Nov. 14, 1961 A. C. LAWSON ET AL 3,009,028

TIME SWITCH OMIT MECHANISM

Filed Aug. 15, 1958 4 Sheets-Sheet 1

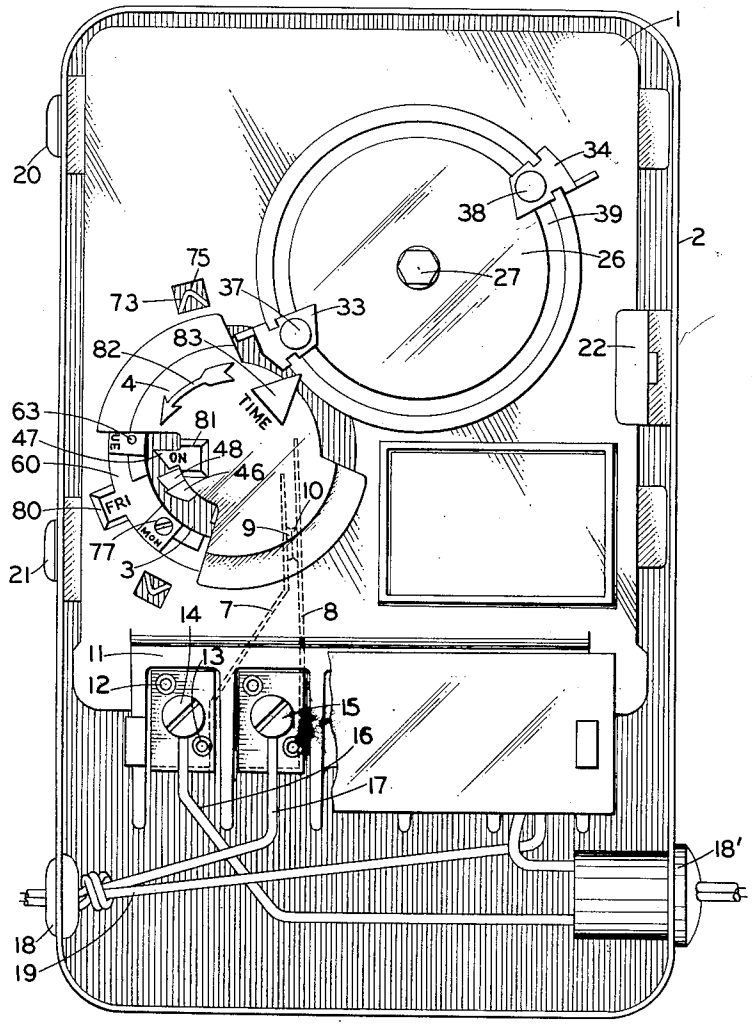

Fig. 1

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TIME SWITCH OMIT MECHANISM

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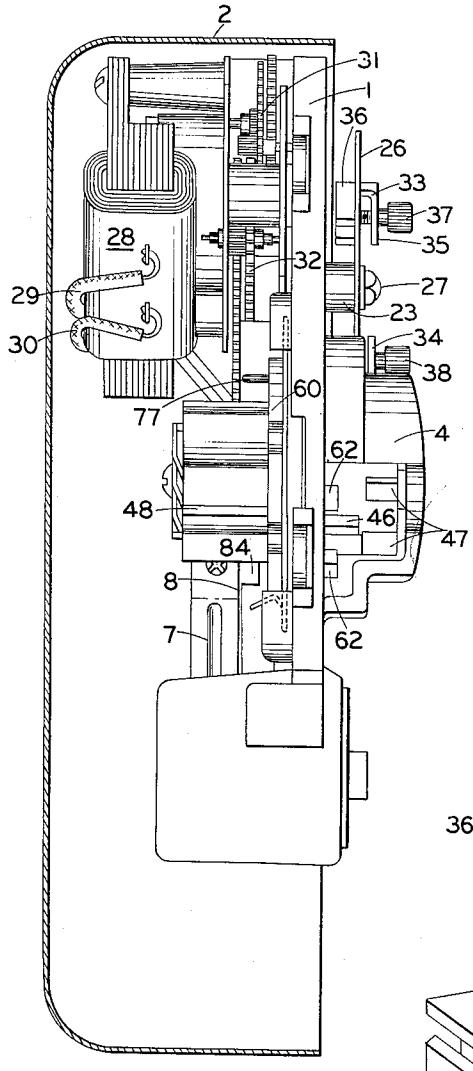

