

(No Model.)

2 Sheets—Sheet 1.

R. W. ROLLINS.

ELECTRIC CLOCK CONTROLLED SWITCH MECHANISM.

No. 605,915.

Patented June 21, 1898.

Fig. 1.

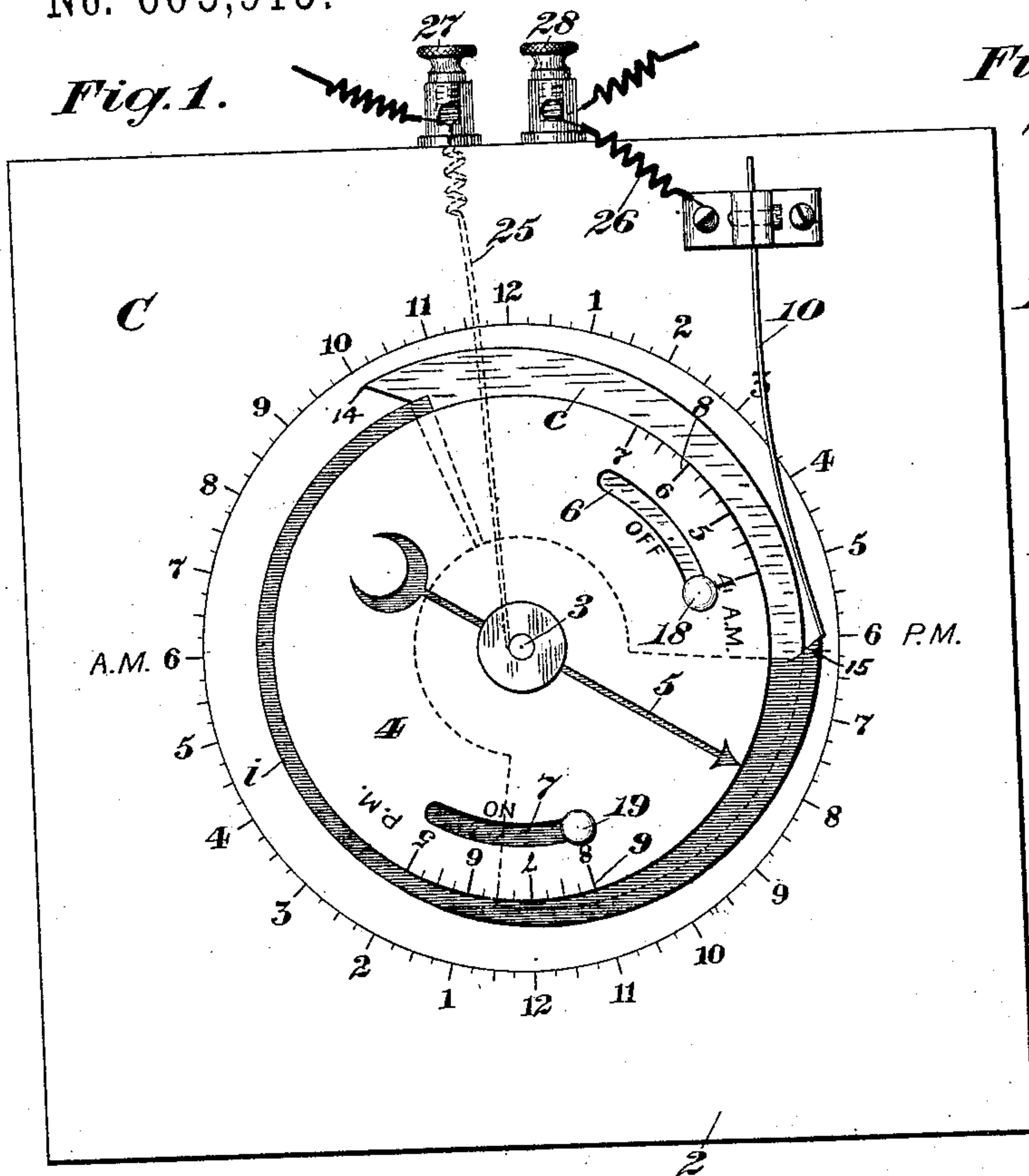


Fig. 2.

