Aug. 6, 1935. H. COZENS ET AL 2,010,781

TIMING DEVICE

Filed Feb. 8, 1930

Fig. 1

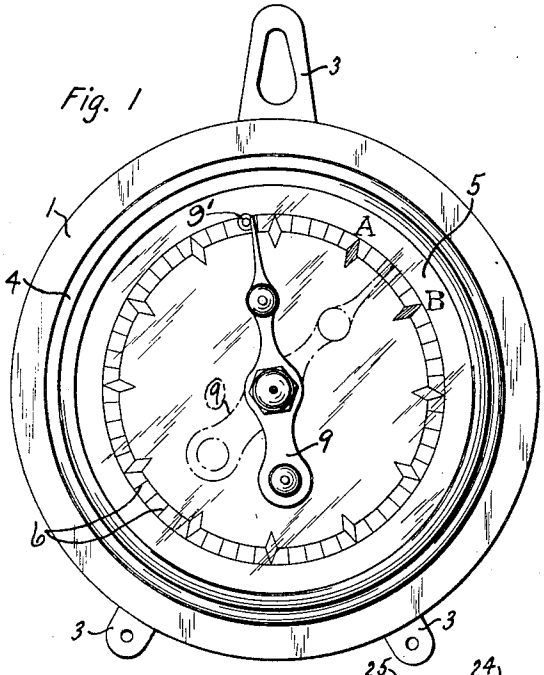
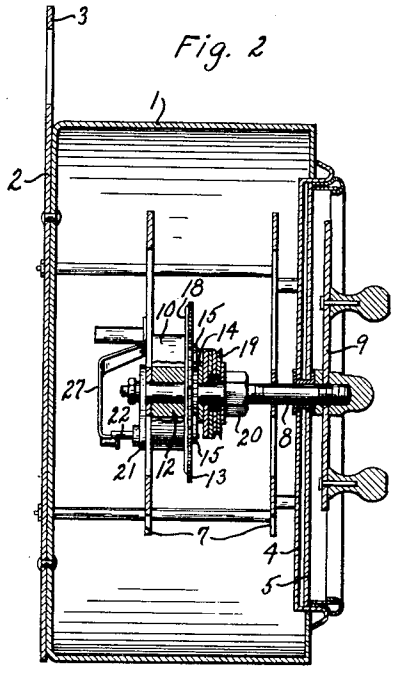


Fig. 2



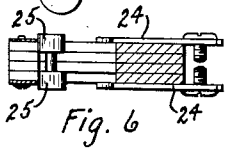


Fig. 6

Fig. 3

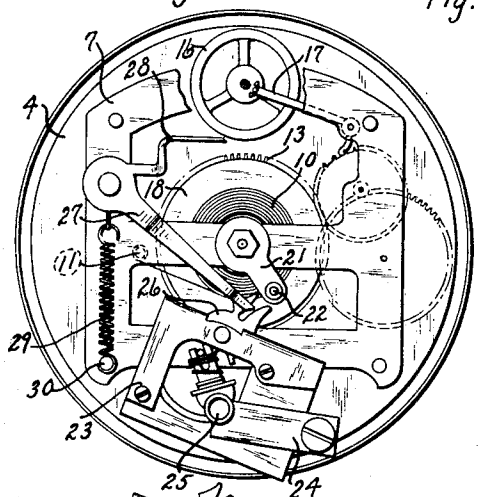
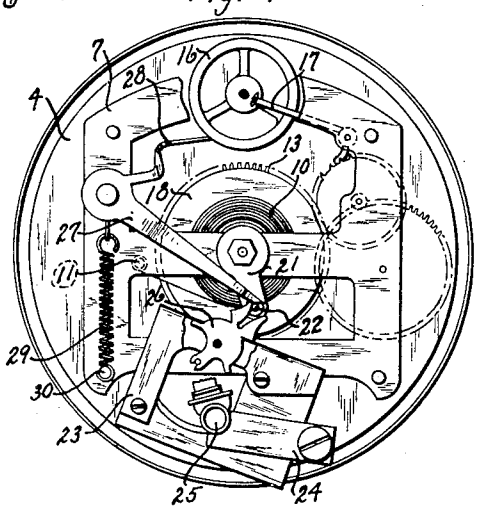


Fig. 4



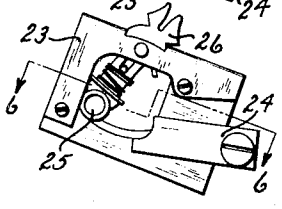


Fig. 5

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TIMING DEVICE

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Application February 8, 1930, Serial No. 426,881

4 Claims. (Cl. 200—39)

Our invention relates to a timing device. It pertains, particularly, to a timing device embodying means for automatically operating a switch structure and is particularly applicable to operating mechanisms deriving their operating power from electrical current, although it is not limited thereto.

