

April 29, 1941.

J. C. GILLETTE

2,239,999

AUTOMATIC TIME SWITCH

Filed Nov. 12, 1938

3 Sheets-Sheet 1

Fig. 1

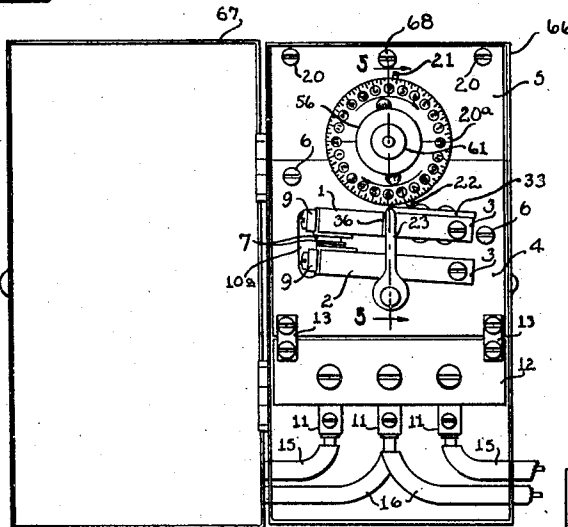


Fig. 2

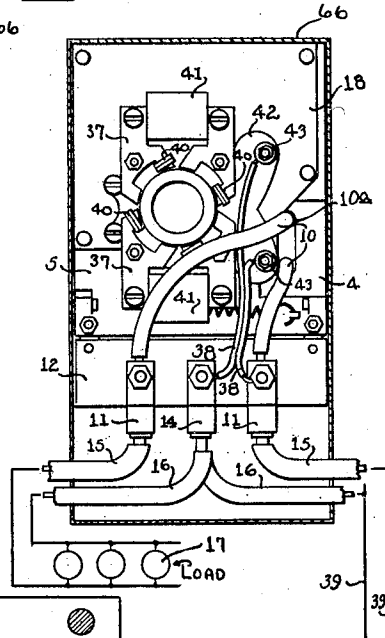
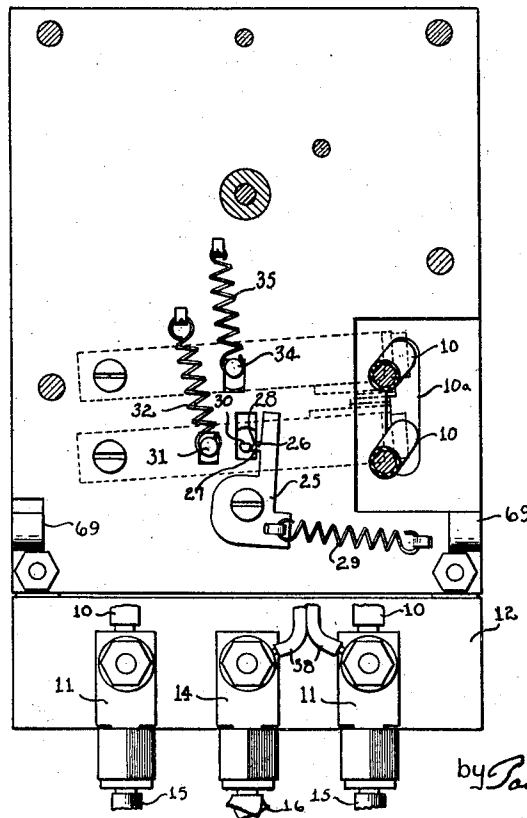


