May 3, 1949. F. A. PEARSON 2,469,341

CYCLE TIMER

Filed June 9, 1944 3 Sheets-Sheet 1

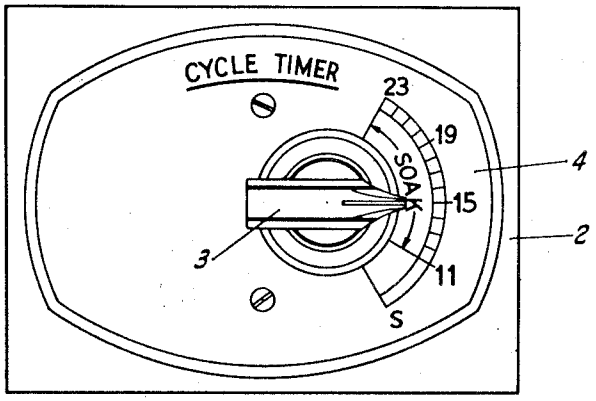


Fig. 1

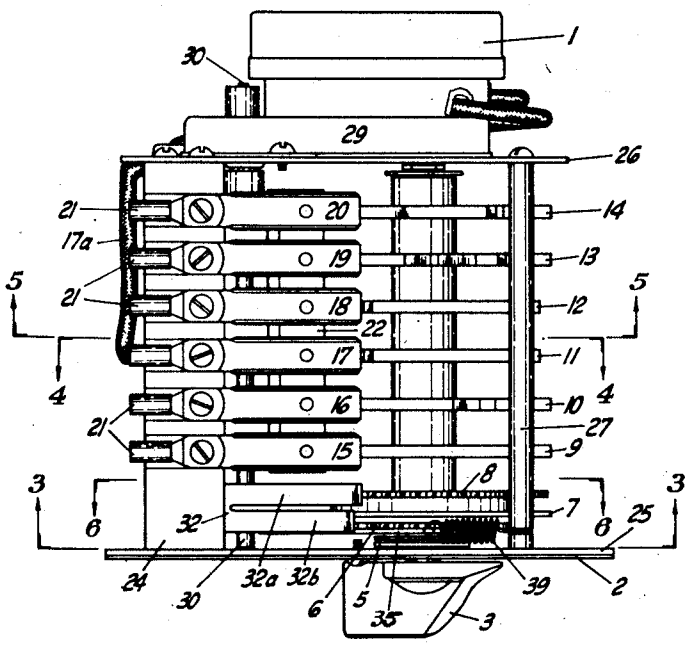


Fig. 2

INVENTOR.
F. A. PEARSON

BY
Merrill M. Blackburn
ATTORNEY.

