

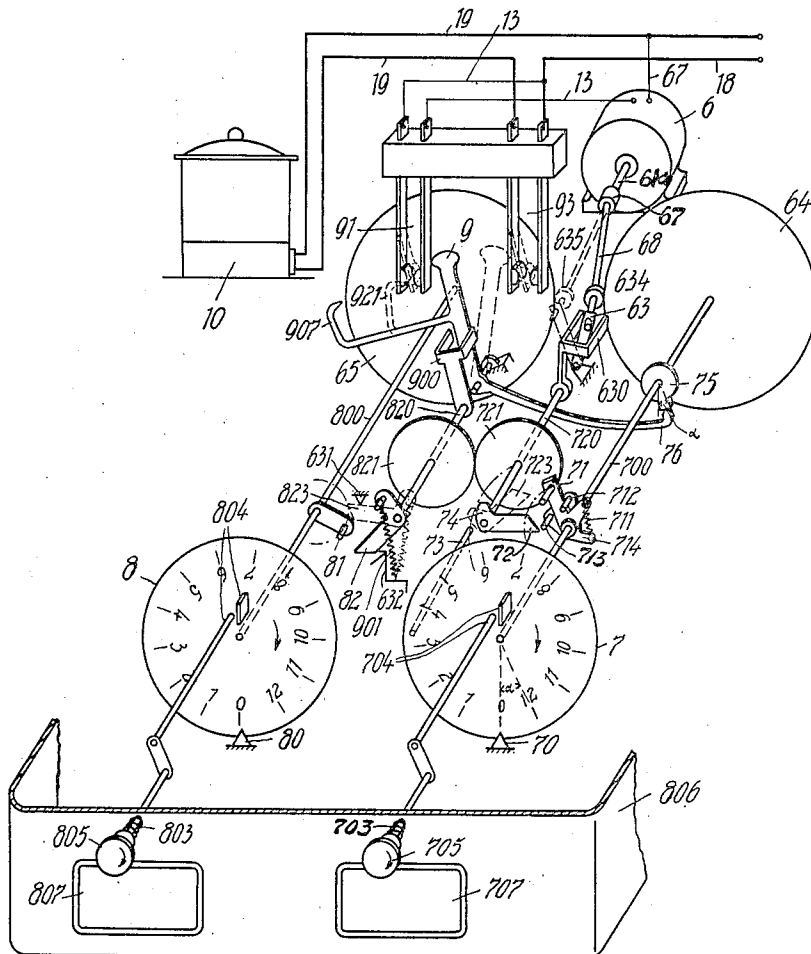
March 29, 1932.

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1,851,592

TIME SWITCH

Filed Feb. 19, 1930



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TIME SWITCH

Application filed February 19, 1930, Serial No. 429,742, and in Germany February 18, 1929.

Our invention relates to time-controlled switches and, more particularly, to switches controlled by clock movement for controlling the energization of heating elements used in various cooking devices.

An object of our invention is to provide a relatively simple mechanism for controlling the energization of a heating unit, which heating unit is to be energized, after a predetermined adjustable waiting period of time, for a second predetermined heating period of time and then deenergized.

In practicing our invention, we provide two separate manually adjustable discs for the waiting period and the heating period of time, respectively, a clutch actuated by a clock or time movement, which clutch is adapted to be selectively moved into engagement with the disc for the waiting period and the disc for the heating period by suitable means operatively associated with the two discs. The clock movement, which may include a motor, is caused to operate at the beginning of the waiting period of time, to drive the waiting-period disc, and is then operatively connected to the heating period disc to drive the same, while the switch controlling the energization of the heating element is closed, the entire system becoming inoperative at the end of the predetermined heating period of time.

The single figure of the drawing is a view, in perspective, of our improved automatic time-controlled switch, as applied to a cooking device.

Numeral 7 indicates a disc for adjusting the waiting period of time, and 8 is a similar disc for adjusting the heating period of time, 70 and 80 indicating fixed marks. Disc 7 is fixedly mounted on a shaft 700, on which there is mounted also a member 714, carrying stops 712 and 713 between which a switch finger 71, constituting a part of member 714, may move, but which is normally pressed against stop 712 by a spring 711. Shaft 700 has also mounted thereon a cam 75 having a projecting lug 76 thereon, and a gear wheel 64. The disc 7 has mounted thereon a finger 73 and a lug on the forward face constituting one part of a coupling 704. A second part of

this clutch may be constituted by a rod which rod may be moved by the adjusting knob 705 acting against a helical spring 703 located between the knob and a housing or casing 806. This casing is to be understood as enclosing all of the mechanism, but the major portion thereof is not shown in the drawing, for the sake of clearness. When the knob 705 is pushed toward the front of the casing, the inner end of the rod actuated by the knob will engage the lug on disk 7 to thereby effect any desired turning movement of the disk 7, and the amount of this turning movement can be observed through the inspection window 707 in the casing 806.