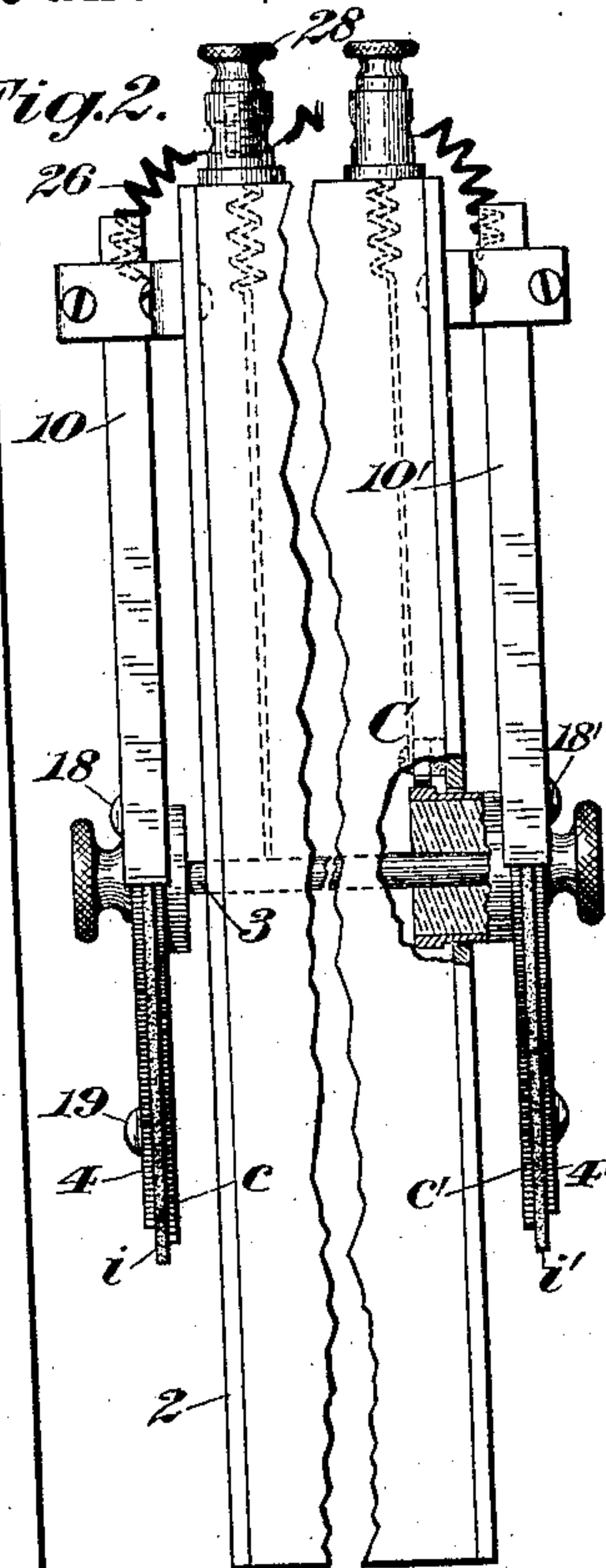


Fig. 3.