May 3, 1949. F. A. PEARSON 2,469,341

CYCLE TIMER

Filed June 9, 1944 3 Sheets-Sheet 2

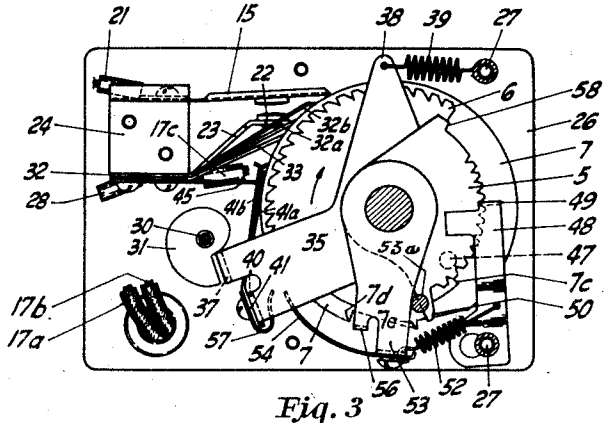


Fig. 3

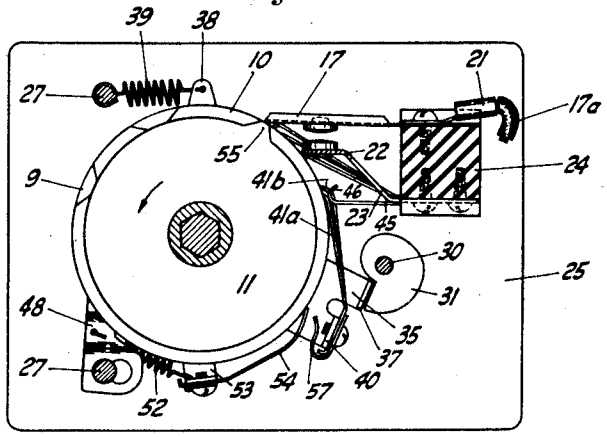


Fig. 4

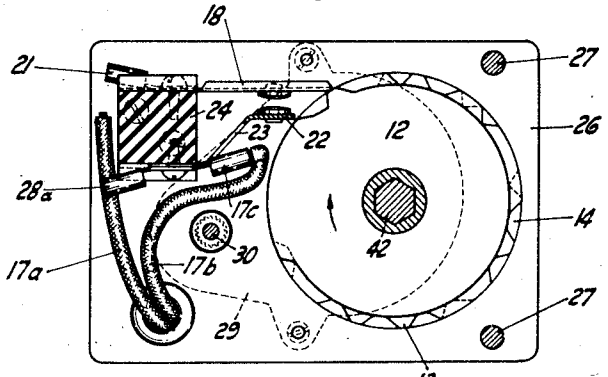


Fig. 5

INVENTOR.
F. A. PEARSON

BY
Merrill M. Blackburn.

ATTORNEY.

May 3, 1949. F. A. PEARSON 2,469,341

CYCLE TIMER

Filed June 9, 1944 3 Sheets-Sheet 3

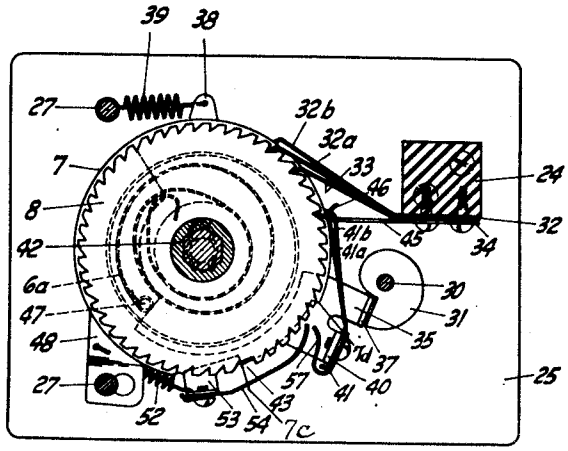


Fig. 6

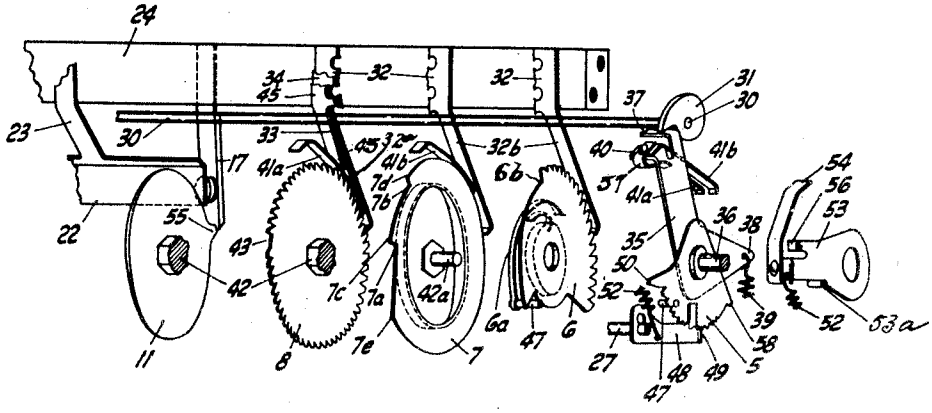


Fig. 7

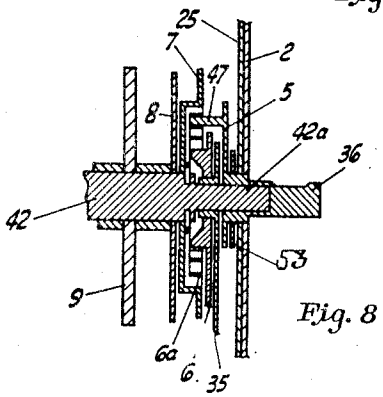


Fig. 8

INVENTOR.
F. A. PEARSON

BY
Merrill M. Blackburn.
ATTORNEY.

