

May 6, 1958

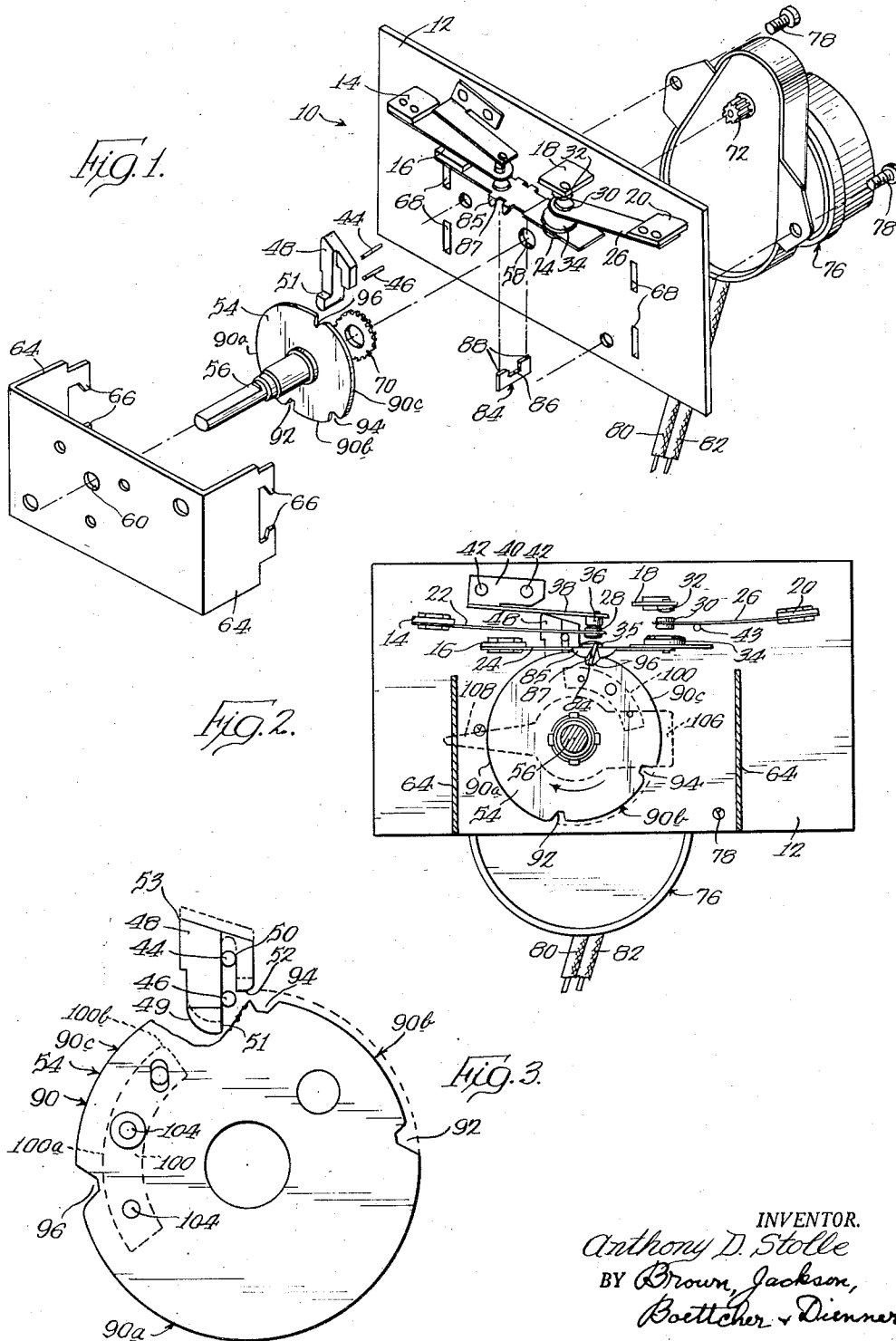
A. D. STOLLE

2,833,874

TIME SWITCH MECHANISM

Filed Dec. 15, 1955

2 Sheets-Sheet 1



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TIME SWITCH MECHANISM

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2 Sheets-Sheet 2

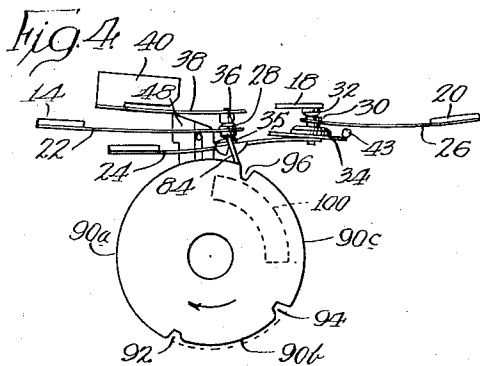
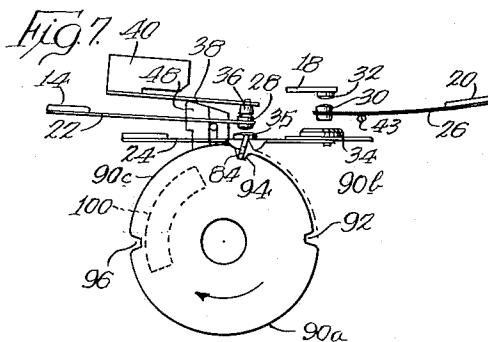
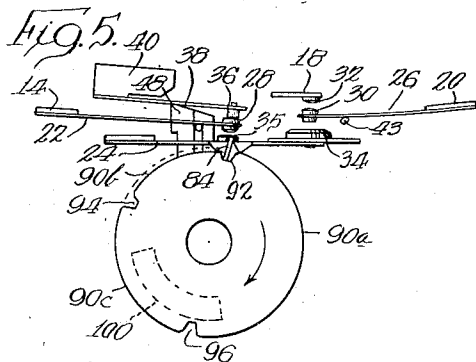
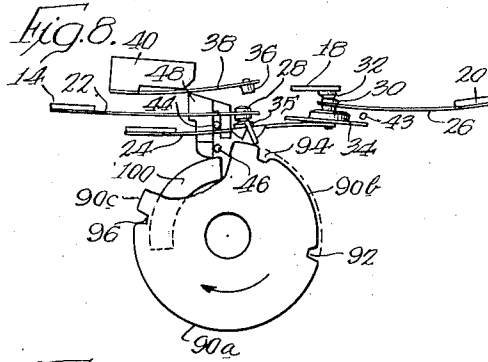
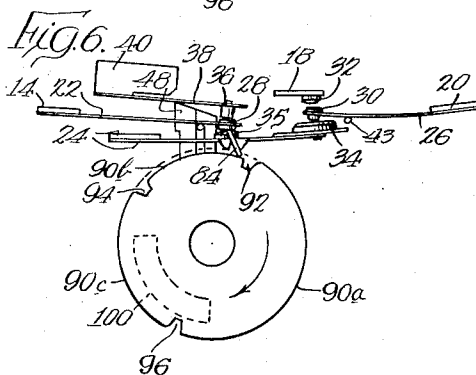
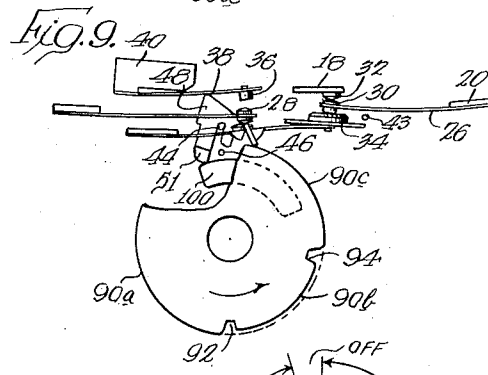
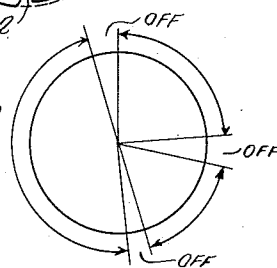


Fig. 11.

CONTACTS				
28-36 TIMER				
30-32 HEATER				
28-35 TUMBLER				

Fig. 10.



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2,833,874

TIME SWITCH MECHANISM

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8 Claims. (Cl. 200—38)

The present invention relates generally to switch mechanisms, and, more particularly, is directed to time switch mechanisms.

It is an object of the present invention to provide a time switch mechanism wherein an electrical circuit between two switch arms may be interrupted by improved supplemental switch operating mechanism.

The present invention is concerned with the general type of time switch mechanism comprising a power driven main cam having a track with a plurality of abrupt radial recesses therein and switch arms having associated therewith a cam follower which is engageable with the cam track for urging the switch arms into engagement with each other. When the cam follower is received in a particular cam track recess, upon completion of a timed cycle, the switch arms are permitted to separate. Time switch mechanisms of the character referred to are disclosed and claimed in the copending application of William P. Gallagher, Anthony D. Stolle and Robert B. Ellis, Serial No. 393,802, filed November 23, 1953, and in the copending application of Anthony D. Stolle and Robert B. Ellis, Serial No. 450,436, filed August 17, 1954, now Patent No. 2,801,305.

