Nov. 30, 1948. E. R. SCHOTT 2,454,887

TIME SWITCH

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Fig 1.

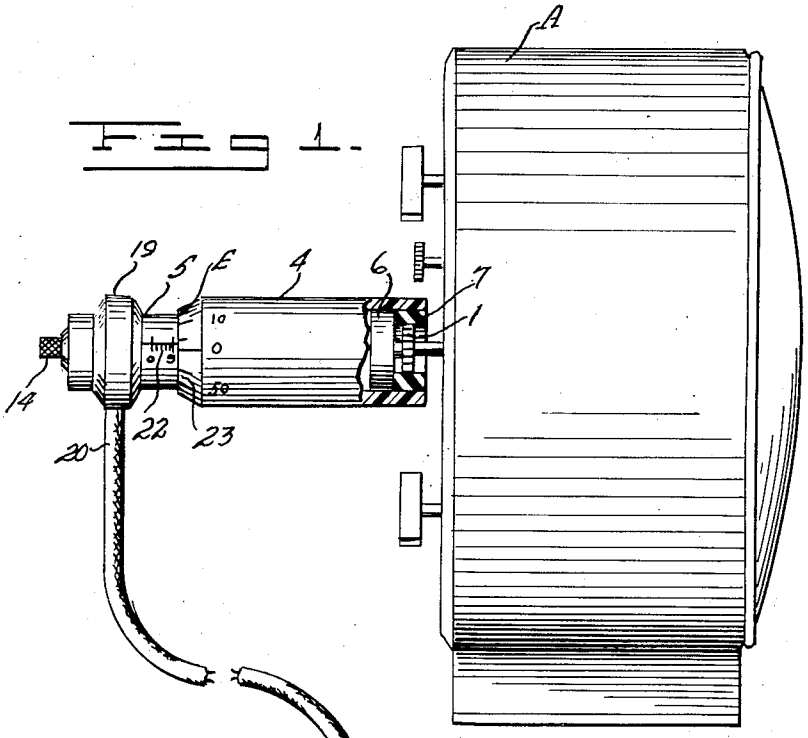
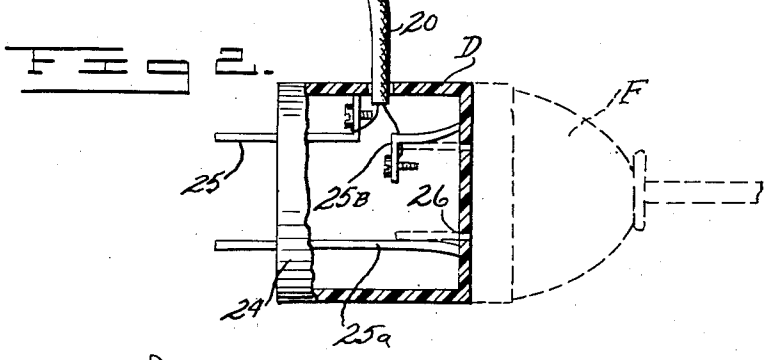


Fig 2.



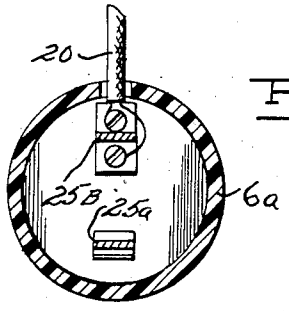


Fig 3.

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TIME SWITCH

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Fig 4.

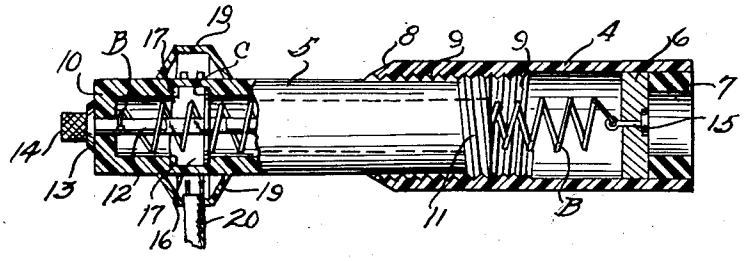


Fig 5.

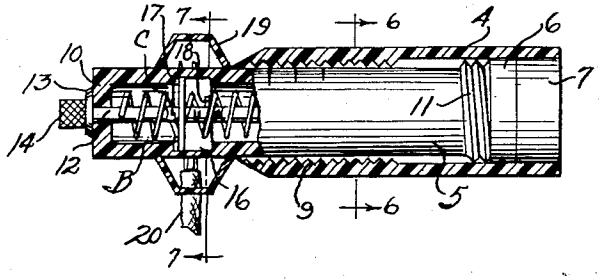


Fig 6.