Fig. 2

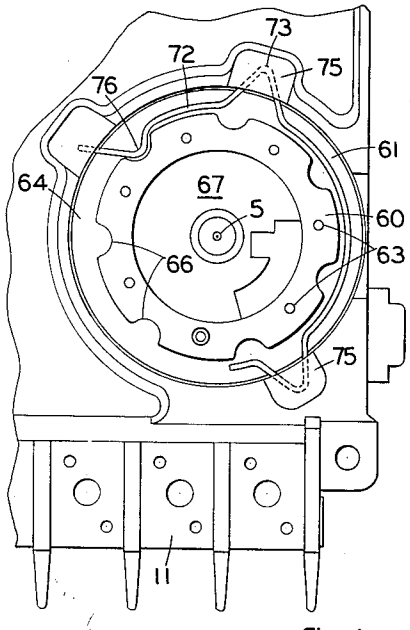

Fig. 4

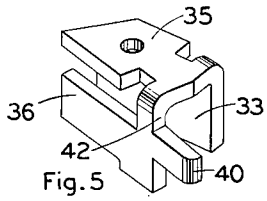

Fig. 5

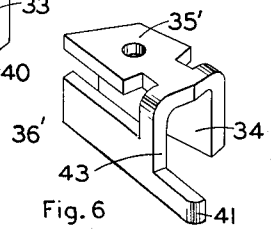

Fig. 6

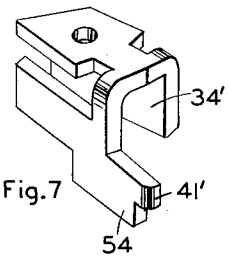

Fig. 7

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TIME SWITCH OMIT MECHANISM

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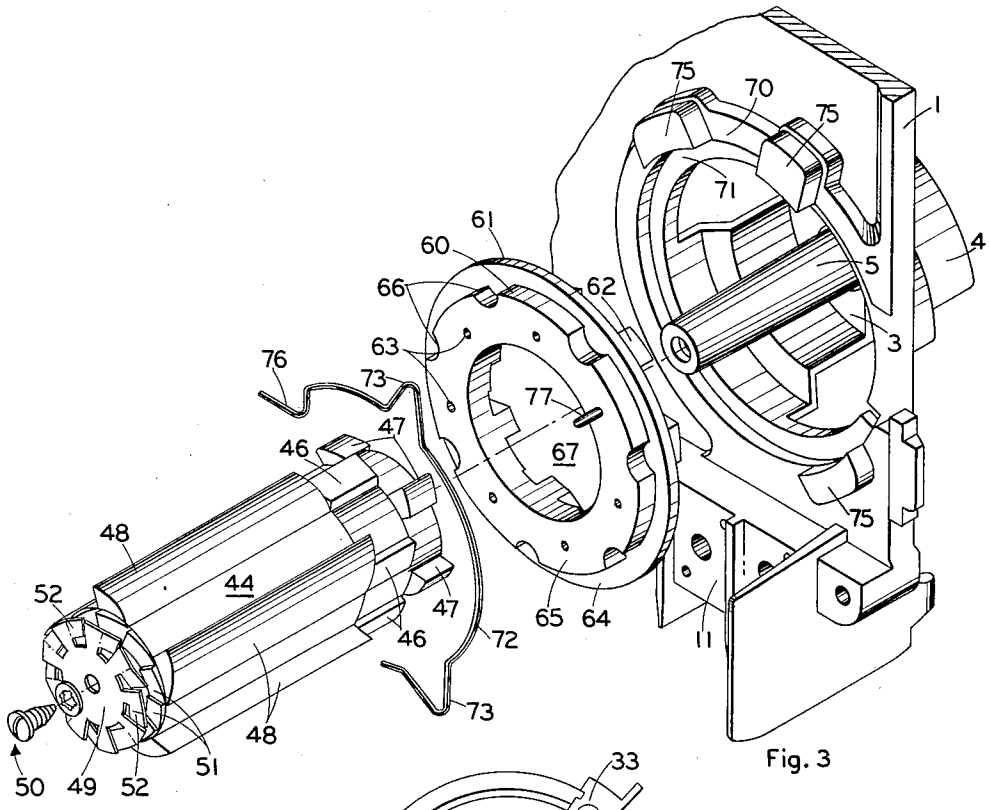