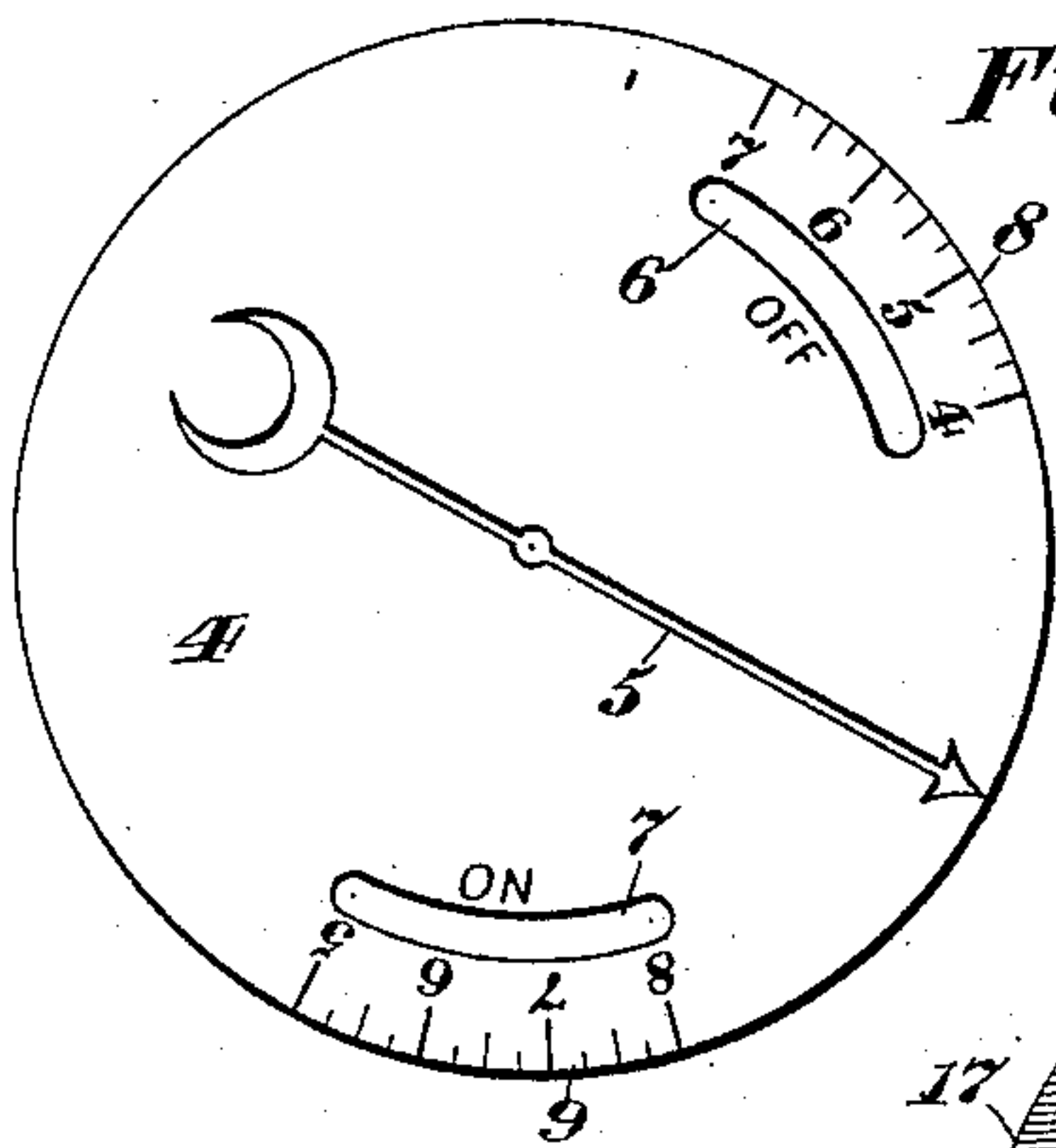


Fig. 4.

