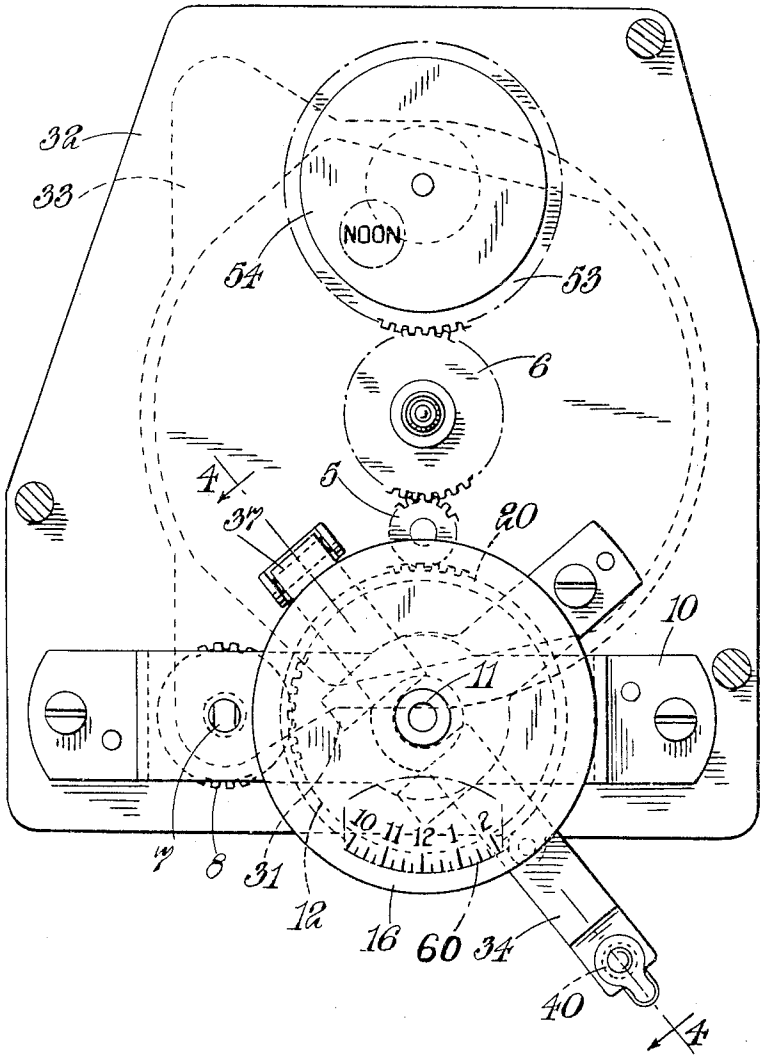
Feb. 28, 1950 J. W. ELLIS 2,499,270

CLOCK CONTROLLED SWITCH GEAR

Filed May 29, 1947 6 Sheets-Sheet 1

Fig. 1.



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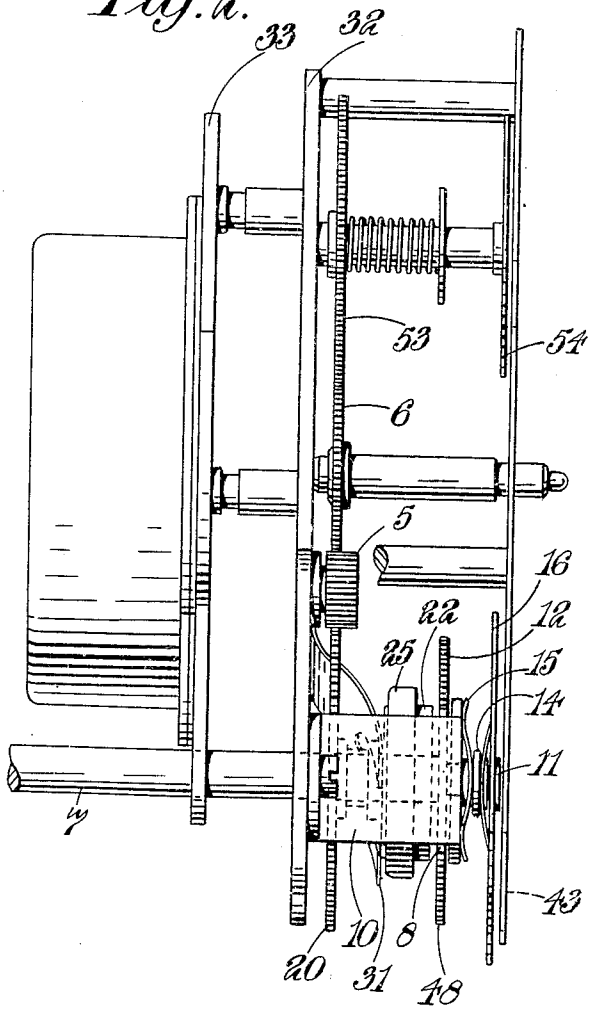
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CLOCK CONTROLLED SWITCH GEAR

