 91 so that each of its arms resiliently presses the gear wheel 87 against the pinion 86 (see Fig. 6). The spring 92 thus produces a frictional force, binding the gear wheel 87 with the pinion 86, which is effective normally to constantly rotate the pinion 86 in a clockwise direction at a uniform rate. However, when the cam 80 with its gear segment 85 is swung in a clockwise direction, the gear segment will drive the pinion 86 in a counterclockwise direction, causing the frictional connection between the pinion and the gear wheel 87 to slip and thus imparting no appreciable force to the driving train or the motor 42, which continue to normally rotate the timing disk 35 at its uniform rate.

It will be understood that once the cam 80, the gear segment 85, and the pinion 86 are manually positioned to a desired setting and manual force is no longer applied to the positioning lever 81, the frictional connection which drives pinion 86 will be effective to rotate the pinion in a clockwise direction at a steady and uniform rate of speed. The pinion will in turn drive the gear segment 85 and thus return the cam 80 to its inactive position at a uniform rate.

It can therefore be seen that the time required to return the cam 80 to its inactive position depends upon the distance it is moved from that position. In the preferred embodiment, the angular speed of the pinion 86 and the length of gear segment 85 has been selected so that if the last tooth 95 of the gear segment 85 is brought into engagement with the pinion 86, a time lapse of seven days will be required before the cam 80 is completely returned to its inactive position. If desired, a scale 96 may be provided on the outer face of the front frame plate 11 so as to facilitate the positioning of the lever 81 in setting the cam 80, and its gear segment 85, to a point where a desired number of days must elapse before the cam returns to its inactive position and normal cyclic operation of the switch 15 is resumed.

In order to interrupt operation of the switch 15 for an indefinite period, sufficient clearance between the parts is provided so that the lever 81 may be swung in a clockwise direction sufficiently far to carry the last tooth 95

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of the gear segment 85 out of engagement with the pinion 86. This position of the lever 81 is indicated by the legend "off" on the scale 96 (see Fig. 1). When the cam 80 is thus positioned, the drive mechanism will be ineffective to return the cam to its inactive position so that the dwell portion 83 will continue to hold the actuator arm 50 in its disabled position, and the switch 15 will not be operated, until the timer 10 is manually readjusted.

In order to insure a sudden drop-off of the lug 64 from the cam dwell portion 83 as the cam 80 is returned to its inactive position, a pivoted cam segment 97 is provided. The segment 97 is mounted on the cam 80 and is resiliently urged by a torsion spring 98 in a clockwise direction, to bring a lug 99 into engagement with the side of the cam 80, so that the segment may normally provide an extension of the dwell portion 83. However, when the positioning lever 81 is moved downwardly and the segment 97 is brought into engagement with the lug 64 formed on the actuator arm 50, the segment 97 will pivot idly and permit the rise portion 82 of the cam 80 to force the lug 64 to the right and onto the dwell portion 83. As soon as the lug 64 rests on the dwell portion 83, the cam segment 97 snaps back into its normal position providing a continuation of the dwell portion. When the cam 80 is returned to its inactive position, the lug 64 will ride over the dwell portion 83 and onto the cam segment 97. The lug will be supported on the cam segment until the latter passes beyond the lug 64 allowing the actuator arm 50 to suddenly return to its switch-open non-operating position.

Résumé of operation

In normal operation, the timing disk 35 rotates in a clockwise direction, completing one revolution every twenty-four hours. During each revolution, the cam clip 65 carried at the periphery of the timing disk engages the lug 64 formed on the switch actuator lever 50 and urges the arm 50 to the right. As the arm 50 moves to the right, its pivoted camming tip 51 engages the abutment 56 formed on the switch operating lever 23 and wipes past and to the right of the abutment. When the cam 65 has passed the lug 64, the arm 50 snaps to the left under the urging of the spring 61 and the lug 64 is caught by the latch 63. As the arm 50 snaps back, the inclined surface 57 of the tip 51 engages the abutment 56 and the operating lever 23 is forced upwardly to close the contacts 16, 17. The contacts remain closed when the arm is latched in a position where the abutment rests on the end of the tip 51.

