March 31, 1936. J. W. LUOMA 2,035,712

TIME CONTROLLED SWITCH

Filed June 25, 1935 2 Sheets-Sheet 1

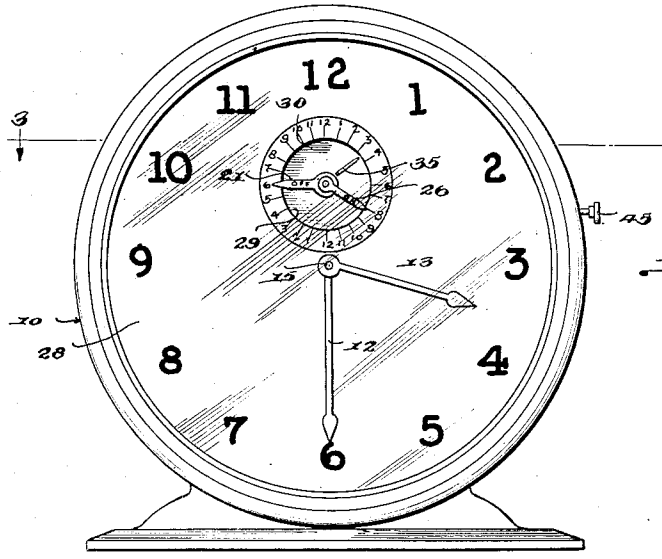


Fig. 1.

Fig. 2.

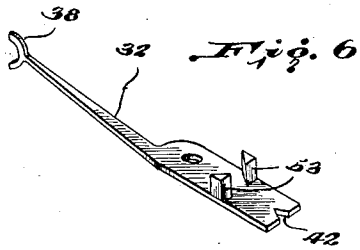


Fig. 6.

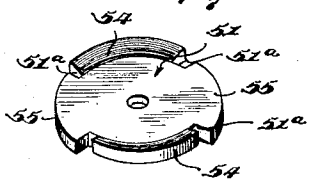


Fig. 5.

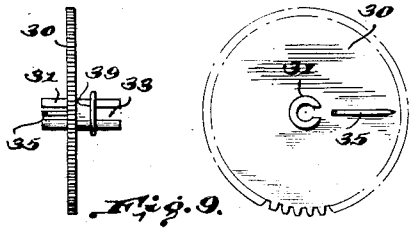


Fig. 9.

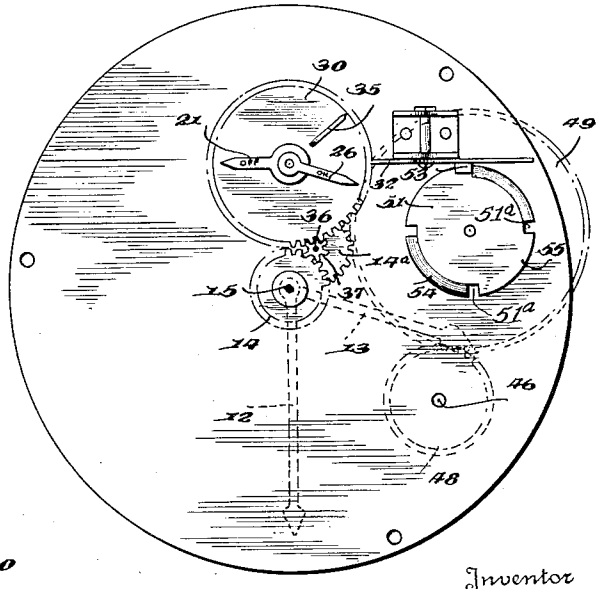


Fig. 10.