Patented May 3, 1949

2,469,341

UNITED STATES PATENT OFFICE

2,469,341

CYCLE TIMER

Frank Arthur Pearson, Moline, Ill., assignor to Eagle Signal Corporation, Moline, Ill., a corporation of Massachusetts

Application June 9, 1944, Serial No. 539,580

8 Claims. (Cl. 161—1)

1

The present invention relates to a cycle timer, designed particularly for use in connection with washing apparatus, the same being provided with means for adjusting the length of the period of soaking the clothing. Cycle timers for use in connection with clothes washing machines are already known but, so far as I am aware, they are all designed to operate a fixed period of time for each operation which is timed. By contrast therewith, mine provides for the adjustment of the "soak" period, which is desirable since some clothing requires a shorter period of soaking and other clothing requires a longer period. This, then, is the primary object of my invention. Another object is the provision of an improved operating mechanism for a timer. This invention comprises, also, such further objects, advantages, and capabilities as will later more fully appear and as are inherent in the structure disclosed herein. My invention further resides in the combination, construction, and arrangement of parts illustrated in the accompanying drawings and, while I have shown therein what is now regarded as the preferred embodiment of this invention, I desire the same to be understood as illustrative only and not to be interpreted in a limiting sense.

In the drawings annexed hereto and forming a part hereof,

Fig. 1 is a front view of my timer showing the dial for use in regulating the "soak" period;

Fig. 2 is a plan view looking down on the structure shown in Fig. 1;

Fig. 3 represents a transverse section substantially along the plane indicated by the line 3—3, Fig. 2;

Fig. 4 represents a transverse section along the plane indicated by the line 4—4, Fig. 2;

Fig. 5 represents a transverse section substantially along the plane indicated by the line 5—5, Fig. 2;

Fig. 6 represents a transverse section substantially along the plane indicated by the line 6—6, Fig. 2;

Fig. 7 is an expanded perspective view of parts of the operating mechanism; and

Fig. 8 is a fragmentary showing of parts of the operating mechanism, shown in longitudinal section.

This construction is provided with a synchronous motor 1 and a face plate 2 in front of which is a combined operating knob and indicating pointer 3, used to start the operation of the machine and set the operating parts of the mechanism so that the soaking period will be in accordance with the desires of the person using

2

the machine. On the face plate is a dial 4 having at one end the letter S and along an edge thereof the numerals 11, 15, 19, and 23. Of these, the letter S indicates start and the numerals indicate the number of minutes of soaking which the operator desires that the clothes shall have.

By referring to Figs. 2 and 7, it will be seen that there are several ratchets 5, 6, 7, and 8, and cams 9, 10, 11, 12, 13, and 14. Associated with each of the cams, 9 to 14, inclusive, is a switch, these being designated by the numerals 15 to 20, inclusive. Each switch has a connector 21 connected thereto for attachment of circuit wires leading to the apparatus to be controlled, except that from switch 17 a wire 17a leads to the motor 1. Below the switches is a bus-bar 22 having contact elements thereon to cooperate with corresponding contact elements of the switches. The bus-bar 22 is mounted, by means of arms 23, upon the insulating block or bar 24, supported at one end by a front plate 25 which is just inside of the face plate 2 and, at its second end, by a back plate 26. The plates 25 and 26 are connected by posts 27 and the insulating bar 24. It is appropriate to remark that the order of arrangement of the cams 9 to 14, inclusive, and their corresponding switches is immaterial, it being important only that the appropriate connections are made to the connectors 21.

The power line connectors 28 and 28a are provided for connecting this timer to a power circuit. Back of the back plate 26 is a housing 29 in which are mounted the gears which transmit rotation from the drive shaft of the motor 1 to the cam shaft 30 by means of which the cam 31 is supported and rotated.

Referring now to Fig. 7, it will be seen that cams 9 and 10 have been omitted from this figure which is designed to give the relationship between the cam 11 and the ratchets 7 and 8. Secured to the underside of the insulating block 24 is a double pawl 32, having two arms 32a and 32b, the former bearing against the ratchet 8 and the latter against the ratchets 6 and 7. Another pawl 33 is also secured to the insulating block 24 with the pawl 32, as indicated at 34, the pawl 33 underlying the pawl 32 and being secured to the insulating block 24 by the same screws which pass through the pawl 32 and into the block. It should be remarked that the pawl arm 32b can contact the ratchet 6 only when it drops into the notches 7a and 7b on the edge of cam 7. Because of the separation of the ratches 6 and 7, in Fig. 7, it has been necessary to duplicate the showing

of the pawl arm 32b. However, it should be understood that this is merely a double showing of the same element, designed to give a conception of its relation to the other elements.