Fig. 3

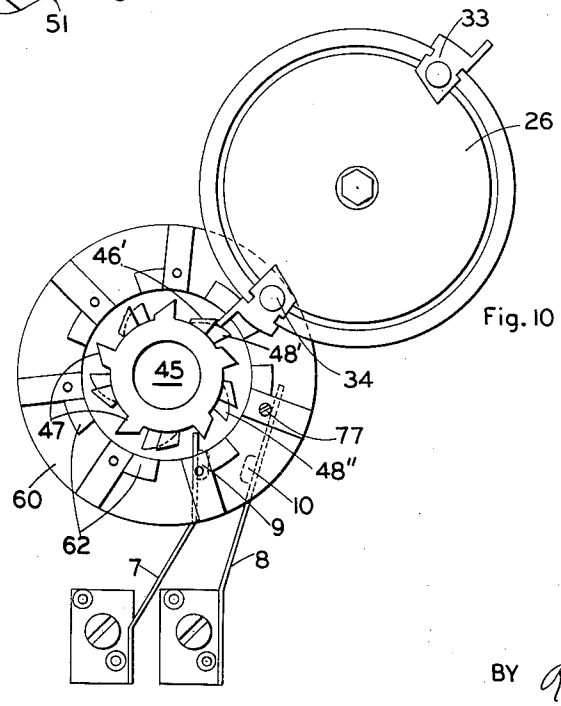

Fig. 10

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TIME SWITCH OMIT MECHANISM

Filed Aug. 15, 1958 4 Sheets-Sheet 4

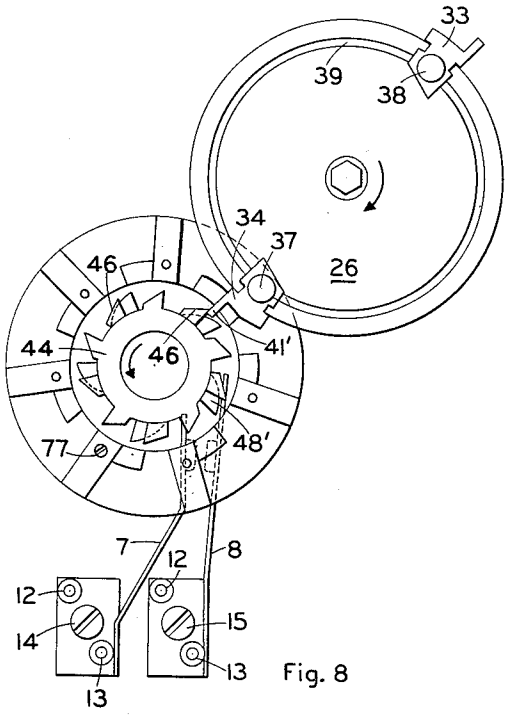

Fig. 8

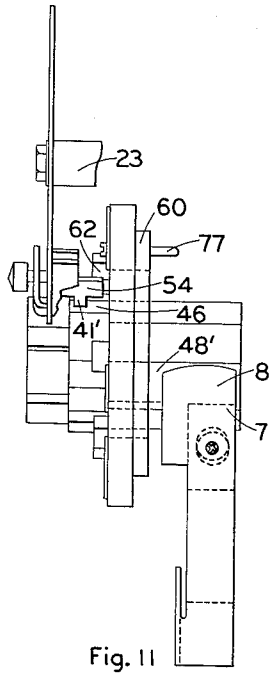

Fig. 11

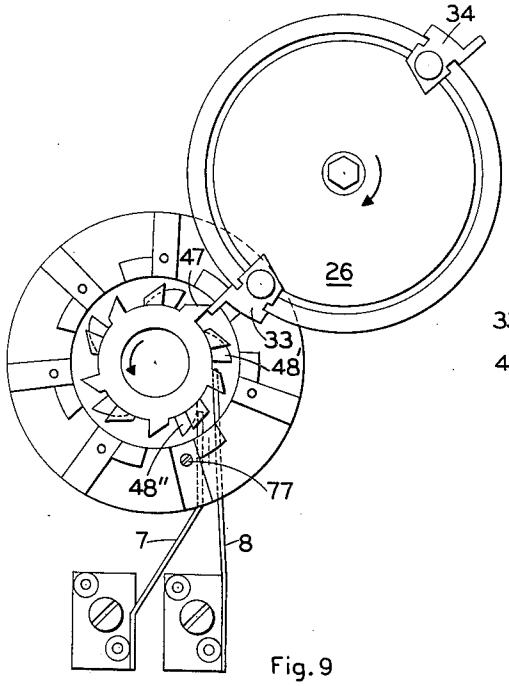

Fig. 9

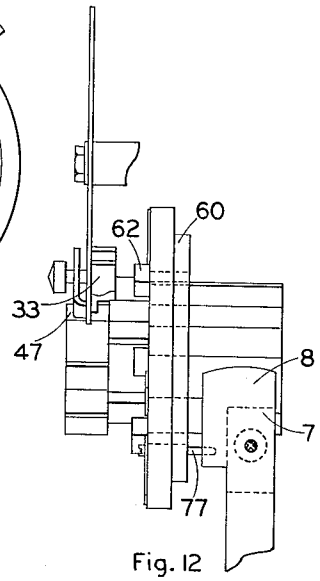

Fig. 12

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United States Patent Office 3,009,028
Patented Nov. 14, 1961

3,009,028

TIME SWITCH OMIT MECHANISM

Alfred C. Lawson, Peabody, and Ralph M. Manning, Winchester, Mass., assignors to General Electric Company, a corporation of New York

Filed Aug. 15, 1958, Ser. No. 755,265
11 Claims. (Cl. 200—38)

The present invention relates generally to time switches and more particularly to improvements in time switches that enable automatic and regular control of electric circuits on a schedule related to the time of day.

Such times switches generally comprise one or more sets of switch elements operable to open and close switching positions for control purposes by an operator mechanism actuated in accordance with a predetermined schedule through a plurality of actuator elements. The switching schedule is obtained by adjustably mounting the actuator elements at preselected position intervals on a calibrated rotatable dial. Timed operation is obtained by an electric drive such as a constant speed motor and associated reduction gearing designed to rotate the calibrated dial one complete revolution every twenty-four hours or similar period. Repetition of the schedule of switch operations is obtained through continuous energization of the electric drive.

Time switches of this type have found wide utility in industrial and other applications where it is desired to repeat a single or a set of switch operations each day. For various reasons, however, it may be desirable to have the schedule of switching operations omitted on one or more days. In such circumstances, it is common to provide the time switch with a suitable mechanism commonly referred to as an omit or omitting device. Like the actuator elements of the time switch, it is customary that the omitting device be designed so as to permit adjustable selection of the days or intervals during which switch operation is omitted.

While the actuator mechanism is continuously operating, the omit device is operated in an indexing manner; that is, the omit device is advanced periodically one step at a time in a sequence of steps toward a position in which an omit operation will be performed. After the omit operation, further indexing enables resumption of the scheduled switching cycle.

It has been customary to utilize the actuator elements to both index the omit device and to actuate the operator mechanism for switching purposes. However, prior art time switches have at the same time required a substantial recovery time, i.e., a time interval between the last switching operation and the succeeding omit operation which may amount to several hours in a time switch having a twenty-four hour operating interval. During the recovery time no useful switching operations can be performed imposing a substantial limitation on utilization of the time switch on a completely automatic basis.

A further characteristic of prior art time switches which inherently require a large recovery time reside in the generally complicated nature of the omitting device mechanism. These omitting device mechanisms when actuated by the actuator elements are generally designed to prevent or obstruct operation of the switch operating mechanism. In addition, the combination of the prior art type omitting device and complicated switch operator mechanism involving a large number of parts result in a complex mechanism.

It is therefore an object to provide an improved time switch having a new and improved omit device which is simplified in construction and operation.