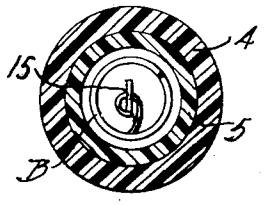
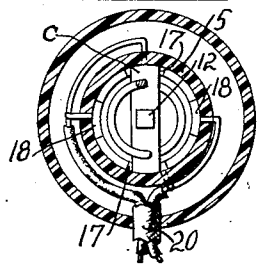


Fig 7.



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TIME SWITCH

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Application February 14, 1947, Serial No. 728,605

6 Claims. (Cl. 200—35)

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This invention relates to new and useful improvements in time switches and more particularly and specifically to an activating and setting means for a time switch.

The primary object of this invention is the provision of a time switch which may be set to operate at any predetermined time and which is adapted for direct attachment to and motivation by the setting knob of a clock.

Another object of this invention is the provision of a time switch and activation means therefor which may be set to place a circuit in either an open or closed position for a predetermined period of time.

Another and still further object is a time switch and activation means therefor of the character set forth which operates without gears and other complicated moving parts and which is simple and positive in its setting and automatic operation.

Still another object of this invention is the provision of such a switch as set forth which is provided with a plug connection adapting it to be placed in series with any desired circuit to open or close that circuit at a predetermined time.

Still a further object and improvement of this invention resides in the provision of a time switch and actuator therefor which is of an extremely simple, durable, and inexpensive design and construction.

Still further improvements and advantages of this invention will readily appear to those skilled in the art when the following description is read in the light of the accompanying drawings in which:

Fig. 1 is a side elevation in partial vertical section of the assembled switch and activator.

Fig. 2 is a partial vertical section of the series plug.

Fig. 3 is a vertical section taken on line 3—3 of Fig. 2.

Fig. 4 is a partial vertical section of the assembled switch in an open condition.

Fig. 5 is a partial vertical section of the assembled switch in a closed condition.

Fig. 6 is a vertical section taken on line 6—6 of Fig. 5.

Fig. 7 is a vertical section taken on line 7—7 of Fig. 5.

Referring now to the accompanying drawings which illustrate the preferred embodiment of this invention and in which like numerals indicate similar parts throughout, A designates a conventional clock having the conventional knobs on the

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rear face thereof including the time setting knob 1 which revolves, in all clocks, one revolution per hour.

The principal switch mechanism, as more clearly illustrated in Figs. 4 and 5, consists mainly of two tubular bodies 4 and 5 constructed from insulating material. The larger of the two tubular bodies 4 is provided adjacent one end with a closure plate 6 set inwardly a short distance from said end and with a rubber ring 7 inserted in such end so as to seat upon the outer surface of the plate 6 and line the tube wall from said plate to the adjacent end of the tube 4.

The second or inner end of the tube 4 is tapered or beveled, as at 8, on its external surface, and the adjacent inner surface is formed with internal right-hand threads 9 which extend inwardly of said inner end to substantially one-half the length of said tube at which point they terminate in spaced relation to the plate 6 and provide a smooth inner surface between the terminus of the threads and such plate.

The second and smaller elongated tubular body 5 is closed at the outer end by an end wall 10 and is open at the inner end. The outer periphery of said inner end is formed with a limited number of external right-hand threads 11 adapted for rotating threaded engagement with the threads 9 of the tube 4.

An elongated flattened pin 12 extends axially inwardly from the center of the end wall 10 of the tube 5 for a distance not greater than the length of the tube 5. One end of the pin 12 extends through the end wall 10 and has formed thereon externally of the end wall 10 a flared disc 13 lying adjacent the end and a knurled handle 14 extending therebeyond facilitating the easy rotation of the pin within the tube. In this connection, that portion of the pin which passes through the end wall 10 is preferably circular in cross-section.

A coil spring B is secured at one end to the pin 12 adjacent the closed end of the tube and extends inwardly of the tubes 4 and 5 concentrically about said pin throughout the length of the tube 5 into the tube 4 where the second end thereof is secured to a swivel hook 15 carried by the center of the plate 6. This spring B retains said tubes under resilient tensional attraction at all times, and said swivel adapts the tube 4 to be freely threadedly rotated about the tube 5 causing the right handed threads to bring the smaller tube further within the greater tube with such rotation.

