Feb. 29, 1944. A. A. MILLER 2,342,814

TIME CONTROL APPARATUS

Filed April 26, 1941 2 Sheets-Sheet 1

Fig. 1.

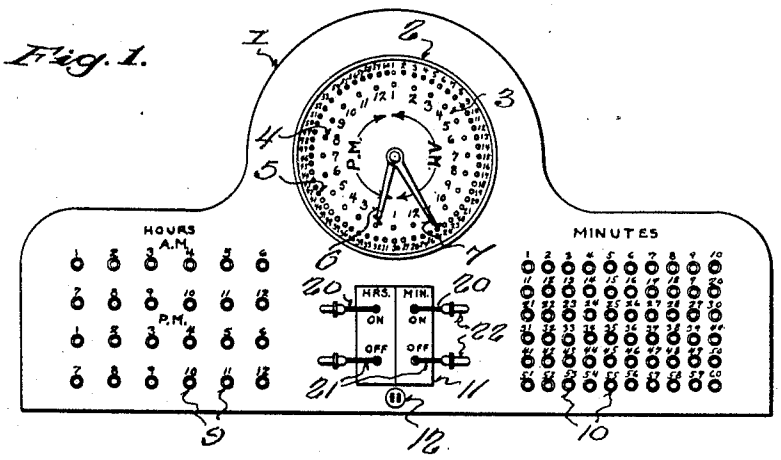
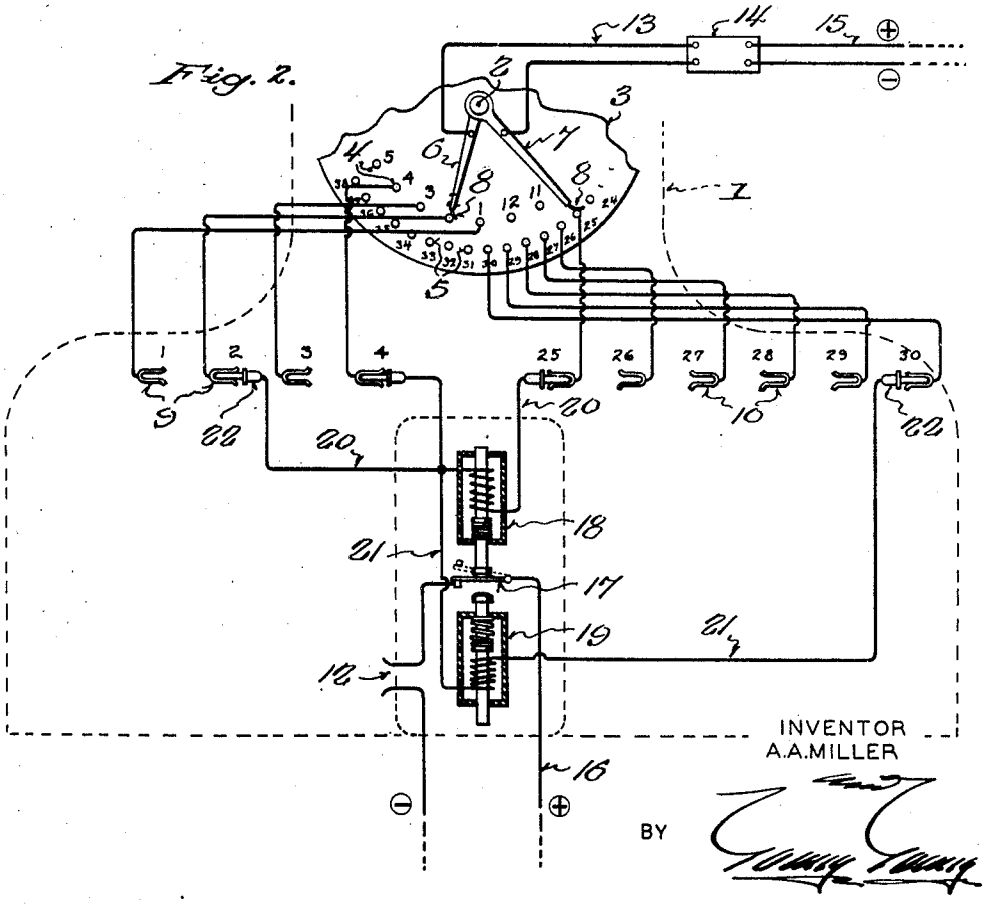


Fig. 2.



