Sept. 23, 1930. H. R. MILLER 1,776,519

TIME SWITCH

Filed May 17, 1929 2 Sheets-Sheet 1

FIG. 1.

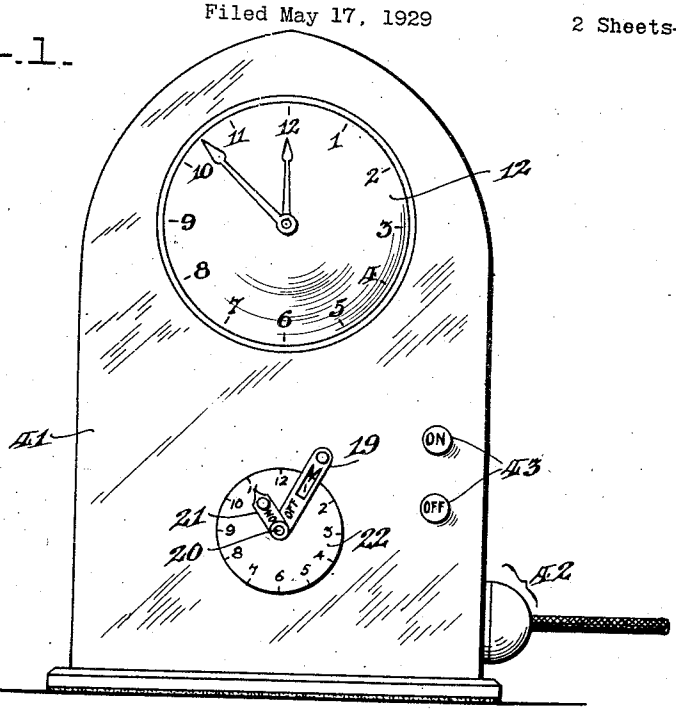
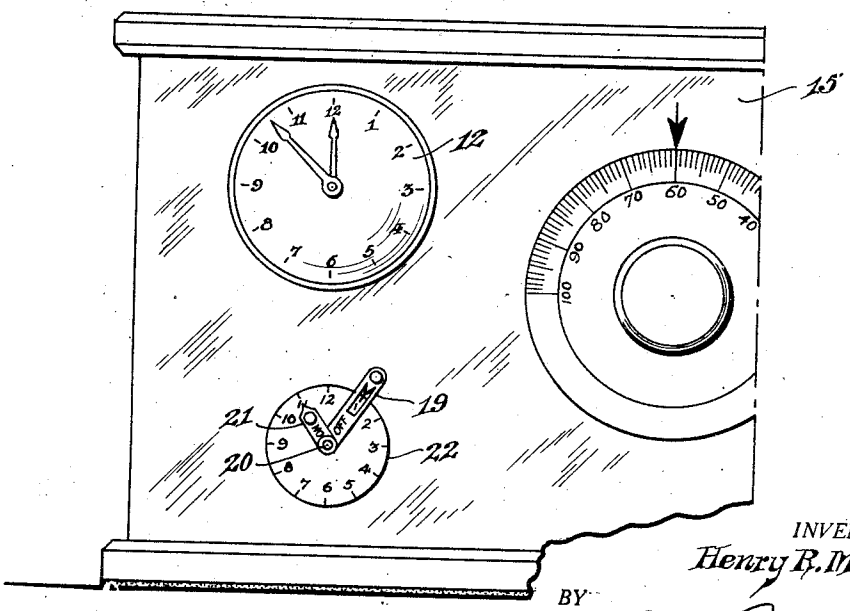


FIG. 2.



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Fig. 3.