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TIME CONTROLLED SWITCH

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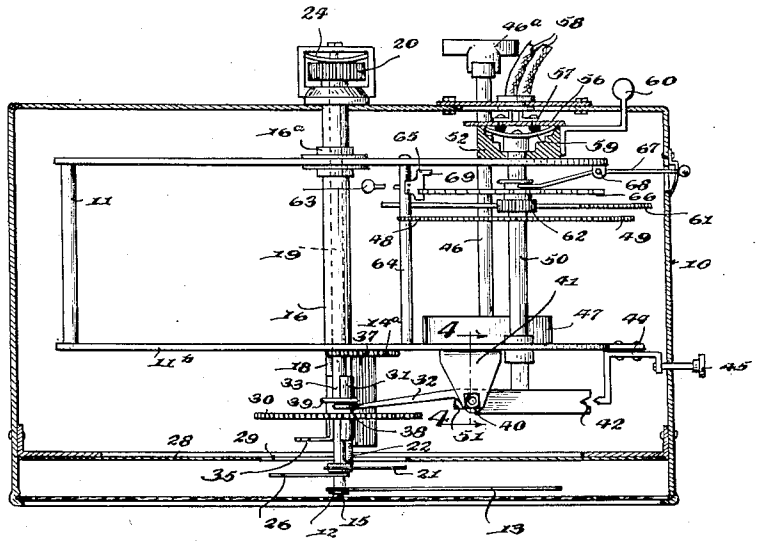


Fig. 3.

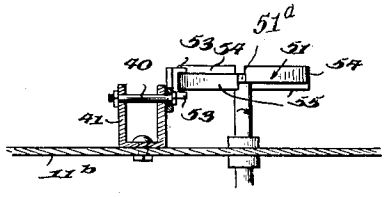


Fig. 4.

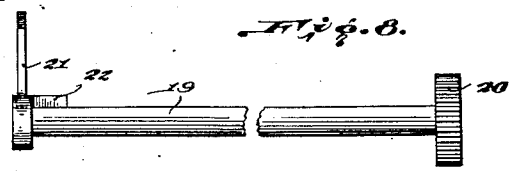


Fig. 8.

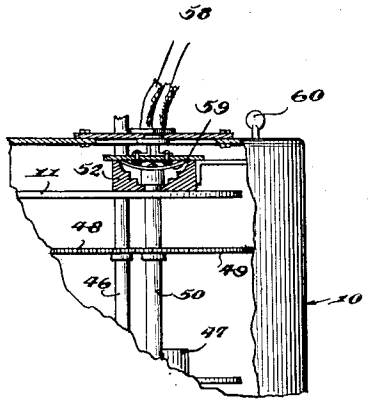


Fig. 11.

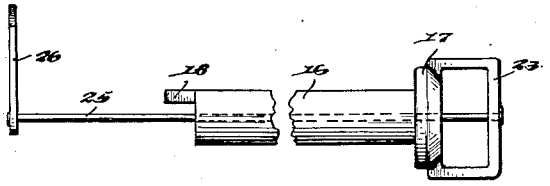


Fig. 7.

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Patented Mar. 31, 1936

2,035,712

UNITED STATES PATENT OFFICE

2,035,712

TIME CONTROLLED SWITCH

John William Luoma, New York, N. Y.

Application June 25, 1935, Serial No. 28,316

6 Claims. (Cl. 200—40)

My invention relates to a mechanism for producing a quick and timed action for controlling the switching "on" and "off" of an electric circuit, and it consists in the constructions, arrangements and combinations herein described and claimed.

It is a primary purpose of the invention to provide a mechanism cooperable with a clock train which is adjustable to provide action of a switch at any interval of time within the 24 hours of the day, and automatically repeating so long as the spring of the clock works remains properly wound.

It is also an object of the invention to provide a suitable alarm mechanism which will remain silent during switching off circuit, but which will be operative to sound the alarm when the switch is actuated to the "on" position.

It is a still further object of the invention to provide a simple unit, inexpensive to construct and convenient for general use, such as for automatically switching the parking lights of automobiles, anchor lights of water-craft; lights of display windows, lights of poultry houses and for many other purposes where a timed actuation of an electrical switch for control of appliances may be required.

Additional objects, advantages and features of invention will be apparent from the following description considered in conjunction with the accompanying drawings, wherein

Figure 1 is a front elevation of my device.

Figure 2 is an enlarged plan view with the dial removed,

Figure 3 is a sectional view on the line 3—3 of Figure 1.

Figure 4 is a detail of the escapement, taken on the line 3—3.

Figure 5 is a perspective view of the cam embodied in the escapement.