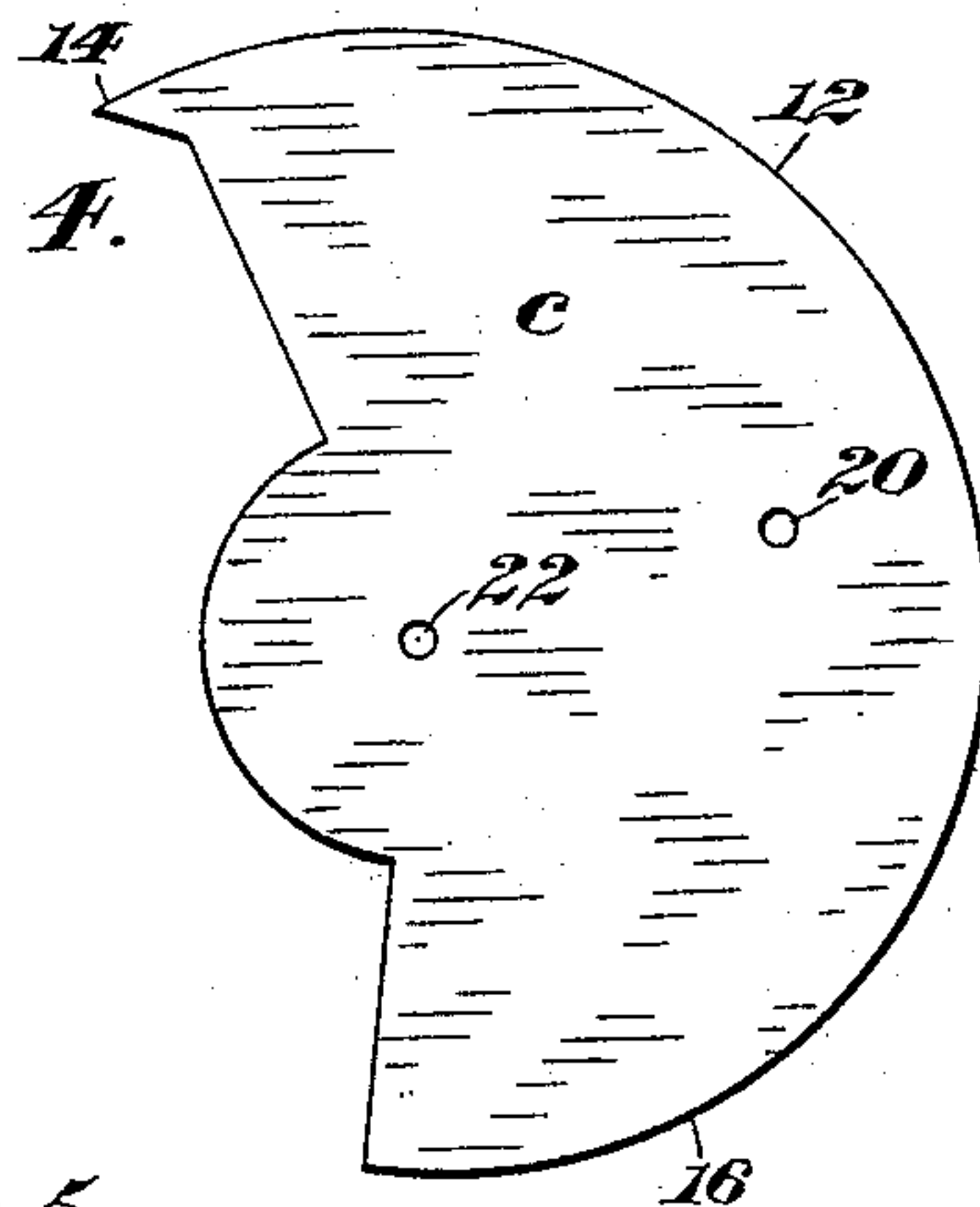
