

Nov. 4, 1947.

B. F. FLEGEL

2,430,286

AUTOMATIC ELECTRIC TIME SWITCH

Filed Feb. 16, 1946

2 Sheets-Sheet 1

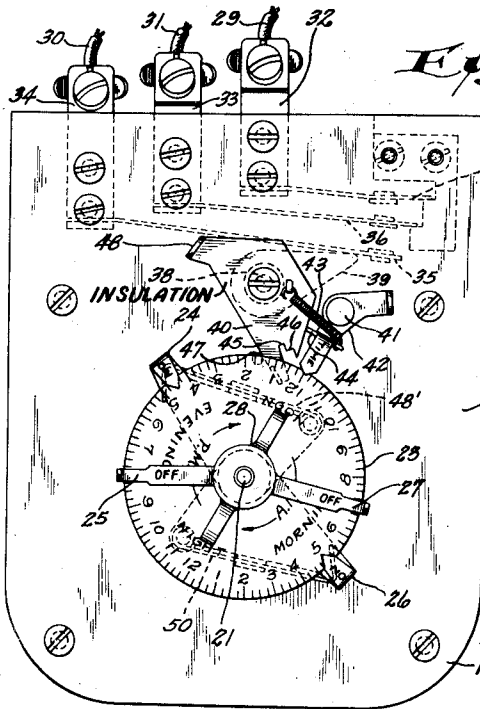


Fig. 1.

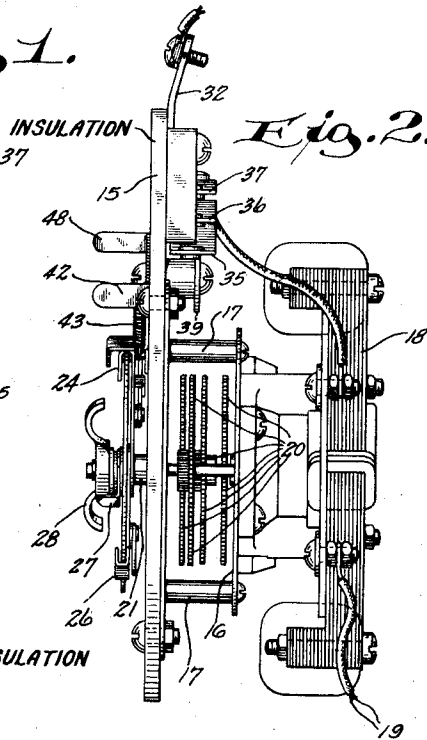


Fig. 2.

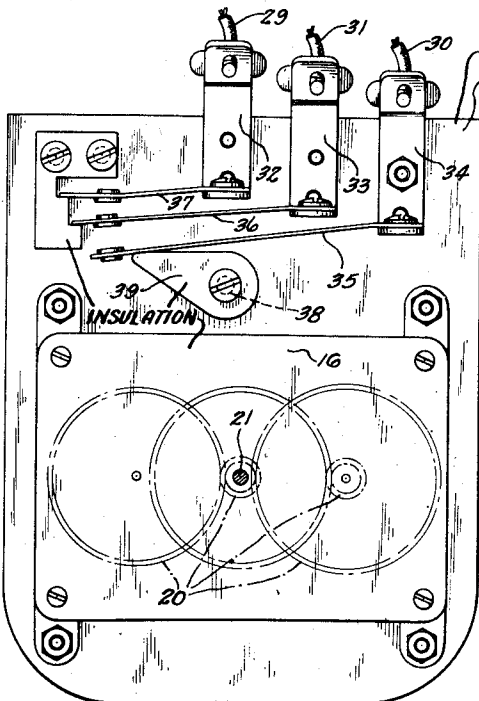


Fig. 3.

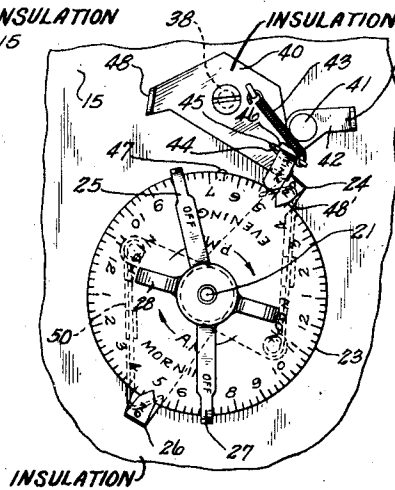


Fig. 4.