It is a further object of this invention to provide a time switch having an improved arrangement of an adjustable omit device and other operating elements to obtain simplified operation.

It is a still further object of this invention to provide an improved time switch in which the recovery time after omit operation is substantially reduced.

It is an additional object of this invention to provide an improved time switch wherein the actuator elements can effectuate the actuation of both the switch mechanism and the omit device with a minimum of recovery time.

Briefly stated, this invention provides for a time switch in which relatively movable switch elements are moved by a switch operator to perform a plurality of switching operations in accordance with a predetermined schedule as established by a plurality of actuator elements carried in spaced sequence by a time operated calibrated rotatable dial member. Omission of the switching schedule is provided by an indexable omit device adapted to directly act upon the switch elements to restrict their relative movements.

More specifically, this invention provides a time switch in which a switch means comprising a plurality of pairs of resilient deflectable contact switch blades are operated by a rotatable switch operator. An omit device in the form of a rotatable annulus or wheel is arranged concentrically with the switch operator and in indexed periodically by one or more of switch actuators carried by a rotatable time operated calibrated dial. An actuator element which indexes the omit device also actuates the switch operator. Omit control means, such as pin members, are carried by the omit wheel at locations corresponding to the number of days or a scheduling program and are adapted to engage and deflect one of the pairs of switch blades and prevent their relative movement and so omit switching by the switch operator until the omit wheel is indexed to a non-omit position.

Thus, by making the omit device directly operable upon the switch blades rather than the switch operating mechanism, a simplified time switch is realized. The concentric arrangement of switch operator and omit device makes possible a substantial reduction in recovery time, thereby providing a time switching having expanded useful switching schedules.

The features of this invention which are believed to be novel are set forth with particularity in the appended claims. The invention itself may be better understood as to organization and construction as well as to further objects and advantages by reference to the following description taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a front elevation of a time switch assembly with the cover removed from the enclosing case;

FIGURE 2 is a side elevation of the time switch assembly of FIGURE 1 with the enclosing case in section and the cover removed;

FIGURE 3 is an expanded isometric view of a fragmentary showing of the omit device and associated parts;

FIGURE 4 is a fragmentary rear elevation of the portion of the time switch assembly of FIGURE 1 showing the omitting device in assembled position with certain operating elements eliminated for clarity;

FIGURES 5, 6, and 7 are isometric views of actuator elements of the type used in the time switch assembly of FIGURE 1;

FIGURES 8, 9, and 10 are a series of views of the switching mechanism in various positions assumed during omit operation useful in explaining the operation thereof; and

FIGURES 11 and 12 are side views of FIGURES 8 and 9, respectively, illustrating relative positions of the operating elements.

Like reference characters are utilized throughout the drawings to indicate like parts.

This invention is disclosed in relation to a time switch of the type disclosed in a copending application of William J. Schultz and Carl F. Van Bennekom having a filing date of November 18, 1957, Serial No. 697,206, now U.S. Patent 2,900,463, and assigned to the same assignee as the present application.

Referring to the drawings, there will be seen, particularly in FIGURES 1, 2, and 3, a time switch assembly incorporating the features of this invention which in a preferred embodiment comprises a support plate **1** mounted in enclosing case **2** having an enlarged opening **3** permitting through access to the front and rear sides of the plate. Spanning the opening **3** on the front side of plate **1** is a bridge member **4** preferably integral with the plate. Extending rearwardly through opening **3** and substantially centrally disposed therewithin is stationary shaft support **5**, best shown in FIGURE 3, which in cantilever fashion has one end fixed to bridge member **4** while the opposite end freely extends beyond the rear side of plate member **1**.

Mounted on support plate **1** and extending along the rear surface thereof is a switch **6** in the form of a pair of parallel deflectable resilient contact blade members **7** and **8**, having suitable contacts **9** and **10** thereon. While any satisfactory technique or arrangement for fastening blades **7** and **8** to support plate **1** may be used, it is preferred that plate **1** be provided with an integral terminal board **11** on the bottom edge thereof and that this support be shaped to provide recesses in which blades **7** and **8** are individually anchored at corresponding ends. See FIGURES 1, 3 and 4. In accordance with the preferred practice, blades **7** and **8** are fabricated from suitable resilient material to have integral flanged portions on their ends designed to wrap around the end of and engage opposite sides of the terminal board. Anchoring of the blades **7** and **8** is obtained through the use of eyelet rivets **12** and **13** which transfix the flanged portions of the blade members in place in a manner more fully described in the copending application of Warren N. Kernander and Carl F. Van Bennekom, filed July 19, 1956, having Serial No. 598,951, now U.S. Patent 2,944,-131, and assigned to the same assignee as the present application. Terminal screws **14** and **15** are provided for attaching electrical conductors **16** and **17** to blades **7** and **8** thereby enabling connection of the switch into the electric circuit (not shown) to be controlled. Case **2** may be provided with a suitable insulating bushing **18** and **18'** inserted in an opening in case **2** to enable passage of conductors **17** and **19** through the casing into the area of the terminal board **11**. Plate member **1** may be also provided with hinge abutments **20** and **21** along an edge thereof which are removably fitted to form a hinge connection with the side of case **2**. On the opposite side of case **2** a latch member **22** is attached thereto to engage the edge of support plate **1** proximate to that edge of case **2** as best illustrated in FIGURE 1.

