Oct. 17, 1939. J. C. GILLETTE 2,176,569

TIME SWITCH

Filed Dec. 7, 1936 2 Sheets-Sheet 1

Fig. 1.

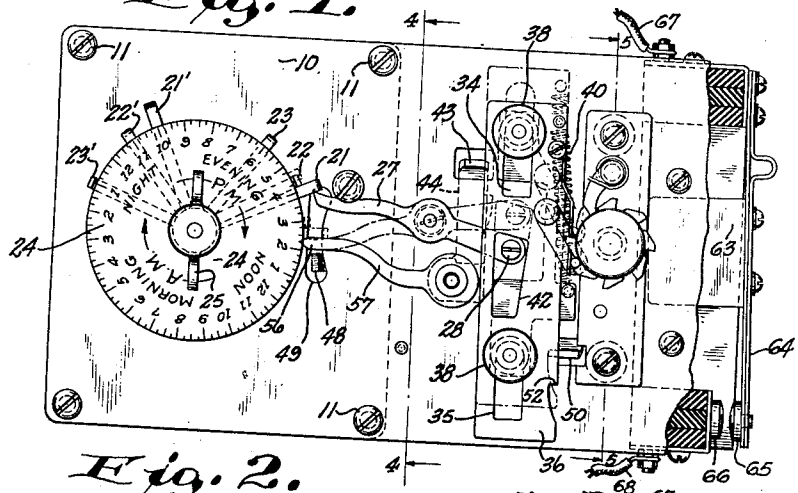


Fig. 2.

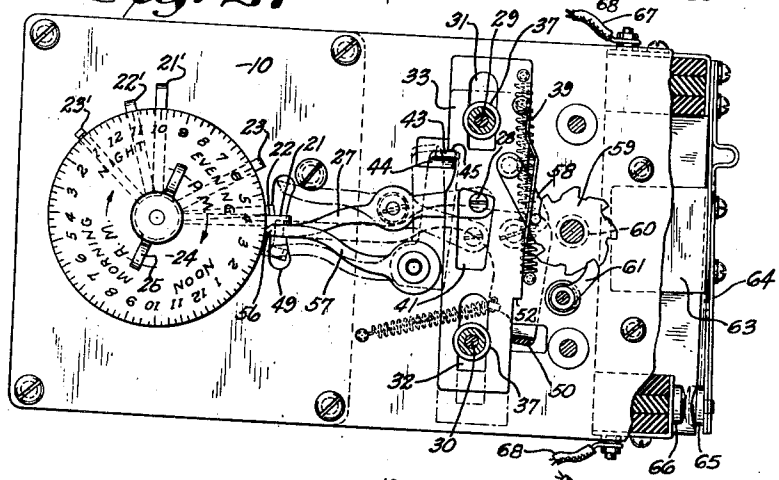
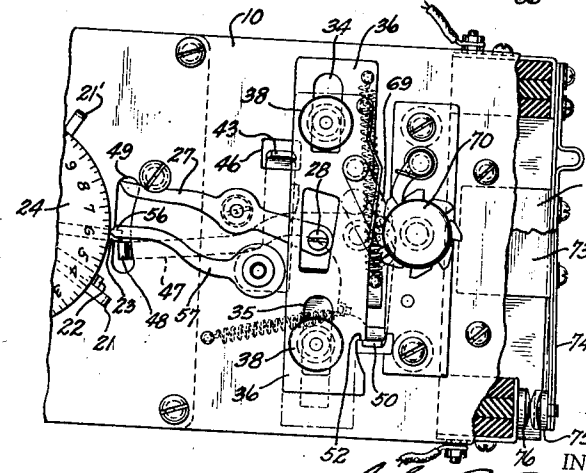


Fig. 3.



INVENTOR.
John C. Gillette
BY
Morsell Lieber & Morsell
ATTORNEYS.

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Fig. 4.