A bell crank lever 35, pivotally mounted on the shaft 36, is located between the ratchets 5 and 6. At one end, this has a finger 37 bent at a right angle to the plane of the body of the lever, this finger extending into the path of the cam 31 and riding on the edge thereof. It is therefore apparent that, as the motor 1 causes rotation of the shaft 30, the lever 35 will be actuated in one direction by the cam 31. The end 38 of the lever 35 has a spring 39 secured thereto for moving the lever in the opposite direction from that caused by the cam 31. As shown in Figs. 3 and 6, the second end of the spring 39 is connected to a post 27.

A second finger 40 is bent laterally from the lever 35 and serves as supporting mean for the double pawl 41, having the pawl arms 41a and 41b which normally engage the ratchets 8 and 7. As the lever 35 is rocked by the cam 31, the pawl arm 41a moves back one notch along the edge of the ratchet 8. Then as the cam 31 releases the lever 35 and the latter is moved forward by the spring 39, the pawl arm 41a moves the ratchet 8 one step forward, advancing the shaft 42 correspondingly. As the ratchet is advanced, the nose of the pawl arm 32a drops into a notch in ratchet 8 and holds the ratchet against retrograde movement with the pawl arm 41a, upon its next backward movement. It is therefore clear that the shaft 42 moves forwardly with a small step by step motion until its cycle is completed. This shaft 42 has a reduced extension 42a which extends through ratchet 6 and into a longitudinal opening in shaft 36 to furnish a bearing for the forward end of the shaft 42. As indicated at 43, one tooth of the ratchet 8 is omitted. Therefore, when the pawl arm 41a reaches this point, it is unable to advance the ratchet.

A spring 45, having a re-curved end 46, is mounted on the underside of bar or block 24, with the pawls 32 and 33, and is held in place thereon by the same screws which hold the pawls in place. The inner end of this spring bears upon the arm 41a of pawl 41 to provide means for wedging arm 41a into engagement with ratchet 8, thus to prevent overtravel of shaft 42 and associated parts beyond the point to which it is advanced by cam 31. Pawl 33 engages in the notches of ratchet 8 to prevent backward rotation thereof when arm 32a engages in notch 43.

Normally, the ratchet 7 holds the pawl arms 41b and 32b out of engagement with the edge of ratchet 6 as the latter is moved forward by the pawl arm 41a engaging ratchet 8, as the lever 35 oscillates. When ratchet 7 has rotated so notch 7b is presented to the end of pawl 41b, the pawl engages the teeth in ratchet 6. Since ratchet 6 is free to rotate on shaft 42a with nothing preventing its backward movement, succeeding oscillations of pawl 41b merely rotate ratchet 6 forward and backward while ratchet 8 and shaft 42 continue their step-by-step forward advance. When ratchet 7 has advanced far enough to allow pawl arm 32b to fall into notch 7b at point 7d, pawl arm 32b engages the teeth in ratchet 6. Now, as pawl arm 41b oscillates, being in engagement with ratchet 6, it moves that ratchet forward one notch at a time, backward movement of the ratchet 6 being prevented by pawl arm 32b. The shoulder 7c of ratchet 7 does not extend outwardly far enough, radially, to release the pawl

arms 32b or 41b from the notches of ratchet 6, but when the edge 7e, which extends a greater distance, radially, from the shaft 42, comes under the pawl arms 41b and 32b, the pawls are raised to release the ratchet 6 which snaps back against pin 47 under the influence of spring 6a secured at one end to pin 47 and at its other end to a hub on ratchet 6.

As shown in Fig. 7, the pin 47 is carried by the ratchet 5 and extends through a notch in the edge of the ratchet 6. Since ratchet 5 is secured rigidly to shaft 36 on which the knob 3 is mounted, turning this knob turns ratchet 5 and causes a partial revolution of pin 47 about the axis of shaft 36. A stop member or pawl 48, pivotally mounted on one of the posts 27, has a finger 49 bent perpendicularly with relation to the plane of the stop member and extending back away from the front plate 25. The ratchet 5 is provided along its marginal edge with notches to be engaged by the finger 49 so that the ratchet will be held reasonably firmly in adjusted position. However, it can be moved without difficulty by turning the knob 3. At one corner of the ratchet 5 there is a stop finger 50 which engages the projection or finger 49 when the knob 3 is turned in a counterclockwise direction to the limit of its motion, that is, to the index line marked 23 on the dial. When the indicator on the dial reaches this line, stop finger 50 engages projection 49 and prevents further rotation.