Disc 8 is mounted on a shaft 800, on which are mounted a switch finger 81 and a gear wheel 65. A clutch 804, substantially similar to the clutch 704, is operatively associated with the disc 8 and is controlled by the knob 805 on a shaft moved against a helical spring 803 which normally maintains the parts of clutch 804 out of engagement with each other. The disc 8 may be adjusted for any predetermined length of time, and the adjustment observed through window 807.

A shaft 720, which may be called, for short, the first auxiliary shaft, has mounted thereon an L-shaped lug having arms 72 and 74, as well as a gear wheel 721 and a rocker 630, of open rectangular shape which controls a coupling arm 63. A second auxiliary shaft 820 has mounted thereon a switch finger 82 which is forced by spring 901 against either a stop 631, when it will occupy the position shown by the broken lines indicated by numeral 823, or against a stop 632, which position is shown by the full lines in the drawing. The shaft 820 has mounted thereon a gear wheel 821 and a rocker 900 which is of substantially fork-shape and which controls a switch-actuating arm 9. Gear wheels 721 and 821 are in engagement with each other.

Switches 91 and 93 are located in the path of movement of arm 9. Switch 91 can be controlled also by an extension 907 on arm 9. Switch actuating arm 9 has an extension 76 thereon which extends into reach of the lug on cam 75. A cooking device 10 is connected to the supply circuit by conductors 19 ex-

tending through switch 93 and conductor 18, while a motor 6, which constitutes, in this particular embodiment of our invention, the clock movement, is connected to the supply circuit conductors through switch 91 and conductors 67 and 13.

The rotor shaft 61 of motor 6 is coupled, through a flexible coupling 67a, with a shaft 68 having a pinion 634 thereon, which latter pinion may be moved into mesh with either gear wheel 64 or gear wheel 65 by the hereinbefore described coupling arm 63 actuated by member 630.

In the single figure of the drawing, the various parts of our improved device are shown in their inoperative positions in which the switches 91 and 93 are open, as shown by the full-line positions, motor 6 and the cooking device 10 are deenergized so that the clock movement is inoperative.

Let it be assumed that it is desired to cause energization of the heating element of device 10 after a waiting period of five hours and that it is to be energized for a period of three hours. Button or knob 705 is pushed inwardly to effect engagement of the clutch 704, and disc 7 is turned in a clockwise direction to effect a turning movement of the disc 7. As soon as part 12 of the scale, as shown on the front of disc 7, reaches the mark 70, the extension or finger 76 of arm 9 is disengaged from the projection of cam 75 so that the switch arm 9 will turn in a counter-clockwise direction to engage a part of switch 91 to close the same, thereby energize motor 6 to cause operation of disc 7, rotor shaft 61 being coupled to gear wheel 64 through shaft 68 and pinion 634. The turning movement of disc 7 by means of knob 705 is, if course, continued until the desired scale, marked in this case 5, has reached the fixed point 70. Disc 8 for the second predetermined (or heating) period of time is adjusted in a similar manner, but, in this case, it is turned in the clockwise direction until the scale marked 3 is opposite the fixed member 80.

Disc 7 will continue to rotate while disc 8 remains stationary and the scale divisions 4, 3, 2, 1 move past the fixed mark 70, and mark 0 also moves toward mark 70 and, as soon as it reaches this mark, switch finger 71, which had been caused to engage stop 713 by the action of member 72 under the tension of spring 711, moves member 72 into the position shown by the broken lines and indicated by 723, this movement being effected with a snap action by reason of spring 901 and the meshed gear wheels 821 and 721. Finger 71 moves into the position shown in the drawing with a snap action by reason of the spring 711. At the same time that member 72 moved, member 82 was moved into the position shown by the broken lines and indicated by 823, and the movement of rocker 630 and coupling arm 63 caused disengagement of

pinion 634 from gear wheel 64 and engagement thereof with gear wheel 65, pinion 634 being moved into the position shown by the broken lines and indicated by 635. Pinion 634 is, therefore, coupled, through gear wheel 65 and shaft 800, with disc 8 indicating the heating period while disc 7 now remains stationary.

A turning movement of member 900, simultaneously with the turning of gear wheel 821, causes a movement of switch arm 9 in a clockwise direction and into the position shown by the broken lines, extension 907 thereon moving into the position shown by the broken lines and indicated by 921. The arm 9 causes closing of switch 93 so that the cooking device 10 or, more particularly, the heating element thereof (not shown in the drawing), is energized. Switch 91, momentarily opened by reason of the turning movement of arm 9, has again been closed by the engagement therewith of extension 907 when moved into the position 921, so that motor 6 is again energized and continues to operate.