Figure 6 is a perspective view of the gate member.

Figure 7 is a side elevation of one of the adjustment pointers.

Figure 8 is a similar view of the other adjustment pointer.

Figure 9 is an edge view of the control gear.

Figure 10 is a plan view thereof.

Figure 11 is a fragmentary view illustrating the gearing for actuating the switch when the alarm mechanism is to be omitted.

As shown in Figures 1, 3 and 11, I employ a clock 10 having any suitable casing within which a standard clockworks frame 11 is mounted. The frame 11 includes the usual clock works for actuating the minute hand 12 and the hour hand 13, the clock works mechanism being well understood in the art, and therefore is not shown in detail, it being thought sufficient to explain that my mechanism is actuated through the time-keeping gears 14—14a, the former of which is keyed to the hour hand arbor 15.

A sleeve 16 is journalled in the side members of the frame 11, terminating exteriorly of the casing at the rear, in a knob member 17, by means of which the sleeve and associated parts may be rotated, as will be explained in greater detail hereinafter. The opposite end of the sleeve projects slightly beyond the side member 11b of the frame and terminates in a tooth 18. The tooth 18 lies in a plane parallel with the shaft and functions as a part of a clutch, as will presently appear.

As may be seen from Figure 3, a hollow shaft 19 is revolubly mounted in the sleeve 16, and includes an integral knob 20, the opposite end of the shaft having fixed thereto an adjustment pointer 21, and also a tooth 22. The tooth 22 lies in a plane coincident with the shaft 19 and in opposed relation to the tooth 18. The knob 17, in the present instance, is shown as an open ring member 23 of a size to revolubly receive the knob 20 therein and in order to frictionally bind the sleeve 16 and the shaft 19 together for manipulation at times, I provide a light leaf spring 24, which is interposed between the ring 23 and the knob 20. By this construction the shaft 19 will be frictionally held to the sleeve, whereby the sleeve and shaft may be given unitary rotation by actuation of the knob 17, yet the shaft 19 may be rotated independently of the sleeve through actuation of the knob 20. The sleeve 16 is frictionally retained in the bearing 16a so that the indicator 26 will not be moved when the knob 20 is rotated.

A shaft 25 is provided, one end of which is fixed to the ring 23, this shaft extending through the hollow shaft 19 and of a length to position an adjustment pointer 26 slightly beyond the pointer 21. These pointers 21—26 will obviously be moved upon actuation of the sleeve 16 and shaft 19, and function to set the time at which the switch mechanism is to be operated, the pointer 21 indicating the "off" actuation of the switch, while the pointer 26 will control the "on" action of the switch. Therefore, these pointers will bear appropriate legends, and will function in conjunction with markings representing 24 hours, the markings being divided in two divisions, namely, A. M. and P. M. These markings are indicated at

27 upon the dial 28, and preferably the dial is cut away as at 29, to admit the pointers therethrough, and also serves as a sight opening, as will be subsequently described.

As has been explained, the sleeve 16 and the shaft 19 are arranged in concentric relation, and it should be noted that the sleeve 16 is of lesser length than the shaft 19 in order to accommodate a gear 30 therebetween. The gear 30 includes a hub 31 through which the shaft 19 projects, whereby the gear is revolubly mounted, and this gear is also longitudinally shiftable upon the shaft 19 through actuation of a shipper lever 32, as will be understood as the description proceeds.

The hub 31 is of a length to occupy the space between the opposed teeth 18 and 22 which is essential to maintain the gear in a neutral position, as shown in Figure 3, but in order that the gear 30 may be moved into engagement with respective teeth 18 and 22, at times, the hub 31 is provided with a pair of slots 33—34, the slot 33 receiving the tooth 18 when the gear 30 is moved in the direction thereof, while the slot 34 will accommodate the tooth 22 when the hub 31 is shifted thereinto.

A pointer 35 is carried by the gear 30 which is discernible through the aperture 29 of the dial, this pointer functioning to indicate the period and time. These indicators, 21—26 and 35, together with the divided markings of the 24 hours form an obvious unmistakable, visual relation by which every individual person can promptly and certainly set the adjustments, even if the clock has stopped for some reason, the pointer 35 showing whether the switch will be actuated during the A. M. or P. M. period.