Substantially parallel with stationary support member **5** is rotatable shaft **23** mounted within appropriate bearing means (not shown) in support plate **1** (see in particular FIGURE 2). On the front side of support plate **1** a calibrated dial **26** is attached by suitable fastening means **27** to one end of rotatable shaft **23** so as to be rotatable therewith. Timed operation of the calibrated dial **26** is obtained through the provision of a constant speed electric drive including a synchronous electric motor **28** having conductor leads **29** and **30** for connection to a power supply (not shown) and reduction gearing **31** including a driven gear **32** fixedly attached to the opposite end of rotatable shaft **23**. Attached to the calibrated dial **26** in selectable positions on the front face thereof are actuator elements **33** and **34** generally shaped to extend radially beyond the end of dial **26** so as to enter into the region defined by the concavity of bridge member **4**. In addition, actuator elements **33** and **34** are designed to have their radial extensions displaced axially in planes parallel to each other. In accordance

with well-known switch operations, actuator element **33** may be designated an "ON" actuator while actuator **34** may be designated an "OFF" actuator. The time of day when such operations occur is determinable by the selective setting of actuator elements **33** and **34** at calibrated positions on the face of dial **26**. For adjustable attachment of the slotted actuator elements **33** and **34** to dial **26**, upper ears **35** and **35'** and lower ears **36** and **36'** (see FIGURES 6 and 7) are designed to span the dial **26** with set screws **37** and **38**, gripping the dial. In a preferred manner, dial **26** may be provided with a groove **39** in the face thereof for receiving the end of set screws **37** and **38**, thereby enhancing the gripping action to more firmly fix the actuators in their set positions.

Direct operative connection between actuator elements **33** and **34** and switch blades **7** and **8** is obtained through a unitary switch operator **44** which is best illustrated in FIGURES 3 and 10 and which in its preferred embodiment is cylindrical in shape and has an axial opening **45** therethrough for rotatably mounting on stationary shaft support **5**. The outer peripheral surface of operator **44** is provided with sets of longitudinally disposed actuator cams **46** and **47** and operator cams **48**. For periodically and sequentially being engaged by actuator elements **33** and **34** as they are carried by rotatable dial **26**, actuator cams **46** and **47** are arranged in parallel planes transverse to the axis of the operator **44** and the individual actuator cams **46** and **47** of the respective actuator cam sets are angularly offset from each other. Longitudinally displaced from actuator cams **46** and **47** are operator cams **48** formed on the outer peripheral surface of operator **44** and circumferentially spaced and contoured and positioned so as to effectuate relative deflections of switch blades **7** and **8** to obtain snap action switching in a manner to be described.

In its operative position, switch operator **44** is rotatably mounted on stationary shaft support **5** so as to be within opening **3** of support plate **1**. Actuator cams **46** and **47** are thereby within the concavity afforded by bridge member **4** and are consequently positioned in line with actuator elements **33** and **34** to be periodically engaged thereby. Operator cams **48** extend longitudinally along operator **44** such that operative engagement is made with switch blades **7** and **8**. Maintaining switch operator **44** in operative position on shaft support **5** is a retaining means formed of a resilient retaining member **49** attached to the free end of stationary shaft support **5** by fastening means such as screw **50** removably turned into a threaded opening in the end of shaft support **5**. Resilient retaining member **49** bears against the end of operator **44** in the annular region between opening **45** and the base of operator cams **44**. Resistance to counter-rotation caused by counter-rotary torque applied to operator **44** through the bias force exerted by switch blades **7** and **8** is thereby achieved. Further increase of this resistance to counter-rotation is obtained by forming a plurality of circumferentially disposed recesses **51** in the end of operator **44** and providing mating protrusions **52** on the end of resilient member **49**.

The omit wheel or annulus **60**, as best shown in FIGURES 3 and 4, comprises a ring-shaped portion **61** with seven projecting cams **62** equally spaced circumferentially about the inner edge thereof and a like number of threaded openings or switch control positions **63** passing through the omit wheel. The side of omit wheel **60** opposite projecting cam **62** preferably comprises a shoulder **64** and a central raised portion **65** having seven arcuate recesses **66** equally spaced circumferentially about the edge adjacent the shoulder **64**. The circular opening **67** is adapted to concentrically surround and be spaced from the switch operator **44** and, therefore, is larger in diameter than the switch operator. In a preferred embodiment, the omit wheel **60**, including the projecting cam

62 and central raised portion 65, is of a unitary construction and may be molded of a suitable plastic.

As best shown by FIGURES 2, 3, and 4, the omit wheel 60 is concentrically positioned around the stationary support member 5 such that the projecting cams 62 extend through the enlarged opening 3 in support plate 1 into the region defined by bridge member 4. Lateral displacement of the omit wheel 60 is prevented by the ridge 70 formed as part of support plate 1 and surrounding the shoulder 71, against which the ring-shaped portion 61 of omit wheel 60 is slidably engaged. Axial displacement of the omit wheel 60 is prevented by a detent mechanism comprising a resilient snap ring 72, which may be formed of spring wire having portions which overlie shoulder 64 of omit wheel 60 and projections 73 to engage openings in circumferentially spaced housing 75 surrounding ridge 70 and formed as a part of support plate 1. The snap ring 72 has a detent 76 which is arcuately shaped to engage the arcuate recesses 66. Omit wheel 60 is thus rotatably secured to support plate 1, with projecting cams 62 extending into the bridge member 4 and positioned such as to be indexed by certain actuator elements associated with calibrated dial 26.