Fig. 3



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Fig. 4

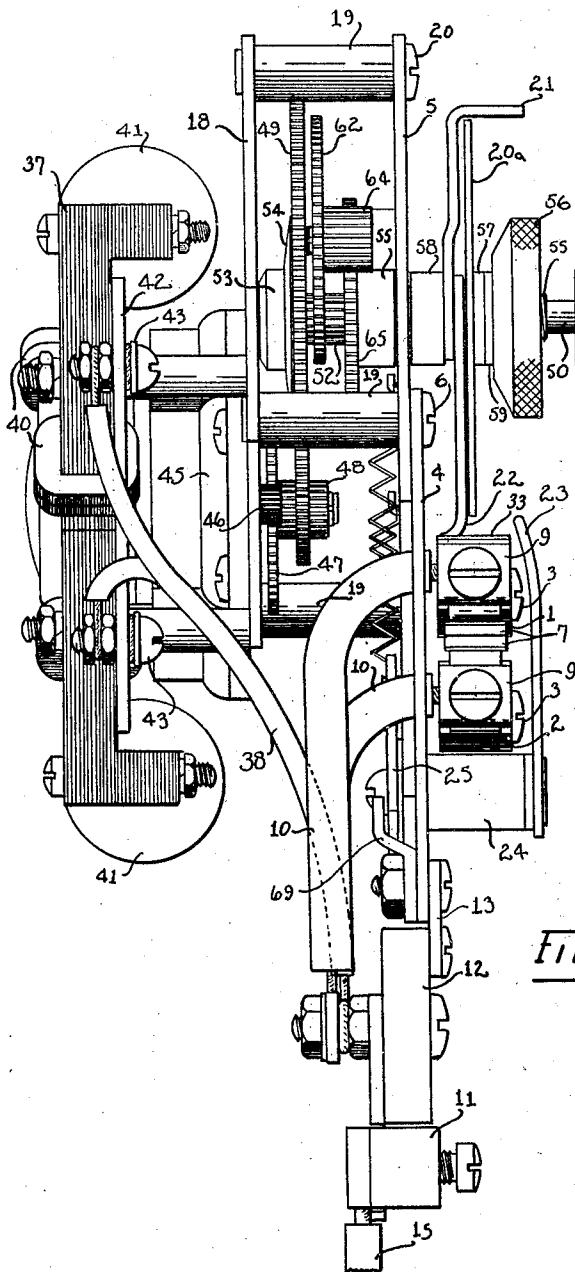


Fig. 5

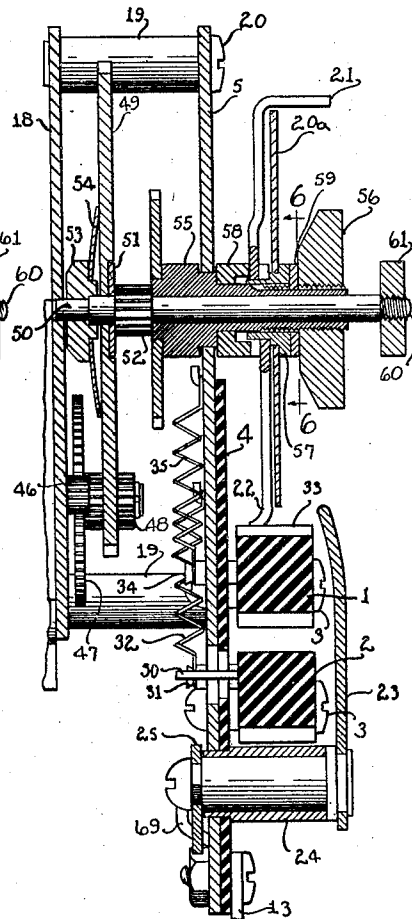
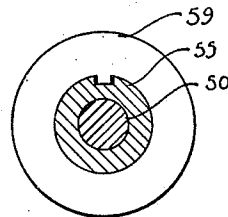