Attention is now particularly directed to Figures 1 and 2 of the drawings, wherein it will be seen that the shaft 36 of the gear 14*a* mounts a gear 37, this latter gear being in mesh with the gears 14 and 30.

Since the gear 30 must partake of longitudinal shifting movements, the gear 37 is of a length or height to permit such movement, the teeth of the gear 30 being slidable between the teeth of the gear 37. From the foregoing, it will be apparent that when the gears 14—14*a* are rotated through the clockworks mechanism rotation of the gear 30 will be effected by virtue of the gear 37.

The shipper lever 32 includes a forked end 38 engaged within a collar 39 of the gear 30 and is pivoted intermediate its length as at 40 to a mounting 41. The free end of the shipper lever 32 is notched as at 42 and receives therein, at times, a tooth 43 of a sliding lever 44. The lever 44 is actuated through a suitable pull-button 45 exposed to the exterior of the casing of the clock. It will be apparent that when the lever 44 is moved inwardly to engage the tooth 43 in the notch 42, the shipper lever 32 will be held against movement in either direction, and consequently, the gear 30 will be held in neutral position free of engagement with either of the teeth 18—22.

The description thus far has dealt with the time mechanism and the switch actuating and alarm means and its association with the timing mechanism will now be described.

A shaft 46 is mounted in the frame 11 to which there is secured a clock spring 47, the shaft tending to rotate the gear 48 fixed thereto under action of the spring. The shaft 46 will of course include a key 46*a*, whereby the spring 47 may be properly wound. The gear 48 is in mesh with a gear 49 carried by the shaft 50. The shaft 50 is suitably journalled in the frame 11 and projects therebeyond, that end terminating in the proximity of the dial of the clock having secured thereto a cam 51, the opposite end having integrally connected therewith a switch head 52. The cam and head will be rotated in unison with the shaft 50, the cam 51 being intermittently rotatable between a gateway defined by a pair of pins 53 formed upon the shipper lever 32.

The cam 51 is a circular disk having a pair of offset lugs 54, and a similar pair of lugs 55. The lugs 54 are disposed diametrically opposite each other, as are the lugs 55, and the paired lugs project in opposite directions. Thus, with the cam positioned in the gateway of the lever, either a lug 54 or 55 will be in contact with one of the pins 53. Under actuation of the shipper lever 32, the next oppositely disposed lug of the cam will be brought into engagement with the other pin. Thus the cam and gateway permit intermittent rotation of the shaft 50 which functions to control the switch. In order that undue movement of the cam 51 will be prevented during winding of the spring 47, notches 51*a* are formed in the periphery of the disk, between the opposed lugs, permitting entrance of one of the pins 53 thereinto. These notches 51*a* are shallow enough to permit escape of the pin upon actuation of the shipper lever 32.

The switch includes a stationary head 56 having contacts 57 to which electric cables 58 are connected, these cables being associated with a source of current and the lights or other appliances to be controlled. The head 52 includes a contact strip 59 adapted to bridge the contacts 57 upon rotation of the head 52. In order that the switch may be manually actuated to open or close the circuit, a lever 60 is provided upon the rotatable head 52, this lever 60 projecting exteriorly of the casing of the clock.

The lever 60 may be actuated without in any way interfering with any previous adjustments which have been made for automatic operation.

The switch structure and means for operating the same is of the simple type in which no alarm mechanism is employed, and as shown, in Figure 11. However, in Figure 3, I have illustrated a structure wherein an alarm mechanism may be actuated through rotation of the shaft 46, and for this purpose, a gear 61 is secured to the shaft 46 which is in driving engagement with a gear 62 on the shaft 50. The gear 61 is provided with teeth around but one-half its circumference, so that during one-half its rotation no movement will be imparted to the gear 62, permitting the sounding of the alarm only during one-half revolution of the gear 61. A bell-hammer 63 is rockably mounted upon a shaft 64, the hammer being adapted to strike a suitable bell (not shown), and in order to provide motion to the shaft 64, the shaft is provided with a trigger 65 which is disposed in the path of rotation of a gear 66 which is connected in parallel relation with the gear 62. The shaft will be rocked through engagement of each tooth with the trigger. The gears 62 and 66 are shiftable longitudinally of the shaft 50 and to accomplish this I provide a lever 67. One end of the lever 67 is bifurcated and engaged with a collar on the gear 66, the opposite end extending beyond the casing of the clock where it may be readily rocked upon its pivot 68, so as to move the gear 62 into and out of engagement with the gear 61. Thus, the alarm operation may be made optional. In the disengaged position of the gears, the gear 66 will