One object of our invention is to provide an automatically operating timing device embodying means for connecting an operating mechanism with a power supply and disconnecting the power supply from such mechanism, together with means for regulating and determining with length of time such power supply will be connected with the operating mechanism, and means for connecting the power supply with the operating mechanism so that the mechanism will operate continuously and the usual means for disconnecting the power supply from the mechanism will be ineffective. The invention is particularly applicable for use in conjunction with apparatus which it may be desirable at will to operate for a predetermined period of time in some instances or continuously in other instances. For example, it may well be used in conjunction with cooking apparatus such as an electric stove where it is desired to have the stove operate for only a certain length of time for some cooking operation. With this apparatus, the stove may be turned on and then left with the certainty that it will be rendered inoperative after a predetermined period of time. A further advantage resides in the fact that the control apparatus or timing device is so constructed that it may be set whereby the stove will operate indefinitely. In addition, the invention is equally applicable to such apparatus as a radio or the like where it is desired to set the radio in operation and then have it either operate indefinitely or be automatically shut off after a predetermined period of time.

Other objects and advantageous features of our invention may be seen in the following description and one embodiment thereof may be seen in the accompanying drawing wherein similar characters of reference designate corresponding parts, and wherein:

Fig. 1 is a front elevation showing the means for placing the mechanism in operation, together with means for determining the length of time that the mechanism will operate.

Fig. 2 is a sectional elevation of the device showing only a part of the operating mechanism.

Fig. 3 is a rear elevation of the interior mechanism of the device showing the switch structure in operative position.

Fig. 4 is a view similar to Fig. 3 and showing the braking structure in operative position.

Fig. 5 is an elevation of the switch structure.

Fig. 6 is a sectional plan view taken on the line 6—6 of Fig. 5.

Referring to the drawing, we have shown one embodiment of our invention as comprising a casing or housing 1 secured to a plate 2 that is provided with a plurality of ears 3 by means of which the plate and casing may be attached to a support. A plate 4 is adapted to initially fit within the open face of the casing 1 and another plate 5 fits within the open face of the casing 1 and in front of the plate 4. This last named plate is provided with a series of graduations or markings 6 and preferably takes substantially the form of a clock dial.

The plate 4 partially supports a frame 7 within the housing or casing 1, the frame, in turn, supporting a system of gearing and coacting mechanism, shown partly diagrammatically in Fig. 3. Journalled in this frame 7 is a shaft 8 extending outwardly through both of the annular plates 4 and 5 and rigidly carrying a pointer or indicator 9 on the outer end in such position as to register with the graduations or markings 6 on the outer face of the plate 5, a stop 9' being provided for stopping the indicator in maximum on and off position.

As will be understood, the shaft 8 is rotatable and is equipped with the usual main operating spring 10 of a clock mechanism, such spring having one of its ends rigidly attached to the frame 7 as at 11 and its opposite end rigidly attached to a drum 12 on the shaft 8. With this construction, the spring 10 will be wound up by the manual rotation of the shaft 8 in one direction and will tend to rotate the shaft in the opposite direction immediately upon the shaft being relieved of manual rotating force. A time control gear 13 that has a ratchet gear 14 adjacent thereto and pawls 15 mounted thereon in such position as to coact with the ratchet gear, is loosely mounted on the shaft 8, the ratchet gear 14 likewise being loosely mounted on the shaft 8. Such gear 13 is adapted to cause oscillation of a balance wheel 16 through the train of gears and lever 17 diagrammatically shown in Figs. 3 and 4, and such gear is rotated by the action of the operating spring 10, being operatively connected to such spring by a slip connection comprising a friction plate 18 between the gear and spring and rigidly mounted on the shaft 8 and provided with means

for causing varying degrees of friction between the plate and gear, which comprises a series of washers 19 and a nut 20 threaded on the shaft. These washers likewise provide a slip connection between the time control gear 13 and ratchet gear 14 whereby the gear 14 is rotated in one direction relative to the gear 13 by winding up of the clock mechanism, the gear 13 being held against rotation by the connected clock gearing, but is held against rotation relative to the gear 13 in the opposite direction during unwinding of the clock mechanism by the pawls 15 carried by the gear 13. Thus, the gears 13 and 14 rotate to go in this one direction under the influence of the spring 10. A crank arm 21 is disposed on the end of the shaft opposite the end which carries the pointer 9 and is adapted to be rotated in unison with the shaft 8. Such crank arm is equipped with the usual crank pin 22.