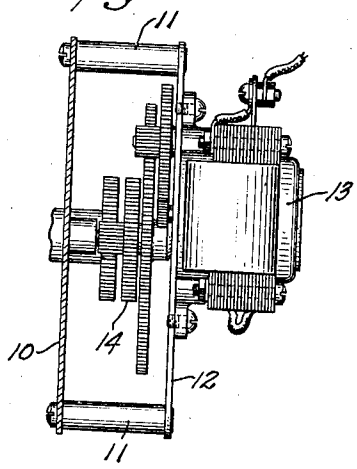
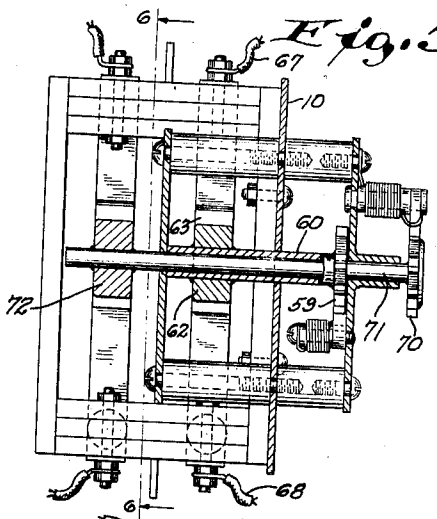


Fig. 5.



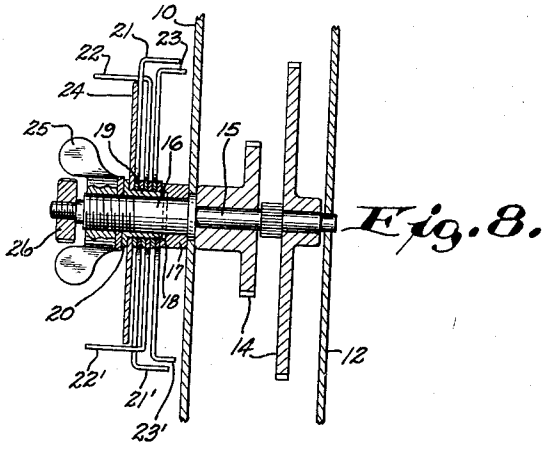


Fig. 8.

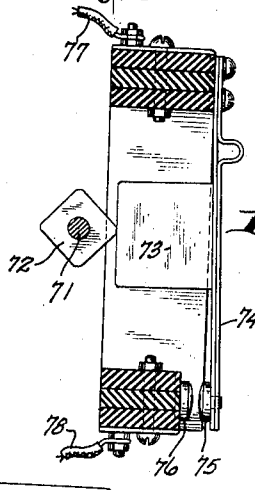


Fig. 6.

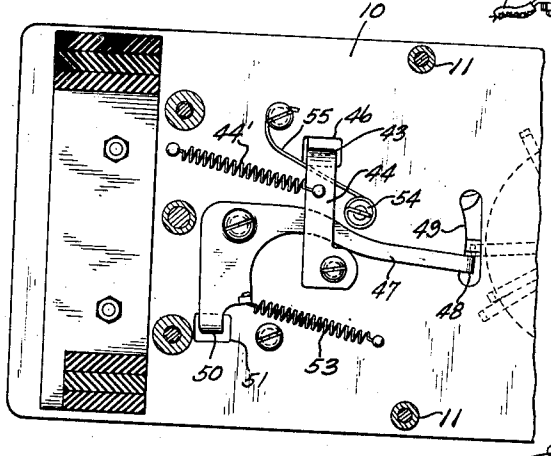


Fig. 7.

INVENTOR.
John C. Gillette

BY Morsell Lieber & Morsell
ATTORNEYS.

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2,176,569

TIME SWITCH

John C. Gillette, Racine, Wis.

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12 Claims. (Cl. 200—38)

This invention relates to improvements in time switches.

Electrical time switches, as heretofore constructed, have been capable of controlling a single circuit, and in certain cases a plurality of circuits wherein it was satisfactory to have all of the circuits completed at the same time and likewise shut off simultaneously. Where, however, there were a plurality of circuits to be controlled at different times, then it was necessary to have a separate and complete time switch for each circuit. For example, where a department store desired to have its neon sign turned on at four o'clock in the afternoon and turned off at one o'clock in the morning, and desired to have its window lights turned on at five o'clock in the afternoon and off at midnight, it has heretofore been necessary to utilize a separate time switch for each circuit.

It is a general object of the present invention to provide an improved time switch constructed to selectively and independently control a plurality of circuits, whereby each circuit may be operated at a different time to satisfy particular conditions.

A further object of the invention is to provide an improved time switch for selectively controlling a plurality of circuits, wherein a change in the time of operation for any circuit may be readily effected.

A more specific object of the invention is to provide an improved time switch for controlling a plurality of circuits wherein there is a common cocking or setting means for the switch actuating mechanisms of the several circuits, and wherein there is means for independently releasing said cocked switch actuating mechanisms at different selected times.