As the timing disk 35 continues its steady rotation, the tripping clip 70 will be brought into engagement with the latch 63 at the desired time to swing the latch upwardly, releasing the lug 64 and permitting the actuator arm 50 to fully return and snap against the stop 62. This releases the abutment 56 and permits the actuating lever 23 to move down under the urging of its spring 26 against the stop 25, so that the contacts 16, 17 are again opened. The above cycle of closing and opening the contacts 16, 17 continues to normally occur during each revolution of the timing disk.

When it is desired to delay the cyclic operation of the switch 15 for a certain selected time interval, the lever 81 is swung downwardly to an indicia mark representing from one to seven days. Movement of the lever 81 downwardly causes the cam 80 to move in a clockwise direction, raising the lug 64 onto the dwell portion 83 of the cam, and thus disabling the actuator 40 by moving the actuator arm 50 out of the path of the cam clip 65 and the tripping clip 70. As the cam 80 is swung downwardly, the gear segment 85 is simultaneously moved into engagement with the pinion 86, and the frictional connection between the pinion 86 and the gear wheel 87 permits the former to be moved relatively to the constantly driven gear wheel.

When the lever 81 has been properly positioned as de-

sired, it is released and the constantly driven gear wheel 87, through the frictional connection provided, drives the pinion 86 in a clockwise direction so as to steadily return the cam 80 to its inactive position. As the cam 80 moves toward its inactive position, the lug 64 will ride along the dwell portion 33 of the cam and over the cam segment 97, to suddenly drop free and permit the arm 50 to move to the left for resuming cyclic switch operation under the influence of the clips 65, 70. The time interval required for the cam 80 to return to its inactive position depends upon the setting of the lever 81 and, in the preferred embodiment, can be any number of days or fractions thereof, up to one week.

It will be appreciated that the construction of the timer 10 is such that the motor 42 and its associated driving train is never called upon to simultaneously operate the delay mechanism, which comprises the positionable cam 80, together with the switch actuating mechanism, which includes the actuator arm 50. Thus, when the gear segment 85 is in engagement with the pinion 86 and the delay mechanism is being operated, the clips 65, 70 idly rotate and do not perform any switch operating function. When the gear segment 85 moves out of engagement of the pinion 86 and the delay mechanism is returned to its inactive position, the actuator 40 is again in position to be operated by the clips 65, 70 and the full power of the motor 42 can be utilized for this purpose.

I claim as my invention:

1. A switch actuating timer comprising, in combination, a steadily cycling timing member, a switch including contacts closed by an actuator which may be latched in its contact-closing position, a cam carried by said timing member for urging said actuator into latched, contact-closing position each time the timing member cycles, a trip carried by the timing member for unlatching said actuator so as to open said contacts each time the timing member cycles, a blocking member movable to shift said actuator out of the path of said cam, a swingable gear segment connected to move said blocking member, a steadily driven pinion, said segment being swingable from an inactive position into driven engagement with said pinion, said connection between the segment and the blocking member causing the blocking member to shift the actuator out of the path of said cam when the segment is in engagement with the pinion while allowing the actuator to remain in the path of said cam when the segment is in its inactive position, and means for driving said pinion in a direction for steadily returning said segment to its inactive position so long as they are in engagement.

2. A switch actuating timer comprising, in combination, a steadily cycling timing member, a switch including contacts closed by an actuator which may be latched in its contact-closing position, a cam carried by said timing member for urging said actuator into latched, contact closing position each time the timing member cycles, a trip carried by the timing member for unlatching said actuator so as to open said contacts each time the timing member cycles, a blocking member movable to shift said actuator out of the path of said cam, a swingable gear segment connected to move said blocking member, a steadily driven pinion, said segment being swingable from an inactive position into driven engagement with said pinion at any desired point along the segment or to a position beyond the pinion where the segment will not be driven, said connection between the segment and the blocking member causing the blocking member to shift the actuator out of the path of said cam when the segment is in engagement with the pinion or in said position beyond said pinion, while allowing the actuator to remain in the path of said cam when the segment is in its inactive position, and means for driving said pinion in a direction for steadily returning said segment to its inactive position so long as they are in engagement.