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Fig. 5.

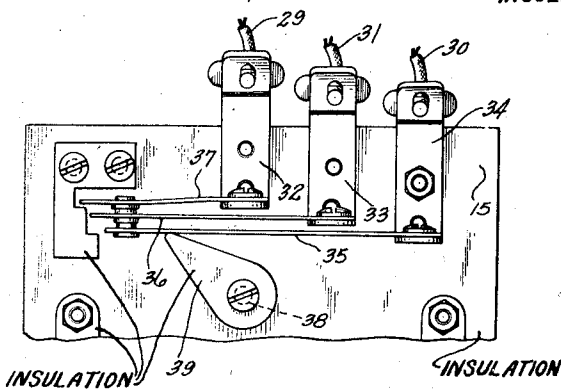


Fig. 6.

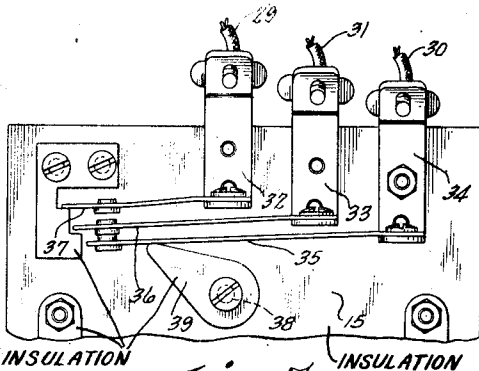
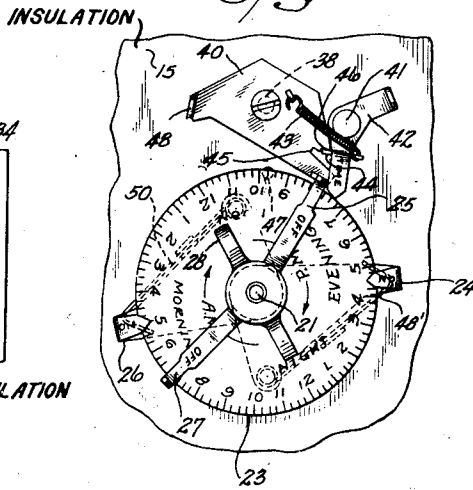
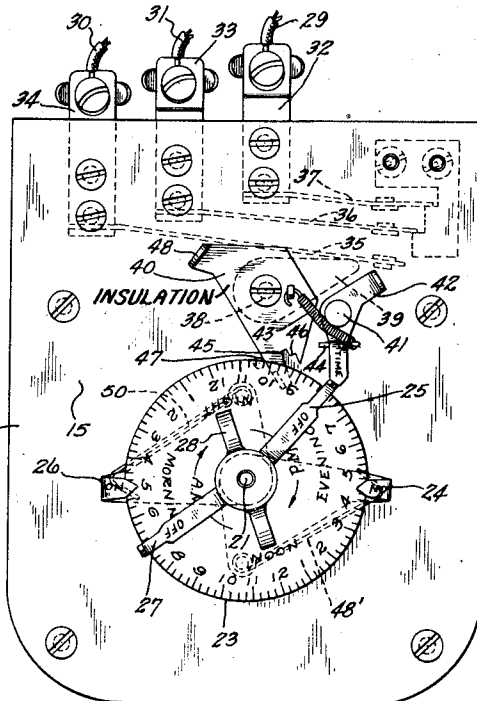


Fig. 7.

INSULATION

Fig. 8.



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UNITED STATES PATENT OFFICE

2,430,286

AUTOMATIC ELECTRIC TIME SWITCH

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Application February 16, 1946, Serial No. 648,029

8 Claims. (Cl. 200—38)

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This invention relates to improvements in automatic electric time switches, and more particularly to a dual circuit time switch.