As shown in Fig. 4, pawl 48 is pivoted on the lower post 27 and is actuated into holding position by a spring 52 which, at its second end, is secured to the outer end of a lever 53, pivoted on a hub surrounding and constituting a part of shaft 36 and substantially filling the opening in the lever 53. The spring biased movement of lever 48 is limited by projection 49 engaging ratchet 5 and the spring biased movement of lever 53 is limited by pin 53a.

Bent at a right angle to the plane of the lever 53 is an arm upon which is rigidly mounted a spring pawl 54, constructed and arranged to engage the shoulder 7d of the ratchet 7. When the hump 55 on the cam 11 is under the switch element 17, as shown in Figs. 4 and 7, the apparatus is in "off" position, that is, the current is cut off from the motor circuit, including the wires 17a and 17b. The wire 17b has a terminal 17c which is connected by a screw to bar 24 and to a terminal 28, and the other motor wire 17a is connected to contact finger 17. One of the power line wires (not shown) is connected to terminal 28 and the other power line (not shown) is connected to terminal 28a which, in turn, is connected to bus bar 22. Terminals 28 and 17c are insulated by the insulating bar 24 from bus bar 22. Thus the motor circuit can be traced from one power line through terminal 28, terminal 17c, wire 17b, the coil in motor 1, wire 17a, contact finger 17, bus bar 22, terminal 28, and the other power line wire. Therefore, when contact 17 is closed on bus bar 22, the motor runs, and when it is raised away from 22, the motor stops. The lead wires 17a and 17b lead through the back plate 26 and into the motor case of the motor 1.

When it is desired to start the mechanism into operation, hump 55, being under contact member 17, the knob 3 is turned in a clockwise direction to the indicating line S and then it is permitted to return to the line 11. Turning this knob in a clockwise direction to the S position causes the finger 50 to engage the finger 56 on

lever 53 and turn the latter around the shaft 36. This causes pawl 54 to move forwardly and engage the shoulder 7d of ratchet 7, rotating the shaft 42 and the cams 9 to 14. In order to insure that the pawl 54 will not miss the shoulder 7d, when the latter is in proper position to be engaged, a spring arm 57 on finger 40 projects into the path of the forwardly moving pawl 54 and presses it inwardly into engagement with the shoulder 7d.

When knob 3 is turned clockwise to the S position, stop finger 58 contacts projection 49 on lever 48 to prevent knob 3 being turned beyond the S position. Since the radius of cam 7 at 7c is less than the radius of cam 7 at 7d, pawl 54 will engage only shoulder 7d. Therefore, after shaft 42a, ratchet 7, and other associated parts are advanced to the S position, knob 3 is ineffective to again advance the shaft 42a until it has completed its revolution.

Inasmuch as the cams 9, 10, and 12 to 14, inclusive, may be very much modified for controlling the circuits to the working apparatus, according to the desire of the manufacturer, and, since these do not constitute a part of the present invention, they are not disclosed in detail, being disclosed in part only in Figs. 4 and 5. However, when the knob 3 is turned to the starting position and allowed to come back to the line 11, the apparatus will be set for a soaking period of eleven minutes. If, on the other hand, it is desired that the clothes soak for sixteen minutes, let us say, then the knob is turned to the left, to the line indicating sixteen (16) minutes, immediately after the motor is started into operation. the knob 3 being allowed to rest there. This will cause the soaking period to be extended from eleven (11) minutes to sixteen (16) minutes. After the soaking period has been completed, the apparatus will go on with the next step in the cycle of operation.

Operation

When it is desired to start the washing operation, the operator turns the knob 3 to the S position and then releases it. This knob then returns to the position indicated by the numeral 11 on the dial 4. If the operator wishes a longer soak time, he or she turns the knob to the desired position on the dial. The timer then completes its cycle and stops.