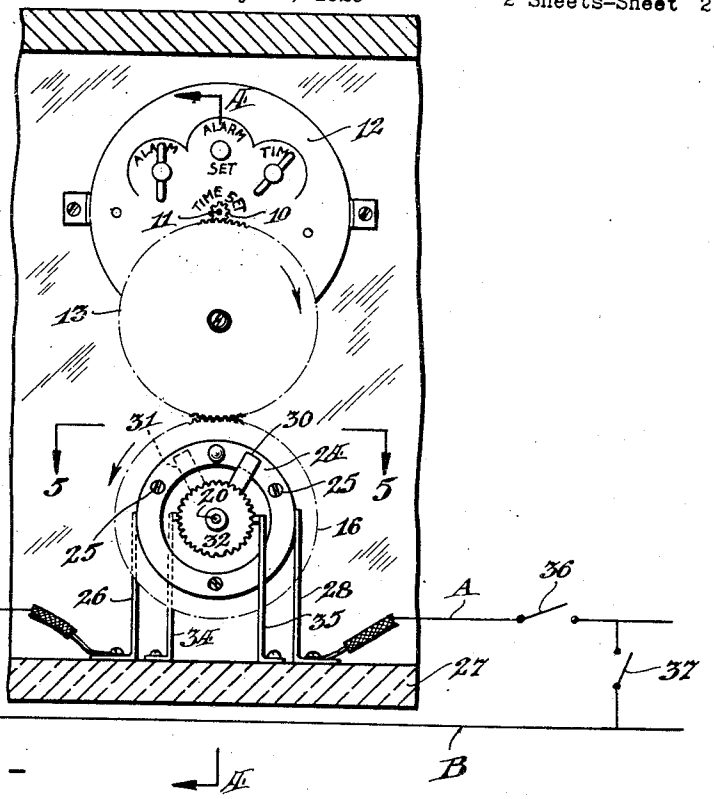


Fig. 6.

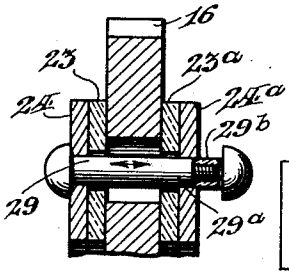


Fig. 4.

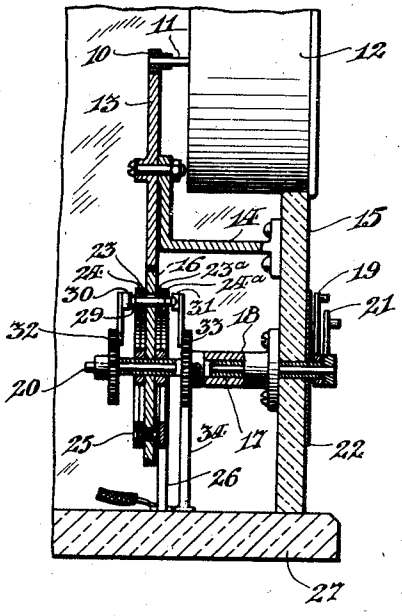
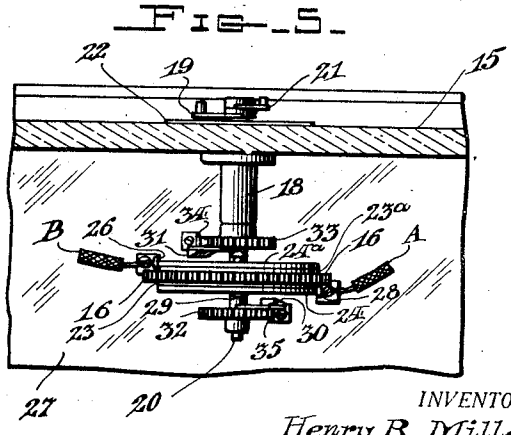


Fig. 5.



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UNITED STATES PATENT OFFICE

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TIME SWITCH

Application filed May 17, 1929. Serial No. 363,756.

This invention relates to time switches and more specifically to one particularly adapted for controlling radio receiving sets.

One object of my invention is to combine an electric switch of novel and simple construction with a clock mechanism, and in such compact form that it can be readily mounted and built into any radio receiving set.

Another object is to provide such a time switch with a simplified control, similar in appearance to the face of a clock which can be easily and quickly adjusted and set by anyone.