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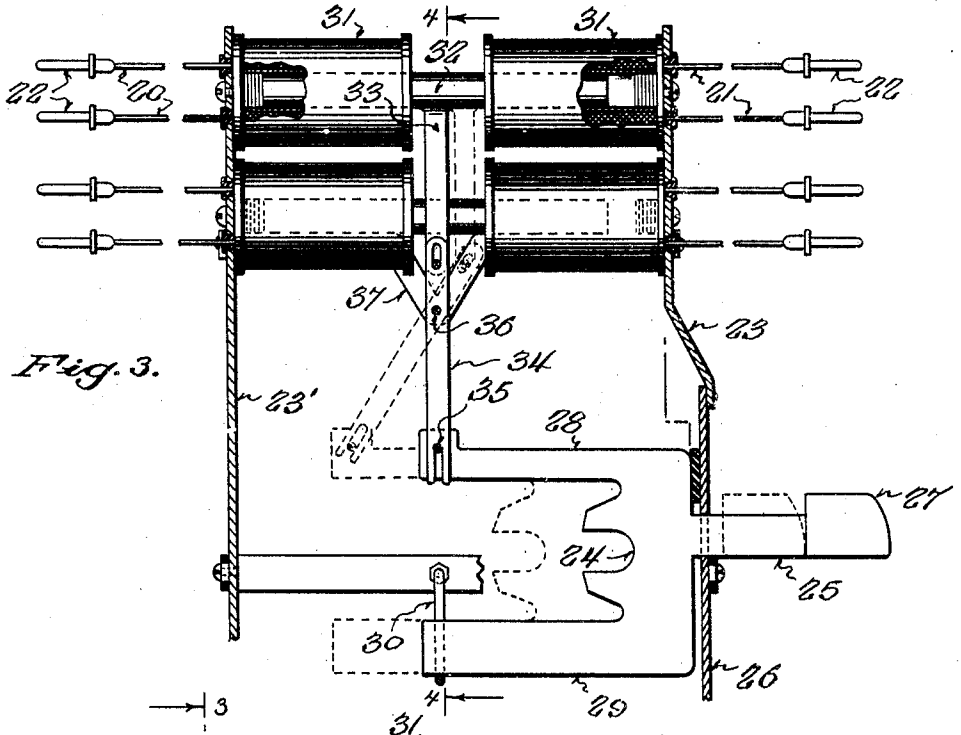


Fig. 3.

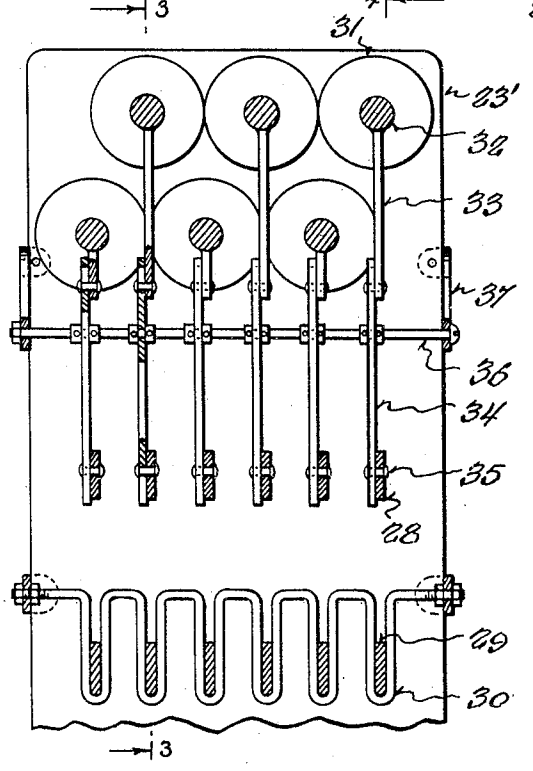


Fig. 4.

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TIME CONTROL APPARATUS

Albert A. Miller, Madison, Wis.