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Fig. 2.



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CLOCK CONTROLLED SWITCH GEAR

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Fig. 3.

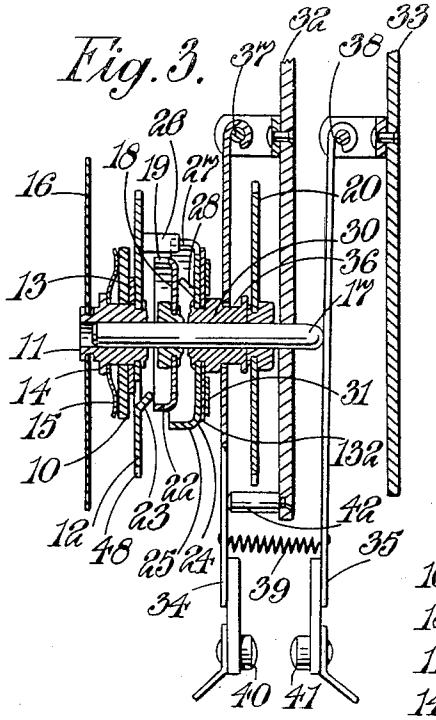


Fig. 4.

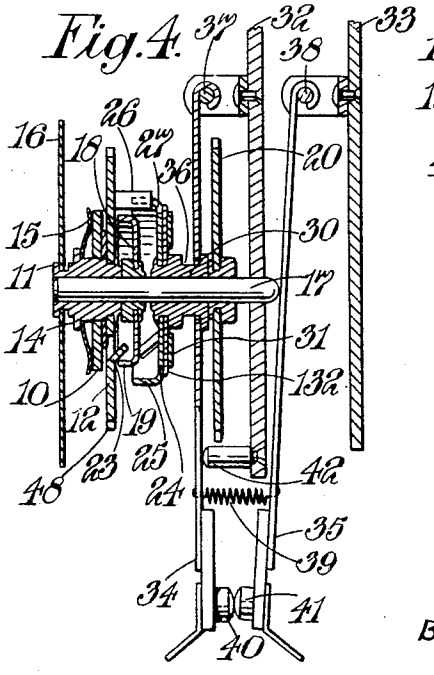
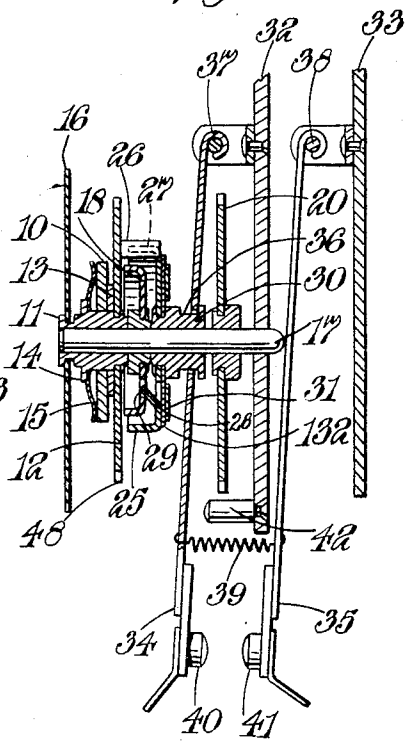


Fig. 5.