engage a toe **69** on the trigger, thereby preventing undue movements or clicking noises.

The operation

The operation will be substantially as follows, it being assumed that the clockworks spring and switch are fully wound, and the clockworks in operation, and that the switch is to be operated to the "on" position at 8 o'clock, P. M., and to be switched to the "off" position at 6 o'clock, A. M. (See Fig. 1.) The setting of the pointers **21** and **26** having been moved to their positions through actuation of their respective knobs **17** and **20**. In this position of the parts, the gear **30** is in neutral position as shown in Figure 3, the hour gear **14** transmitting rotary motion to the gear **30**, by virtue of the gears **14***a* and **37**, and the shaft **46** being under tension of the spring **47**, tending to rotate the cam **51** through the gateway of the lever **32**. However, one of the pins **53** is engaged in one of the notches **51***a* and abutting one of the lugs **54** or **55** as the case may be. Now when the gear **30** has been rotated so as to align the slot **33** with the tooth **18** or the slot **34** with the tooth **22**, which will be determined by the position of the lever **32** and the lug of the cam which is engaging the gateway. As soon as either of the teeth and slots are aligned the lug of the cam will shunt the lever **32** moving the gear **30** so as to receive the tooth in the slot. When this action occurs the shaft **46** will be revolved a quarter turn, a similar movement being imparted to the cam **51**, bringing the next lug into engagement with the other pin **53**. Such engagement of the pin and lug will shunt the shipper lever **32** to a neutral position in readiness for the next actuation of the clock to move the switch to an "off" position which would, in the present instance, occur at 6 o'clock A. M., brought about by aligning the proper slot and tooth.

Obviously, when the shaft **46** is rotated, rotary motion will be imparted to the shaft **50**, by the gears **48**—**49**, with consequent actuation of the switch. Also, it will be apparent that the alarm mechanism will be operated upon actuation of the shaft **50**, although as previously explained, the alarm may be rendered inactive through the lever **67**. Further, should it not be desired to have the switch operate, for any reason, the gear **30** may be held in neutral position by engaging the tooth **42** in the notch **43**.

While I have described certain preferred constructions, I am well aware that changes may be made, and I therefore consider as my own all such modifications as fairly fall within the scope of the appended claims.

I claim:—

1. In a time controlled switch, a clockworks, a dial therefore having an aperture, markings on the dial representing A. M. and P. M. periods of time, adjustable indicators cooperative with the markings on the dial, a switch, means for intermittently rotating the switch according to the setting of the adjustable indicators, and a further indicator discernible through the aperture and movable by the clockworks to indicate the time on a twenty-four hour dial.

2. In a time controlled switch, a clockworks, an hour gear associated therewith, a gear driven thereby and being laterally shiftable, a switch, means for actuating the switch intermittently, a lever associated with said means and said second named gear, the lever being moved laterally, alternatively, upon actuation of the switch, a dial for the clock having an aperture, markings on the dial representing A. M. and P. M. periods of time, adjustable indicators cooperative with the markings on the dial, and a further indicator on the second named gear and discernible through the aperture to indicate the time on a twenty-four hour dial.