Fig. 6



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Fig. 7

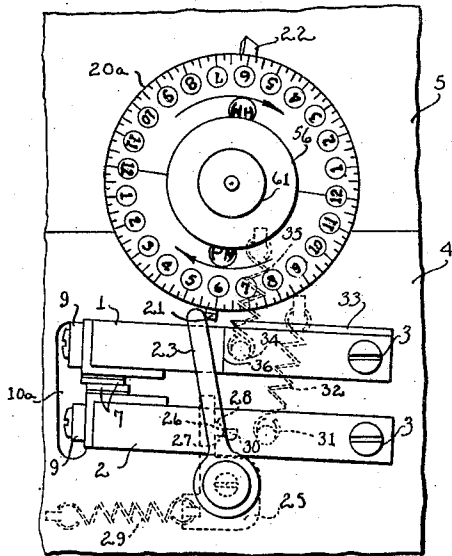


Fig. 8

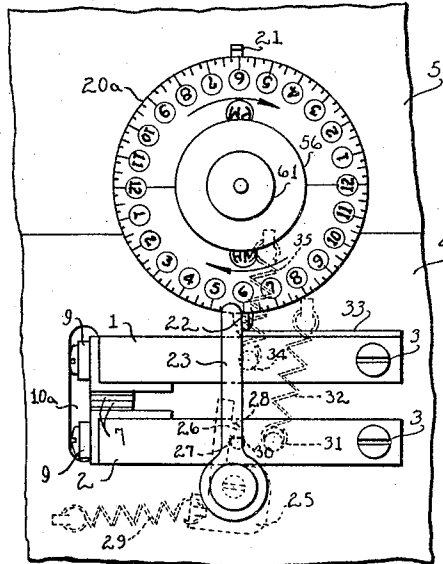


Fig. 9

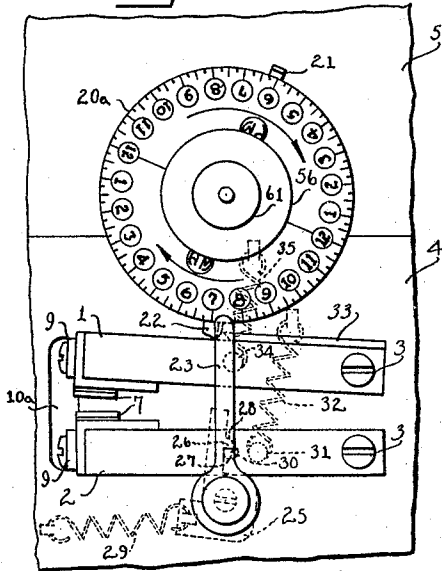


Fig. 10

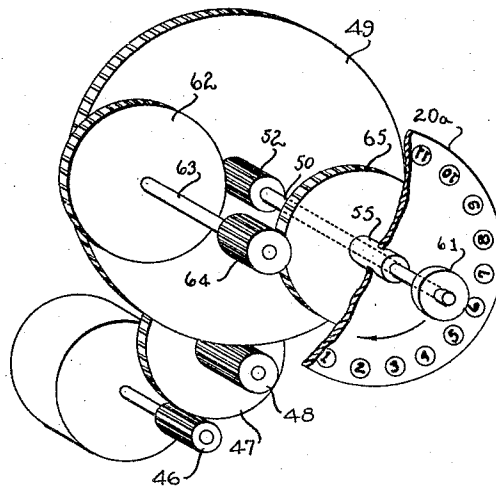
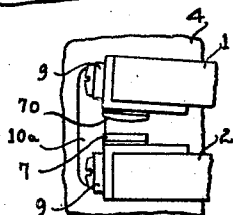


Fig. 11



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UNITED STATES PATENT OFFICE

2,239,999

AUTOMATIC TIME SWITCH

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Application November 12, 1938, Serial No. 240,179

13 Claims. (Cl. 200—38)

The present invention relates to automatic time switches and particularly to those switches which employ a pair of longitudinal arms carrying contact points at their extremities.

In the prior art form of switch of the double arm type, there has been a tendency for the contacts to become heated when passing considerable currents, and this heating effect is traceable directly to the considerable resistance residing at the contact surfaces. These surfaces are invariably coated with an oxide layer which offers resistance to current flow, depending on the type of the oxide, and sometimes the points do not bear over the entire contact surface. Again, in certain forms of switches, the break period is fairly slow, which tends to draw a prolonged arc, causing severe ionization between the points and the chiseling out or fusing of small areas over the contact surfaces, which phenomenon is generally designated "pitting." All of these conditions lead to undue heating at the contacts and a consequent reduction in the operating life of the switch.

The primary object of the present invention is to provide an automatic time switch capable of making and breaking circuits carrying large or small currents, and having a minimum number of parts and of simple design.

Another object is to provide a time switch, in which the contacts are automatically wiped during operation so as to present clean contact surfaces at all times, which offer the minimum resistance to current flow and minimum heating effects.

A still further object is to provide a switch, in which the break is made practically instantaneously without drawing an arc, whereby excessive pitting is avoided.

The final object is to provide a timing mechanism with a micrometer adjustment of simple design in order accurately to set the time switch.

These objects are attained, in brief, by carrying the make and break contacts on a pair of parallelly disposed pivoted arms, one arm of which is moved against the other arm to close the contacts, but, when opening the contacts, both arms are moved to a so-called reset position, such as to produce a wiping action at the contacts, after which one arm is moved to break the contact. The various movements of the arms are brought about by levers secured to the timing dial and the latter is provided with a special gear mechanism to introduce a slow and accurate time adjustment.

Other objects and features will be apparent

as the specification is perused in connection with the accompanying drawings, in which—

Figure 1 represents a front plan view of a box with its cover in an open position, the box containing the improved time switch;

Figure 2 is a plan view, looking at the rear of the switch with the box in section;

Figure 3 is an enlarged plan view, looking at the back of the front panel of the switch and the motor and all of the gears being removed and each of the shafts in section;

Figure 4 is an enlarged elevational view of the improved switch removed from the box;

Figure 5 shows a section taken along the line 5—5 of Figure 1, while

Figure 6 is a view taken along the line 6—6 of Figure 5, but twice enlarged;

Figures 7, 8 and 9 are fragmentary plan views showing different positions assumed by the contact-carrying arms and the contact-closing lever during the make, wiping and break operations of the contacts;

Figure 10 is a fragmentary view, in perspective, of the gear mechanism which operates the time dial, and showing the latter partly in section;

Figure 11 is a fragmentary view showing a portion of the contact-carrying arms and having one of the contacts formed with a partially spherical surface.