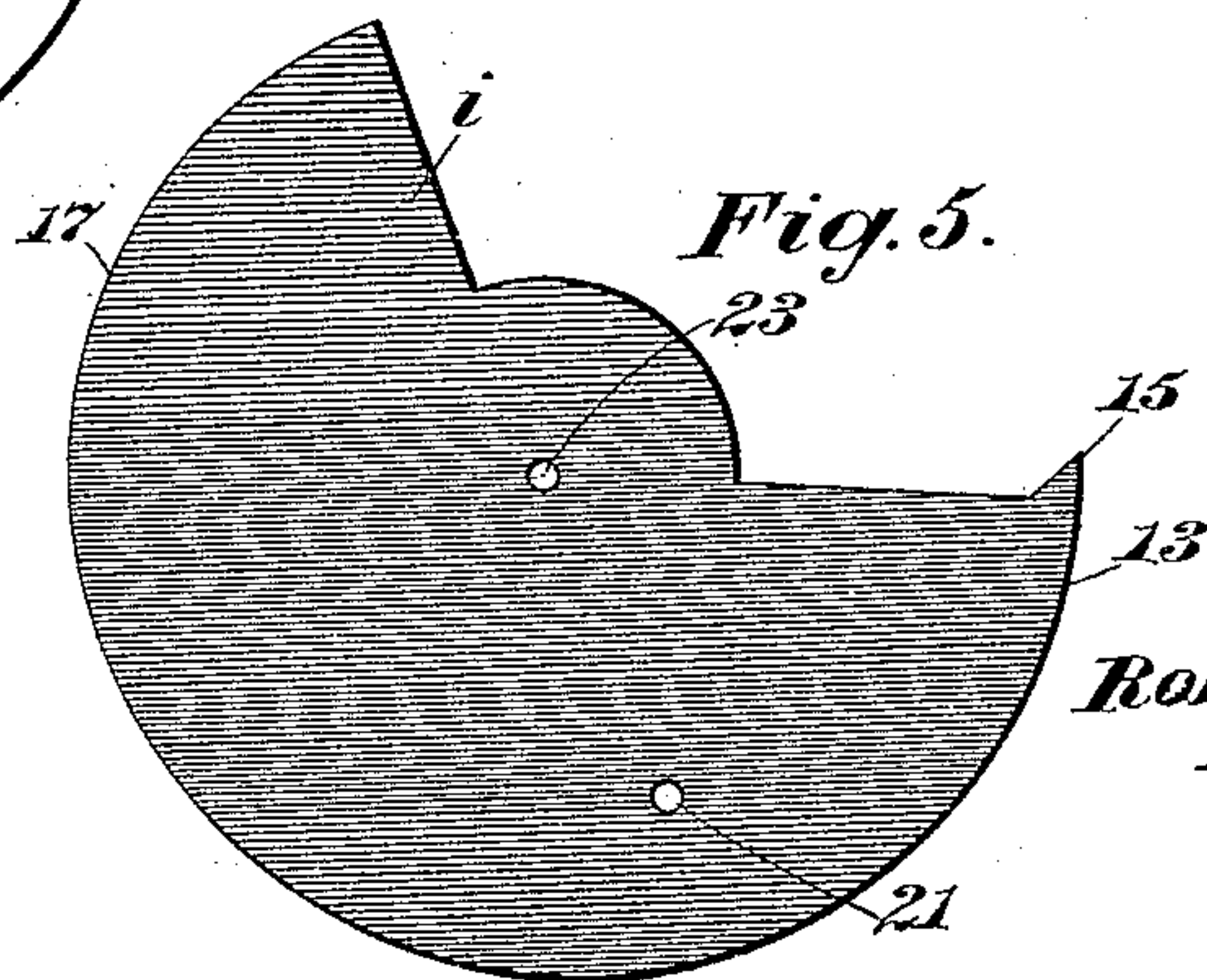