Referring again to FIGURE 1, the projecting cam side of omit wheel 60 is shown positioned in enlarged opening 3 on one side of the bridge member 4. The threaded openings 63 are adapted to receive the switch control means or threaded omit pins 77, which may be screwed in from the front panel side of support plate 1 and which extend through the omit wheel 60 into the region of the deflectable resilient blade members 7 and 8. Each threaded opening 63 may conveniently be identified with a day of the week. The omit screw or pin 77 shown is set to provide omit operation on "MON" or Monday.

An aperture 80 may conveniently be provided in support plate 1 to cooperate with circumferentially spaced markings on wheel 60 surrounding those markings identifying the threaded opening 63 so as to indicate the actua' day of the week. As shown in FIGURE 1, "FRI" is positioned in the viewing aperture 80, indicating that the day of the week is Friday. Also, to facilitate operating the time switch, a properly placed viewing aperture 81, labeled "ON" may be utilized in combination with the white painted ends of actuator cams 47 to indicate when the contacts 9 and 10 of the switch are in the "ON" position.

Similarly, for convenience and ease of operation, an arrow 82 is provided to indicate the direction of rotation of both the switch operator 44 and the omit wheel 60, and a pointer 83 is provided to cooperate with the calibrated dial 26 to indicate the hour of the day and to enable adjustment of the schedule of switching operations.

Prior to initial operation, "ON" and "OFF" actuator elements 33 and 34 are set at the desired positions on calibrated dial 26, and switch operator 44 is rotated manually to bring the proper actuator cam into position so as to be actuated by the actuator elements at the proper time. The omit wheel 60 is manually indexed to the correct day of the week. Upon energization of motor 28, such as by closing a manually operated switch (not shown) in the circuit of the motor leads 29 and 30, motor 28 begins rotating at a fixed rate of speed. The speed of the motor 28 is reduced by the selection of the individual gears in the train 31 to produce one complete revolution for every twenty-four hours of gear 32, and calibrated dial 26 is secured thereto. Calibrated dial 26 rotates on shaft 23 and carries actuator elements 33 and 34 in circular paths to sequentially bring them into the realm of bridge member 4 so as to engage the actuator cams 46 and 47.

Referring to FIGURES 5 and 6, it should be noted that actuator cams 33 and 34 differ in that the actuator tab 40 of "ON" actuator 33 is spaced a shorter distance from upper ear 35 than actuator 41 of "OFF" actuator 44 is spaced from upper ear 35'. Shank portion 42 of actuator 33 is shorter than shank portion 43 of actuator 34. Since both actuators 33 and 34 are supported by calibrated dial 26 and rotate in a plane transverse to the axis of rotation of switch operator 44, the actuator tab 41 will extend further into the enlarged opening 3 than actuator tab 40 when they are respectively rotated into the realm of opening 3.

As shown in FIGURES 2 and 3, the actuator cams 46 are axially displaced from the actuator cams 47 and are positioned such that actuator tab 40 when properly rotated will engage actuator cams 47 while actuator tab 41 will sequentially engage actuator cams 46. Through the shaping of the cams each engagement will rotate switch operator 44 a fraction of a complete turn. Since operator cams 48 are an integral part of the operator 44, the operator will be rotated equivalent angular amounts each time. As illustrated by FIGURES 2 and 8, the operator cams 48 extend beyond the side of support plate 1 remote from the actuator cams 46 and 47 into the region of switch blades 7 and 8 and when rotated will sequentially engage switch blades 7 and 8 so as to first drive them in a direction toward each other and "close" the contacts associated therewith on the "ON" operation and then away from each other on the subsequent "OFF" operation. The sequential closing and opening of the contacts associated with switch blades 7 and 8 is more fully described in the aforementioned application of Schultz and Van Bennekom.

It should be appreciated that although only one "ON" actuator element and one "OFF" actuator element is shown, a plurality of such actuator elements could be utilized to provide the desired sequential switching operation for each day. However, it is often desirable to omit the switching operations during one or more preselected days of the week. The operation of the omit wheel 60 containing one or more omit pins 77 will provide such an omission of switching operation as follows:

FIGURE 7 illustrates an "OFF" actuator 34' which is identical with "OFF" actuator 34 with the exception of an omit tab 54 positioned below and partially extending from actuator tab 41' which corresponds to actuator tab 41 of actuator 34. Referring to FIGURE 2, it should be noted that projecting cams 62 of omit wheel 60 do not extend as far into bridge member 4 as do the actuator cams 46. Actuator cams 46 and projecting cams 62 are positioned such that actuator tabs 41 and 41' will engage and rotate actuator cams 46 but will not engage projecting cams 62. However, omit tab 54 extends further into the enlarged opening 3 than do actuator tabs 41 and 41' and will engage and rotate projecting cams 62 and the omit wheel 60 a fraction of a complete turn. Since only a single "OFF" actuator cam provided with an omit tab 54 is utilized, there will be only a single actuation of the omit wheel each day of operation, and the omit wheel will turn one-seventh of a complete revolution upon each actuation.

As best shown by FIGURES 2 and 12, the omit pin 77 rotates in a plane substantially parallel to and beyond the rear of support plate 1, so as to contact and deflect the end portion 84 of blade 8 while passing freely past the blade 7.

