May 6, 1947. P. O. SHRACK 2,420,019

TIMING DEVICE

Filed July 23, 1945 2 Sheets-Sheet 1

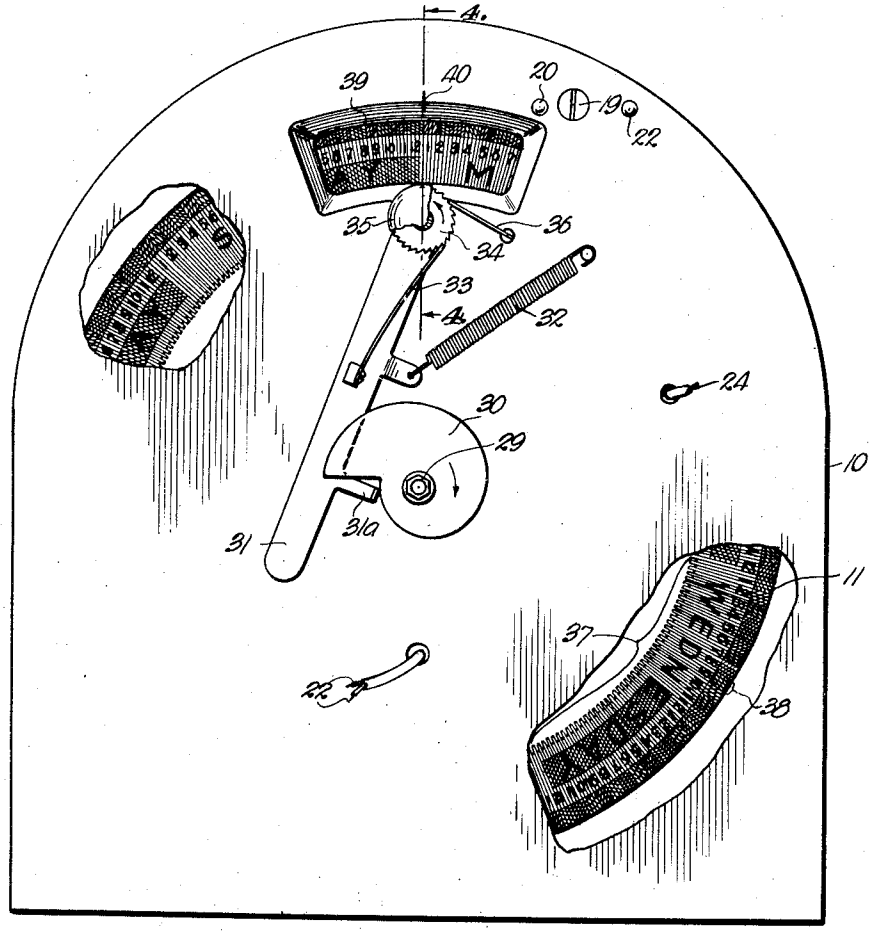


Fig. 1.

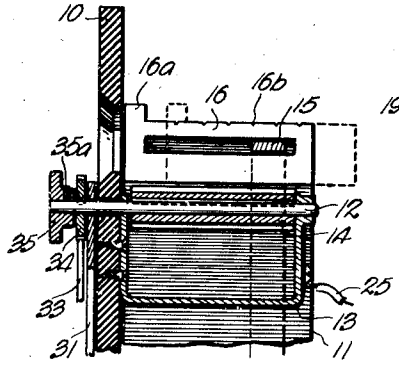


Fig. 4.

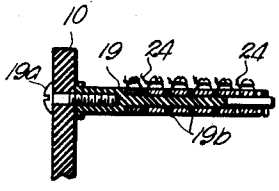


Fig. 5.

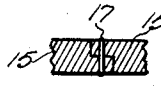


Fig. 6.