The invention comprises the combination of a clock mechanism including a minute hand arbor which rotates when the mechanism is in motion, of an electric switch, adjustable switch control members, and actuating means connected with said arbor to bring said members and switch into coactive engagement.

My invention is distinguished in the simplicity of construction of the switch and in the novel manner of construction and designing the component parts thereof, whereby a switch may be manufactured at low production cost.

My invention is also distinguished in the combination of a pair of metallic rings insulated from each other and functioning in a novel manner with a reciprocatory type of contact element, whereby in one position of the contact element the rings are electrically connected together and in another position of the contact element the rings are electrically disconnected.

Other objects and attendant advantages will become more readily apparent from the detailed description of one embodiment of the invention which follows, reference being had to the accompanying drawings in which

Figure 1 is a front elevational view of the time switch mounted as an individual unit in a separate casing.

Figure 2 is a fragmentary front elevational view of a radio receiving set with the time switch embodied therein.

Figure 3 is a fragmentary rear sectional view of Figure 2.

Figure 4 is a section, substantially taken on the line 4—4 of Figure 3, looking in the direction indicated by the arrows, certain parts being shown in full.

Figure 5 is a section in line 5—5 of Figure 3.

Figure 6 is a fragmentary enlarged sectional view of a certain part of the switch mechanism as illustrated in Figure 4.

Any well known type of clock mechanism may be used in connection with my invention, and for illustrative purposes, I have shown it in connection with a common alarm clock.

The clock mechanism includes a pinion 10 fixed to the minute hand arbor 11 of the alarm clock 12, which meshes with a freely rotating gear 13 mounted on a bearing bracket 14 secured to the casing or radio panel 15 in any suitable manner. The pinion 10 and gear 13 have a ratio of twelve to one, so that twelve complete revolutions of the pinion 10 will revolve the gear 13 but once.

Gear 13 meshes with a similar gear 16 which is mounted to rotate on the sleeve or hollow shaft 17. Shaft 17 in turn is mounted to rotate in a bearing 18 suitably mounted on the panel 15. The hollow shaft 17 extends through the panel 15 and has an indicator 19 fixed to its outer end. A rod or shaft 20, having an indicator 21 fixed thereon, extends through, and is rotatable in the sleeve or hollow shaft 17. A dial 22, fixed on the panel 15 directly beneath the face of the clock 12, cooperates with the manually operable indicators 19 and 21 to indicate at which time the radio receiving set will be automatically turned on and off, as will be more fully explained later.

Insulating rings 23 and 23^a and metal rings 24 and 24^a are secured to both sides of gear 16 by screws 25. These screws are inserted from opposite sides and have beveled heads which are countersunk into the metal rings 24 and 24^a respectively. The shank of each screw 25 extends through the insulating ring located adjacent to the metal ring, in which the screw head rests, and through an insulating sleeve in the gear 16 and is in threaded engagement with the insulating ring on the opposite side of the gear as shown in Fig. 4.

A flexible conductor 26, fixed to the base plate 27, is in constant frictional engagement with the periphery of the metal ring 24ª, while a similar conductor 28 engages the periphery of the metal ring 24 in like manner. These conductors serve as terminals to which are connected the leads A and B of the radio control circuit.

By referring now more particularly to Figures 4 and 6, it will be noted that a slide pin 29, comprising a metal shank 29ª and an insulating piece 29ᵇ forming an insulated extension of the metal shank, provides the electrical connection between the metal rings 24 and 24ª. This slide pin is mounted to slide back and forth in suitable holes located opposite each other in the metal rings. The length of the metal shank and its insulating extension is such that the sliding back and forth between the metal rings the electric connection between the metal rings is opened or closed, depending on whether the pin is in its extreme right or left position. In one case the metal shank 29ª is in contact with both rings and completes the electric circuit, while in the other case the insulating extension 29ᵇ intervenes between the metal rings and opens the electric circuit between them. In order to establish good frictional contact between pin 29 and ring 24ª, any well known expedient may be employed, such as spring pressure contact, etc.