Referring to the drawings in detail, the switch proper includes an upper arm 1 and a lower arm 2, preferably, of rectangular cross section and made of a hard insulating material, such as ebonite, etc. These arms are pivotally mounted at 3 on the front panel 4 of ebonite of the switch. This panel overlaps a metal plate 5, to which it is secured by screws 6. At their ends opposite from the pivots 3, the arms carry a pair of contacts or points 7, preferably constituted of silver and of a thickness that causes the arms to maintain a substantially parallel position when the contacts are closed. This parallel arrangement is shown in Figures 1, 7 and 8. Conductors are taken from each of these contacts through terminal binding plates 9 and heavy insulated wire 10 to a pair of hollow terminals 11 mounted on a terminal block 12 of insulating material. Since these conductors pass from the under-side of the front panel to the upper side thereof in order to contact with terminals 9, an opening 13a is provided in the front panel to permit these conductors to move in a vertical direction along with their terminals 9, as the arms are moved to their contact-closing and opening positions.

The terminal block 12 is secured to the front panel member 4 by a pair of joiner plates 13 screwed to the panel and block respectively. There is mounted on the terminal block, in addition to the two terminals 11 referred to hereinbefore, and intermediate terminal 14, the purpose of which will be described hereinafter. Heavy insulated wires 15 are taken from the two outer terminals 11 (as shown in Figure 2), and a pair of heavy insulated wires 16 are taken from the intermediate terminal 14. The load circuit indicated by a lamp bank 17 is connected between one pair of wires 15, 16, and the other pair of wires 15, 16 is connected to the alternating current mains, as indicated in Figure 2. It will thus be seen that the contacts 7 are in series with the lamp load circuit so that the load current passes through the contacts when the latter are in closed position. This load may be quite considerable, even as high as 75 to 100 amperes.

For operating the switch, I employ a system of spring-operated latches and levers secured to a time dial which is operated by an electrically driven clock mechanism. The latch mechanism is secured to the under-side of the front panel. The clock mechanism, including the various gears, is carried for the most part by a metal back panel 18 secured to and spaced from the front panel 5 by cylindrical spacers 19 containing screw-headed bolts 20.

The time dial 20a which determines the time at which the switch will close and open or vice versa is marked on its front face with divisions indicating hourly and fifteen-minute intervals for twenty-four hours. This dial carries a contact-closing trigger 21 which projects outwardly from the front face of the dial. The trigger is positioned on a bearing sleeve located at the under-surface of the dial and on a shaft, both of which are hereinafter described. The dial also carries a lever 22 which is termed a reset trigger, since it serves to trigger the arms through a reset position to the open-contact position. The reset trigger is positioned at the under-side of the dial similarly to the closing trigger and extends inwardly toward the panel, as indicated in Figure 4.

As the dial revolves clockwise, trigger 21 will move the contact-closing lever 23 slightly to the left. This trigger is rotatably mounted on the panel 4 through a bearing 24 to a latch 25, shown more clearly in Figures 3, 7, 8 and 9, which is adapted to be rotated with the lever 23. This latch is provided with a tooth 26 having a right angle abutting surface on the under-side of the tooth, as indicated at 27, and an arcuate cam surface at the upper side of the tooth, as indicated at 28 (Figures 3, 7, 8 and 9). The latch is mechanically biased by a spring 29 secured to a lug on the under-side of the front panel. The lower arm 2 is provided with a downwardly extending pin 30 which projects through an opening in the front panel and, when the contacts are in an open position and the arm 2 is in its lowermost position, the pin engages the surface 27 of the tooth 26, as indicated in Figure 9. However, when the contacts are in the closed position and the arm 2 is moved upwardly, as will be explained more fully when describing the operation of the switch, the pin 30 is disengaged from the lower surface of the tooth 26 and rides the arcuate surface 28. Consequently, as the trigger 21 moves around with the dial, it rotates the closing lever 23 which, in turn, causes the

pin 30 to become disengaged from the tooth of the latch 25.

The arm 2 is provided with a second pin 31, as shown most clearly in Figure 3, and, similarly to the pin 30, extends through an opening in the front panel to permit movement of the pin. The pin 31 is mechanically biased by the spring 32 secured to the under-side of the front panel in any suitable manner and tends to force the lower arm 2 upwardly when the latter is in an unlatched condition.