A general object of the invention is to provide an improved automatic electric time switch for controlling, according to a pre-determined plan, a pair of independent electrical circuits. The present invention has particular utility in connection with the automatic control of electric light circuits for a hen house. It is an established fact that the laying productivity of hens can be increased by prolonging the light or illumination within the hen house, and this is particularly true in winter when the days are short and darkness comes on relatively early in the evening. Consequently, during those portions of the year when it becomes dark at a relatively early hour, it has been established scientifically that artificial illumination within the hen house for an additional period of time, will cause a greater yield in the eggs laid by the hens. Where artificial illumination is provided for a hen house it is, of course, necessary that the electric lights be turned off at a reasonable time in the evening to permit the hens to go to roost. It has been found that if the artificial illumination is suddenly extinguished, the hens are unduly agitated thereby and an undue length of time elapses before the hens find their roosting places. With the above factors in mind, it is, therefore, a specific object of the present invention to provide an automatic electric time switch for a pair of electric light circuits for a hen house, with the time switch being arranged to automatically close both circuits at a pre-determined time in the afternoon or evening for artificial illumination of the hen house and to thereafter, when the roosting time of the hens is reached, to automatically turn off one circuit to subdue the illumination and to shortly thereafter turn off the other light circuit to result in complete darkness within the hen house for the balance of the night. The arrangement cited gives a period of subdued illumination within the hen house wherein the hens go to roost quickly and orderly before the illumination within the hen house is completely extinguished.

Where hen houses are provided with artificial illumination with automatic time switch means controlling the same, it has been found that during certain times of the year it is desirable to turn on the illumination so as to awaken the fowls and then after a predetermined time, when natural daylight enters the hen house, the illumination may be extinguished. With the present in-

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vention wherein an automatic time switch is used for controlling a pair of hen house independent light circuits, the arrangement provides for turning on both light circuits at a pre-determined early morning hour, thereby producing brilliant artificial illumination which will awaken the fowls. At a pre-determined time thereafter the improved automatic time switch of the present invention will operate to extinguish one light circuit and shortly thereafter, the automatic time switch will operate to open or break the other light circuit and thus cause the extinguishment of all of the electric lights.

A further object of the invention is to provide an automatic electric time switch which is extremely compact and simple mechanically, which is easy to regulate and set, and which builds up and ultimately releases power with a minimum of effort and wear on the moving parts.

A further object of the invention is to provide an automatic electric time switch for dual electric circuits which is of very simple construction, is strong and durable, is inexpensive to manufacture and install, and which is well adapted for the purposes set forth.

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

In the accompanying drawings in which the same reference characters indicate the same parts in all of the views:

Fig. 1 is a front view of the improved time switch with the parts in a position wherein both of the electrical circuits are open;

Fig. 2 is a side view of the switch with the parts in the position of adjustment of Fig. 1;

Fig. 3 is a rear view of the switch, with the electric clock mechanism detached therefrom and showing the circuit controlling contact elements disengaged in accordance with the dial position of Fig. 1;

Fig. 4 is a fragmentary front view of the switch in a position different from that of Fig. 1 and wherein both of the controlled electrical circuits are closed;

Fig. 5 is a fragmentary rear view of the switch, similar to Fig. 3 only showing the circuit controlling contact elements for both circuits in closed position pursuant to the dial position and setting of Fig. 4;

Fig. 6 is a fragmentary front view of the switch in still another position which causes one pair of contact elements for one circuit to be engaged

and the other circuit contact elements to be disengaged;

Fig. 7 is a fragmentary rear view of the time switch, similar to Fig. 3, only showing the circuit controlling contact elements in the position corresponding to the Fig. 6 setting and position of the dial; and

Fig. 8 is a front view of the time switch showing still another position of adjustment and dial position wherein the mechanism has caused disengagement of all of the circuit controlling contact elements.

Referring more particularly to the drawings, it will appear that the numerals 15 and 16 indicate respectively front and rear plates on and between which the switch mechanism is mounted. The front plate 15 is formed of insulating material. Said plates are held together in spaced parallel relation by transverse posts or studs 17. In practice, the entire frame and mechanism carried thereby may be enclosed by a suitable casing (not shown) and the device is mounted vertically wherever convenient.