Application April 26, 1941, Serial No. 390,572

1 Claim. (Cl. 161—1)

This invention pertains generally to time control apparatus, and more particularly to a system for closing and opening an electric circuit at predetermined time intervals for controlling operation of various appliances and devices.

The invention has primarily for its object to provide a time actuated mechanism in combination with an electrically operated switch, which may be selectively connected with contacts associated with the time actuated mechanism for closing and opening an electrical circuit at predetermined intervals.

Incidental to the foregoing, a more specific object of the invention resides in the provision of an apparatus in which solenoids for actuating an electric switch can be readily connected with selected contacts of a time actuated mechanism for opening and closing the switch at predetermined periods.

Another object of the invention is to provide a time control apparatus, which can be operated by either storage battery or low voltage current of approximately six to eight volts, and capable of controlling a high voltage circuit of either direct or alternating current, for the operation of electrical appliances or devices.

A still further object is to provide for automatic control of radio receiving sets, whereby selected sending stations may be received and cut out at predetermined times.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the novel construction, combination and arrangement of parts, substantially as hereinafter described, and more particularly defined by the appended claim, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claim.

In the accompanying drawings is illustrated one complete example of the physical embodiment of the present invention constructed according to the best mode so far devised for the practical application of the principles thereof.

In the drawings:

Figure 1 is a front elevational view of one form of unit incorporating the present invention;

Figure 2 is a diagrammatical view of one arrangement of electrical circuits and associated mechanical elements;

Figure 3 is a fragmentary vertical sectional view through a conventional radio receiver control of the push button type with the invention applied thereto, the view being taken on the line 3—3 of Figure 4; and,

Figure 4 is a similar view taken on the line 4—4 of Figure 3.

While the present invention has been designed primarily to control the operation of electrical appliances, such as stoves, washing machines, refrigerators and the like, it is also contemplated that the same may be employed in connection with radio receivers, display lighting, and many other electrical devices, such as signals, alarms, room calls, door openers, and so on. However, for the purpose of simplicity the explanation will be confined to control of an electric circuit, and a radio receiving set, it being understood that any desired appliance or device may be connected in the controlled circuit.

Referring now more particularly to the drawings, the numeral 1 designates a panel upon which a conventional chronometer 2 is mounted. The chronometer may be either electrically operated or actuated by a spring motor.

The dial 3 is provided with two series of concentric annularly arranged contacts 4 and 5 respectively. The contacts 4 in the present instance, represent hours throughout a twenty-four hour period, while the contacts 5, represent minutes. The chronometer is provided with a pair of arms 6 and 7 provided with wipers 8 for engaging the hour and minute contacts respectively.

Carried by the panel board 1 are two series of terminals 9 and 10, preferably in the form of sockets for reception of plugs.

Also for the purpose of compactness, and casing 11, which houses a switch control to be later described, is mounted upon the panel 1, and a socket 12 provides for the insertion of an appliance plug.

Figure 2 diagrammatically illustrates one arrangement of the electric circuits and associated mechanical elements, and it will be noted that the arms 6 and 7 are connected with a circuit 13, which passes through a transformer 14 connected with a supply circuit 15. In the event that the supply circuit is of 110 or 220 volts, the transformer 14 is designed to reduce the current through the circuit 13 to either six or eight volts, and should the circuit 13 be fed by a storage battery or low voltage supply line, naturally the transformer 14 may be eliminated.

As heretofore explained, the panel terminals 9 are electrically connected with the chronometer contacts 4 that represent the hours throughout a day, while the panel terminals 10 are connected with the chronometer contacts 5, representing the minutes of an hour. It will be apparent that

the chronometer may be so designed as to vary the significance of the contacts to represent different periods of time, such as hours and days, days and weeks, and so on, without departing from the principle of the invention.

The socket 12 adapted to receive a plug of an appliance line, is connected with a high voltage circuit 16, which is controlled by a switch 17, that in turn is actuated by a pair of solenoids 18 and 19 respectively, the solenoid 18 serving to close the switch, while the solenoid 19 opens the same.

Each solenoid is provided with a pair of lead wires, the lines 20 serving the "on" solenoid 18, while the leads 21 supply the "off" solenoid 19.