A further specific object of the invention is to provide a time switch for controlling a plurality of circuits wherein the switches are operated by cam members mounted on concentric shafts whereby a compact construction results.

With the above and other objects in view, the invention consists of the improved time switch and all its parts and combinations as set forth in the claims and all equivalents thereof.

In the accompanying drawings illustrating one complete embodiment of the preferred form of the invention wherein the same reference numerals designate the same parts in all of the views:

Fig. 1 is a front elevational view of the time switch showing the switch open, the full lines showing the switch actuating means in uncocked position, and the dot-and-dash lines indicating the cocked position of the parts;

Fig. 2 is a similar view with the front cocking plate removed, showing the rear cocking plate in cocked position in full lines, and in released position in the dot-and-dash lines;

Fig. 3 is a fragmentary front elevational view illustrating the front cocking plate in cocked position by full lines, and in released position by dot-and-dash lines;

Fig. 4 is a sectional view taken on line 4—4 of Fig. 1 to illustrate the motor and clock gears;

Fig. 5 is a sectional view taken on line 5—5 of Fig. 1;

Fig. 6 is a sectional view taken on lines 6—6 of Fig. 5;

Fig. 7 is a fragmentary rear view of the device, parts being shown in section; and

Fig. 8 is an enlarged fragmentary sectional view, showing the method of mounting the dial and the trip levers associated therewith.

Referring more particularly to the drawings, the numeral 10 designates a front plate having posts 11 projecting from the rear thereof for supporting a rear plate 12 in spaced relationship from the front plate as shown in Fig. 4. Mounted on the exterior of the rear plate 12 is an electrical motor 13 of any well-known construction which drives a train of clock gears 14 positioned between the plates 10 and 12 as shown in Fig. 4. The clock gears in turn drive a shaft 15 which extends through the front of the plate 10, said shaft being enlarged as at 16, as shown in Fig. 8. Mounted fast on the enlarged portion 16 of the shaft adjacent the plate 10 is a collar 17 having its outer face formed with a recess 18 surrounding the shaft 16. A sleeve 19 also surrounding the shaft part 16 has its inner end positioned in the recess 18 of the collar 17, and the outer end of the sleeve 19 is flanged as at 20. Mounted between the flange 20 and the collar 17 are a plurality of rings each carrying a trip lever, and said trip levers are designated by the numerals 21 and 21', 22 and 22', 23 and 23'. Also mounted on the sleeve 19 adjacent the outermost tripping member 21 is a dial 24. A winged nut 25 which is threaded on the end of the shaft part 16 may be turned to clamp the tripping lever rings and dial between the flange 20 and the collar 17 so that the dial and tripping levers will rotate with the shaft 16. A knurled knob 26 is threaded on the extreme outer end portion of the shaft 16 against an enlarged shoulder. This knurled knob may be turned to effect minor adjustments.

The dial 24 has the twenty-four hours of the day delineated on the face thereof with suitable fractional division lines between the hours. Other delineations may also appear on the face to indicate morning, noon, evening and night, and to also indicate "A. M." and "P. M."

The tripping levers 21, 22 and 23 all project radially beyond the periphery of the dial. It is preferred to have the lever 21 longer than the others and provided with an inwardly bent end portion, to have the lever 22 shorter than the others and provided with an outwardly bent end portion, and to have the lever 23 of intermediate length and provided with an inwardly projecting end portion. The levers 21', 22' and 23' are of corresponding length to the levers 21, 22 and 23 respectively, and are similarly formed. By referring to Fig. 8, it is apparent that when the winged nut 25 is loosened, that the tripping levers may be independently adjusted to any desired position.

For purposes of illustration, the lever 21 may be a cocking control lever and set at approximately 4:15 to control, as will hereinafter be explained, one of the circuits which may be a neon sign for a store. The lever 23 may be set for six o'clock to control the other circuit which may be the circuit for the window lights in a store. As will hereinafter be pointed out in detail, the levers 22 and 23 are adapted to complete the circuits, and the levers 22' and 23' which are set for 11:00 p. m. and 1:00 a. m. respectively, are adapted to break the circuit to shut off the lights at the hours designated. The second cocking control lever 21' which is set in advance of the levers 22' and 23', is for the purpose of preparing the switch actuating mechanism for its second, or shutting-off operation.