An annular recess 16 is provided about the inner

circumference of the smaller tube at a point inwardly of the closed end thereof and a rectangular contact plate C is secured to the coil spring B, being slidably keyed on pin 12, with the outer ends thereof extending into the recess 16. Such outer ends are slidable longitudinally in such recess between the annular shoulders defining the ends of the same. Thus, movement of the spring moves plate C longitudinally of the recess 16, while rotation of the pin 12 rotates the plate therein.

Two pairs of electrical contacts 17 and 18 are provided within the recess 16. The contacts 17 are located on the rearward annular shoulder of the recess in diametrically-opposite positions, and the contacts 18 are located on the forward shoulder of the recess in diametrically-opposite relation, but in 90° offset relationship to the contacts 17.

A housing 19 is provided about the tube 5 without the enlarged section therein and an electrical two wire lead 20 is brought thereinto with each wire tying into one contact of each of the pairs of contacts in series, as illustrated in Fig. 7, while the second ends of the wire are tied into a series plug D.

In operation of this switch mechanism the outer tube 4 is placed behind the clock A with the rubber ring in a gripping position about the setting knob 1 of the clock, thus causing the tube 4 to rotate with the knob, whereby the tube makes one rotation an hour about the smaller tube 5.

By providing a micrometer scale arrangement E on the exterior of the smaller tube, and the beveled end of the larger tube, as illustrated in Fig. 1, with an hour scale 22 longitudinally imposed on the tube 5 and a minute scale 23 circumferentially about the beveled end 8 of the tube 4 a relative calculation may be established between the thread pitch and the rotation of the tube 4 in such a manner as to allow a visual setting on the scale for release of the switch, in the manner to be described, after a predetermined time or a set number of revolutions of the greater tube.

For purposes of illustration we will suppose that it is desired to activate a circuit one hour from the time the switch is set. Then the inner tube 5 is drawn outward the tube 4 until the threads of said tubes make contact. The outer tube is then threadedly revolved one complete revolution bringing the zero mark on the minute scale from zero on the hour scale to one on the hour scale.

It is then necessary to set the switch in the position desired relative to opening or closing a circuit after expiration of an hour's time. This setting is accomplished by use of the knurled handle 14 which rotates the pin 12, the spring B and the contact plate C. If it is desired to set the switch to close a circuit, the pin is rotated to bring a pointer mark on the disc 13 adjacent a position marked "on" inscribed on the tube 4. This operation coincidentally brings the outer ends of the plate C in alignment with the pair of contacts 17 on the rearward shoulder of the recess 16 but retains the plate in an insulated condition against the forward shoulder of the recess. The connection between the spring B and plate C is such that as the spring is stretched the plate is carried with it to the forward shoulder of the recess, but is returned to the rearward shoulder of the recess upon compression of the spring. The tube 4 is then connected as previously described to the setting knob 1 with the rubber ring 7 gripping the setting knob, whereby the tube 4 will rotate therewith.

Hence when the minute hand of the clock has made one revolution with the passing of one hour the tube 4 will have also made one revolution and at the end of said revolution the engaging threads of the two tubes will be freed thus allowing the coil spring to telescope the smaller tube 5 inwardly of the larger tube 4 until the inner end of the tube 5 abuts the plate 6.

As the tube 5 is drawn inwardly of the larger tube 4, the compression of the spring causes the relative position of the contact plate C to change bringing it to rest against the contacts 17 on the rearward shoulder of the recess 16, whereby to complete or close the circuit through the contacts 17 and consequently through the series plug D.

When the converse reaction is desired wherein it is necessary to open the circuit after a predetermined period of time the operation of the switch remains the same as described only the rear marker 14 is moved to an off position which brings the contact plate C in a circuit closing position between the contacts 18 on the forward shoulder of the recess 16 closing the circuit which is opened with the time actuation of the switch which brings the plate ends to bear against the insulated section of the rear shoulder of the recess 16 90 degrees out of alignment from the contacts 17 thereon.

The series plug D comprises a plug casing 24 of Bakelite, plastic or the like which carries a pair of male prong contacts 25 which extend outwardly from one face thereof and a female receptacle 26 on the second face thereof adapted to accommodate the male plug F of the appliance circuit to be controlled. As illustrated in Fig. 2 one pole 25*a* is continuous through the plug while the second pole 25*b* is divided, and the division is bridged by the two wires of the switch lead 20 necessitating the passage of current through the switch to complete the circuit.