Fig. 5.



Witnesses:

D. S. Hawkins.

Fred. J. Gole.

Inventor:

Robert W. Rollins.

By his Attorney,

F. H. Richards.



(No Model.)

2 Sheets—Sheet 2.

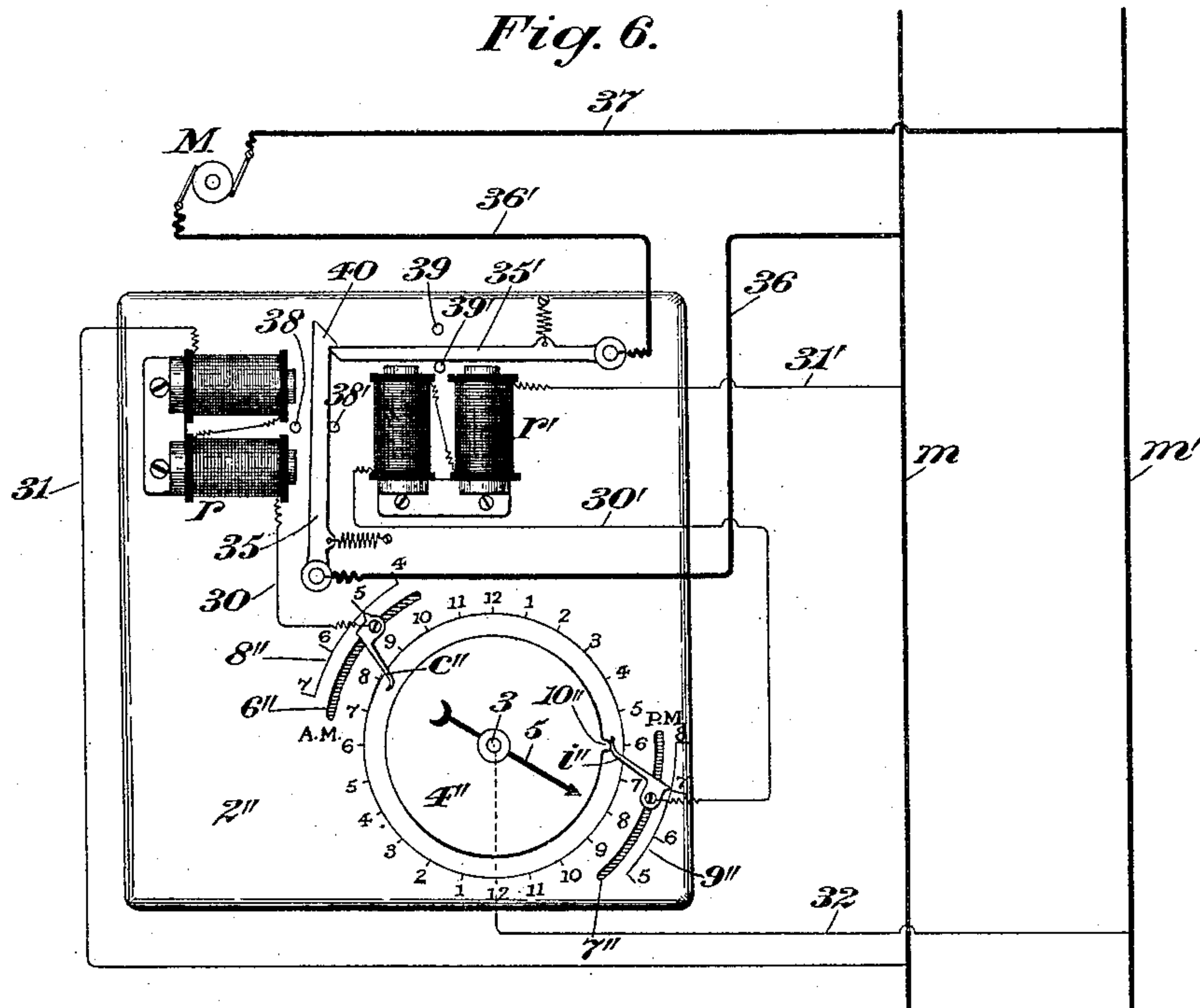
R. W. ROLLINS.