It is another object of the present invention to provide a switch mechanism, as noted, wherein the circuit between a pair of the switch arms may be opened and then closed in particular timed relation to a timed cycle of operation of the switch mechanism.

In accomplishing the latter object, I provide switch actuating means which is operable by the motor driven cam mechanism in one range of rotation of the cam mechanism to separate one pair of the switch arms. More specifically, a slidable member is associated with the one pair of switch arms and is adapted to separate the latter. A supplemental cam is mounted on the side of the main cam, and in one part of the rotative movement of the main cam this supplemental cam engages and actuates the slidable member.

As one end of the supplemental cam moves into engagement with the slidable member, upon rotation of the main cam, the slidable member is given endwise sliding motion, whereby the selected switch arms are separated. Upon further rotation of the main cam, the other end of the supplemental cam moves out of engagement with the slidable member for releasing the force applied thereto and permitting the switch arms to re-engage.

It is a feature of my present invention that the selected pair of switch arms, after they have been separated, are re-engaged without any radial movement being required on the part of the cam follower.

Other objects and features of the invention will appear in the following detail description of one embodiment of the invention. In the accompanying drawings illustrating such embodiment:

Figure 1 is an exploded view of the time switch mechanism of my present invention;

Figure 2 is a front elevational view of the time switch

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mechanism of Figure 1, with the cover member being broken away;

Figure 3 is a fragmentary elevational view on a larger scale, showing the main cam, the supplemental cam and the slidable member responsive to said latter cam;

Figures 4 through 9 illustrate various sequences of steps in the operation of the time switch mechanism;

Figure 10 is a diagrammatic knob layout showing the sequence and angular duration of the several steps of typical cycles; and

Figure 11 is a chart diagramming the sequence and time duration of the several steps of such typical cycles.

Referring now to Figures 1 and 2, there is indicated generally by the reference numeral 10 the time switch mechanism of the present invention. The time switch mechanism 10 comprises a supporting plate 12 which is preferably formed of insulating material and is generally rectangular.

Staked in apertures formed in the upper half of the member 12 are metallic terminal post members 14, 16, 18 and 20, the ends of which project through the member 12 and are adapted to have suitable connection with various electrical devices for timing the operations thereof. The process by which the terminal post members 14, 16, 18 and 20 are staked to the mounting member 12 is disclosed and claimed in the copending application of William P. Gallagher, Anthony D. Stolle and Paul G. Bielak, Serial No. 366,842, filed July 8, 1953.

Secured, as by riveting, to the forward ends of the posts 14, 16 and 20 are the one ends of elongated, metallic switch arms 22, 24 and 26. The other ends of the switch arms 22 and 26 have respectively mounted thereon metallic contacts 28 and 30, the latter of which cooperates with a metallic contact 32 secured to the terminal post 18. The other end of the switch arm 24 has secured thereto an insulating button or disk 34 which is adapted to cooperate with the contact 30 on the switch arm 26. In addition, a metallic contact 35 is secured to the switch arm 24 intermediate the ends thereof and cooperates with the contact 28.

The contact 28 of the switch arm 22 is further adapted to cooperate with a metallic contact 36 which is carried at the one end of a metallic switch arm 38 having a flanged foot portion 40 which is suitably riveted at 42 to the mounting member 12. The rivets 42 preferably extend through the member 12 and are adapted to support terminal members which may be connected with an electrical device. A fixed pin 43 projecting from the insulating panel 12 limits downward movement of switch arm 26 substantially to the position shown in Figure 2.

A pair of spaced pin members 44 and 46 are secured at their one ends in the member 12 on the opposite sides of the switch arm 24. The upper pin member 44 serves to limit movement of the switch arm 22 in a downward direction, as viewed in Figure 2. A slidable insulating member 48 has mounting on the pin members 44 and 46 for actuating the upper switch arm 38. This slidable insulating member 48 has a forwardly extending boss or foot portion 49 at its lower end. Substantially centrally of its width, this insulating member 48 is formed with a vertically extending slot-like opening 50. The left hand edge of the slot 50 continues down to the bottom of the foot portion 49 along a substantially vertical guide surface 51. The right hand edge of the slot 50 terminates at the horizontal shoulder 52, which is disposed substantially above the foot portion 49. The upper edge of the insulating member 48 is sloped upwardly to the pointed nose 53 located at the upper left hand corner of the insulating member. The upper end of the slot-like opening 50 is adapted to receive the upper pin member 44. The engagement of the upper pin 44 in the upper end of the slot 50 limits downward movement of slidable

member 48. The lower pin member 46 occupies a position below the horizontal shoulder 52, and in the normal position of the insulating member 48 the vertical guide edge 51 bears against the side surface of this lower pin. However, this insulating member is free to pivot in a clockwise direction around the upper pin 44, in which pivoting movement the guide edge 51 separates from the lower pin 46. When the slidable member 48 is in assembled position, as shown in Figure 3, it lies immediately in back of the switch arms 22 and 24. Its upper pointed nose portion 53 is adapted to engage the switch arm 38 for moving this switch arm to circuit opening position when the slidable member is slid upwardly in a vertical direction, as will be later described.