FIGURES 8 through 12 are a series of views illustrating the operation of the blade members 7 and 8 with the omit action. As shown in FIGURES 8 and 11, the "OFF" actuator 34 has contacted the actuator cam 46 through rotation of the dial 26 in the direction shown by the arrow terminating a switching action which had been taking place. Rotation of dial 26 has driven the unitary switch operator 44 in the direction shown by the arrow, such that one of the operator cams 48' has passed out of contact with switch blade 7, allowing blade 7 to snap toward operator 44. Blade 8 has followed blade 7 for a short distance and then been stopped by the same operator cam 48' thus allowing blade 7 to move away from blade 8 to open the contacts therebetween. Since the

time switch illustrated utilizes only a single "ON" actuator 33 and a single "OFF" actuator 34, the "OFF" actuator 34 has both an actuator tab 41', which engages actuator cam 46 to rotate switch operator 44, and an omit tab 54, which contacts projecting cams 62 to cause rotation of the omit wheel 60. The resultant rotation of the omit wheel 60 is illustrated by FIGURE 9, wherein omit pin 77 has been rotated a total one-seventh of a revolution.

Referring to FIGURES 9 and 12, the calibrated dial 26 has been rotated a sufficient amount to bring the "ON" actuator 33 into engagement with the actuator cam 47 and cause rotation of switch operator 44 and operator cam 48' and 48" associated therewith in a direction as shown by the arrow. The rotation of the operator cam 48' drives it beyond switch blade 8 allowing blade 8 to snap back toward blade 7. Meanwhile blade 7 is driven by cam 48" toward blade 8 with the resultant closing of the switch contacts therebetween. Since the "ON" actuator 33 does not have an omit tab associated therewith, the omit wheel 60 and omit pin 77 remain in the position as shown until the omit wheel is actuated again by an "OFF" actuator having an omit tab 54 associated therewith.

Upon further rotation of calibrated dial 26, the "OFF" actuator 34 is again rotated into the region defined by the bridge member 4 so as to contact another of the actuator cams 46' and rotate the operator cam 48" that had been contacting switch blade 7 out of engagement with switch blade 7 and into engagement with switch blade 8. The snap action opening of blades 7 and 8 as described in regard to FIGURE 7 and the omit wheel 60 are rotated at the same time by engagement of omit tab 54 with projecting cam 62 another one-seventh of a revolution.

Because of the positioning and movement of omit cams 62 relative to omit tab 54 and actuator cams 46 and 47 relative to actuator tabs 40 and 41 the actuation of the omit wheel 60 occurs over a period both before and after the rotation of switch operator 44. This insures that a snap action of the switch blades 7 and 8 will open the contacts 9 and 10 therebetween before omit pin 77 is brought into the region to contact blade 8.

The rotation of omit wheel 60 drives omit pin 77 past switch blade 7 which, because of the relative positioning thereof, does not contact blade 7 and into contact with switch blade 8 so as to drive blade 8 even further away from blade 7 and maintain the contacts in an open position as shown in FIGURE 10. The switch blades 7 and 8 will remain separated by omit pin 77 during the day of omit operation until the "OFF" actuator 34 which has an omit tab 54 associated therewith makes a complete revolution on dial 26 and drives the omit pin 77 an additional one-seventh of a revolution and beyond engagement with blade 8. During the omit period, detent 76 of the resilient detent snap ring 72 engages one of the detent recesses 66 to prevent reverse rotation of omit wheel 60 by the resiliency of blade 8 against omit pin 77.

The switch will operate throughout the omit period such that the "ON" actuators 33 will drive cams 48 and blade 7 toward blade 8 but the contacts therebetween would not close because the omit pin 77 will keep blade 8 widely separated from blade 7 until a successive actuation of the omit wheel.

While the operation of the time switch was described and shown as having only a single day of omit operation, it should be appreciated that any number of days of the week could be omitted by merely securing additional omit screws 77 in the appropriate threaded openings 63. Also, the calibrated dial 26 may be driven by any desired gearing 31 so as to provide an operating schedule of any desired length of time which may be more or less than a day.

Therefore, while a particular embodiment of the subject invention has been shown and described herein, it is in the nature of description rather than limitation, and it will occur to those skilled in the art that various changes, modifications, and combinations may be made within the provisions of the appended claims and without departing either in spirit or scope from the invention in its broader aspects.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In a time switch, a pair of relatively movable switch blades, a rotatable switch operator operable to change the relative position of said blades to perform a series of predetermined switching operations through the movement of contacts associated with said blades, a rotatable omit device operable directly on said switch blades to modify the relative position thereof and prevent switching action of said contacts by said operator, said rotatable switch operator and said rotatable omit device being operable on said same pair of switch blades to change the relative position thereof, said omit device being shaped and positioned to modify the relative position of said pair of blades during periods of omit operation a sufficient amount such that rotation of said switch operator during such periods does not further change the relative position of said pair of blades sufficiently to cause the predetermined switching operations which would occur in the absence of said omit operation, and a timing device including a rotatable member and actuator means carried thereby for periodically actuating both said operator and said omit device in accordance with a predetermined sequence of switching and omitting operations.

2. In a time switch, a pair of relatively movable switch blade elements, a rotatable switch operator operable to change the relative position of said blade elements to perform a series of predetermined switching operations, an omit device including a rotatable member having a portion thereof adapted to engage one of said blades, said rotatable member being operable to modify the relative position of said elements so as to prevent switching by said operator, said rotatable switch operator and said omit device being operable on said same pair of switch blade elements to change the relative position thereof, said omit device being shaped and positioned to modify the relative position of said pair of switch blade elements during periods of omit operation a sufficient amount such that rotation of said switch operator during such periods does not further change the relative position of said pair of switch blade elements sufficiently to cause the predetermined switching operations which would occur in the absence of said omit operation, and a timing device for periodically actuating said operator and indexing said rotatable member in accordance with a predetermined schedule of switching and omitting operations.