Mounted on the outer face of the rear plate 16 is an electric clock mechanism 18 (see Fig. 2) which receives electricity from any convenient electrical outlet (not shown) through circuit wires 19. A driven shaft in the clock mechanism 18 extends through the rear plate 16 and by means of a series of reduction gears, designated generally by the numeral 20, a clock dial shaft 21 is revolved in a clockwise direction. Said clock dial shaft 21 is journaled in a suitable bearing and extends through the front plate 15.

The shaft 21, forwardly of the front plate 15, adjustably revolvably carries a clock dial 23 and the same is graduated in a counter-clockwise direction from 12 noon to 12 midnight through 180° of the dial surface, and through the remainder of the dial surface the graduations extend from 12 midnight to 12 noon. There are also suitable quadrant markings to represent "noon," "evening," "night" and "morning."

Apertured inner ends of a series of arms or operating hands are adjustably mounted on the outer extended portion of the shaft 21 between suitable spacing and clamping collars or discs. Said actuating arms or hands include a dual circuit closing member 24, a circuit opening member 25, a dual circuit closing member 26, and another circuit opening member 27. The circuit opening members 25 and 27 are mounted over the outer face of the dial 23, while the circuit closing members 24 and 26 are mounted adjacent the inner face of the dial 23.

The outer extremity of the shaft 21 is threaded and carries a winged nut 28. When this winged nut is released, the dial 23 and the various hands 24, 25, 26 and 27 may be adjusted on the shaft 21 to properly position the same. When the nut 28 is tightened, the dial and hands are clamped between collars on the shaft and all of the members on the shaft 21 will then turn therewith. The ends of all of the arms extend beyond the periphery of the dial 23 to desired extents. The outer extremities of the arms 25 and 27 are turned right angularly inwardly.

It is intended that the improved automatic electric time switch be used for the sequential control of a pair of electrical circuits, as for example, independent light circuits for a building such as a hen house. Included in the two electrical circuits to be controlled are circuit wires 29 and 30, one for each circuit, and additionally, there is a third circuit wire 31 common to both

electrical circuits. The upper rear portion of the front plate 15 has spacedly secured thereto fixed metallic contact elements 32, 33 and 34 to which the respective wires 29, 31 and 30 are secured by binding posts. The flanged lower extremities of the fixed contact elements 34, 33 and 32 have secured thereto respectively inner end portions of laterally projecting yieldable contact elements 35, 36, and 37.

Extending through the front plate 15, somewhat above the dial 23 is a shaft 38 fast on the inner end of which is a cam 39. The forward end of the shaft 38 has fast thereon a circuit operating plate 40.

Extending transversely through the front plate 15, adjacent the operating plate 40, and above the dial 23, is a stud shaft 41 on the outer end of which is mounted a bell crank lever 42. Said bell crank lever is revoluble relative to the stud shaft 41, but is connected with the circuit operating plate 40 by means of a spring 43 which is connected respectively with one arm of the bell crank lever and a peripheral portion of the control plate 40. The lever 42 has its inner extremity offset outwardly so as to lie in the path of movement of the angled extremities of the circuit breaking arms 25 and 27. The same arm of the lever 42 is provided with an edge lug 44 adapted, under certain conditions to lodge in the stepped-ly arranged shouldered recesses 45 and 46 in the control plate 40 to hold said plate against undesired rotation. An edge portion of the control plate 40 adjacent the recess 45 is extended and is adapted to contact a pin 47 for the purpose of limiting the range of movement of said plate 40 when it moves in a clockwise direction. One side of the control plate 40 carries an angular arm 48 for convenience in manual manipulation of said plate.