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May 6, 1947. P. O. SHRACK 2,420,019

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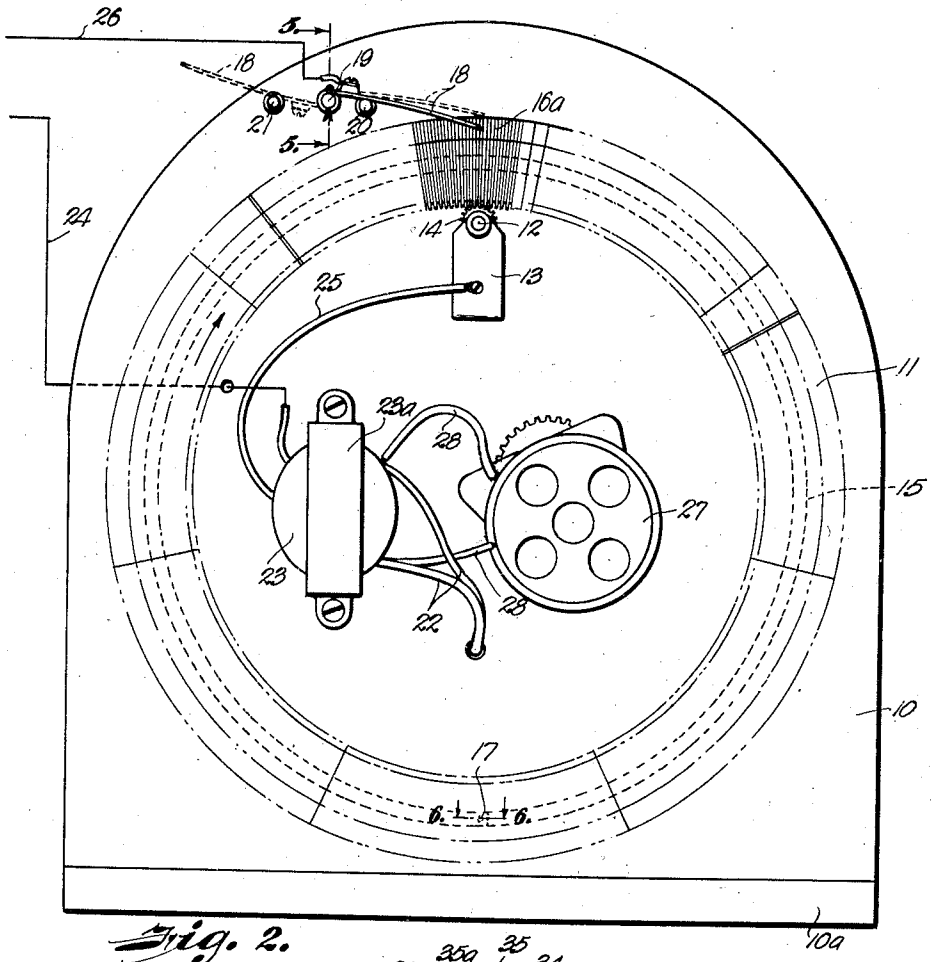


Fig. 2.

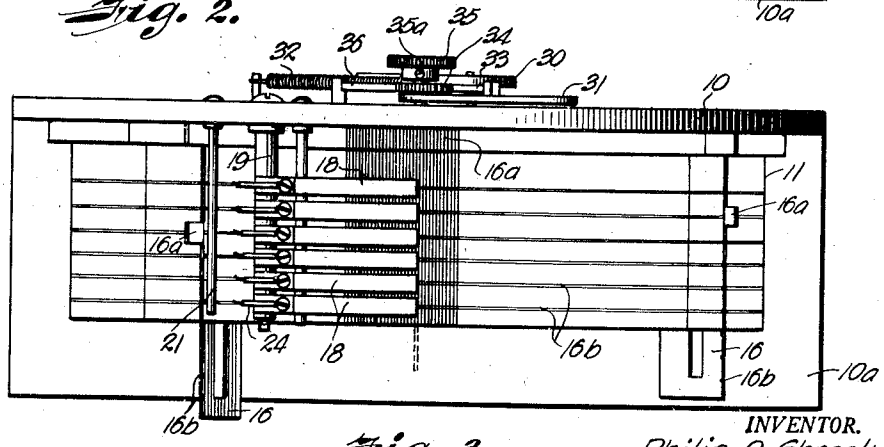


Fig. 3.