As a preliminary condition to opening the contacts, assuming that they have been closed, the two arms are rotated downwardly on their pivots to a so-called "reset" position. This resetting operation is produced by the rotating effect of the reset trigger 22 which bears down on a metal plate 33 secured to the upper side of the arm 1, as shown more clearly in Figures 7, 8 and 9. The lefthand edge (as shown) of the plate 33 is undercut so as to provide a sharp disengaging effect between the trigger 22 and the plate.

The arm 1 is provided with a pin 34 which extends through an opening in the front panel to the under-side where it is biased by a spring 35 shown more clearly in Figure 3.

While the operation has been set forth in a general way when referring to the function of the different elements, it is believed that a clearer understanding of the effectiveness with which this switch operates will be had by the following description.

Assume that the closing and reset triggers 21, 22 respectively have been moved to a position on the dial 20a (in a manner to be described hereinafter), indicating the time at which it is desired to have the contacts respectively close and open. The dial is turned by any suitable mechanism, for example, an electrical motor of any suitable type of which one form will be described hereinafter and synchronously with clock time. As the closing trigger 21 reaches its lowermost point of travel, it strikes the lever 23, moving it to the left, as indicated in Figure 7. The rotation of the lever is carried through its shaft to the latch 25, and the pin 30 is released from the under-surface of the tooth 26, so that the spring 32 is permitted to pull the lower arm 2 upwardly until the contacts close.

In order to open the switch, the arms are first moved into the reset position referred to hereinbefore. This is done by the reset lever 22 which, on having moved to a position just before its lower vertical position by the clock mechanism, bears down on the upper surface of the plate 33. Further movement of the trigger 22 forces the upper arm to rotate on its pivot downwardly, and since the contacts are closed during this time, the lower arm is simultaneously forced downwardly. Thus the arms, together with their pivots and contacts, constitute a parallelogram, two arms of which are maintained parallel and rotated about two fixed pivots. The effect of this motion is to cause the arms to move longitudinally with respect to one another, and a wiping action of the most effective kind is produced at the contact surfaces. This wiping effect cleans these surfaces of any insulating or partly insulating oxides and also reduces pitting, as well as introducing an abrading effect to cause the points to contact evenly over their entire surface. This longitudinal movement between the two arms 1, 2 is clearly shown by a comparison between Figures 7 and 8, where it will be noted that

the contacts in one figure overlap one another, and in the other figure coincide with one another.

When both arms 1, 2 have been swung to their lower position by the moving reset trigger 22, the pin 30 on the lower arm engages the under-surface of the tooth 26 of the latch 25, and the latter is snapped into a locking position by the spring 29, as is clearly indicated in Figure 8. Thus, the lower arm is held in its lower position. The rotation of the latch 25 restores the contact-closing lever 23 to its vertical position ready to be struck by the contact-closing trigger 21 on the next rotation of the dial 20a. In the meantime, the reset trigger 22 has entirely disengaged the plate 33 and the upper arm 1 is, therefore, free to swing upwardly due to spring 35 away from the lower arm. Thus, the contact points are opened. As pointed out hereinbefore, this upward movement of the arm 1 is accelerated by an instantaneous disengagement between the reset trigger 22 and the plate 33 brought about by the undercut edge shown at the left of the plate.

The spring 35 can be made as powerful as desirable so that there is no limit other than practical to the velocity with which the arm 1 moves upwardly to open the contacts. Due to this snap action break effect, the formation of a prolonged arc is precluded, even though the contacts are carrying considerable amperage. In order to facilitate the proper setting of the reset trigger 22 with respect to the dial so as to bring about the reset operation with great time accuracy, a vertical white line 36 is drawn transversely of the black ebonite arm 1 to indicate the position that the reset trigger assumes when the reset operation is initiated.

While various forms of prime movers, spring devices or clock mechanisms may occur to those skilled in the art, I prefer to employ a single phase induction motor of the shaded pole type energized from a single phase alternating current source. Such a motor is illustrated on the drawings. In the event that the contacts 7 are intended to interrupt alternating current, it is convenient to energize the motor from the same source. For this purpose, the intermediate terminal 14 (Figure 2) is provided and wires 38 are taken from this terminal and the live righthand terminal 11 to the motor. These terminals 11 and 14 are connected directly to the single phase alternating current mains 39. The laminations which comprise the poles of the motor are indicated at 37, and these poles have portions which carry shading coils 40.