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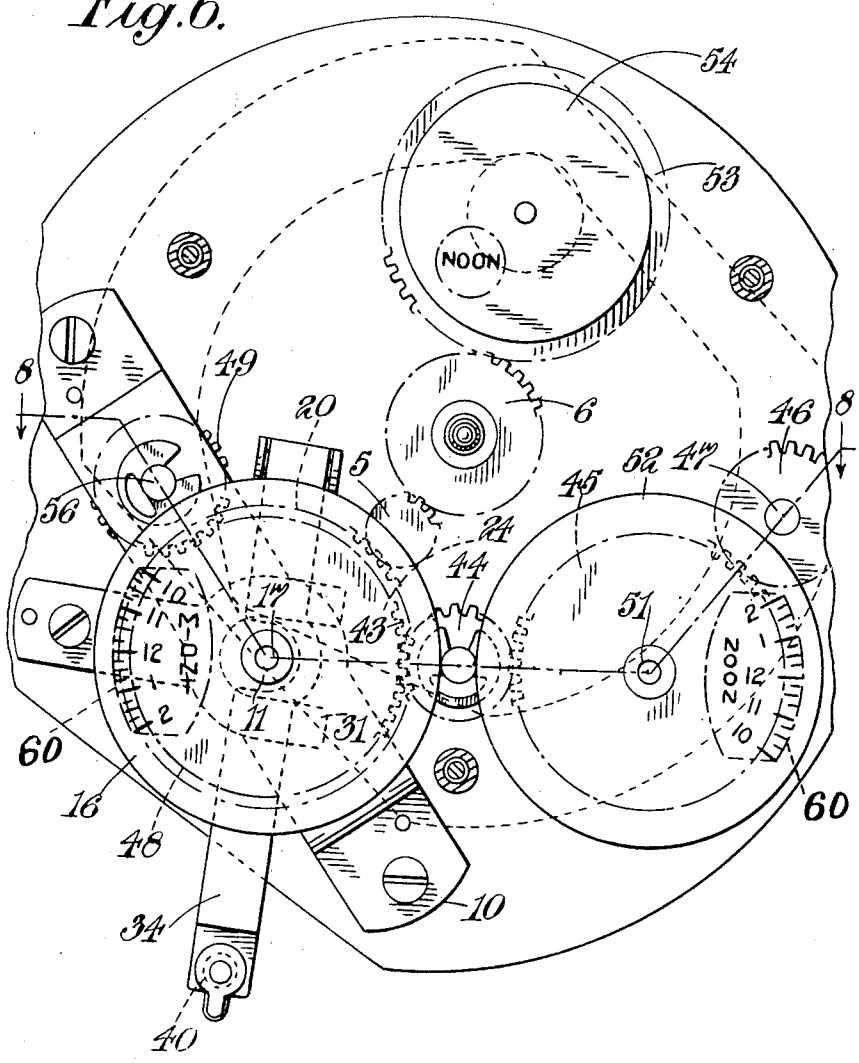
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CLOCK CONTROLLED SWITCH GEAR

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Fig. 6.