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TIMING DEVICE

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7 Claims. (Cl. 200—37)

1

This invention relates to improvements in a timing device for controlling electrical systems and refers more particularly to a timing mechanism having a selector with adjustable members by which electrical circuits are completed to perform desired acts at predetermined times. The device is adapted for use in controlling radio transmitters and receivers, lighting and signalling systems and for innumerable other purposes where a mechanism is to be started or stopped at a particular time.

Timing appliances are usually complex delicate mechanisms which require a mechanic to operate and keep in order, are cumbersome, occupy considerable space and are complicated to adjust.

An object of the present invention, therefore, is to provide a simple compact timing device capable of controlling several electrical systems over an extended period of time with each adjustment.

Another object is to provide a timing device in which the adjustable members of the selectors are mounted in abutting relationship, adjustment being by a simple shifting or lateral displacement of the members.

A further object is to provide a timing device in which a plurality of the contacts may be set simultaneously to control electrical circuits over a period of time and readjustment of the contacts may be easily made at any time at the will of the operator.

Other and further objects of the invention will appear from the following description.

In the accompanying drawings which form a part of the instant specification and are to be read in conjunction therewith,

Fig. 1 is a front elevation of a timing device embodying the invention with parts broken away,

Fig. 2 is a rear elevation of the device shown in Fig. 1,

Fig. 3 is a top plan view of the device,

Fig. 4 is a view taken along the line 4—4 in Fig. 1 in the direction of the arrows,

Fig. 5 is a view taken along the line 5—5 in Fig. 2 in the direction of the arrows, and

Fig. 6 is a view taken along the line 6—6 in Fig. 2 in the direction of the arrows.

Referring to the drawings the timing device comprises a vertical standard 10 which carries a rotatable cylindrical selector 11. The mounting for selector 11 comprises a shaft 12 and gear 14, the former supported on the standard by a bracket 13. This bracket is fastened to the rear side of the standard, as shown in Fig. 4. The elongated pinion or gear wheel 14 is fixedly attached to shaft 12 between the ends of the bracket. Selector cylinder 11 is internally serrated, as will be hereinafter explained, and these serrations or teeth mesh with the teeth of pinion 14. In other words, the cylinder 11 is supported by the gear wheel or pinion by engagement of the internal teeth of the cylinder with the teeth on the periphery of the gear.

2

Cylinder 11 is made up of a split ring or hoop-shaped support 15 on which are carried or strung a plurality of slotted slide members, plates or laminations 16. After assembly of the slide members on the ring the ends of the ring are fitted together and fastened by a pin 17 which fits into registering holes in the ends of the ring, shown in Figs. 2 and 6. When assembled these slide members constitute a plurality of laminations or plates held in abutment throughout the 360 degrees of the support ring. The slide members may be moved axially of the ring to shift the position of lugs 16a on the outer edges or peripheries of the slide. In making this adjustment the support ring which is threaded through slots in the slides serves as a guide as shown in Fig. 4. It should be noted that alternate slide members when arranged upon the support ring are of different depths or of slightly different radial widths. The alternate mounting of the different depth slides forms the toothed surface on the inner periphery of the selector cylinder previously referred to. It is the teeth formed by the different depth slide members which mesh with the pinion 14. Also it should be noted that clearance is provided between the upper ends of bracket 13 and the inner or toothed periphery of the cylinder permitting the selector cylinder to rotate freely with rotation of the gear.