So as to effect the desired timed actuation of the above described switch arms of the time switch mechanism of my present invention, I provide a non-metallic revoluble member or cam 54 mounted on a shaft 56, which is journaled at one end in a central aperture 58 formed in the mounting member 12, and, at the other end, in a central aperture 60 formed in a cover member 62 having arm members 64. In the assembly of the switch mechanism, lugs 66, which are formed at the ends of the arms 64 of the cover member 62, are inserted through rectangular openings 68 formed at the sides of the mounting member 12, and are then bent or twisted so as to lock the cover 62 in position.

Secured to the shaft 56, intermediate of the cam 54 and the mounting member 12, is a gear 70 which has meshing engagement with a pinion 72 that projects through an aperture 74 formed in the mounting member 12. The pinion 72 is drivingly connected through reduction gearing with a slow speed synchronous electric motor, the latter assembly being indicated generally by the reference numeral 76. The electric motor and reduction gearing unit 76 is secured by screws 78 to the mounting member 12, with the electric motor being adapted to be placed in communication with an electric power source through lines 80 and 82, the latter of which are suitably connected to the appropriate switch terminals.

Associated with the switch arm 24 is a floating, metallic C-shaped cam follower 84 which has a body portion 86 and arm portions 88. The switch arm 24, intermediate of the ends thereof, is formed at its opposite edges with spaced flanges 85 that project at right angles therefrom and toward the cam 54. Each flange 85 is formed in two parts which define a substantially V-shaped recess 87.

The V-shaped recesses 87 at opposite edges of the switch arm 24 floatingly and pivotally receive the C-shaped cam follower 84 when the elements of the switch mechanism are in the assembled relation, shown in Figure 2. The arm portions 88 of the cam follower 84 partially envelope the switch arm 24 and intersect the plane of the latter so as to serve to limit endwise movement of the follower 84 relative to the switch arm 24.

The above described main cam 54 has a peripheral track 90 on which the cam follower 84 rides. When the cam 54 is being driven automatically by the electric motor 76 it revolves in a clockwise direction, as viewed in Figure 2. Extending into the cam track 90 are three relatively abrupt radial recesses 92, 94 and 96. These three recesses 92, 94 and 96 divide the peripheral track 90 into three separate cam dwells 90a, 90b and 90c. The first cam dwell 90a lies between the recesses 96 and 92; the second cam dwell 90b lies between the recesses 92 and 94; and the third cam dwell 90c lies between the recesses 94 and 96. The first and third cam dwells 90a and 90c are both of the same radius. The second cam dwell 90b is of smaller radius to lie below the level of the first and third cam dwells 90a and 90c. The three cam dwells 90a, 90b and 90c enable the timer to be set for effecting three different operating conditions of the

apparatus controlled thereby. For example, when the timer is being used for controlling a clothes dryer, the timer is set on the cam dwell 90a for normal wash loads, such as cottons, linens, etc.; it is set on cam dwell 90b for delicate fabrics, synthetics, etc.; and it is set on cam dwell 90c for abnormal loads such as turkish towels, woolen rugs, etc. When the cam follower 84 drops into any one of the three recesses or notches 92, 94 or 96 at the ends of cam dwells 90a, 90b and 90c respectively, the entire operation which was being effected by that cam dwell stops, as will be later described.

It will be noted that the pivotal axis of the cam follower 84 is offset from the axis of rotation of the cam 54. This causes the cam dwells 90a, 90b and 90c to present a down hill sloping surface to the lower edge of the cam follower 84 when the cam follower is engaging one of these cam dwells. Whenever the cam follower 84 is riding on one of the cam dwells 90a, 90b or 90c it occupies the angular position shown in Figures 4, 6, 8 and 9, with its lower edge sloping downhill in a clockwise direction along the cam dwell. This is true irrespective of the direction of rotation of the cam 54, the cam follower immediately snapping to this position after it has been forced up out of one of the recesses 92, 94 or 96, even in a counterclockwise rotation of the cam 54. This action of the cam follower 84 results by reason of the fact that the pivotal axis of the cam follower is offset from the axis of rotation of the cam 54. The clockwise direction of slope of the cam follower 84 on the cam dwells 90a-90c minimizes wear between the follower and dwells during the motor driven clockwise rotation of cam 54. Whenever the cam follower 84 drops into either of the recesses 92, 94 or 96 it immediately snaps to the opposite angle of inclination, as shown in Figures 2, 5 and 7, which aids in effecting a quick separation of the contacts.