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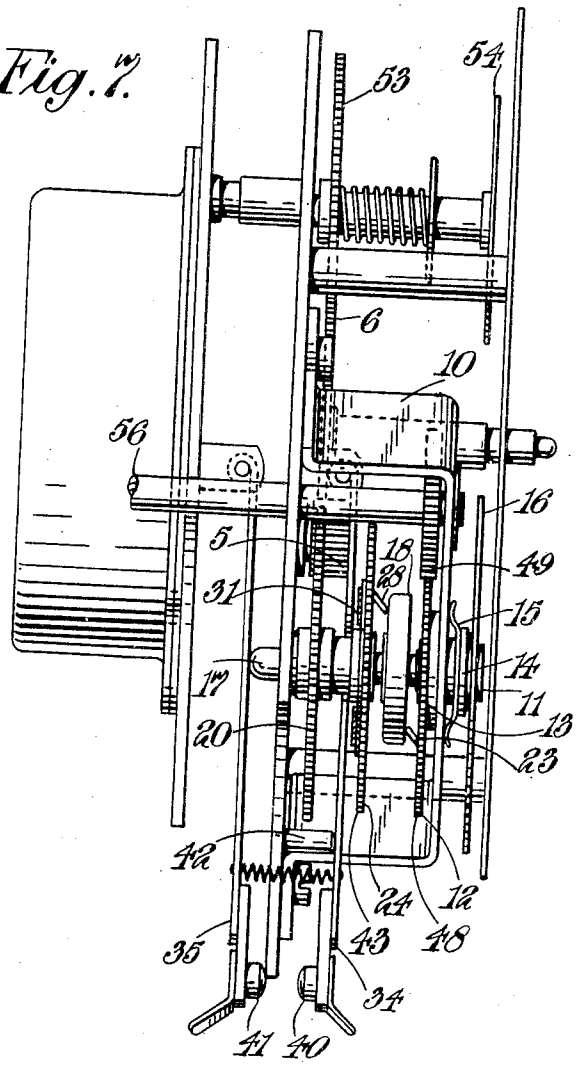
By Watson, Cole, Grindle, + Watson

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Fig. 7.



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CLOCK CONTROLLED SWITCH GEAR

Filed May 29, 1947 6 Sheets-Sheet 6

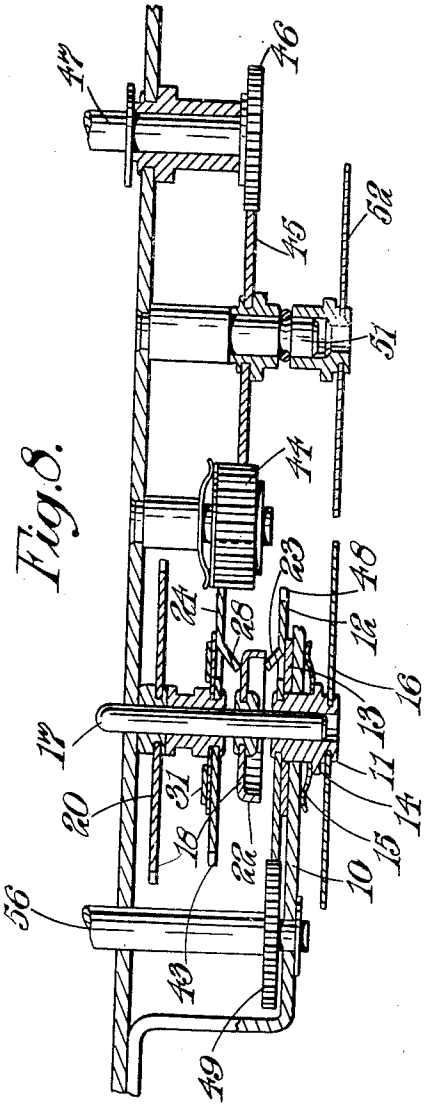


Fig. 8.

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Patented Feb. 28, 1950

2,499,270

UNITED STATES PATENT OFFICE

2,499,270

CLOCK-CONTROLLED SWITCH GEAR

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Application May 29, 1947, Serial No. 751,480
In Great Britain June 6, 1946

6 Claims. (Cl. 200—38)

1

This invention relates to clock-controlled switch gear of the kind provided with setting means, whereby the times at which the switch gear may be opened and closed may be preselected, and is particularly applicable to clock-controlled electric switches for automatically starting and stopping radio sets, thereby enabling a programme, selected in advance, to be switched on at the appropriate time.

According to this invention, a clock-controlled switch gear of the kind referred to is characterised in that the switch operating mechanism comprises an operating element driven by the clock, two control members associated with the operating element and adjustable either independently or together relatively thereto, one controlling the closing movement and the other the opening movement of the switch gear, which controlling members and operating element are arranged to impart quick opening and closing movements to the switch. This quick opening and closing movement is of particular importance in connection with switch gear for radio sets, since it prevents any protracted crackling noises and sparking of contacts.