Slide members 16, gear 14 and bracket 13 are included in the electrical circuit and for this reason are made of conducting material. In the embodiment shown, five separate contacts 18 are pivoted above selector cylinder 11 on a pivot pin or rod support 19. This rod is of insulating material and is fastened to support 10 by screw 19a, shown in Fig. 5. Contacts 18 are separated and are insulated from each other by removable collars 19b. The contacts and collars are held on the pin by a cotter pin or other suitable fastening. Rotative movement of contacts 18 about the pivot rod 19 is limited by stops 20 and 21 fastened to and extending from support 10 shown in Fig. 2. These stop pins are likewise of insulating material. Pin 20 positioned beneath the contacts serves as a rest and locates the free ends of the contacts slightly above the outer periphery of the laminations or slide members 16 which

make up the selector cylinder 11. The clearance between the ends of contacts 18 and the slide members is slightly less than the height of the lugs 16a. Thus when a slide member is laterally displaced or shifted to align its lug 16a with a selected contact 18, the aligned lug and contact member engage upon rotation of the cylinder. This engagement makes a temporary contact between the contact and the lug. To facilitate shifting of the slides and adjustment of the lugs with respect to a particular contact notches 16b, shown in Figs. 3 and 4, are cut in the outer edges of the laminations or slides and the alignment of these notches form guide grooves which coincide with the path followed by each of the contacts 18 over the periphery of the selector cylinder.

The circuit of the timing device is shown diagrammtically in Fig. 2 and includes conductors 22 leading from any suitable convenient source of electrical energy not shown. The conductors are fastened to terminals of the primary winding of transformer 23 mounted on the rear of support 10 by bracket 23a. One end of conductor 24 is connected to a terminal of the secondary winding of the transformer, its opposite end is connected to a terminal of the system to be controlled. The other terminal of the secondary winding is connected by conductor 25 to bracket 13 which forms a part of the circuit including shaft 12, gear 14, and the laminations or slide members 16 which make up the selector cylinder. Contacts 18, as previously explained, selectively make contact with lugs 16a on the outer edges of the slide members to close the circuit through the contact member and a conductor 26. In other words, there are five separate conductors 26 attached respectively to the five contacts 18 and on engagement of a contact with one of the lugs the circuit is completed. Conductors 24 and 26 are connected to the electrical system to be controlled, such as a radio, signalling system, lighting system or the like, not shown.

Obviously, it is contemplated that any suitable number of contacts may be employed each having connection to the system to be controlled. Also it is contemplated that a plurality of lugs may be arranged on the edges of each of the slide members whereby one or a group of electrical systems may be simultaneously controlled and selectively actuated by closing of the circuit at a predetermined time. Thus, it will be seen that a selected circuit is completed by engagemnt of a lug 16a of a slide with one of the contacts 18.

The manner in which cylinder 11 and gear 14 are actuated to complete the selected circuit at a predetermined time period or interval will now be explained.

To begin with a selected time interval is chosen during which a mechanism is to be operated. For convenience in describing the device a 15 minute period during any time of the day or night has been chosen as the selected period. The number of slide members corresponding to the number of 15 minute periods in a day or week are mounted by threading the support ring 15 through the slots of the individual slide members. Thus, to make up a cylinder of 15 minute intervals for a week there will be mounted 672 slide members on the ring. The sizes of the slide members are alternated to produce the internal gear within the cylinder. To synchronize the rotation of the cylinder so that each slide is brought under the contacts 18 during the week an actuator 27 is provided. Actuator 27 rotates gear 14 through a cam and ratchet drive later described. In the drawings actuator 27 is shown as an electric clock or time device mounted on the rear of the support 10 and connected by conductors 28 to the transformer. This actuator, however, may be a spring driven clock or time-keeping mechanism. Actuator 27 drives an arbor 29 journaled in the support 10. The front end of this arbor extends through the support and has mounted thereon a cam 30. The arbor makes one complete revolution every 15 minutes or a complete revolution during any other selected period of time.