Between these poles, a rotor of the squirrel cage type rotates when the pole windings 41 are energized. For convenience in making connection to the windings 41, a terminal plate 42 of insulating material is provided, which carries screw terminals 43 connected to the intermediate terminal 14 and righthand terminal 11 by conductors 38. Connections are, in turn, taken from the screw terminals 43 to the field windings 41 of the motor. This rotor is connected through a gear box 45 to a pinion 46, as shown more clearly in Figure 4. This pinion meshes with a gear 47 which carries a pinion 48 and the latter, in turn, drives a large main gear 49. The gear 49 is carried on a shaft 50, but is not keyed thereto and instead is secured to the shaft by a spring device described presently. The gear has a countersunk portion, into which fits a washer 51. The shaft 50 has securely attached thereto a pinion 52 which abuts the washer 51. The lefthand end of the shaft, as shown in Figure 5, is provided with a nut 53 firmly

secured to the shaft; and between the nut and the gear 49, there is positioned a spring washer 54 held under compression by the nut 53.

It is apparent that, if force can be applied to cause the shaft 50 to move slightly to the right (as shown in Figure 5), the spring washer 54 will force the gear 49 against the lefthand face of the pinion 52, causing the gear 49 to drive the shaft 50. On the other hand, it is apparent that, since the gear is attached to the shaft 50 only through the frictional effect exerted by the washer 54, the shaft can be turned without rotating the gear if sufficient rotational effect can be exercised. The manner in which the force tends to move the shaft along its axis in order to frictionally tighten the gear 49 on the shaft, and the force which is capable of turning the pinion without rotating the gear 49 will be pointed out when the remainder of the gear mechanism has been described.

There is a long multi-shouldered sleeve 55 which extends through an opening in the front panel 5 and is loosely secured to the shaft 50. The righthand end of this sleeve (as shown in Figure 5) is provided with screw threads for receiving the threaded opening of a nut 56 knurled on its periphery. There is a multi-shouldered sleeve 57 surrounding that portion of the sleeve 55 which is of the smallest diameter and which, in turn, carries on its shoulders the time dial 20a, the circuit closing trigger 21 and the reset trigger 22. If the nut 56 is not tightened, these triggers and the dial are free to rotate on the shoulders of the sleeve 57, but are prevented from moving off the shoulders by an offset end (not shown) formed at the extreme lefthand end of the sleeve.

The portion of the triggers 21, 22 which is right next to the shaft 50 is constituted similar to a flat washer so that the triggers and the dial can be tightened on the sleeve 57 by an axial force acting on the trigger 21 in a direction toward the nut 56. In other words, the nut can draw up the two triggers and the dial toward its under-surface. For this purpose, there is provided a spacing cylinder 58 which contacts with one of the shoulders on the sleeve 55 and also with the flat washer-like surface of the trigger 21.

It is, therefore, apparent, as the nut 56 is tightened, it draws up on the sleeve 55 which exercises a compressional force against the spacing cylinder 58 which, in turn, forces the two triggers and the dial against the righthand shoulder of the sleeve 57. The sleeve 57 is preferably spaced away from the nut 56 by a washer 59 which permits the nut to be turned readily. As the nut 56 is loosened, the dial and the two triggers are free to rotate on the sleeve 57 independently of one another.

The shaft 50 is carried through the entire length of the sleeve 55 and terminates in a screw-threaded end 60 carrying a knurled nut 61. It is apparent that, as this nut is rotated in the proper direction, the shaft 50 is likewise rotated, causing the pinion 52 to be rotated against the frictional effect exerted by the nut 53 and the spring washer 54, and without turning the large gear 49. This pinion 52 meshes with a large gear 62 (Figure 10) carried on a shaft 63 secured to the front panel and the shaft carries a pinion 64. The latter drives a gear 65 which is firmly secured to the lefthand shoulder of the sleeve 55. Assuming that the nut 56 has been tightened on the sleeve 55 so that the triggers 21, 22 and the dial 20a are likewise tightened, any rotation of the knurled nut 61 will turn the pinion 52 and through the gears 62, 64 and 65 will rotate the sleeve 55, caus-

ing the dial and the two triggers firmly secured thereto to be rotated.

It is clear from this description that the knurled nut 56 serves simply to unloosen or tighten the dial and the triggers with respect to one another and with respect to the sleeve 55, whereas the knurled nut 61 serves to rotate the sleeve, triggers and dial as a unit. The teeth ratios of the gear train 52, 62, 64 and 65 are such that the dial moves considerably slower than the rotation of the nut 61, thereby providing micrometer adjustment.

For setting the switch, it is necessary simply to unloosen the nut 56 and rotate the triggers 21, 22 about the dial to any hour or quarter hour index, at which it is desired to have the switch open or close or vice versa. The nut 56 is then tightened. The dial is set to the proper time by turning the knurled nut 61 in the clockwise direction, which operation moves the dial very slowly around until the proper figure on the dial appears opposite the white line 36 on the upper arm 1. To facilitate this operation, the indications on the dial are divided into two groups, one of which is labeled A. M. from 1 to 12, and the other is labeled P. M. with similar indexes.