Also mounted on the frame 7 is a quick throw or snap switch structure 23 embodying the usual contacts 24 and contact member 25. A pivotally mounted plate 26 is carried by the frame of this switch structure 23 in the manner shown in Figs. 3 and 4, and one side of this plate 26 embodies a bifurcated arm portion in which the crank pin 22 is disposed under certain conditions and in certain positions of the operating mechanism of the timing device whereby movement of the timing device operating mechanism will cause rotation of the plate 26 about its pivot to throw the contact member 25 into or out of engagement with the contacts 24 or into on and off position.

The timing device embodies a brake structure of the friction type consisting of an arm 27 having one end pivotally mounted on the frame in such position that under certain conditions the opposing end of the arm will contact with and be moved upwardly by the crank pin 22. This is clearly shown in Fig. 4. It also embodies an outwardly extending arm 28 whose outer end is adapted to contact with and stop the rotation of the balance wheel 16. A spring 29 having one of its ends connected to the arm 27 immediately below its pivot point and its opposite end secured to the frame 7 as at 30 normally maintains the outer end of the brake arm 28 out of contact with the periphery of the balance wheel 16. That is, the spring 29 normally maintains the brake structure in off position.

As shown in Figs. 2, 3 and 4 of the drawing, the arm 27 is offset between its ends, only a short portion of its free end being so located as to be engaged by the pin 22. Therefore, the crank pin 22 will be effective to contact with the lower edge of the short free end portion of such arm and to move the arm upwardly during only a small portion of the rotation of the crank in the winding direction and, upon being rotated in the unwinding direction, will pass above the upper edge of the short free end portion of the arm 27 and not only be ineffective to operate the brake structure, but indeed the arm 28 of the brake structure will be moved farther away from the balance wheel 16. Such construction is important in view of the fact that the brake structure will be effective only when the pointer or indicator is between given points on the dial such as A and B, which points usually represent minutes, and by rotating the crank arm until the crank pin 22 passes beyond the end of the arm 27 and then returning the crank arm toward its original position until the pointer or indicator is between the given points on the dial wherein the brake is effective, the brake structure will be ineffective and the device will operate as if the pointer were in any other position on the dial even though the pointer is within that area on the dial in which the brake structure is usually effective.

In the operation of this device, the shaft 8 is rotated in a clockwise direction, Fig. 1, to wind up the spring 10 on the drum 12, the time control gear being prevented from rotating by reason of its connection with the train of gears hereinbefore mentioned. However, the force necessary to rotate the shaft and wind up the spring must be sufficient to overcome the resistance of the slip connection hereinbefore described. On release of the shaft 8 from the force necessary to rotate the shaft in a clockwise direction the friction between the plate 18 and the gear 13, and the gear 13 and gear 14 will be sufficient to cause rotation of the gear and shaft 8 in a counter-clockwise direction by the action of the spring 10, the friction connection being further supplemented by the ratchet gear 14 and the pawls 15.

Turning the pointer 9 and the shaft 8 to the right in Fig. 1 to the point marked "A", marking the near boundary of the dead zone, the switch is thrown to on position, the spring 10 is partly wound, and as soon as pin 22 engages the lower edge of the short free end portion of lever 27 and moves it the brake 28 is applied to the balance wheel 16. In the arrangement shown, the switch is actually thrown to on position just a little short of position "A", and the brake is applied at position "A". Continued rotation of the pointer to the right through the dead zone from "A" to "B" produces no other change than to additionally wind the spring 10, the brake being held applied while the pin 22 travels this distance along the end of the lever arm 27. When the point "B" is reached, at the furthest boundary of the dead zone from the off position, the pin 22 passes the end of the short free end portion of lever arm 27 which allows the lever and brake to move downwardly whereby the brake is released. Continued rotation beyond the point "B" produces no other change than to additionally wind the spring in accordance with the amount of rotation. Reverse rotation of the pointer back to the starting point in a counter-clockwise direction of course unwinds the spring 10 and, when the pointer travels through the dead zone from "B" to "A", no operation of the brake is produced because the pin 22 travels along the upper edge of the brake lever 27 and thereby does not raise the brake 28 into engagement with the balance wheel 16, but on the contrary, further depresses it.