The cam and ratchet drive between the actuator and gear 14 on shaft 12 includes cam 30 and an arm 31 pivoted loosely on the shaft. A projection 31a on the arm is held in abutment with the periphery of cam 30 by coil spring 32, one end of the spring being fastened to the support and the other to the arm. Rotation of the cam will oscillate or cause the arm to rock on its pivot as the projection 31 follows the cam periphery. The upper free end of pawl 33 pivoted on the arm engages a ratchet wheel 34 keyed to the end of shaft 12. Button 35 attached on the end of the shaft by set screw 35a holds the ratchet wheel in place. A stop 36 attached to the support at one end and engaging the ratchet wheel at the other limits the ratchet wheel and shaft to one directional rotation. Oscillation or rocking of the arm due to rotation of the cam moves the end of the pawl into engagement with successive teeth on the periphery of the ratchet rotating the ratchet at intervals corresponding with the rotation of the cam. Thus, the arrangement for driving the selector cylinder 11 including the actuator 27, arbor 29, cam 30, arm 31, ratchet assembly and gear 14 is such that the cylinder 11 is rotated intermittently through a small arc at the commencement of each selected time interval. With the rotation of the cylinder each succeeding slide member 16 of the cylinder is positioned directly beneath the ends of contacts 18 where it remains during the time interval covered by one complete rotation of the cam. If it is desired to complete a certain circuit during any predetermined time interval the slide located beneath the contacts at that interval will be shifted or adjusted so its lug 16a will engage the desired contact as it passes thereunder.

To select a particular radio program, if a lighting circuit is to be turned on or to operate other remote systems or circuits at a certain time the slide member representing that time interval is adjusted or shifted with respect to the other slides so its lug will engage the contact which completes the circuit when the selector is rotated. Completing the circuit will actuate a switch or other mechanism adapted to close the lighting circuit or select a particular station if it be a radio program.

To facilitate adjustment of the slides 16 distinguishing indicia is placed on the front edges of the slides or laminations. For example, the slides are divided into seven equal groups which represent days of the week. Upon the ends of the slides of each group is printed the name of a day of the week. The slides are arranged about 360° of the cylinder so that the individual groups of slides represent the days of the week from Sunday through Saturday, as indicated in Fig. 1. The slides of the seven daily groups are subdivided into hourly groups of four slides each, the individual slides representing the four fifteen minute periods of each hour. Distinctive colorations are given the groups and hourly subdivisions so the antemeridian and postmeridian in-

tervals of each day are easily detected. The four individual slides which make up the four 15 minute intervals of each hour are designated by the hour of the day which they represent, as shown at 38. To facilitate visual distinction between the hourly groups it is preferable to distinctively color the hourly groups which lie adjacent to each other or, if desired, hours of each day, while colored distinctively from each other, may have the same coloration for succeeding days. This likewise will make selection of a particular slide easier for the operator. To aid in placing cylinder 11 on gear 14 in proper position with respect to the time of day and day of the week a slotted opening or window 39 with an indicating arrow 40 is provided in the upper portion of the support. The arrow designates the slide directly beneath the contacts. Button 35 may also be used as an aid in making this adjustment since rotation of the button rotates shaft 12, upon which gear 14 is mounted.

Operation of the device is more or less obvious from the foregoing description. Slides corresponding with time intervals of a given period, such as a day or week, are assembled by mounting the laminations on a support ring. Certain of the selected slides are then adjusted so their lugs 16a will complete selected circuits at a particular time by engagement with the contacts on rotation of the cylinder. The cylinder is rested on the periphery of gear 14 with its interior serrations meshing with the teeth of the gear and the arrow designating the proper slide through the window. Actuator 27 is started and the cam 30 is rotated through one revolution during each time interval corresponding to that represented by a slide. Upon rotation cam 30 rocks arm 31 and pawl 33 actuates the ratchet driving gear rotating shaft 12 and gear 14. Selector cylinder 11 is rotated by the gear and the individual slides of the selector are successively passed under contacts 18. Where five contacts, as shown in the drawings, are used five separate circuits or systems may be controlled. Each of these circuits may represent a particular radio station and the contacts would in such case be connected to the radio control box so any one of the five stations can be selectively tuned in at a particular time and for a time interval corresponding to selected slides.