As explained hereinbefore, as the dial is rotated by the rotor, the contact-closing trigger and the reset trigger are carried around until they respectively strike the lever 23 to close the contacts or bear against the plate 33 to eventually open the contacts. The clock mechanism is kept in phase with mean solar time by the synchronizing effect of the oscillations passing from the A. C. mains into the motor.

For practical reasons, I prefer to install the improved switch in a box 66, preferably made of metal, and including a cover 67. Three sides of the box are provided with lugs on which the switch rests. A screw 68 firmly secures the switch to one of the lugs. In order to assure a firm seating of the switch, lugs 69 corresponding to those in the box may be provided on the under-side of the front panel, of which one is shown in Figure 4. The various leads taken from the terminals 11, 14 may be carried through openings in the box to the A. C. mains and to the load, as indicated in Figure 2.

From the foregoing, it is apparent that I have disclosed an automatic time switch which is capable of making and breaking circuits with extreme rapidity and yet is capable of carrying considerable currents without drawing an excessive arc. A switch of this character may be designed to carry large current overloads, since the temperature at the contact points is fairly low. As an example of its capability in this respect, a switch which had been designed on the basis of carrying 30 amperes, 110 volts A. C., actually successfully closed and opened a circuit for a considerable length of time, carrying not less than 70 amperes.

Between the contact-closing and contact-opening operations, there is a longitudinal movement provided between the two arms and automatically produced so as to clean the contact surfaces and obliterate the effects of pitting. The switch can be designed very simply, since it consists, except for the electrical clock mechanism, of only the two contact-carrying arms, three springs, a latch, a closing lever 23 and a resetting plate 33.

While I have described my improved switch on the basis of providing the two contact members with flat surfaces, it may be desirable on occasion to give one of the contact members a

convex form, leaving the opposite contact member in flat form. This modification is illustrated in Figure 11, in which the contact 70 secured to the upper arm has a partially spherical form. When the arms are moved longitudinally relative to one another, as explained hereinbefore, the upper contact 70 tends to form a groove in the lower contact 7, and both contacts are in this manner kept free from oxide and severe pitting effects.

It will be understood that I desire to comprehend within my invention such modifications as come within the scope of the claims and the invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A switch comprising a pair of rigid parallelly disposed arms, said arms being pivotally mounted at one end on separate pivots secured to the switch and carrying at the opposite ends contacts for making and breaking circuits, means for maintaining the arms in a closed contact position, means for rotating both arms in the same direction about their pivots to a reset position, whereby the arms are moved longitudinally with respect to one another and a wiping action takes place at the contact surfaces, and means for moving the arms relatively to one another to open the contacts.

2. An automatic time switch comprising a pair of parallelly disposed rigid parallelly disposed arms, said arms being pivotally mounted on separate axes at one end on the switch and carrying at the opposite ends contacts for making and breaking circuits, means for maintaining the arms in a closed contact position, time-operated means for rotating said arms as a unit and in parallel relation to a reset position, whereby the arms are moved longitudinally with respect to one another and a wiping action takes place at the contact surfaces, and spring-operated means for moving the arms relatively to one another to open the contacts.

3. A switch comprising a pair of rigid parallelly disposed arms, said arms being oscillatably mounted on separate axes at one end on the switch and carrying at the opposite ends contacts for making and breaking circuits, means for rotating the arms into an open contact position, means for moving the arms into a closed contact position, and means for rotating said arms to a reset position while the contacts are closed, ready to be moved into the open contact position by said first-mentioned means.

4. An automatic time switch comprising a pair of rigid parallelly disposed arms, said arms being oscillatably mounted on separate axes at one end on the switch and carrying at the opposite ends contacts for making and breaking circuits, spring-operated means for maintaining the arms in an open contact position, time-operated means for moving the arms into a closed contact position, and time-operated means for moving said arms to a reset position while the contacts are closed, ready to be moved into open contact position by said first-mentioned means.

5. An automatic time switch comprising a pair of parallelly disposed rigid coextensive arms, said arms being pivotally mounted on separate axes at one end on the switch and carrying at the opposite ends contacts for making and breaking circuits, spring-operated means for rotating the arms into an open contact position, time-operated means for rotating the arms into a

closed contact position, and time-operated means for resetting the arms ready to be moved into the open contact position by said first-mentioned means, said resetting means serving to rotate the arms together as a unit in closed contact position and in parallel relation, whereby the arms move longitudinally with respect to one another and a wiping action takes place at the contact surfaces.