Improved mechanism of the present invention which is provided for opening the circuit between a pair of the above-described switch arms for an interval during a timed cycle of operation of the switch mechanism, comprises switch actuating means in the form of a supplemental cam 100, which is secured to the back side of the main cam 54. This supplemental cam 100 consists of an arcuate segment, preferably composed of insulating material, which is secured by rivets 104 to the back side of the cam 54. Such cam segment has an outer cam surface 100a which is curved concentrically of the axis of main cam 54, the leading end of such cam surface 100a being formed with a rounded nose portion 100b. This supplemental cam segment is arranged to actuate the slidable member 48, the cam being disposed in the same fore and aft plane as the forwardly extending foot portion 49 of the slidable member. When the supplemental cam segment pushes the slidable member 48 upwardly, the pointed nose 53 of the latter engages and flexes the upper contact spring 38 in an upward direction, with consequent separation of contact 36 from contact 28. In the particular embodiment disclosed, the supplemental cam 100 has an angular span of approximately 90°, corresponding substantially to the angular span of the cam dwell 90c, so that for approximately one-quarter of each revolution of timing shaft 56 and main cam 54 the contact 36 is held separated from contact 28, substantially concurrently with the engagement of contacts 35 and 28 and of contacts 30 and 32. It will be understood, however, that these proportions are merely illustrative, and that the supplemental cam 100 can be designed of a longer or shorter angular span.

It will be understood that the above described time switch mechanism is enclosed within an outer housing of the clothes dryer or other device which is controlled thereby, or is enclosed in a separate time switch housing, with the front end of the time shaft 56 projecting from such housing. Mounted on the outer end of the timer shaft 56 is a manually actuated setting knob or handle

106 having a pointer 108 which points to different indicia on a dial plate surrounding the shaft 56. The dial plate carries indicia designating the three different operating conditions corresponding to each of the cam dwells 90a, 90b and 90c being under the cam follower 84. In the three non-operating conditions of the time switch mechanism when the follower 84 is in one of the recesses 92, 94 or 96, the knob pointer 108 occupies the corresponding one of the "off" positions illustrated in Figure 10. Any well known type of friction slippage clutch is interposed in the driving train between the timer motor 76 and the main cam 54, being preferably interposed between the spur gear 70 and the main cam 54. This friction slippage clutch permits a manually actuated rotation of the timer shaft 56 and cams 54 and 100 in either direction by the knob or handle 102 in the operations of manually starting, stopping or setting the time switch mechanism.

Referring now to the operation of the switch mechanism, Figure 2 shows the switch in an "off" position with the cam follower 84 engaging in cam recess 96 and with the supplemental cam 100 in a position past the slidable member 48, so that the latter is in lowered position. By virtue of the engagement of cam follower 84 in recess 96, the contact 28 and 35 and the contacts 30 and 32 stand in open circuit position; and by virtue of the supplemental cam 100 occupying a position out from under the slidable member 48 the latter is in its lower position with the contact 36 engaged with the contact 28. Let us assume that the time switch is mounted on an electrically heated clothes dryer; with the contacts 28, 35 connected for controlling the motor which drives the clothes drum or tumbler and any separate air circulating fan in the dryer; with the contacts 30, 32 connected for controlling the electrical heating element of an electrically heated dryer (or the electrical solenoid gas valve of a gas heated dryer); and with the contact 36 through contacts 28 and 35 connected to control the motor 76 which drives the time switch. Let it also be assumed that the line side of the electrical supply line that supplies current to the tumbler motor and to the timer motor 76 is connected to the switch arm 24 to pass in series through the contacts 35, 28 and 36, so that when contacts 28 and 36 are separated the timer motor 76 is disconnected, and so that when the contacts 35 and 28 are separated the tumbler motor and also the timer motor 76 are disconnected (the latter then irrespective of the position of the contacts 28 and 36). It will also be assumed that the housewife or user first institutes a time cycle of operation by rotating the setting knob 106 in a clockwise direction from the position shown in Figure 2 substantially to the position shown in Figure 4. This moves the cam follower 84 out of the recess 96 up onto the first cam dwell 90a. By virtue of the movement of the cam follower 84 up onto the first cam dwell 90a, the switch arm 24 is moved upwardly for bringing the contact 35 into engagement with the contact 28, and for also bringing the contact 30 of switch arm 26 into engagement with stationary contact 32. Thus, the three switch arms 22, 24 and 38 become electrically interconnected, and the fourth switch arm 26 also moves into closed position, with the result that all three circuits are closed at the control contacts. Hence, the timer motor 76 starts driving the time switch, the dryer motor starts driving the clothes tumbler drum, and the electrical heater becomes energized.