The levers 21 and 21' are positioned to engage one end of an intermedially pivoted lever 27. The other end of the lever 27 has a pin 28 projecting therefrom. Vertically spaced posts 29 and 30 (see Fig. 2) extend through elongated apertures 31 and 32 of an inner cocking plate 33 and through similar apertures 34 and 35 of an outer cocking plate 36 (see Fig. 1). Collars 37 which are of a size to overlap the edges of the elongated apertures 31, 32, 34 and 35, are positioned beneath the cocking plate 33 and between the cocking plate 33 and the cocking plate 35, and suitable retaining means 38 may be utilized on the outer ends of the posts to maintain the parts in assembled position and permit vertical sliding movement of the two plates 33 and 36 on the posts 29 and 30. The inner plate 33 is normally urged to the dot-and-dash line position of Fig. 2 by a coil spring 39, and the outer plate 36 is normally urged to the lowered full line position of Fig. 1 by a similar coil spring 40.

Between the slots 31 and 32 the plate 33 is formed with another slot 41, and the plate 36 is formed with a similarly positioned slot 42. The pin 28 on the lever 27 projects through the slots 41 and 42 as shown in Fig. 1. Thus when the cocking lever 21 in connection with the clock urges the lever 27 from the full line position of Fig. 1 to the dot-and-dash line position therein, then the pin 28 will push both of the plates 33 and 36 upwardly, against the tension of the springs 39 and 40 to the dot-and-dash line, or "cocked" position shown in Fig. 1. When the inner plate 33 is moved to cocked position, a laterally bent end portion or latch 43 of a lever 44 snaps into position beneath a shoulder 45 to maintain the plate 33 in cocked position. The lever 44 is pivoted to the rear of the plate 10 as shown in Fig. 7 and is normally urged into engaging position by a spring 44'. An aperture 46 in the plate 10 permits the laterally bent portion of the lever to project through to the front of the plate. Another lever 47 which is also pivoted to the rear of the plate 10 as shown in Fig. 7 has one end 48 projecting through a slot 49 to the front of the device and has its other end 50 projecting through another opening 51 in the plate. The end 50 is engageable beneath a shoulder 52 on the front cocking plate 36 (see Fig. 3) to latch said plate in cocked position. This end of the lever is normally urged into engagement beneath the shoulder 52 by a coil spring 53 shown in Fig. 7. The supporting post 54 for the lever 27 extends through the rear of the frame part 10 as shown in Fig. 7 and has a spring 55 associated therewith for normally urging the lever 27 to the full line position of Fig. 1.

After the inner and outer cocking plates 33 and 36 have been moved to cocked position, that is to the dot-and-dash line position of Fig. 1 and to the full line position of Fig. 2, then, continued rotation of the clock dial will bring the trip lever 22 into engagement with the end 56 of the lever 57, the lever 57 being movable with the latching lever 44. When the lever 57 is moved downwardly from the full line position of Fig. 2 to the dot-and-dash line position therein, this will cause the latching lug 43 to be withdrawn from beneath the shoulder 45 of the inner cocking plate to permit said plate to drop forcibly downwardly to the dot-and-dash line position of Fig. 2 under the tension of the spring 39. During such downward movement a dog 58 carried by the inner cocking plate 33 will cause movement of a ratchet wheel 59 mounted on a sleeve or tubular shaft 60 to partially rotate said shaft, the ratchet wheel and shaft being held in this new position of rotation by a slip dog 61. The tubular shaft 60 extends through the front plate 10 of the device and carries near its inner end a rigidly mounted cam block 62 (see Fig. 5), which cam block is cooperable with an insulating block 63 mounted on a yielding contact finger 64. The contact finger 64 has a contact point 65 at its free end engageable with a complementary contact 66 (see Fig. 2) to complete the circuit between wires 67 and 68. The circuit is completed when the cam block 62 has a flat face paralleling the insulating block 63. Before the inner contact plate 33 has moved down to partially rotate the sprocket wheel 69 and cam member 62, the cam member is in such a position that a corner is engaging the switch block 63 to maintain the switch in open position. This open position of one of the switches is illustrated in Fig. 6, both switches being identical.