More specifically, with the timer in the "off" position and with cam 11 holding motor contact 17 open, ratchet 7 is in a position such that shoulder 7d occupies the position indicated in Figs. 6 and 7. Now, as the knob 3 is turned toward the S position, finger 58 on ratchet 5, which is connected to knob 3, is rotated to engage finger 56 on lever 53. Continued rotation of knob 3 now rotates ratchet 5 and lever 53 forward. As pawl 54 attached to lever 53 moves forward, it engages spring arm 57. The end of pawl 54 is so formed that continued movement of pawl 54 when sliding under spring arm 57 forces the end of pawl 54 downward into engagement with shoulder 7d. Ratchet 7 with shaft 42 and associated parts are now moved forward with knob 3. When knob 3 reaches position S on the dial, the shaft 42 has advanced one position. Finger 58 on ratchet 5 engages the end 49 of lever 48, preventing further forward movement of knob 3. When the operator releases knob 3, spring 52 returns lever 53 to engage pin 53a. Finger 56, still being in engagement with finger 50, also returns ratchet 5 and knob 3. Knob 3 stops in the position indicated by the numeral 11 on the dial when

return movement of lever 53 is stopped by pin 53a. Advancing shaft 42 one position causes the hump 55 on cam 11 to move from under contact finger 17, allowing it to close on bus bar 22 and thus close the circuit to start motor 1.

It is pointed out that pawl 54 is effective to engage only shoulder 7d of ratchet 7 since shoulder 7c of ratchet 7 is closer to the center than 7d. Therefore, after the shaft 42 is once advanced to the start position, knob 3 is ineffective to advance the shaft at any time during the ensuing cycle. This makes it impossible for the operator to shorten any of the intervals of the normal cycle, so proper timing of each interval of the washing cycle is insured.

The normal or minimum soak time is eleven (11) minutes, as indicated by the position to which the knob 3 automatically returns. With the motor now running, cam 31 is rotated 1 R. P. M. to actuate bell-crank lever 35 in a counterclockwise direction, as viewed in Fig. 7. Then, spring 39, connected to lever 35, causes it to turn in the opposite direction with a rapid motion when lever 35 falls off the high point of cam 31. This actuates pawl 41, causing step-by-step rotation of ratchet 8 and forward advancement of cams 9 and 14, inclusive. These, by operation of the various switch elements 15 to 20, open and close the various operating electrical circuits with a snap action and control the functioning of the mechanisms intended to be controlled by this timer. It should be noted that in Fig. 7 the pawl arms 41a and 41b are shown in two different positions in order to show the relations to other elements of the structure.

Since cam 31 rotates 1 R. P. M. to advance the shaft 42 one position per minute, at the end of ten (10) minutes, ratchet 8 will have advanced so that the cut-away portion 43 of ratchet 8 will be under pawl arm 41a. Shoulder 7c on ratchet 7 is advanced under the end of pawl arm 41b at the end of the 10th minute, simultaneously with advancement of the cut-away tooth 43. If the soak time is not to be extended beyond eleven (11) minutes, the pawl arm 41b engages shoulder 7c and advances shaft 42 one position on the next oscillation at the end of the 11th minute. Pawl arm 41a then re-engages the teeth of ratchet 8 to complete the revolution of shaft 42 in the regular manner.

If the soak time is to be extended beyond eleven (11) minutes, pawl arm 41b is held out of engagement with shoulder 7c by the teeth in ratchet 6. There is nothing to advance shaft 42 farther since pawl arm 41a merely oscillates in notch 43. However, pawl arm 41b engages in the notches of ratchet 6 and advances this, one notch at a time, for a period of time corresponding to the increase in the soak period represented by the difference between 11 and the setting of the indicating pointer on knob 3. Then, pawl arm 41b engages shoulder 6b on ratchet 6. As shoulder 6b is deeper than the teeth of the ratchet, pawl arm 41b drops down low enough to engage, also, shoulder 7c on ratchet 7. The next oscillation of pawl arm 41b again advances ratchet 7 and shaft 42. Pawl arm 41a now re-engages the teeth in ratchet 8 to continue the step-by-step advance of shaft 42.