The time cycle represented by the full length of the first cam dwell 90a corresponds to a moderately long heated drying operation or cycle, during which air plus heat are supplied to the clothes. This long heated drying cycle is generally used for a normal wash load including cottons, linens, etc. The housewife can utilize the full length of this first cam dwell 90a for obtaining a moderately long heated drying period; or if she desires a shorter heated drying period, she can rotate the setting knob 102 clockwise to a further point for making a more limited

portion of the first cam dwell 90a effective for maintaining the tumbler motor contacts 35 and 28 closed and the heating circuit contacts 30, 32 closed.

When the recess 92 moves into a position under the cam follower 84, either by the timed drive from the timer motor 76, or by the act of the housewife for terminating the heating operation represented by the cam dwell 90a, the lower switch arm 24 moves downwardly and lowers the switch arm 26 for separating the supply line contacts 35, 28, and also separating the heater contacts 30, 32. This position of the contacts is shown in Figure 5. Thus, when the cam follower drops into the recess 92 in Figure 5 and snaps to the opposite angle of inclination, it stops the timer by stopping the timer motor 76 and stops the dryer by stopping the tumbler motor, both circuit interruptions occurring at the supply line contacts 35, 28. It also stops the heating operation at contacts 30, 32.

Referring now to the second cam dwell 90b, the time cycle represented by the length of this second cam dwell corresponds to an unheated drying or fluffing operation in which the heat is not turned on, and in which forced air alone functions as the drying or fluffing medium, the clothes being tumbled in this unheated operation. Such operation may be employed for fluffing clothes, or by the addition of a sprinkler attachment, it may be employed for sprinkling clothes. The housewife may manually select this unheated tumbling operation by turning the knob 102 to bring the second cam dwell 90b under the cam follower 84, as shown in Figure 6.

As previously described, this second cam dwell 90b is of a smaller radius than the other cam dwells 90a and 90c, and hence the switch arm 24 is only moved upwardly a sufficient distance to close supply line or tumbler motor contacts 35 and 28, but not a sufficient distance to raise the switch arm 26 for closing heater contacts 30 and 32. Hence, the heating function is discontinued over that portion of the timed cycle represented by the length of the second cam dwell 90b. This unheated drying operation terminates when the recess 94 moves under the cam follower 84, as shown in Figure 7.

The dropping of the cam follower 84 into the recess 94 lowers the switch arm 24 for separating the tumbler motor contact 35 from the contact 28, with the result that the circuit to the tumbler motor is interrupted. The heater controlling contacts 30 and 32 remain in separated relation, and the timer motor contacts 28 and 36 remain in engaged relation, but the supply circuit to the timer motor 76 is interrupted at contacts 35, 28.

Referring now to the operation or cycle which occurs when the housewife turns the cam 54 to bring the third cam dwell 90c under the cam follower 84, the time cycle represented by the length of this third cam dwell 90c represents a thermostatic drying cycle during which the heat is turned on, but wherein the length of the heated drying cycle is not dependent on the operation of the timer motor 76, but instead is dependent upon a thermostatic switch generally located in the flue leading from the dryer. This drying cycle is usually used for abnormal loads of turkish towel material, woolen rugs, etc. As shown in Figure 8, when the rotation of the cam 54 forces the cam follower 84 upwardly out of the recess 94 and on to the third cam dwell 90c, the resulting upward flexure of the switch arm 24 causes engagement of the tumbler motor contacts 28 and 35, and also flexes the switch arm 26 upwardly for causing engagement of the heater contacts 30 and 32. Hence, the circuits to the tumbler motor and to the heating element are restored. Concurrently, with the rising movement of the cam follower 84 out of the recess 94, the rounded nose portion 100b engages the curved surface of foot portion 49 of the slidable member 48, pushing this member upwardly. The upward motion of the slidable member 48 flexes the upper switch arm 38 in an upward direction, with consequent separation of contact 36 from contact 28, thereby opening the circuit to the timer motor 76

and stopping or preventing the rotation of cam 54. However, the aforesaid thermostatic control switch located in the outlet flue from the dryer is connected in shunt of the timer motor contacts 28, 36. Hence, when the load of abnormal material becomes dry the flue temperature rises and the thermostatic control switch responds by shunting the timer motor contacts 28, 36. Accordingly, the cam 54 starts or resumes rotation until the cam follower 84 drops down into the third recess 96. This restores the timer mechanism to condition illustrated in Figure 2, in which condition the timer is at rest with all of the contacts in open circuit positions.