One of the circuits controlled by the time switch is now completed, and as the clock dial advances, the trip lever 23 will ultimately arrive at the position shown in Fig. 3 to engage the projecting end 48 of the lever 47. When the tripping lever 23 and dial have moved sufficiently far, the latch portion 50 on the other end of the lever 47 will be moved free of the shoulder 52 on the front cocking plate 36 to release said plate and allow the same to move forcibly from the full line position of Fig. 3 to the dot-and-dash line position. During such movement a dog 69 will partially rotate a ratchet wheel 70 mounted rigidly on a shaft 71 to cause partial rotation of the shaft 71 and second cam member 72 (see Fig. 5). It is to be noted that the shaft 71 extends loosely through the sleeve 60 on which the inner sprocket 59 is mounted; thus these two sprocket shafts are concentric and considerable space is conserved. This partial rotation of the

cam member 72 will cause it to rotate from the position of Fig. 6 to a position which permits the insulated contact block 73 and contact finger 74 to spring inwardly until contact points 75 and 76 are in engagement as shown by the dotted lines in Fig. 3. This completes the circuit between the wires 77 and 78.

Both of the cocking plates are now in uncocked position, one circuit having been completed at approximately 4:15 in the afternoon, and the other circuit having been completed at approximately six o'clock in the evening, in accordance with the setting of the tripping levers 22 and 23.

When it is approximately ten o'clock in the evening, the second cocking control lever 21' will engage the lever 27 to recock both of the plates 33 and 36 in the same manner as heretofore described in connection with the cocking control lever 21. Then, the tripping lever 22' will eventually cooperate with the lever 57 to release the inner cocking plate, and this release of the inner cocking plate will cause additional rotation of the cam member 62 to again break the circuit between the contact points 65 and 66. As the clock advances further the tripping lever 23' will ultimately engage the projecting portion 48 of the lever 47 to release the outer cocking plate 36 and partially rotate the cam 72 back to the position of Fig. 6 to break the contact between the points 75 and 76 and the circuit between the wires 77 and 78.

From the above it will be seen that a plurality of circuits may be independently controlled and that the time for both completing and breaking the circuit to any one of the switches may be independently controlled through a change in the position of the tripping levers. It is further apparent that the time of operation of either circuit may be readjusted whenever conditions require. For example where lights are being controlled, it is necessary that the lights be turned on much earlier during the winter months than in the summer months. The flexibility of the present time switch makes it possible to make these seasonal adjustments in a very simple manner.

It is apparent that the construction may be readily enlarged upon by having more than two concentric cam shafts for the switches and by having more than two cocking plates and associated devices to control any desired number of circuits more than two. It is further apparent that only one motor and one time clock is required in any case.

Various other changes and modifications may be made as may occur to those skilled in the art, and all of such changes are contemplated as may come within the scope of the claims.

What I claim is:

1. A time switch for controlling a plurality of electrical circuits comprising a switch for each circuit, a clock, means including a tensioned member for actuating each switch, means including a clock driven member for cocking said tensioned actuating members for all of said switches simultaneously, and a plurality of other members driven by said clock, each of said members being cooperable with the tensioned actuating member for a particular switch to release said tensioned actuating member and cause operation of said particular switch at a predetermined time.

2. A time switch for controlling a plurality of electrical circuits comprising a switch for each circuit, a clock, means for moving each switch into and out of circuit making position, actuating mechanism for each switch moving means including a movable cocking plate having a spring in connection therewith, means including a member driven by said clock for cocking all of said cocking plates simultaneously against the tension of their springs, a latch for each plate for automatically holding said plates in cocked position, and means including a plurality of other members driven by said clock, each of said means being cooperable with the latch for a particular cocking plate to release said latch at a particular time and cause operation of the switch moving means and completion of the circuit controlled by a particular switch.

3. A time switch for controlling a plurality of electrical circuits comprising a switch for each circuit, a clock, means for moving each switch into and out of circuit making position, actuating mechanism for each switch moving means including a movable cocking plate having a spring in connection therewith, means including a member driven by said clock for cocking all of said cocking plates simultaneously against the tension of their springs, a latch for each plate for automatically holding said plates in cocked position, and means including a plurality of other independently adjustable members driven by said clock, each of said means being cooperable with the latch for a particular cocking plate to release said latch at a particular time and cause operation of the switch moving means and completion of the circuit controlled by a particular switch.

4. A time switch for controlling a plurality of electrical circuits comprising a switch for each circuit, a clock, means for moving each switch into and out of circuit making position, actuating mechanism for each switch moving means including a movable cocking plate having a spring in connection therewith, means including a member driven by said clock for cocking all of said cocking plates simultaneously against the tension of their springs, a latch for each plate for automatically holding said plates in cocked position, means including a plurality of other independently adjustable members driven by said clock, each of said means being cooperable with the latch for a particular cocking plate to release said latch at a particular time and cause operation of the switch moving means and completion of the circuit controlled by a particular switch, and means including other members driven by said clock for recocking said plates and for again releasing said latches at selected times to effect breaking of the circuits controlled by said switches.