6. An automatic time switch including a pair of coextensive arms A, B, said arms being pivotally secured at one end to the switch and carrying at the opposite ends contacts for making and breaking circuits, spring-operated means for moving arm B toward arm A for closing the contacts, time-operated means for moving arms A, B as a unit on both pivots to a second position, means for locking the arm B in the second position, spring-operated means for returning arm A to its initial position, and time-operated means for releasing said locking means, whereby arm B is permitted to be moved by its spring-operated means to its contact-closing position.

7. An automatic time switch including a pair of coextensive arms A, B, said arms being pivotally secured at one end to the switch and carrying at the opposite ends contacts for making and breaking circuits, spring-operated means for moving arm B toward arm A for closing the contacts, time-operated means for moving arms A, B as a unit on both pivots to a second position, means for locking the arm B in the second position, spring-operated means for returning arm A to its initial position, and time-operated means for releasing said locking means, whereby arm B is permitted to be moved by its spring-operated means to its contact-closing position, both of said time-operated means comprising a lever secured to a clock-operated dial.

8. An automatic time switch including a pair of coextensive arms A, B, said arms being pivotally mounted at one end on the switch and carrying at their opposite ends contacts for making and breaking circuits, spring-operated means for moving arm A away from arm B to open the contacts, spring-operated means for moving arm B toward arm A to close the contacts, time-operated means for moving arms A, B as a unit about both pivots to a second position against the force of both of said spring-operated means whereby the arms are caused to move longitudinally with respect to one another and provide a wiping effect between the contact surfaces, means for locking the arm B in its second position but permitting the arm A to return to its initial position, and time-operated means for releasing said locking means whereby arm B is permitted to be moved by its spring-operated means to its contact-closing position.

9. An automatic time switch including a pair of coextensive arms A, B, said arms being pivotally mounted at one end on the switch and carrying at their opposite ends contacts for making and breaking circuits, spring-operated means for moving arm A away from arm B to open the contacts, spring-operated means for moving arm B toward arm A to close the contacts, time-operated means for moving arms A, B as a unit about both pivots to a second position against the force of both of said spring-operated means whereby the arms are caused to move longitudinally with respect to one another and provide

a wiping effect between the contact surfaces, means for locking the arm B in its second position but permitting the arm A to return to its initial position, and time-operated means for releasing said locking means whereby arm B is permitted to be moved by its spring-operated means to its contact-closing position, both of said time-operated means being connected to a single dial rotated by a clock mechanism.

10. In an automatic time switch comprising a pair of rigid parallelly disposed arms, said arms being rotatably mounted on separate axes at one end on the switch and carrying on the opposite ends contacts for making and breaking circuits, means constituting solely a spring for mounting the arms in an open contact position, time-operated means for moving the arms into closed contact position, and time-operated means for moving said arms to a reset position while the contacts are closed, ready to be moved into open contact position by said first-mentioned means.

11. In an automatic time switch comprising a pair of parallelly disposed rigid coextensive arms, said arms being rotatably mounted on separate axes on one end of switch and carrying on the opposite ends contacts for making and breaking circuits, means constituting solely a spring for rotating the arms into an open contact position, time-operated means for rotating the arms into a closed contact position, and time-operated means for resetting the arms ready to be moved into the open contact position by said first-mentioned means, said resetting means serving to rotate the arms together as a unit in closed contact position and in parallel relation whereby the arms move longitudinally with respect to one another and a wiping action takes place at the contact surfaces.

12. A switch comprising a pair of parallelly disposed rigid coextensive arms A, B, said arms being rotatably mounted on separate pivots at one end on the switch and carrying at the opposite ends contacts for making and breaking circuits, means including a spring secured to arm A for rotating the arms relative to one another into open circuit position, means for rotating both arms as a unit and in parallel relation about their pivots to a reset position whereby the arms are moved longitudinally with respect to one another, and means including a spring secured to arm B for rotating the arms relative to one another into closed circuit position.

13. A switch comprising a pair of parallelly disposed rigid coextensive arms A, B, said arms being rotatably mounted at one end on the switch and carrying at the opposite ends contacts for making and breaking circuits, said contacts having respectively spherical and flat surfaces which abut one another when the contacts close, means including a spring secured to arm A for rotating the arms relative to one another into open circuit position, means for rotating both arms as a unit and in parallel relation about their pivots to a reset position whereby the arms are moved longitudinally with respect to one another, and the spherical contact surface forms a groove in the flat contact surface by a wiping action, and means including a spring secured to arm B for rotating the arms relative to one another into closed circuit position.

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