Irrespective of whether the manual setting operation is in a clockwise or in a counterclockwise direction for obtaining any one of the above three heating cycles, my improved timer will go through the same automatic cycle of operations.

In Figure 9, I have illustrated what happens to the slidable member 48 when the timer is manually set to bring the third cam dwell 90c under the cam follower 84 (Figure 8) by a counterclockwise direction of rotation of the control knob 102. For example, it may be desirable to go from the positions shown in Figures 2 or 4 to the position shown in Figure 8 by a backwards or counterclockwise rotation, instead of having to rotate knob 102 through most of a complete revolution in a clockwise direction. In such manual counterclockwise rotation, the trailing end of the supplemental cam 100 engages the vertical guide surface 51 of the slidable member 48 and swings this guide surface to the left with a resulting clockwise direction of rotation of the slidable member 48 around the upper pin 44. This swings the pointed nose 53 of the slidable member in an upward direction against the under side of the switch arm 38, with consequent separation of the contact 36 from the contact 28. At the completion of the thermostatic switch controlled drying operation, when the supplemental cam 100 moves past the lower end of the slidable member 48, such member pivots back to normal position around the upper pin 44, with consequent re-engagement of the contacts 36 and 28.

In Figure 10, I have illustrated a diagrammatic layout of the different positions of the manually actuated setting knob or handle 102, corresponding to the different cycles or steps described above.

In Figure 11, I have shown a time chart of the above described cycles or steps, showing the relative times that the cooperating pairs of contacts are open and closed.

It will be understood that the above-described sequence of operations and the time intervals of these operations are merely typical of one arrangement of my improved timing mechanism, and that this sequence of operations and the time intervals thereof may be widely varied as operating conditions require.

While I have shown and described what I regard to be the preferred embodiment of my invention, nevertheless it will be understood that such is merely exemplary and that numerous modifications and rearrangements may be made therein without departing from the essence of the invention.

I claim:

1. In a switch assembly, the combination of a revoluble main cam having a track with a recess therein, first and second switch arm means associated with said main cam, a floating cam follower associated with said first switch arm means and engageable with said cam track for moving said first switch arm means into and out of contact with said second switch arm means, a slidable pivotable member associated with said second switch arm means and being adapted to move said second switch arm means into and out of contact with said first switch arm means, and a supplemental cam moving fixedly with said main cam and operative in one direction of rotation of said main cam for imparting sliding movement to said slidable pivotable member, and operative in the

opposite direction of rotation of said main cam for imparting pivotal movement to said slidable pivotable member.

2. In a switch assembly, the combination of a revoluble main cam, a plurality of cam dwells of different radii formed in the surface of said main cam, a plurality of relatively abrupt recesses of smaller radii than said cam dwells formed in the surface of said main cam, first and second switch arm means associated with said main cam, a floating cam follower associated with said first switch arm means and being engageable with said cam track for moving said first switch arm means into and out of contact with said second switch arm means, a slidable pivotable member associated with said second switch arm means and being adapted to move said second switch arm means into and out of contact with said first switch arm means, and a supplemental cam fixedly secured to said main cam and operative in one direction of rotation of said main cam for imparting sliding movement to said slidable pivotable member and operative in the opposite direction of rotation of said main cam for imparting pivotal movement to said slidable pivotable member.

3. In a switch assembly, the combination of a revoluble main cam having a track with a recess therein, first and second switch arm means associated with said main cam, a floating cam follower associated with said first switch arm means and engageable with said cam track for moving said first switch arm means into and out of contact with said second switch arm means, a slidable member associated with said second switch arm means, a pivot around which said slidable member can have pivotal movement, said slidable member being adapted to move said second switch arm means into and out of contact with said first switch arm means pursuant to sliding motion or to pivotal motion of said slidable member, and a supplemental cam fixedly secured to said main cam and operative to impart sliding motion to said slidable member in one direction of rotation of said supplemental cam and being operative to impart pivotal movement to said slidable member in the other direction of rotation of said supplemental cam.