5. A time switch for controlling a plurality of circuits comprising two switches having yielding contact fingers, a rotatable tubular shaft having a cam member thereon cooperable with the contact finger of one of said switches to move the same into and out of circuit making position, a second shaft rotatable within said tubular shaft and having a cam member thereon cooperable with the contact finger of the other switch to move the latter into and out of circuit making position, movable clock mechanism, and means controlled by said clock mechanism for independently imparting partial rotation to said two shafts to provide for selective control of said two switches.

6. A time switch for controlling a plurality of circuits comprising two switches having yielding contact fingers, a rotatable tubular shaft having a cam member thereon cooperable with the contact finger of one of said switches to move the same into and out of circuit making position, a second shaft rotatable within said tubular shaft

and having a cam member thereon cooperable with the contact finger of the other switch to move the latter into and out of circuit making position, movable clock mechanism, and adjustable means controlled by said clock mechanism for independently imparting partial rotation to said two shafts to provide for selective control of said two switches.

7. A time switch for controlling a plurality of circuits comprising two switches having yielding contact fingers, a rotatable tubular shaft having a cam member therein cooperable with the contact finger of one of said switches to move the same into and out of circuit making position, a second shaft rotatable within said tubular shaft and having a cam member thereon cooperable with the contact finger of the other switch to move the latter into and out of circuit making position, a ratchet wheel on each of said shafts, movable clock mechanism, and means controlled by said clock mechanism and engageable with said ratchet wheels for independently imparting partial rotation to said two shafts to provide for selective control of said two switches.

8. A time switch comprising a switch member, switch moving means, a movable cocking plate having a spring in connection therewith and mounted independently of the switch moving means, a clock, means including a member driven by said clock for cocking said plate against the tension of its spring, a tensioned latch for holding said plate in cocked position, means including another member driven by said clock for releasing said latch, and means between said cocking plate and switch moving means for transmitting actuating movement from said cocking plate to the switch when said cocking plate latch is released.

9. A time switch for controlling two electrical circuits comprising two switches, a clock, means including a movable tensioned member for actuating each switch, means including a clock driven member for cocking said tensioned actuating members for both switches simultaneously, a tensioned latch for releasably holding each actuating member in cocked position, means including an adjustable clock driven member for releasing one of said latches to cause operation of one of said switches at a selected time, and means including an adjustable clock driven member for releasing the other of said latches to cause operation of the other switch at a different selected time.

10. A time switch for controlling two electrical circuits comprising two switches, a clock, means including a movable tensioned member for actuating each switch, means including a clock driven member for cocking said tensioned actuating members for both switches simultaneously, a tensioned latch for releasably holding each actuating member in cocked position, means including an adjustable clock driven member for releasing one of said latches to cause completion of the circuit of one of said switches at a selected time, means including an adjustable clock driven member for releasing the other of said latches to cause completion of the circuit of the other switch at a different selected time, and means including other clock driven members for recocking said actuating member and for again releasing said latches to cause breaking of the riccuits controlled by the switches at selected times.

11. A time switch comprising a switch member, switch moving means, a movable cocking plate having a spring in connection therewith and mounted independently of the switch moving means, a clock, means including a member driven by said clock for cocking said plate against the tension of its spring, a tensioned latch for holding said plate in cocked position, means including another member driven by said clock for releasing said latch, and means between said cocking plate and switch moving means for transmitting actuating movement from the cocking plate to the switch to close the latter only when said cocking plate latch is released, said means being adapted to also transmit actuating movement from the cocking plate to the switch to open the latter.

12. A time switch comprising a switch member having a yielding contact finger, a rotatable shaft having a cam member thereon cooperable with the contact finger to move the same into and out of circuit making position, a movable cocking plate having a spring in connection therewith, a clock, means including a member driven by said clock for cocking said plate against the tension of its spring, a tensioned latch for holding said plate in cocked position, means including another member driven by said clock for releasing said latch, and means between said cocking plate and cam shaft for imparting partial rotation to the latter when the cocking plate latch is released to operate said switch.

JOHN C. GILLETTE.