# ELECTRIC CLOCK CONTROLLED SWITCH MECHANISM.

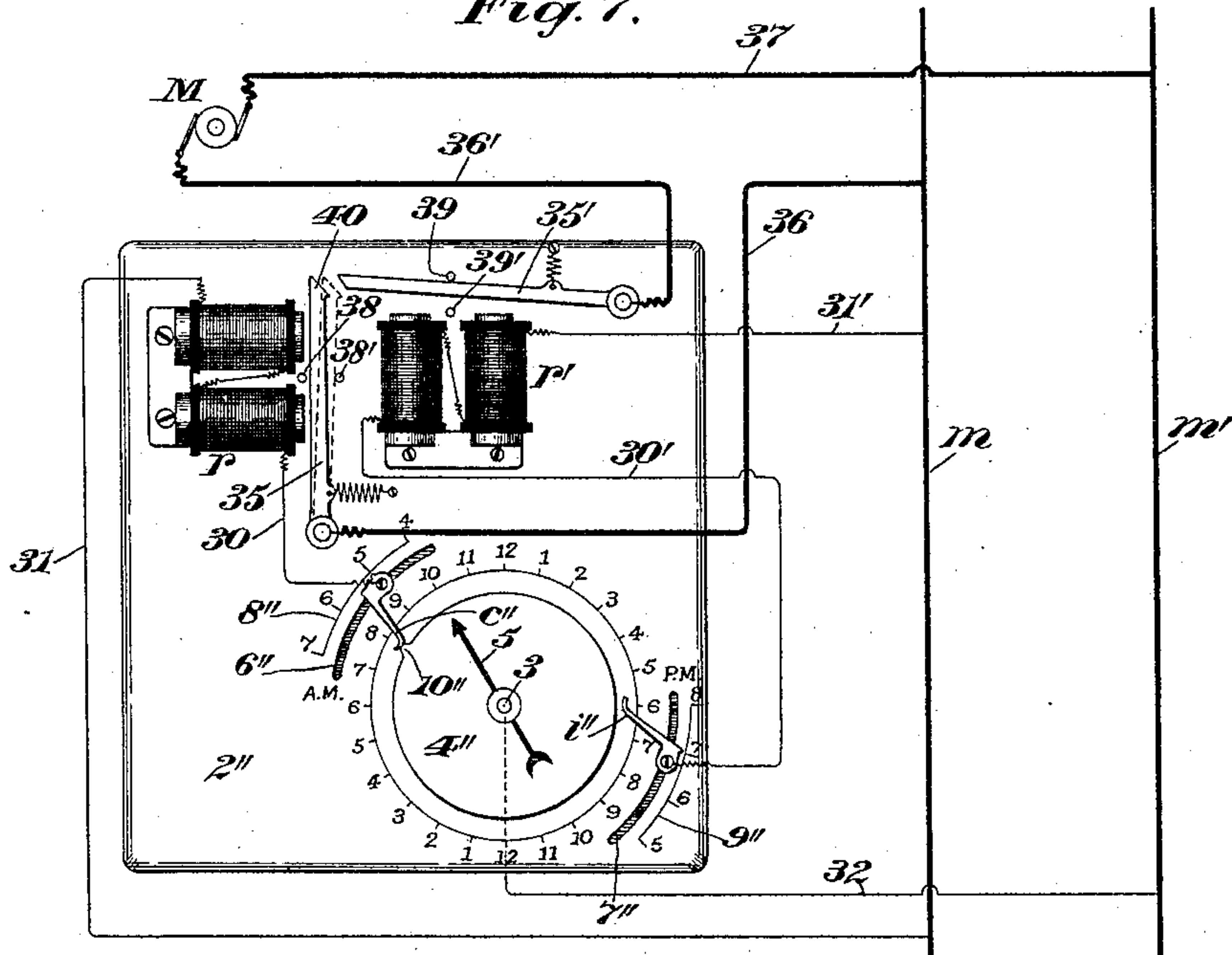
No. 605,915.

Patented June 21, 1898.

*Fig. 6.*



*Fig. 7.*



*Witnesses:*

K. S. Hawkins.

Fred. J. Gole.

*Inventor:*

*Robert W. Rollins.*

*By his Attorney,*

F. A. Richards.



# UNITED STATES PATENT OFFICE.

ROBERT W. ROLLINS, OF HARTFORD, CONNECTICUT.

## ELECTRIC CLOCK-CONTROLLED SWITCH MECHANISM.

SPECIFICATION forming part of Letters Patent No. 605,915, dated June 21, 1898.

Application filed September 27, 1897. Serial No. 653,184. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT W. ROLLINS, a citizen of the United States, residing in Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Electric Clock-Controlled Switch Mechanism, of which the following is a specification.

This invention relates to electric clock-controlled switch mechanism adapted for automatically making or breaking an electric circuit at a predetermined time, and more particularly it relates to clock-controlled switch mechanism of that class adapted for automatically making and breaking an electric circuit at predetermined hours of the day or night for the purpose of turning the current onto or shutting it off from the mains of a city-light circuit or power-circuit.

One of the principal features of my invention is the employment of a clock for this purpose in which two circuit-controllers which are adjustable separately relatively to each other and connected to one side of the circuit in such a manner as to control, respectively, the making and breaking of the latter cooperate with a third circuit-controller connected with the other side of the circuit and are shiftable for adjustment in suitable slots in indicating means for showing the time at which the circuit should be made and broken, at least one of these circuit-controllers being rotated by suitable actuating means or clockwork in such a manner that the indicator or dial and the adjustable circuit-controllers will move in unison after the proper adjustments of the circuit-controlling members have been effected.

In order that my improved clock-controlled switch mechanism may be employed in connection with two circuits to regulate the making and breaking of the same independently, I may also employ a switch mechanism of duplex construction, the two circuit-controlling mechanisms thereof being independently regulable in such a manner that a city-light circuit may be opened and closed independently of the making and breaking of another circuit, such as a power-circuit or multiple inclosed long-burning eighty-volt arc-light circuit.