Let it be assumed that the circuit wires 30, 31 and 29 extend to and include therein separate sets of incandescent bulbs for the illumination of the interior of a hen house. According to this arrangement, one circuit which includes wires 30 and 31 will also include therein incandescent bulbs, and a second independent circuit, including circuit wires 29 and 31, also includes therein incandescent bulbs. The result is that according to the improved time switch, the incandescent bulbs in one circuit may be controlled independently of the incandescent bulbs in the other circuit. In Figs. 1, 2 and 3 there is illustrated the condition of all of the parts of the switch at 12 noon. As shown, the free ends of the yielding contact elements 35, 36 and 37 are all separated so that both light circuits are broken and the incandescent bulbs are extinguished. Let it be assumed that the time of year is winter and that darkness comes on at about 4:30 p. m. In the drawing the "lights on" arm 34, which is the arm for effecting the closing of both electrical circuits, is shown at the 4:30 p. m. position on the dial. With the electric clock mechanism driving the dial 23 through the medium of the gears and shafts, said dial will turn slowly in a clockwise direction. In approaching the late afternoon setting, an anchored spring 48', associated with the dial 23 and with the arm 24, will ride along a side of the pin 47 and said spring will be compressed and retracted thereby. This serves to put the arm 24 under compression for quick positive and effective snap action similar to the spring lug arrangement described in my prior Patent No. 2,242,517. Upon further movement of the time dial 23 to reach the desired setting

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of 4:30 p. m., such advancement of the dial will cause the outer end of the spring 48 to snap clear of the pin 47, striking the extended portion of the control plate 40. This very quickly oscillates the control plate 40 and elements associated therewith in a counter-clockwise direction to an extent to cause the bell crank lever lug 44 to snap into the more remote plate recess 45 whereby the position of Fig. 4 is attained. As a result of this movement of the control plate 40, the shaft 38 carrying the cam 39 is turned to the position shown in Fig. 5 wherein the contact ends of all of the yielding contact elements 37, 36, and 35 are held in engagement to close or complete the two independent electric light circuits whereby brilliant illumination is then produced in the hen house.

From the preceding description, it will be clear that with the specific adaptation of the improved electric automatic time switch and according to its operational setting, both light circuits for the hen house will be turned on at the particular time of the day when darkness is at hand. To increase the laying productivity of the hens housed in the hen house, it is desirable that the hen house be well illuminated for some additional period of time during the short daylight season. As a result thereof it is proposed, according to the setting of the hands relative to the dial 23 in the exemplification illustrated, that the electric lights for the hen house be extinguished shortly after 8 p. m. so that the hens may then go to roost. However, if all of the lights are suddenly extinguished, the hens will be disturbed and will not go to their roosts quickly and orderly. The present invention aims at overcoming this undesirable contingency by arranging for the extinguishment of one set of lights at a desired time, followed quickly by the extinguishment of the other set of lights, whereby during the period of subdued illumination the hens may go to roost in an orderly and expeditious fashion.

With reference to the drawings it will be noted that "lights off" arm 25 is set at 8 p. m. After the condition of Fig. 4 is attained, the time dial 23 turns in a clockwise direction very slowly and eventually the condition of Fig. 6 is reached wherein the angled extremity of arm 25 engages the adjacent arm of the bell crank lever 42 and in the slow movement of the dial the bell crank lever 42 will be initially tripped to a position wherein its lug 44 is shifted from engagement in the plate notch 45 to engagement within the plate notch 46. This permits a slight movement of the control plate 40 in a clockwise direction which turns its shaft 38 and the cam 39 to the position shown in Fig. 7 wherein the yielding contact members 35 and 36 are still in engagement but contact element 35 is separated from contact element 37, thereby breaking one light circuit but permitting the other to remain on or closed while this condition temporarily prevails.

The slow continued movement of the time dial 23 then causes the flanged end of the arm 25 to further oscillate the bell crank lever 42 until its lug 44 disengages the plate notch 46 whereupon the spring 43 will cause the control plate 40 to move to the position of Fig. 8. In this position of the control plate 40 the cam 39 will be in the position of Fig. 3 wherein the contact members 35, 36 and 37 are all separated, whereby both electric light circuits are broken and there is complete darkness within the hen house. It may be stated that it takes about one-half hour to shift the mechanism from the position of Fig.

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6 to the position of Fig. 8. During this one-half hour period the hen house is partially illuminated and due to the extinguishment of one light circuit, the hens then proceed to go to roost in an orderly manner and by the time the position of Fig. 8 is reached and both light circuits are open, the hens are all at roost.