Now, a cycle of operation will be described in which the normal or minimum soak time is eleven (11) minutes. The knob 3 is turned forward to advance shaft 42 one position. Spring 52 returns knob 3 to the 11-minute position on the dial. The ratchet 6 is so positioned by pin 47 on ratchet 5

that the shoulder 6b of ratchet 6 is under pawl arm 41b. The pawl arms 41a and 41b oscillate in one-minute cycles, being driven by motor 1. After ten oscillations, the wide notch 43 is presented to pawl arm 41a so that 41a is ineffective to advance ratchet 8. However, shoulder 7c, being in line with the wide notch 43, is now presented to pawl arm 41b which is free to engage shoulder 7b, since the teeth of ratchet 6 are in advance of the pawl and no longer hold the pawl arm out of engagement with ratchet 7. Therefore, on the eleventh (11th) oscillation of 41a and 41b, pawl arm 41b engages shoulder 7c and advances shaft 42 one position. This terminates the soak time. On the twelfth (12th) oscillation, pawl arm 41b again engages the teeth in ratchet 8 and continues to advance the shaft in the normal manner.

Next, we will assume it is desired to operate the timer with the soak period extended five (5) minutes, making a total of sixteen (16) minutes. The operator turns the knob 3 clockwise to the S position to advance the shaft 42 one position to start the motor. The knob 3 is then turned counterclockwise to the 16-minute position on the dial. This counterclockwise movement of knob 3 turns ratchet 5 and pin 47 counterclockwise five notches beyond the point to which it is moved when spring 52 returns knob 3 to the 11-minute position. Ratchet 6, being biased counterclockwise by spring 6a against pin 47, also moves counterclockwise five additional notches, to remain in engagement with pin 47. Pawl arm 41b will now be over the fifth notch of ratchet 6, counting clockwise from 6b. However, pawl arm 41b will be held out of engagement with ratchet 6 by the raised surface of ratchet 7. As shaft 42 is advanced, notch 7b will first be presented to pawl arm 41b, allowing the pawl arm 41b to fall into engagement with ratchet 6. Ratchet 6 will then oscillate with pawl arm 41b but will not be advanced. At the end of the tenth (10th) oscillation of pawl arms 41a and 41b when the wide notch 43 moves under the pawl arm 41a, pawl arm 32b falls off the shoulder 7d into notch 7b and engages the teeth of ratchet 6. Pawl arm 32b now holds ratchet 6 against retrograde movement. The succeeding oscillations (11 through 15) of pawl arm 41b each advances ratchet 6 one tooth. On the sixteenth (16th) oscillation, pawl arm 41b engages shoulder 6b, as well as shoulder 7c, and advances ratchet 7 together with shaft 42 one notch. Pawl arm 41a now engages the teeth in ratchet 8 and the shaft 42 is rotated step-by-step through the remaining portion of the cycle in the normal manner.

It should be stated that the advance of ratchet 6 is stopped when pawl arm 41b drops behind shoulder 6b at the end of the notched part of ratchet 6. The pawl arm 41b then merely reciprocates along the unnotched part of this ratchet until shoulder 7e raises pawl arms 41b and 32b out of engagement with ratchet 6. Then ratchet 6 snaps back under the bias of spring 6a to its initial position against pin 47.

Expressed in another way, and perhaps more simply, the motor 1, through shaft 30, cam 31, arm 35, and pawl arms 41a and 32a, advances the cam shaft 42; the wide notch 43 stops the advancing of the cam shaft by not furnishing means to be engaged by the pawl arm 41a; the ratchet segment 6 is advanced from an initial position by the motor acting through the pawl arm 41b when cams 7 and 8 are stopped, after it has moved a predetermined amount, permitting engagement of pawl arm 41b with shoulder 7c to advance the cam shaft past its stopping position, whereupon the cam shaft advancing means again takes up the driving of the shaft, the ratchet segment being returned to its initial position by the spring 6a.

It is of course understood that, while the description of the extension or shortening of a period has been specifically applied to the "soak" period, it may equally as well be applied to some other period, as, for example, the "washing" period.

It will of course be understood that the specific description of structure set forth above may be departed from without departing from the spirit of this invention as set forth herein and in the appended claims.

Having now described my invention, I claim:

1. In a timer for a plurality of operating electrical circuits, a movable switch element for each of said circuits, an operating cam for each of said switch elements, a shaft on which said cams are carried and by which they are rotated in contact with the switch elements, intermittently operating means for rotating said shaft, including pawl and ratchet mechanisms, and means adjustable at will for varying the time interval controlled by one of said switch elements, one of said ratchet mechanisms having a tooth omitted whereby to cause temporary discontinuance of the functioning of that mechanism.