The aforesaid switch gear may either comprise two switches independently and respectively controlled by the two control members or the switch gear may comprise one set of contacts differentially operated by both said controlling members.

The aforesaid driven operating member may comprise a rotatable cam member and said two control members comprise cam followers adjustable around the cam member and bearing on different parts thereof, which cam is so shaped as to effect rapid relative movement between it and said followers at pre-selected times. Preferably, said relative movements are arranged to be axial.

In one form of construction according to this invention, one of said cam followers is fixed against axial movement and engages a cam track on one side of an axially movable and rotatable cam, the opposite side of which cam is provided with another cam track engageable by the other follower which is also axially movable, which cam member and latter follower are so connected to the switch gear that the movement of one closes the switch and the subsequent movement of the other opens it.

The arrangement may be such that the first action of the cam results in both it and the latter cam follower moving axially together, whereas the second action of the cam results only in said latter cam follower moving axially,

2

which follower is connected through a lost-motion device to the switch gear so that its second part of movement only operates the switch.

In one form of construction, the aforesaid switch comprises two contact-carrying blades spring-urged towards one another in the same direction as said axial movement, one of which blades is engaged by an operating member connected to said cam member so as to move axially therewith and the other of which blades is engaged through a lost-motion device by second operating member connected to the latter, i. e., second named cam follower so as to move axially therewith but so as to be movable both axially and rotationally relatively to the first said operating member and spring means urging said latter cam follower axially against the cam member whereby after an initial rotational movement of the cam member both it and the first operating member and the second cam follower are moved axially under the control of the spring means and of the first follower, and thus the first said control blade is moved towards the other which remains stationary due to the lost-motion device, whereafter continued rotation of the cam member eventually results in the second cam follower being moved axially thereby moving the second contact blade away from the first.

The aforesaid cam followers may either be arranged to be independently adjustable relatively to the cam member or may be coupled together so as to be adjustable together. In the latter case, they are so relatively disposed that the switch remains closed always for the same time irrespective of the time of opening. Such an arrangement is found to be suitable for a radio set where the switch may be arranged to remain closed say, for a period of two hours.

The following is a more detailed description of two alternative constructions of a clock-controlled switch for a radio set, reference being made to the accompanying drawings, in which;

Figure 1 is a plan view of one form of clock-controlled switch;

Figure 2 is a side elevation of the arrangement shown in Figure 1;

Figures 3, 4 and 5 are sections on the line 4—4 of Figure 1 showing different positions of the control device;

Figure 6 is a similar view to Figure 1 of an alternative arrangement;

Figure 7 is a side elevation of the arrangement shown in Figure 6; and

Figure 8 is a section on the bent line 8—8 of Figure 6.