The leads 20 and 21 are provided for insertion in the panel sockets 9 and 10, and to simplify the solenoid circuits and eliminate the necessity of additional panel sockets, one of the lines 20 and 21 are connected as shown in Figure 2.

In operation, plugs 22 provided on the ends of the solenoid leads are inserted into selected panel sockets to determine the time of opening and closing the switch 17 for controlling the high voltage circuit 16. Because of the large number of sockets available on the panel board, it will be apparent that a plurality of electric switches, controlling additional high voltage circuits may be plugged in at the same time.

In the arrangement shown in Figure 2, one of the leads 20 from the "on" solenoid 18, is plugged into a panel socket 9 connected with the chronometer contact 4 representing 2 o'clock p. m., while the other lead is inserted in the panel socket 10 connected with the chronometer contact 5 representing 25 minutes. Consequently, when the wiper 8 of the arm 6 engages the 2 p. m. contact, and the arm 7 reaches the 25 minutes contact, current from the circuit 13 will energize the "on" solenoid 18 to close the switch 17, which in turn completes the high voltage circuit 16 to operate any device connected therein.

At the same time one of the leads 21 from the "off" solenoid 18 has been plugged into a panel socket 9 connected with one of the chronometer contacts 4 representing 4 p. m., while the other lead 21 is plugged into one of the panel sockets 10 connected with a chronometer contact 5 representing 20 minutes. Consequently, when the arms 6 and 7 after further rotation, engage the chronometer contacts represent 4:30 p. m., the solenoid 19 is energized to open the switch 17 and break the high voltage circuit 16, cutting off operation of the appliance or electrical device connected in the circuit.

In Figures 3 and 4, the invention is shown as applied to a radio receiving set, dialing of which is accomplished by conventional push buttons arranged to select different sending stations.

The mechanism illustrated is carried by a frame consisting of front and rear plates 23 and 23' respectively, which are suitably mounted within a receiving cabinet, not shown. In the type of control (not shown) to which the invention is applied, selection of various sending stations is accomplished by means of pusher plates 24 having shanks 25 projected through a panel 26 carried by the front plate 23, the shanks being provided with suitable push buttons 27. The pusher plates 24 are provided with spaced upper and lower arms 28 and 29 respectively, the lower arms 29 being guided in a suitable support 30.

Mounted upon the plates 23 and 23' above the pushers 24, are pairs of alined solenoids 31, each pair serving to effect reciprocation of one of the pushers 24. Cooperating with each pair of solenoids is an armature 32 provided with a depending finger 33, having a pin and slot connection with an oscillating lever 34, the lower end of which is bifurcated to straddle a pin 35 carried by the upper arm 28 of the pusher 24. The oscillating arms 34 are pivotally mounted on a bar 36, carried by a bracket 37 connected with the plates 23 and 24.

Each pair of solenoids 31 correspond to the "on" and "off" solenoids 18 and 19 heretofore described, and are provided with leads 20 and 21, which are inserted into selected panel sockets 9 and 10 to determine the time of energization of the solenoids for reciprocating the pushers 24 to effect both selection and cut out of the sending stations.

From the foregoing explanation considered in connection with the accompanying drawings, it will be apparent that a comparatively simple apparatus has been devised, which is operable upon a low voltage current for controlling a high voltage circuit, in which various appliances and electrical devices may be connected.

Attention is directed to the fact that one of the main advantages resulting from the present invention, resides in the simple manner in which the time interval control is accomplished and the wide range of flexibility of the apparatus.

I claim:

In an apparatus for controlling an electric high voltage circuit, a chronometer having rotary hour and minute arms, and two series of concentric groups of stationary arm contacts carried by the chronometer, the combination of a panel board provided with two series of terminal elements corresponding to the arm contacts carried by the chronometer and electrically connected to said arm contacts, a low voltage circuit connected to the chronometer arms, a high voltage circuit for operating electrical devices, a switch for controlling said high voltage circuit, a pair of solenoids for closing and opening said switch and a pair of plugs electrically connected to each solenoid adapted to be selectively coupled to pairs of the terminals of each series.

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