3. In a switch actuating timer, the combination comprising, a timing member and means to drive said member through an operating cycle, a switch having an actuator positioned adjacent said member, means carried by said member to engage and operate said actuator during each cycle of the timing member, a positionable cam having an inactive position and being shiftable into engagement with a drive mechanism effective to return the cam to its rest position, said cam having a dwell portion effective, when the cam is in engagement with said drive mechanism, to disable said actuator so that it will not be operated by said means, and means to shift said cam from its inactive position so that said switch will not be cyclically operated during the time interval required to return the cam to its rest position.

4. In a switch actuating timer, the combination comprising, a timing member and means to drive said member through an operating cycle at a steady rate, a switch having an actuator positioned adjacent said member, means carried by said member to engage and operate said actuator during each cycle of the timing member, a positionable cam having an inactive position and being shiftable into engagement with a drive mechanism effective to return the cam to its inactive position at a steady predetermined rate, said cam having a dwell portion of substantial length effective, when the cam is shifted into engagement with said drive mechanism, to disable said actuator so that it will not be operated by said means, said cam also having a drop off portion effective, when the cam is in its inactive position, to release said actuator and permit it to be operated by said means, and means to selectively position said cam from its inactive position so that said switch will not be cyclically operated and a selected time interval will elapse before the cam is returned to its inactive position and normal switch operation is resumed.

5. A switch actuating timer comprising in combination, a steadily driven timing member, a shiftable switch actuator adjacent said member, means carried on said member for engaging and operating said actuator, a driven pinion, a swingable gear segment connected to a blocking member and being swingable from an inactive position into driven engagement with said pinion, the blocking member being mounted on said segment for shifting the actuator out of the path of said means when the segment is in engagement with the pinion, while allowing the actuator to remain in the path of said means when the segment is in said inactive position, and means for driving said pinion in a direction to steadily return said segment to its inactive position so long as they are in engagement.

6. A switch actuating timer comprising, in combination, a steadily driven timing member, a shiftable switch actuator adjacent said member, means carried on said member for engaging and operating said actuator, a blocking member movable to shift said actuator out of the path of said means, a swingable gear segment connected to move with said blocking member, a driven pinion, said segment being swingable from an inactive position into driven engagement with said pinion at any desired point along the segment or to a position beyond the pinion where the segment will not be driven, said connection between the segment and the blocking member causing the blocking member to shift the actuator out of the path of said means when the segment is in engagement with the pinion or in said position beyond said pinion while allowing the actuator to remain in the path of said means when the segment is in said inactive position, and means for driving said pinion in a direction for steadily returning said segment to its inactive position so long as they are in engagement.

7. In a switch actuating timer, the combination comprising, a timing member and means to drive said member through an operating cycle, a switch including contacts closed by an actuator which may be latched in its

contact-closing position, means carried by said timing member for urging said actuator into latched, contact-closing position during the timing member cycle, a trip carried by the timing member for unlatching said actuator so as to open said contacts during the timing member cycle, a positionable cam having an inactive position and being shiftable into engagement with a drive mechanism effective to return the cam to its inactive position, said cam being effective, when the cam is shifted into engagement with said drive mechanism, to disable said actuator by shifting it from the path of said means, and means to selectively position said cam from its inactive position so that said contacts will not be cyclically closed during the time interval required to return the cam to its rest position.

8. In a switch actuating timer, the combination comprising, a timing member and means to drive said member through an operating cycle at a steady rate, a switch including contacts closed by an actuator which may be latched in its contact-closing position, a lug carried by said timing member for camming said actuator into latched, contact-closing position each time the timing member cycles, a trip carried by the timing member for unlatching said actuator so as to open said contacts each

time the timing member cycles, a positionable cam having an inactive position and being shiftable into engagement with a drive mechanism effective to return the cam to its inactive position at a steady predetermined rate, said cam having a dwell portion of substantial length effective, when the cam is shifted into engagement with said drive mechanism, to disable said actuator so that it will not be urged into latched position by said lug, said cam also having a drop off portion effective when the cam is in its inactive position to release said actuator and permit it to be cammed into latched position, and means to selectively position said cam from its inactive position so that said contacts will not be cyclically closed and a selected time interval will elapse before the cam is returned to its inactive position and normal switch operation is resumed.

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