To operate the assembled switch and circuit the plug D is placed in a source outlet and the appliance circuit F is connected thereinto. The switch is then selectively set as described and applied to the clock for motivation and activation in the manner set forth herein.

It is to be understood that there is no limitation placed on the materials used in constructing and manufacturing the parts comprising this invention of either conductive or insulatory nature, that no limitation is placed on the size of the switch or on the length or size of the scale restricting it to use only within a limited time range, and neither is there any limitation to be placed on the use of a rubber ring for gripping engagement with the setting knob of the clock as suitable means may be used in its place such as spring clips, screw means and the like.

Having thus described and explained the construction and operation of the preferred embodiment of this invention and with full conviction that modifications of the nature heretofore set forth would not depart from the spirit of this invention as hereinafter claimed. What I desire to claim in Letters Patent is:

1. In a time-controlled switch, including a shaft having means constantly rotating the same at a substantially uniform speed, rotary means, and a readily-detachable, frictional coupling connecting said rotary means and said shaft together for rotation as a unit; the improvement comprising a cylindrical integral extension of said rotary means, a cylindrical member, said member and extension including opposed end

portions formed to telescope together, said end portions including extremities formed with complementary threads adapted to be threadedly engaged, said threads being formed to move said member and extension relatively in a telescopically-closing direction upon rotation of said shaft, said end portions inwardly of said threads comprising smooth surfaces permitting free sliding relative movement of said member and extension in a telescopically-closing direction upon disengagement of said threads, spring means loading said member and extension for relative telescopic closing movement, a switch carried by one of said member and extension, and said spring means actuating said switch upon said free sliding relative movement of said member and extension in a telescopically-closing direction.

2. In a time-controlled switch, including a shaft having means constantly rotating the same at a substantially uniform speed; the improvement comprising a member, a second member telescopically associated with said first-named member, a switch carried by one of said members, means carried by said second member and adapted to engage said shaft and rotate therewith relative to said first-named member, said members being formed with inter-engaging screw threads threadedly connecting said members together, said screw threads being disengageable upon continued rotation of said shaft, and means for actuating said switch upon said disengagement of said screw threads.

3. In a time-controlled switch, including a shaft having means constantly rotating the same at a substantially uniform speed; the improvement comprising a member, a second member telescopically associated with said first-named member, a switch carried by one of said members, means carried by said second member and adapted to engage said shaft and rotate therewith relative to said first-named member, said members being formed with inter-engaging screw threads threadedly connecting said members together, said screw threads being disengageable upon continued rotation of said shaft, and spring means loading said members for said disengagement, said spring means being operative to actuate said switch upon said disengagement of said screw threads.

4. In a time-controlled switch, including a shaft having means constantly rotating the same at a substantially uniform speed; the improvement comprising a member, a second member telescopically associated with said first-named member, a switch carried by one of said members, means carried by said second member and adapted to engage said shaft and rotate therewith relative to said first-named member, said members being formed with inter-engaging screw threads threadedly connecting said members together, said screw threads being disengageable upon continued rotation of said shaft, means for actuating said switch upon said disengagement of said screw threads, and pre-setting means for obtaining actuation of said switch after a predetermined amount of rotation of said shaft.

5. In a time-controlled switch, including a shaft having means constantly rotating the same at a substantially uniform speed; the improvement comprising a member, a second member telescopically associated with said first-named member, a switch carried by one of said members, means carried by said second member and adapted to engage said shaft and rotate therewith relative to said first-named member, said members being formed with inter-engaging screw threads threadedly connecting said members together, said screw threads being disengageable upon continued rotation of said shaft, means for actuating said switch upon said disengagement of said screw threads, and a micrometer-like means calibrated in units of time formed on said members for pre-setting the same for actuation of said switch upon a selected amount of rotation of said shaft.

6. In a time controlled switch, including a shaft having means constantly rotating the same at a substantially uniform speed; the improvement comprising a pair of cylindrical members, means operatively connecting one of said members to said shaft for rotation therewith, said members including opposed end portions formed to telescope together, said end portions including extremities formed with complementary threads adapted to be threadedly engaged, said threads being formed to move said members relatively in a telescopically-closing direction upon rotation of said shaft, said end portions inwardly of said threads comprising smooth surfaces permitting free sliding relative movement of said members in a telescopically-closing direction upon disengagement of said threads, spring means loading said members for relative telescopic closing movement, a switch carried by one of said members, and means operatively connecting said switch to said spring, whereby to actuate said switch upon said free sliding relative movement of said members in a telescopically-closing direction.

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