3. In a time controlled switch, a clockworks including a dial having an aperture, said clockworks having a sleeve journalled in the frame thereof, a hollow shaft journalled within the sleeve and projecting therebeyond defining a bearing, a revoluble and laterally shiftable gear on the bearing, a spindle within the hollow shaft and terminating therebeyond, an indicating pointer on one end of the spindle, an indicating pointer on one end of the hollow shaft, an operating knob on the sleeve including an open ring, an operating knob on the hollow shaft and disposed within the ring member, said spindle being fixed to the ring member, a leaf spring interposed between the ring member and the knob of the hollow shaft whereby to frictionally hold the sleeve and shaft for unitary or separate manual rotation for setting of the indicating pointers, clockwise gears for rotating the gear member, a switch, means tending to rotate the switch, a cam member associated with the switch, a shipper lever connected with the shiftable gear and the cam, and said cam having means for intermittently swinging the lever and gear to release the cam for partial rotation when said gear has reached a point in its rotation determined by said indicating pointers.

4. In a time controlled switch, a clockworks including a dial having an aperture, said clockworks having a sleeve journalled in the frame thereof, a hollow shaft journalled within the sleeve and projecting therebeyond defining a bearing, a revoluble and laterally shiftable gear on the bearing, a spindle within the hollow shaft and terminating therebeyond, an indicating pointer on one end of the spindle, an indicating pointer on one end of the hollow shaft, an operating knob on the sleeve including an open ring, an operating knob on the hollow shaft and disposed within the ring member, said spindle being fixed to the ring member, a leaf spring interposed between the ring member and the knob of the hollow shaft whereby to frictionally hold the sleeve and shaft for unitary or separate manual rotation for setting of the indicating pointers, clockwork gears for rotating the gear member, a switch, means tending to rotate the switch, a cam member associated with the switch, a shipper lever connected with the shifter gear and the cam, said cam having means for intermittently swinging the lever and gear to release the cam for partial rotation when said gear has reached a point in its rotation determined by said indicating pointers, and manually operated means for holding said shipper lever against movement by the cam.

5. In a time controlled switch, a clockworks including a dial having an aperture, said clockworks having a sleeve journalled in the frame thereof, a hollow shaft journalled within the sleeve and projecting therebeyond defining a bearing, a revoluble and laterally shiftable gear on the bearing, a spindle within the hollow shaft and terminating therebeyond, an indicating pointer on one end of the spindle, an indicating pointer on one end of the hollow shaft, an operating knob on the sleeve including an open ring, an operating knob on the hollow shaft and disposed within the ring

member, said spindle being fixed to the ring member, a leaf spring interposed between the ring member and the knob of the hollow shaft whereby to frictionally hold the sleeve and shaft for unitary or separate manual rotation for setting of the indicating pointers, clockwise gears for rotating the gear member, a shaft revolubly mounted in the clockwork frame, a switch head carried thereby and operable to control an electrical circuit, a second shaft within the frame, spring means tending to rotate the shaft, gear means connecting the shafts, a cam member carried by the first named shaft, said cam member having oppositely disposed lugs, a shipper lever associated with the shiftable gear and pivoted intermediate its length, said lever having a gateway through which said cam member is movable, said gateway comprising pin members alternately engageable with the lugs of the cam.

6. In a time controlled switch, a clockworks including a dial having an aperture, markings on the dial representing A. M. and P. M. periods of time, said clockworks having a sleeve frictionally journalled within the frame thereof, a hollow shaft journalled within the sleeve and projecting therebeyond defining a bearing, friction means for holding the sleeve and shaft for unitary and independent rotation, a spindle carried by the hollow shaft and terminating therebeyond, an indicator pointer on one end of the spindle, an indicator pointer on the hollow shaft, said indicators being cooperable with the markings on the dial, a gear on the bearing and including a hub, said hub having opposed open ended slots, a tooth carried by the sleeve and cooperable with one of the slots, a tooth on the spindle and cooperable with the other of said slots, clockwork gears for rotating the gear, a shaft carried by the clockwork frame, a switch fixed thereto for control of an electrical circuit, a cam on said shaft, a second shaft journalled in the frame, spring means tending to rotate the shaft, a gear train connecting the shafts, a shipper lever connected with said first named gear, said lever having a pair of spaced pins defining a gateway through which said cam may move, said cam having oppositely disposed lugs for alternately engaging said pins upon movement of said first named gear upon alignment of a respective tooth and slot.

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