3. In a time switch, a pair of relatively movable switch blades, a rotatable switch operator operable to change the relative position of said blades to perform a series of switching operations through the movement of contacts fastened to said blades, an omit device including a rotatable member and adjustably positioned control means carried thereby for directly engaging one of said blades, said rotatable member being operable to modify the relative position of said blades so as to prevent switching by said operator, and a timing device including a motor-driven continuously rotatable member and actuator means carried thereby for periodically actuating said operator and said rotatable member in accordance with a predetermined sequence of switching and omitting operations.

4. In a time switch, switch means, a rotatable operator for said switch means, a rotatable omit device, said operator and said omit device being concentrically mounted and independently operable to perform their respective operations, a time driven rotatable dial member and spaced actuating members carried thereby for periodically actuating said operator, at least one of said actuat-

ing members being arranged for simultaneously actuating said operator and indexing said omit device.

5. In a time switch, a pair of relatively deflectable switch blades, a rotatable switch operator for changing the relative position of said blades to perform a predetermined schedule of switching operations, an omit device including a rotatable omit wheel having a plurality of circumferentially disposed control positions thereon and pin means removably attachable thereto at said control positions, said omit wheel being rotatable so as to have said control positions sequentially occupy an omit location, said pin means being engageable with said switch blade means to restrict relative movement thereof when in said omit location, and a timing device including a continuously rotatable dial member and a plurality of spaced actuator members carried thereby for periodically actuating said operator and said omit wheel in accordance with a predetermined sequence of switching and omitting operations.

6. A time switch comprising a switch having deflectable contact blades, a rotatable operator including cam means for causing relative deflection of said blades to perform a series of switching operations, a timing device including a continuously rotatable dial member, spaced apart actuating members carried by said dial member for periodically actuating said operator, and an omitting device comprising a rotatable member having a plurality of spaced support positions, switch control means selectively mounted at certain of said positions, and position advancing means on said rotatable member for intermittently engaging at least one of said actuating members for sequentially advancing said control means toward a predetermined location for controlling the relative deflection of said contact blades whereby a switching operation is omitted.

7. A time switch comprising a switch having deflectable contact blades, a rotatable operator for causing relative deflection of said blades to perform switching operations, an omitting device comprising a rotatable member concentrically mounted relative to said rotatable operator and having spaced apart positions, blade control means removably mounted at certain of said positions, a timing device including a continuously rotatable dial member, adjustably positioned spaced apart actuating members carried by said dial member for periodically actuating said operator, at least one of said actuating members being adapted for simultaneously operating said operator and advancing said rotatable member so as to advance said control means toward a predetermined location for controlling the relative deflection of said blades whereby a switching operation is omitted.

8. A time switch comprising a switch having deflectable contact blades, a rotatable operator including means for causing relative deflection of said blades to perform a series of switching operations, a timing device including a continuously rotatable dial member, spaced apart actuating members carried by said dial member for periodically actuating said operator, and an omitting device comprising an annular rotatable member concentrically arranged about said operator and having a plurality of spaced support positions, said support positions adapted to have selectively mounted thereto switch control means at certain of said positions, and position advancing means on said rotatable member for intermittently engaging at least one of said actuating members for sequentially advancing said control means toward a predetermined location for controlling the relative deflection of said blades whereby a switching operation is omitted.

9. A time switch comprising a switch having deflectable contact blades, a rotatable operator including cam means for causing relative deflection of said blades to perform a series of switching operations, a timing device including a continuously rotatable dial member, spaced apart actuating members carried by said dial member for periodically actuating said operator, and an omitting device comprising an annular rotatable member concentrically arranged about said operator and having a plurality of spaced support positions, switch control means selectively mounted at certain of said positions, and position advancing means on said rotatable member for intermittently engaging at least one of said actuating members for sequentially advancing said control means toward a location to contact one of said blades for controlling the relative deflection of said blades away from the other of said blades whereby at least one switching operation is omitted, said switch control means comprising pins adapted to be secured to said rotatable member at said support positions.

10. A time switch comprising a switch having a pair of deflectable blades secured at corresponding ends and carrying contacts at the free ends thereof, a rotatable operator including cam means for causing relative deflection of said blades to perform a predetermined series of switching operations, a timing device including a continuously rotatable dial member, spaced apart actuating members carried by said dial member for periodically actuating said operator, and an omitting device comprising a rotatable annular member surrounding said operator and having a plurality of spaced support positions with switch control means selectively mounted at certain of said positions, position advancing means on said rotatable member for intermittently engaging at least one of said actuating members simultaneously with a predetermined switching operation for sequentially indexing said control means toward a predetermined location for controlling the relative deflection of said blades to omit a switching operation, a resilient snap ring having projections thereon, and spaced portions of said annular member adapted to cooperate with said projections to provide a detent mechanism herewith in order to facilitate the indexing of said annular member.

11. A time switch comprising a switch having a pair of deflectable contact blades, a rotatable operator including cam means for causing relative deflection of said blades to perform a predetermined series of switching operations, a timing device including a continuously rotatable dial member rotating once each day, spaced apart actuating members carried by said dial member for periodically actuating said operator, an omitting device comprising an annular rotatable member surrounding said operator and having a plurality of spaced support positions with switch control means selectively mounted at certain of said positions, position advancing means on said rotatable member operable simultaneously with one of said predetermined switching operations, said position advancing means engaging once each day one of said actuating members for sequentially indexing said control means toward a predetermined location to control the relative deflection of said blades and omit switching operations for a day, and said indexing being facilitated by a detent mechanism associated with said annular member and having seven equal angularly spaced positions for each revolution thereof.

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