To move the pin 29 axially, oppositely inclined cam members 30 and 31 are provided. These cam members are adapted to be held in adjusted positions at opposite sides of the gear 16, and project into the path of travel of the ends or heads of the pin 29. The cam member 30 is fixed to a disk 32 which in turn is secured to rod 20, and cam member 31 is similarly secured to a disk 33 fixed on the sleeve 17.

Particular attention is called to the simplicity of construction and association of the component parts of the switch device as identified above, whereby the production cost of the article is materially reduced. For instance, the design of the component parts are such that they may be manufactured readily by a stamping operation or by a molding process and quickly assembled in proper relation due to the fact that they may be moved in parallel relation with each other in the mounting thereof so as to bring the parts in accurate connection with each other. It is a very simple operation to mount the pin in the aligning holes of the rings with the heads of the pin positively preventing disconnection when the insulating piece is screwed onto the shank of the pin. Due to this novel connection the assembling operation is a very simple one. Due to the simplified type of switch utilized and the fact that the same may be manufactured at a relatively low cost, a time switch can be produced at a price that will enable its adaptation to products that must be sold at a relatively low cost.

The periphery of each disk 32 and 33 is notched, and springs 34 and 35 are in yielding contact therewith. The springs are secured to the base plate 27 and cooperate with the notches on the disks 32 and 33 to hold the disks in adjusted positions, with the proper amount of firmness.

Thus the terminals 26 and 28, rings 24 and 24ª and the pin 29 constitute an electric switch which coacts with the adjustment cam members 30 and 31 to open or close the circuit when the gear 16 revolves.

Two switches symbolically indicated at 36 and 37 may also be connected in the radio control circuit to cut out the time switch if desired. If the time switch is not to be used, switch 36 is opened, in which case switch 37 is used to control the radio receiving set directly.

The time switch can, of course, be used to control various electrical devices, apparatus or appliances, and for this purpose it is mounted in a separate casing 41, as shown in Figure 1, and is provided with a plug and socket connection 42 and a suitable operating snap switch 43, so that it can be conveniently handled and connected or disconnected in any particular control circuit.

Operation

The simplicity of setting the time switch is a particular feature of my invention. It is merely necessary to turn the pointer 21, bearing the inscription "On" to the point on the dial 22 representing the time at which the radio is to begin to operate, and the indicator 19 marked "Off" to the point on the dial representing the time when the radio is to be turned off again. When the indicators are set, the cams 30 and 31 are of course, simultaneously properly positioned, so that when the gear 16 is rotated in the direction indicated by the arrow in Fig. 3, cam 30 moves the slide or switch pin 29 to the right, as seen in Figure 6 to close the circuit at the time set, thereby turning the radio on, and later pin 29 is moved back to the left by the cam 31, in similar manner, thereby opening the circuit at the proper time, and turning the radio off. It will be noted that for each complete revolution of the minute hand of the clock 12 and consequently, its hand arbor 11, the gear 16 will make exactly one twelfth of a revolution, so that in twelve hours the gear 16 revolves but once. This ratio of gearing can, however, be changed to suit various conditions.

Of course, the time switch shown and described may be changed in various ways, and variations may be required under certain conditions, therefore, while some of the constructional details are deemed preferable and I have shown and described these specifically, it

is to be understood that I do not limit myself to such precise construction, but consider that I am at liberty to make such changes and alterations as fairly come within the scope of the appended claims.

I claim:

1. In a time switch the combination with a clock mechanism including a minute hand arbor which rotates when the mechanism is in motion, of metal rings insulated from each other and mounted to rotate in unison, a movable contact member adapted to establish contact between said rings, actuating means for said movable contact member, and means operatively connecting said pinion and metal rings.

2. In a time switch the combination with a clock mechanism including a minute hand arbor which rotates when the mechanism is in motion, of metal rings insulated from each other and rotatably mounted, a separate terminal in contact with each ring, a movable contact member carried between said metal rings and adapted to make and break the electrical connection between said rings thru said movable contact member, adjustable actuating members for said movable contact member, and means operatively connecting said pinion and metal rings.