4. In a switch assembly, the combination of a revoluble main cam, a cam dwell on said main cam terminating at one end in a relatively abrupt radial recess, first and second switch arm means associated with said main cam, a floating cam follower associated with said first switch arm means and engageable with said cam track for moving said first switch arm means into and out of contact with said second switch arm means, a slidable pivotable member associated with said second switch arm means and being adapted to move said second switch arm means into and out of contact with said first switch arm means, and a supplemental cam carried by said main cam and extending over substantially the angular expanse of said cam dwell for actuating said slidable pivotable member, said supplemental cam being operative in one direction of rotation of said main cam for imparting sliding movement to said slidable pivotable member, and operative in the opposite direction of rotation of said main cam for imparting pivotal movement to said slidable pivotable member.

5. In a switch assembly, the combination of a revoluble main cam having a track provided with a plurality of cam dwells and a plurality of relatively abrupt radial recesses therein, first, second and third switch arms associated with said cam, a cam follower associated with said first switch arm and engageable with said cam track for urging said first switch arm into engagement with said second switch arm, said second switch arm and said third switch arm normally remaining in contact with each other, a slidable pivotable member operative by sliding movement to move said third switch arm out of engagement with said second switch arm, and a supplemental cam secured to said main cam for imparting sliding movement to said slidable member in one direction of rotation of said main cam

and for imparting pivotal movement to said slidable pivotal member in the other direction of rotation of said main cam.

6. In a switch assembly, the combination of a revolvable main cam having a track with a first cam dwell of one radius and a second cam dwell of a relatively smaller radius, first, second and third switch arms associated with said main cam, a fourth switch arm mounted for movement into and out of engagement with a contact and adapted to respond to predetermined movement of said first switch arm, a cam follower associated with said first switch arm and engageable with said cam track, said cam follower when riding on said first cam dwell urging said first switch arm into engagement with both said second arm and said fourth switch arm whereby the latter is moved into engagement with said contact, said cam follower when riding on said second cam dwell urging said first switch arm into contact with said second switch arm but not urging said fourth switch arm into engagement with said contact, a slidable member for moving said third switch arm out of engagement with said second switch arm, a supplemental cam moving with said main cam for sliding said slidable member in the normal direction of rotation of said cams, and a pivot pin around which said slidable member has pivotal motion, said supplemental cam being operative to cause such pivoting of said slidable member when said cams are rotated in the reverse direction.

7. In time switch mechanism of the class described, the combination of a revolvable main cam comprising first and third cam dwells of substantially the same radius, a second cam dwell intermediate said first and third cam dwells of smaller radius than said first and third cam dwells, relatively abrupt radial recesses between said cam dwells, first, second and third switch arms having cooperating contacts operative to interconnect said switch arms, a fourth switch arm responsive to the position of said first switch arm, a stationary contact adapted to be engaged by said fourth switch arm, a cam follower associated with said first switch arm adapted to ride on said main cam, said follower when riding on said first and third cam dwells holding said first and second switch arms in engagement and holding said fourth switch arm

in engagement with said contact, said cam follower when riding on said second cam dwell holding said first and second switch arms in engagement but not holding said fourth switch arm in engagement with said contact, a slidable member operative to move said third switch arm out of engagement with said second switch arm, and a supplemental cam rotating with said main cam operative to actuate said slidable member.

8. In time switch mechanism of the class described, the combination of an electric motor, a revolvable main cam arranged to be driven thereby in one direction, said main cam comprising a cam track having a cam dwell and a relatively abrupt radial recess, first, second and third switch arms having cooperating contacts operative to interconnect said switch arms, a cam follower associated with said first switch arm adapted to ride on said main cam and operative to move said first switch arm into engagement with said second switch arm, a manual setting handle connected with said main cam and operative to impart setting motion to said main cam in either direction, a slidable member operative to move said third switch arm out of engagement with said second switch arm, a supplemental cam moving with said main cam and operative to impart sliding motion to said slidable member in the motor driven direction of rotation of said main cam, and a pivot pin around which said slidable member has pivotal motion, said supplemental cam being operative to cause such pivoting of said slidable member when said main cam is manually set by said setting handle in a direction of rotation reverse to the motor driven direction of rotation, said slidable member being proportioned to actuate said third switch arm to open circuit position with respect to said second switch when thus pivoted around said pivot pin.

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U. S. DEPARTMENT OF COMMERCE
PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,833,874

Anthony D. Stolle

May 6, 1958

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 7, line 64, for "asociated" read -- associated --; column 10, line 33, after "switch" insert -- arm --.

Signed and sealed this 17th day of June 1958.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON

Commissioner of Patents

U. S. DEPARTMENT OF COMMERCE
PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,833,874

Anthony D. Stolle

May 6, 1958

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