Rotatably mounted in an outer plate 10 of the clock frame is a bush 11 which is fixed against axial movement. Fixed to this bush on the inner side of said plate is a setting disc 12, a friction washer 13 being arranged between it and said plate. The setting disc 12 is provided with teeth 48 on its periphery which are engaged by a pinion 8 on a hand-operated adjusting spindle. The outer end of the bush is provided with a shoulder 14 and a spring washer 15 is arranged between said shoulder and the plate so as to press the friction washer against the setting disc. The outer end of the bush is provided with a circumferential groove in which is secured an indicating disc 16 marked with a 24-hour clock scale, the indicating disc being held frictionally in said groove, so as to rotate with the setting disc 12. Extending through said bush is a rotatable operating spindle 17 to which is fixed a cam member 18 and a 24-hour wheel 20 which is driven from a 12-hour pinion 6 of the 12-hour motion wheel of the clock through an intermediate pinion 5, the minute pinion driving the aforesaid 24-hour wheel and the normal 12-hour wheel of the clock mechanism. The cam member 18 comprises a disc having a rim portion 22 directed towards the aforesaid setting disc 12, which setting disc has a lug 23 pressed out of it so as to rest against said rim portion. The rim portion is cut away to provide a notch 19, one face of which is parallel to the axis of the spindle while the other face may be arranged at a comparatively large angle in relation to the first said face, the arrangement being such that the aforesaid lug 23 on the setting disc 12 may move rapidly into the notch after passing beyond the first said face. Encircling said spindle between said cam member and 24-hour wheel is a second setting disc 24 rigidly fixed to a bush 30 and having a rim portion 25 of larger diameter than the rim of the cam member, which rim portion is connected to the first said setting disc by a lug 26 on the setting disc which engages with a slot 27 in the rim 25 of the second setting disc, thereby preventing relative rotational movement between them but permitting axial movement. A lug 28 is pressed out of the second setting disc 24 and bears on the inner face of the cam member 18, which face is provided with a slot 29 or recess into which said lug may enter and is so shaped that the entry may be rapid. The lug 28 is arranged at a predetermined angular distance in advance of the lug 23 representing the time during which the wireless is required to be in operation. The second setting disc is fixed to the bush 30 which is rotatable on said spindle and which extends inwardly from the setting disc. The forked limbs 31 of a blade spring loosely straddle the bush and bear against a washer 132 disposed between them and the inner face of the second setting disc 24 urging both it and the cam member 18 towards the first setting disc 12. Pivotally mounted on the plates 32 and 33 of the clock frame are two contact blades 34 and 35 so arranged that the latter contacts with the end of the aforesaid spindle 17, whereas the former is apertured so as to encircle a groove 36 in the aforesaid bush 30 fixed to the second setting disc 24. The pivot axes 37, 38 of the two contact blades are arranged transversely to the axis of the spindle and spaced apart in a direction parallel with said spindle. The free ends of the contact blades are drawn together by a helical tension spring 39. The aforesaid groove 36 in the bush 30 on the second setting disc is of greater width than the thickness of the contact blade, thereby

allowing lost motion between these parts for the purpose described earlier in the specification. When neither of the lugs 23, 28 is in a notch or recess in its cam member, the operating spindle 17 is in such a position as to maintain apart the contact arms 34, 35 as shown in Figure 3, and with said spring 39 under tension, the contact arms being provided with contacts 40, 41 at their extreme ends. In this position the contact arm 34 engaging said bush 30 is located by a stop 42 disposed on a frame member 32 of the clock between the two contact arms. When the notch 19 in the cam member 18 comes opposite the lug 23 on the first setting disc 12, the resulting axial movement of the cam 18 is imparted to the spindle 17, thereby causing the innermost contact arm 35, under the action of the tension spring 39, to bring its contact 41 into engagement with the contact 40 on the other arm 34, as shown in Figure 4. At the same time the second setting disc moves axially under the action of the spring fork 31, bringing the inner wall of the groove 36 in the bush fixed to it into contact with the outermost contact arm 34. When the lug 28 on the second setting disc 24 enters the recess of aperture in the cam member 18, further axial movement of the second setting disc 24 takes place under the action of the spring fork 31, whereupon the inner wall of the groove 36 of the bush 30 moves the outer contact arm 34 with its contact 40 away from the other contact 41, as shown in Figure 5. Continued rotation of the cam member 18 may gradually bring the parts into their initial positions.

As in the construction described with reference to Figures 1–5, the indicating disc 16 bearing the indicating scale is fixed to a part which may be rotated around the operating shaft 17 by means of a setting disc or gear wheel 12 which has peripheral teeth engaged by the hand operated pinion 49. The gear wheel 20 which is driven by the clock mechanism is keyed to the operating spindle 17 and the driven cam member 18 is also keyed to this shaft or spindle. The 24-hour markings are shown as cooperating with a window in the clock casing, indicated by chain lines in Figures 1 and 6. The margins of the window may carry a lubber line with reference to which the graduations on the disc may be read.

A second 24-hour wheel 53 may be arranged to engage a twelve-hour wheel 6 driven by a pinion 5 of the clock and may be provided with a disc 54 having p. m. and a. m. indications viewable through another window.