Following the extinguishment of both light circuits and according to the setting of the time clock mechanism as illustrated, the yieldable contact elements 35, 36 and 37 will remain in the condition of Fig. 3 from shortly after 8 p. m. until approximately 5 a. m., at which time it is proposed that the fowls be awakened. The clock dial 23 is continuously turning and ultimately an anchored spring 50 associated with the "lights on" arm 26 will engage the pin 47 and be compressed thereby in the same manner as was the case in connection with spring 48'. When approximately the 5 a. m. position of the time dial 23 is reached, the spring 50 will snap past the pin 47 and kick the control plate 40 to a position similar to that shown in Fig. 4 wherein the plate is held in said position by the entrance of the bell crank lever lug 44 in the plate recess 45. Such position of the plate 40 will cause, through the shaft 38, a position of the cam 39 corresponding to that shown in Fig. 5 wherein all of the contact elements 35, 36 and 37 are in engagement. This will result in sudden illumination within the hen house as both light circuits are then closed. The hens are thereby awakened.

As it may actually be prior to daybreak, it is desirable that the illumination within the hen house be continued until such time as there is natural light. Accordingly, the "lights off" arm 27 is set at the 7 a. m. position and both light circuits will remain on from 5 a. m. to 7 a. m., at which time the angled end of the arm 27 initially contacts the bell crank lever 42 so as to shift its lug 44 from plate notch 45 to plate notch 46, resulting in the position of Fig. 6. This shift permits a slight clockwise operation of the plate 40 and a position of the cam 39 corresponding to that shown in Fig. 7 wherein one light circuit is broken, but the other remains closed. This results in a short period of subdued illumination within the hen house and during the next short period of movement of the time dial, the arm 27 will further swing the bell crank lever so as to entirely disengage the same from the control plate 40 whereupon the control plate snaps to the position of Fig. 1 and both light circuits are then broken. The cycle described is repeated during each 24 hours of operation of the automatic time switch.

It should, of course, be understood that the settings described and positions of the hands is merely typical and any desired arrangement may be attained. One of the particular features of the invention is the employment of two independent light circuits in which the yieldable switch or contact elements for the same are actuated by a cam and the position of the cam is determined by the control plate 40 which is formed with the pair of stepped notches 45 and 46 so that there may be limited movement of the control plate when the bell crank lever lug shifts from one notch to the other to accomplish extinguishment of one light circuit and a short period of illumination through the remaining light circuit, thereafter followed by breaking of both light circuits through complete disengagement of the bell crank lever from the control plate 40.

The improved automatic electric time switch is

a unitary structure of simplified and efficient mechanism for the selective control of two independent electrical circuits. The device is positive and quick in its action, is easy to adjust and set and is particularly well adapted for the particular type of installation described.

What is claimed as the invention is:

1. A time switch, comprising a plurality of movable switch elements included in and controlling a pair of independent electrical circuits, a member movable through a variable range for the selective operation of all of said switch elements, an oscillatable switch controlling plate connected with said switch operating member, said plate having a pair of separated notches therein, a latch lever selectively engageable with said plate notches for releasably, temporarily holding the plate in different positions, tension means extending between the latch lever and the plate, a clock, a time dial driven by said clock, and means adjustably associated with said dial for movement therewith for disengaging the latch lever relative to the plate or for engaging the latch lever with different portions of the plate for desired operations of said switch elements for varied control of said electrical circuits.

2. In an automatic time switch, in combination, a plurality of switch elements included in a pair of independent electrical circuits, said switch elements being movable into and out of mutual contact for the control of the electrical circuits, a cam member for producing various degrees of relative movement of said switch elements, an oscillatory plate for moving said cam and having a pair of adjacent holding notches therein, a movably mounted latch lever engageable in either of the plate notches, tension means between the latch lever and plate, a clock, a time dial driven by the clock, a pair of hands adjustably associated with the dial and contactable with the plate to oscillate it into a selected position of engagement with the latch lever, and another pair of hands adjustably associated with the dial and contactable with the latch lever to shift the latter relative to the plate.