The scale marked 2 and 1 on disc 8 will, therefore, move past mark 80 and, as soon as division 0 of the scale reaches the fixed mark 80, switch-actuating member 81 engages the upper edge of member 82, which was, during this time, in the position 823, and moves it back into the position shown by the full lines in the drawing so that arm 9 is returned into the position shown in the drawing, but arm 9 is precluded from closing switch 91 by reason of the engagement of the end of arm 76 thereof with the projection on cam 75. This insures the opening of both switch 93 and switch 91 so that both motor 6 and the heating element of cooking device 10 are deenergized, the mechanism is inoperative and discs 7 and 8 are stationary.

Member 72 was also returned from the position 723 into the position shown by the full lines by the action of gear wheels 821 and 721, this movement effecting disengagement of pinion 634 from gear wheel 65 and engagement with gear wheel 64, or, in other words, these parts have been returned to the position shown in full lines in the drawing. If the operator should turn disc 7 beyond the desired scale mark, it is only necessary that the turning movement be continued in the same direction until the proper desired mark is opposite the fixed member 70. If, during this turning movement, scale division 12 on disc 7 reaches member 70, the end of extension 76 of arm 9 will be disengaged from the projection on disc 75, and the motor 6 will be energized, as was hereinbefore set forth. If the disc 7 is turned further in a clockwise direction until mark 0 again reaches member 70, member 72 is moved into position 723 by finger 71 on shaft 700, whereby arm 9 is moved into the position shown by the broken lines in the drawing, and pinion 634 is moved

into the position 635. If now disc 7 is again turned through a predetermined angular distance, the member 72 is moved back into the position shown by the full lines by the engagement of members 73 and 74, shortly before scale mark 12 reaches the fixed member 70. The temporarily energized heating element of appliance 10 is, therefore, deenergized by the counter-clockwise movement of arm 9 and, simultaneously, pinion 634 is moved into engagement with gear wheel 64, and motor 6 is also deenergized. Further turning of disc 7 to move mark 12 past the fixed mark 70 causes the member 76 to be disengaged from the projection on cam 75, and motor 6 is energized through the action of member 71.

During this continued turning movement, the disc 7, by means of knob 705, the above-mentioned switching movements are effected. The heating element is always energized when the 0 mark on disc 8 reaches the fixed member 80.

Various modifications may be made in the device embodying our invention without departing from the spirit and scope thereof, and we desire, therefore, that only such limitations shall be placed thereon as are imposed by the prior art or are set forth in the appended claims.

We claim as our invention:

1. In a time-controlled switch for controlling the energization of a heating element and including a clock movement, a pair of adjustable discs for indicating a waiting period of time and a heating period of time, respectively, a disc-actuating means driven by the clock movement, and means for effecting engagement of the disc-actuating means with said first disc during a waiting period of time and with the second disc during a heating period of time.

2. In a time-controlled switch for controlling the energization of a heating element and including a clock movement, a pair of adjustable discs for indicating a waiting period of time and a heating period of time, respectively, a disc-actuating means driven by the clock movement, means for effecting engagement of the disc-actuating means with said first disc during a waiting period of time and with the second disc during a heating period of time and slip clutches locked against reverse rotation located between said discs and the disc-actuating means.

3. In a time-controlled switch for controlling the energization of a heating element and including a clock movement, a disc for indicating a waiting period of time, an auxiliary control member on the disc to effect starting of the clock movement when the said disc has been moved from a zero position through a predetermined angular movement, a second disc for indicating a heating period of time, and a control member on said second

disc to cause stopping of the clock movement when said second disc is moved to its zero position.

4. In a time-controlled switch for controlling the energization of a heating element and including a clock movement, a pair of adjustable discs for indicating a waiting period of time and a heating period of time respectively, a disc-driving means actuated by the clock movement, means for selectively coupling the disc-driving means with the discs, and means operatively associated with the coupling means to effect disengagement of the disc-driving means from the first disc and engagement thereof with the second disc simultaneously with the closing of the switch by the first disc.

5. In a time-controlled switch for controlling the energization of a heating element and including a clock movement, a pair of adjustable discs for indicating a waiting period of time and a heating period of time respectively, a disc-driving means actuated by the clock movement, means for selectively coupling the disc-driving means with the discs, and means operatively associated with the coupling means to effect disengagement of the disc-driving means for the second disc and engagement thereof with the first disc simultaneously with the opening of the switch by the second disc.

6. In a device for controlling the energization of a heating element and including a switch and a clock movement, a pair of manually-adjustable discs for indicating a waiting period of time and a heating period of time respectively, means for selectively coupling the clock movement to the discs, means operatively associated with the discs for effecting the closing of the switch at the end of a predetermined period of time in accordance with the setting of the first disc and for effecting opening of the switch at the end of a second predetermined period of time in accordance with the setting of the second disc, and means operatively associated with the discs for effecting the uncoupling of the clock movement from the first disc at the end of said first predetermined time.

In testimony whereof, we have hereunto subscribed our names this 5th day of February, 1930.

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