In the arrangement shown in Figures 6 to 8, the mechanism is similar, but instead of the second setting disc 24 being provided with a rim coupled to the first setting disc 12, it is provided with teeth 43 on its perimeter which are engaged by a pinion 44. This pinion is adjustably rotated by a train of wheels 45 and 46, the latter of which is provided with an adjusting spindle 47 while the former has a spindle 51 to which is secured an indicating disc 52. Similarily, the first setting disc 12 is provided with teeth 48 engaged by a pinion 49 on an adjusting spindle 56. By these means, the length of time during which the contacts 41 and 42 are closed may be adjusted, the indicating disc 52 showing the time when the contacts are required to be opened.

In either of the arrangements referred to above, instead of the contact arms 34 and 35 being differentially controlled by the members 18 and 24, each of those members might be arranged independently to control separate switches.

I claim:

1. A clock controlled switch gear comprising an axially movable rotatable cam member driven by the clock mechanism and having two control cam tracks thereon, two cam followers rotatably adjustable about the axis of the cam member and arranged one on either side thereof, one of which is fixed against axial movement and the other axially movable, two electric contacts movable towards and away from one another, means transmitting the axial movement of the rotatable cam member in one direction to separate the contacts and means transmitting the axial movement of said cam follower in one direction to close the contacts.

2. A clock controlled switch gear comprising an axially movable rotatable cam member driven by the clock mechanism and having two control cam tracks thereon, two cam followers rotatably adjustable about the axis of the cam member and arranged one on either side thereof, one of which is fixed against the axial movement and the other axially movable, two electric contacts movable towards and away from one another, means transmitting the axial movement of the rotatable cam member in one direction to one contact so as to move it away from the other contact and means transmitting axial movement of said axially movable cam follower in one direction to the other said contact so as to move it towards the first said contact.

3. A clock controlled switch gear comprising an axially movable spindle rotated by the clock mechanism, a cam member fixed to said spindle, and having two control cam tracks thereon, two cam followers rotatably adjustable about said spindle, one of which cam followers is fixed against axial movement and the other of which is axially movable, two electric contacts movable towards one another, means transmitting the axial movement of the rotatable cam member in one direction to one contact so as to move it away from the other contact and means transmitting axial movement of said axially movable cam follower in one direction to the other said contact so as to move it towards the first said contact.

4. A clock controlled switch gear comprising an axially movable spindle, rotated by the clock mechanism, a cam member fixed to said spindle and having inner and outer cam tracks thereon, two cam followers mounted on said spindle one on either side of the cam member and rotatably adjustable about said spindle, one of which cam followers is fixed against axial movement and the other of which is axially movable in relation to said spindle, spring means engaging said latter cam follower and urging it towards the cam member and other cam follower, two electric contacts movable towards and away from one another, one of which contacts is operated by axial movement of the spindle and the other by the axially movable cam follower.

5. A clock controlled switch gear comprising an axially movable spindle rotated by the clock mechanism, a cup shaped cam member fixed to said spindle and having one cam track formed on its rim and another on the bottom wall, two rotatably adjustable disc-like cam followers mounted on said spindle so as to permit the spindle to rotate therein, one of which discs is fixed against axial movement and is provided with a projection on the face thereof which engages the cam track on the rim, while the other is provided with a hub portion axially slidable on the spindle and is provided with a projection which engages with the cam track on the bottom wall, one pivotally mounted contact blade is engaged by said spindle and the other pivotally mounted contact blade by said hub, and spring means engaging the cam follower having the hub so as to move it and the cam towards the other cam follower.

6. A clock controlled switch gear comprising an axially movable rotatable cam member driven by the clock mechanism and having two control cam tracks thereon, two interconnected cam followers rotatably adjustable about the axis of the cam member and arranged one on either side thereof, one of which is fixed against axial movement and the other axially movable, two electric contacts movable towards and away from one another, means transmitting the axial movement of the rotatable cam member in one direction to separate the contacts, means transmitting the axial movement of said cam follower in one direction to close the contacts, a rotatable adjusting member operating said cam followers, and indicating means associated with said adjusting member.

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