Therefore, in operation, if the pointer 9 is moved clockwise in Fig. 1 to any point in the dead zone between "A" and "B", the device will operate continuously with no time control, because the switch has been closed and the brake remains applied to the balance wheel. The spring 10 therefore does not unwind and the device controlled by the switch continues in operation until the operating handle 9 is again manipulated to return it to zero or to move it to some other position out of the dead zone where time control occurs. If the operating handle is moved to a position beyond the dead zone, time control occurs for a period depending upon the position of arm 21 and, as the spring unwinds, the pin 22 passes the lever 27 without brake application.

Each time operation is desired for a period represented by a point within the dead zone between "A" and "B" or a point short of that at which

the switch is closed, the desired results may be secured by first turning the operating handle 9 to some position beyond the dead zone and then moving it reversely either to a point in the dead zone, say at seven (7) minutes, or to a point short of the dead zone and of the point of switch operation, say at two (2) minutes, in which case the device will operate by time control for periods of the values indicated, seven (7) minutes and two (2) minutes in the instances stated. This operation is possible because such manipulation closes the switch, applies the brake and releases the brake, and then places the control parts in time control position without any possibility of further brake application.

Referring to the drawing and the preceding description, it will be seen that we have provided a timing device embodying numerous advantageous features. For instance, we have provided a timing device of such nature that a switch structure and the brake structure will be simultaneously operated. Thus, we have provided a device wherein it is possible to have continuous operation of the apparatus which it controls. However, the brake structure is only effective in a given position of the crank arm and further movement of the crank arm by rotation of the shaft will release such brake or movement of the crank arm up to a given point will not apply such brake.

Another advantageous feature resides in the fact that we have provided a device wherein it is possible to operate a switch structure in such manner that power will flow to the apparatus, over a given period of time, and have provided a means for accurately determining what that time shall be. By the simple expedient of reversing the position of the contacts on the switch structure, the device may be employed oppositely, that is, as a timing device in which the power supply is normally connected with an operating mechanism and such power supply is cut off after a predetermined time.

What we claim is:

1. Time switch mechanism adapted at will for either timed or indeterminate operation, comprising a switch, a clock mechanism having a winding member adapted for variable winding thereof, connections between said clock mechanism and said switch arranged to move said switch to one of its two positions when said clock mechanism is substantially run down, connections between said winding member and said switch whereby said switch is moved to the other of its positions thereby at substantially the beginning of operation of said member to wind said clock mechanism, and a brake mechanism actuated by said winding member during a period of its winding movement to be effective on said clock mechanism to stop operation thereof whereby said switch mechanism will remain in one of its positions indeterminately.

2. Time switch mechanism adapted at will for either timed or indeterminate operation, comprising a switch, a clock mechanism having a winding member adapted for variable winding thereof, connections between said clock mechanism and said switch arranged to move said switch to one of its two positions when said clock mechanism is substantially run down, connections between said winding member and said switch whereby said switch is moved to the other of its positions thereby at substantially the beginning of operation of said member to wind said clock mechanism, and a brake mechanism actuated by said winding member during a period of its winding movement to be effective on said clock mechanism to stop operation thereof whereby said switch mechanism will remain in one of its positions indeterminately, said brake mechanism not being rendered effective by unwinding movement of said clock mechanism.

3. In a timing device of the class described, a control member for an operation to be timed, time measuring means, manual means operable to start the running of said time measuring means and to move said member in one direction, said time measuring means normally operating to return said member in the opposite direction, and means operable by said manual means for preventing the return movement of said member.

4. Time switch mechanism adapted at will for either timed or indeterminate operation, comprising a switch movable to open and closed positions, a clock mechanism having a winding member adapted for variable winding thereof, a connection between said winding member and said switch arranged to move said switch to its closed position at substantially the beginning of operation of said member to wind said clock mechanism, a connection between said clock mechanism and said switch arranged to move said switch to its open position when said clock mechanism has run down to the extent of said variable winding, a brake mechanism adapted to stop said clock mechanism and actuated by said winding member at one position in its winding movement only, whereby said switch will remain closed indeterminately so long as the winding member remains at said position, and means tending to release said brake when said winding member is in other than brake-actuating position.

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