2. In a timer for a plurality of operating electrical circuits, a movable switch element for each of said circuits, an operating cam for each of said switch elements, a shaft on which said cams are carried and by which they are rotated in contact with the switch elements, intermittently operating means for rotating said shaft, including pawl and ratchet mechanisms, one of the teeth of one of said ratchet mechanisms being omitted, thus allowing actuation for a limited period of part of the ratchet mechanisms without actuation of the remainder thereof whereby to stop rotation of said shaft for said limited period, and means adjustable at will for varying the time interval controlled by one of said switch elements.

3. In a timer for a plurality of operating electrical circuits, a movable switch element for each of said circuits, an operating cam for each of said switch elements, a shaft on which said cams are carried and by which they are rotated in contact with the switch elements, intermittently operating means for rotating said shaft, including pawl and ratchet mechanisms, one of said ratchet mechanisms having one tooth omitted, thus allowing actuation for a limited period of part of the ratchet mechanisms without actuation of the remainder thereof whereby to stop rotation of said shaft for said limited period, means adjustable at will for varying the time interval controlled by one of said switch elements, and means for adjusting the length of the period during which said shaft does not rotate.

4. In a cycle timer provided with a shaft, a motor, means operated by the motor for causing advancement of said shaft, a second means for causing the advancement of said shaft to be stopped when said shaft has advanced to a predetermined position, said second means being advanced from an initial position by the motor when said first means is stopped, and said second means being operative, after a predetermined movement, to make possible the advancement of said shaft past said predetermined stopping position, whereupon said first means is again effective to advance said shaft, and spring means for

returning said second means to its initial position.

5. In a cycle timer having a shaft, a motor, oscillating means including two pawls driven by said motor, ratchet means attached to said shaft and advanced with step-by-step movement by one of said pawls, said ratchet means having a tooth removed therefrom whereby said shaft is driven by said one pawl to a predetermined position in which said pawl is ineffective to advance said shaft, said second pawl being operable to engage said ratchet means to advance said ratchet and shaft in said predetermined position, and a second ratchet means effective to hold said second pawl out of engagement with said first ratchet means, said second ratchet means being operable to be advanced by said oscillating means to a position ineffective to hold said second pawl out of engagement, whereupon said second pawl can advance said first ratchet means and shaft past said predetermined position and render said first ratchet means effective to again advance said shaft.

6. In a cycle timer having a shaft, a motor, oscillating means including two pawls driven by said motor, ratchet means attached to said shaft and normally driven by one of said pawls, said ratchet means having a tooth removed therefrom whereby said shaft is driven by said one pawl to a predetermined position where said pawl is ineffective to advance said shaft, said second pawl being operable to advance said ratchet and shaft, and means effective to hold said second pawl out of engagement with said ratchet means until said means has advanced a predetermined amount.

7. In a cycle timer provided with a shaft having two ratchet wheels mounted thereon, a motor, oscillating means including two pawls driven by said motor, one of said pawls engaging one of said ratchet wheels to advance said shaft with step-by-step motion, said ratchet wheel having a tooth removed therefrom to render said means ineffective to advance said shaft past the position where the pawl engages the space occasioned by removal of the tooth, said second ratchet wheel having a

tooth positioned to be normally engaged by said second pawl in the position to which the shaft is advanced by the first pawl, and means effective to prevent engagement of said second pawl and said second ratchet wheel, said means being movable through a predetermined distance by said motor to a position where said second pawl can engage the second ratchet to advance the shaft one position, the first pawl then being effective again to advance said shaft.

8. In a cycle timer provided with a shaft having two ratchet wheels mounted thereon, a motor, means driven by said motor engaging one of said ratchet wheels to advance said shaft with step-by-step motion, said ratchet wheel having a tooth removed therefrom to render said means ineffective to advance said shaft when said shaft reaches a predetermined position, said second ratchet wheel having a notch whereby said means is effective to advance said shaft through said position, and a second means operable to hold said first means out of engagement with said second ratchet wheel for a predetermined movement of said second means.

FRANK ARTHUR PEARSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,201,704	Simmen	May 21, 1940
2,218,698	Clark	Oct. 22, 1940
2,241,887	Pick	May 13, 1941
2,315,920	Baker et al.	Apr. 6, 1943
2,325,837	Dyer	Aug. 3, 1943
2,328,473	Leonard	Aug. 31, 1943
2,344,253	Kirby	Mar. 4, 1944

FOREIGN PATENTS

Number	Country	Date
271,995	Great Britain	June 9, 1927