3. In a time switch the combination with a clock mechanism including a minute hand arbor which rotates when the mechanism is in motion, of metal rings insulated from each other and mounted to rotate in unison, a separate terminal in contact with each metal ring, a movable contact member carried by said metal rings and adapted to make and break electrical connection between said rings, a dial, adjustable contact member actuating means, indicators cooperating with said dial and connected with said actuating means, and means operatively connecting said rings and minute hand arbor.

4. In a time switch including a clock having a minute hand and arbor for rotating said minute hand, the combination of a gear rotated by said arbor, a metal ring carried on each side of said gear electrically insulated therefrom, a sliding pin comprising a metal shank, an insulated extension at one end of said metal shank, said sliding pin being carried by said gear and mounted to slide axially in said metal rings, means located on one side of said rings to alternately move said sliding pin back and forth between said metal rings and make and break electrical connection between said metal rings by means of said metal shank and the insulated extension thereof.

5. A time switch comprising in combination, time mechanism control mechanism and a switch operatively associated with said control mechanism and with said time mechanism and consisting of a pair of metallic rings insulated from each other and having a drive connection with said time mechanism and a switch element having a slidable electrical connection with said rings and an operative connection with said control mechanism.

6. In combination, time mechanism, control mechanism and an electric switch device interposed therebetween and operatively associated with both of said mechanisms, and including a pair of metallic rings insulated from each other and having a drive connection with the time mechanism, a switch element slidably associated with the rings for electrically connecting and disconnecting said rings and cam members operatively associated with said contact element and under the control of said control mechanism.

7. In combination, clock mechanism, indicators, and a switch device arranged between the indicators and the clock mechanism consisting of a gear having a drive connection with said clock mechanism and a pair of metallic rings supported by said gear but insulated from each other, a contact pin slidably supported by said rings for electrically connecting and disconnecting the rings and cam members having an adjustable operative relation with said pin and under the control of said indicators.

8. The combination of clock mechanism and a pair of manually adjustable indicators, with a switch device consisting of a gear having a drive connection with said clock mechanism, a pair of rings having a parallel relation with said gear and having an insulated connection therewith to move with said gear, a contact pin slidably mounted in said rings to electrically connect said rings and an insulating piece mounted on said pin for destroying electrical connection between the pin and both of said rings, and a pair of cam members for giving reciprocatory movements to said pin and under the control of said indicators.

9. In combination with clock mechanism, a switch device actuated thereby consisting of a gear having a direct drive connection with the clock mechanism, a pair of metallic rings insulated from but carried upon said gear for movement therewith, a metallic pin slidably supported by said rings to electrically connect the same, an insulated piece mounted on one end of said pin to break electrical connection between the pin and both of said rings, in a predetermined position of the pin, a pair of adjustable mounted cam members for giving sliding movements to the pin for making and breaking electrical connection between the rings and the indicator connected to each cam member for adjusting the position thereof relative to said pin.

10. In combination, clock mechanism and a switch device directly connected thereto, to be driven thereby and including a gear having a direct drive connection with the mecha-

nism, contact rings carried by the gear, a pin slidably supported by the rings and having a metallic portion and a non-metallic portion whereby the pin in one of its positions will electrically connect the rings and in another position electrically disconnect the rings and control mechanism for controlling the slidable movements of said pin for making and breaking electrical connection between the rings.

11. In combination, clock mechanism, and a switch device directly driven thereby consisting of a gear having a direct drive connection with the clock mechanism, a pair of rings mounted on opposite sides of said gear and insulated therefrom, a double headed contact element slidably supported by the rings and consisting of metallic and non-metallic portions whereby in one position of the pin the rings are electrically connected and in another position of the pin the rings are electrically disconnected, and indicators each including a cam member adapted to be adjusted relative to the head portion of the pin for contacting therewith in the movement of said gear for giving reciprocatory movements to the contact element.

In testimony whereof I affix my signature.

HENRY R. MILLER.