As previously suggested, 15 minute time intervals have been arbitrarily used since they are conventional intervals for short radio programs and two of such intervals would cover a half hour period of entertainment or a group of four, a full hour period. In arranging a selector cylinder for a full week of 15 minute periods 672 slides will be assembled upon a support ring and the ends of the ring fastened to complete a solid cylinder of assembled slides or laminations. Selection of radio programs throughout the week are then made by adjustment of the slides. This adjustment is facilitated by the indicia on the ends of the slides and the grooves 16b on the outer edges of the slides. Thus, the slides or laminations are adjusted so their lugs will engage the proper contact to tune in the selected station and the contacts are connected through the radio control to bring in the station selected when the slide completes the circuit.

The adjustment of the slides is easily accomplished by removing the selector cylinder from the gear 14. A necessary precaution when remounting the cylinder is to seat it upon the gear so the arrow points to the slide interval corresponding to the time when the cylinder is mounted. Furthermore, it is important when starting the timing device that the cylinder is mounted in a position corresponding to the slide interval indicated by the arrow. The indicia on the ends of the slides showing through the window and rotation of the gear and cylinder by means of button 35 facilitate this adjustment. When removing the cylinder the contacts are rotated out of contact, as shown in dotted lines in Fig. 2, and when the cylinder is again mounted the contacts are rotated to rest on pin 20, in which position they clear the outer edges of the slides but contact the lugs 16a that have been adjusted in their path.

The actuating mechanism rotates the selector cylinder so each slide is moved to the position beneath the contacts at the commencement of the time interval it represents. To accomplish this actuator 27 rotates arbor 28 and cam 30 through one revolution during each time interval. Ratchet wheel 34 is intermittently rotated by rocking of arm 31 with rotation of the cam. Gear 14 and the selector cylinder are likewise rotated intermittently to advance the slides beneath the contacts at their designated time intervals. Since the slides or laminations 16 themselves constitute the gear teeth of cylinder 11 there is little likelihood of the selector cylinder getting out of adjustment. Each slide, therefore, is accurately brought into position beneath the contacts during its particular time interval.

It will be appreciated that selection of the programs for one week will select the same programs for ensuing weeks if the device is operated continuously and no changes are made in the times when the selected programs take place. If it is desired to make a change in one or more of the programs during the week's period it is only necessary to remove the cylinder and change the adjustment of the slides.

Having thus described my invention, I claim:

1. A timing device comprising a plurality of relatively stationary circuit-closing means, a selector made up of a support, adjustable slide members mounted in abutting relationship upon said support, adjacent ones of said members being of different size whereby they form a serrated surface, a gear meshing with the serrated surface, a mechanism for driving said gear thereby to actuate the selector, means on the slide members adapted to selectively engage said stationary circuit-closing means on adjustment of the slide members and actuation of the selector whereby selected circuits are closed at predetermined time intervals.

2. A device as in claim 1 in which the selector support constitutes a ring freely suspended on said gear.

3. A device as in claim 1 including a standard upon which the selector is removably mounted on said gear whereby the actuating mechanism is disconnected from the selector and adjustment of the slide members facilitated.

4. A device as in claim 1 wherein said gear has a ratchet connection with the selector actuating mechanism.

5. A device as in claim 1 in which guide lines imposed on the peripheral edges of the slide members facilitate their adjustment relative to the contacts.

6. A device as in claim 1 wherein identifying indicia is imposed on the slide members to facilitate their selection and adjustment.

7. Electrical switching apparatus comprising a gear mounted for rotation about a horizontal axis, time-controlled mechanism for rotating the gear, an internally-toothed annular member suspended on said gear and meshing therewith so said member is advanced by the gear, a contact assembly mounted beside the path of said annular member, slide elements mounted side by side on said annular member so they register successively with said contact assembly as the annular member advances, said contact assembly having a plurality of electrical contacts selectively operated by the respective slide elements as same register with the contact assembly.

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