3. In an automatic time switch, in combination, a plurality of switch elements included in a pair of independent electrical circuits, said switch elements being movable into and out of mutual contact for the control of the electrical circuits, a cam member for producing various degrees of relative movement of said switch elements, an oscillatory plate for moving said cam and having a pair of adjacent holding notches therein, a movably mounted latch lever engageable in either of the plate notches, tension means between the latch lever and plate, a clock, a time dial driven by the clock, a pair of hands adjustably associated with the dial and contactable with the plate to oscillate it into a selected position of engagement with the latch lever, and another pair of hands adjustably associated with the dial and contactable with the latch lever to shift the latter from one plate holding notch to the other.

4. In an automatic time switch, in combination, a plurality of switch elements included in a pair of independent electrical circuits, said switch elements being movable into and out of mutual contact for the control of the electrical circuits, a cam member for producing various degrees of relative movement of said switch elements, an oscillatory plate for moving said cam and having a pair of adjacent holding notches therein, a movably mounted latch lever engageable in either of the plate notches, tension means

between the latch lever and plate, a clock, a time dial driven by the clock, a pair of hands adjustably associated with the dial and contactable with the plate to oscillate it into a selected position of engagement with the latch lever, and another pair of hands adjustably associated with the dial and contactable with the latch lever to quickly shift the latter from one plate holding notch to the other, permitting regression of the plate, and to thereafter move free of the plate to permit further regressive oscillation thereof.

5. In an automatic time switch, in combination, a plurality of switch elements included in a pair of independent electrical circuits, said switch elements being movable into and out of mutual contact for the control of the electrical circuits, a cam member for producing various degrees of relative movement of said switch elements, an oscillatory plate for moving said cam and having a pair of steppedly related holding notches therein, a movably mounted latch lever engageable in either of the plate notches, tension means between the latch lever and plate, a clock, a time dial driven by the clock, a pair of hands adjustably associated with the dial and contactable with the plate to oscillate it into a selected position of engagement with the latch lever, and another pair of hands adjustably associated with the dial and contactable with the latch lever to shift the latter relative to the plate.

6. In an automatic time switch, in combination, a plurality of switch elements included in a pair of independent electrical circuits, said switch elements being movable into and out of mutual contact for the selective control of the electrical circuits, a cam member movable into and out of engagement with a switch element for producing various degrees of relative movement of said switch elements, an oscillatory plate for moving said cam and having a pair of steppedly related holding notches therein, a movably mounted latch lever engageable in either of the plate notches, tension means between the latch lever and plate, a clock, a time dial driven by the clock, a pair of hands adjustably associated with the dial and contactable with the plate to oscillate it into a position of engagement between a holding notch and the latch lever, and another pair of hands adjustably associated with the dial and contactable with the latch lever to shift the latter from one plate holding notch to the other.

7. In an automatic time switch, in combination, a plurality of switch elements included in a pair of independent electrical circuits, said switch elements being movable into and out of mutual contact for the control of the electrical circuits, a cam member for producing various degrees of relative movement of said switch elements, an oscillatory plate for moving said cam and having a pair of steppedly related holding notches therein, a movably mounted latch lever engageable in either of the plate notches, tension means between the latch lever and plate, a clock, a time dial driven by the clock, a hand adjustably associated with the dial and contactable with the plate to oscillate it into a selected position of engagement between the latch lever and one notch, and another hand adjustably associated with the dial and contactable with the latch lever to quickly shift the latter from said plate holding notch to the other, permitting regression of the plate, and to thereafter move the latch lever free of the plate to permit further regressive oscillation thereof.

8. A time switch, comprising a plurality of

movable switch elements included in and controlling a pair of independent electrical circuits, a member movable through a variable range for the selective operation of one or more of said switch elements, an oscillatable switch controlling plate connected with said switch operating member, said plate having a pair of separated notches therein, a latch lever selectively engageable with said plate notches for releasably, temporarily holding the plate in different selected positions, tension means extending between the latch lever and the plate, a clock, a time dial driven by said clock, and means adjustably associated with said dial for movement therewith for disengaging the latch lever relative to the

plate or for engaging the latch lever with a selected notch in said plate for desired operations of said switch elements for varied control of said electrical circuits.

BENJAMIN F. FLEGEL.

REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
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