My improved switch mechanism may also

embody as an essential feature thereof a pair of relays the circuits of which will be made and broken by the action of the clock-regulated circuit-controllers, while the armatures of the relays may cooperate and preferably be capable of interlocking at their free ends to close the main circuit, they being, of course, releasable on the breaking of such circuit.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a clock-controlled switch mechanism, illustrating the preferred embodiment of my invention. Fig. 2 is a broken edge view of the same, illustrating such a switch mechanism of duplex construction. Fig. 3 is a front or side view of the rotary indicating-dial of the clock-controlled switch mechanism shown in Fig. 1. Fig. 4 is a similar view of a conducting circuit-controlling cam, which will be described in detail hereinafter. Fig. 5 is a similar view of a corresponding insulating-cam. Fig. 6 illustrates, partly in diagram and partly in elevation, a clock-controlled switch mechanism connected in parallel of the main of a street-circuit, illustrating a branch circuit closed; and Fig. 7 is a similar view showing such branch circuit open.

Similar characters designate like parts in all the figures of the drawings.

Referring first to Figs. 1 to 5, inclusive, C designates a case or support of suitable construction upon and within which the driving means or clockwork (not shown in detail) and the several parts of the switch mechanism controlled by the clockwork may be carried. The front of this case is closed, substantially in the usual manner, by a face-plate, such as 2, which may have thereon time-indications corresponding to the twenty-four hours of the day.

The clockwork or driving means for operating one or more of the circuit-controlling devices may be of any suitable type, having the usual arbor 3, on which, in these views, the indicating means or indicating-dial is mounted, so as to rotate in unison with said arbor. This dial is indicated by 4 and may have therein a slot 5, in the form of a pointer or hand, which will point toward the indications on the face-plate 2 to show the time of day and setting at which the circuit should be



made or broken. This dial is slotted, in the present instance, for the purpose of adjusting one or more circuit-controlling members and in the preferred construction has two curved slots, such as 6 and 7, disposed in concentric arcs the centers of which are in the axis of rotation of the arbor 3. Adjacent to each of these slots is a scale or index by means of which the adjustments of those members of the switch mechanism which control the setting of the parts for different hours of the day may be effected. These two scales or time-indicating devices are designated herein by 8 and 9, respectively.

In the construction illustrated in Figs. 1 to 5 a fixed contact-arm, preferably in the form of a yielding circuit-controller or contact member, such as 10, is intended to make sliding contact with a pair of coöperating circuit-controllers carried for movement in unison with the dial 4. These last-mentioned circuit-controllers are preferably in the form of cams having peripheral cam-faces eccentric to the axis of rotation of the dial 4, said circuit-controlling cams being designated herein by *c* and *i*. The former of these cams may be made of conducting material, while the latter will be, preferably, of insulating material throughout. As to the general form thereof they are substantially similar in construction. The cam-faces of these two circuit-controllers are designated, respectively, by 12 and 13, the extreme end 14 of the rise of the cam-face 12 being at the same distance from the center of movement of the cam *c* as the corresponding point 15 of the cam-face of the insulating-cam *i* is from its center of movement. That part of the periphery of the insulating circuit-controller *i* which is designated by 17 and is concentric with the center of movement thereof is struck from a longer radius than the corresponding concentric face 16 of the conducting circuit-controller *c*.

The circuit-controlling members *c* and *i* may be secured to the dial 4 in any suitable manner, so as to move in unison therewith, while being capable of adjustment thereon with respect to the dial and independently with respect to each other. In this case studs or rivets, such as 18 and 19, may work in the slots 6 and 7 and pass through perforations 20 and 21 in the members *c* and *i* and be secured thereto.

Of course the circuit-controlling members *c* and *i* should turn freely with respect to the dial for the purpose of adjustment, and in the construction shown they have openings 22 and 23, through which the arbor 3 may be passed to permit the cams to turn on such arbor.

It will be obvious by referring to Fig. 1 that the insulating-disk *i* may be adjusted to cause the making of the circuit at any time between five o'clock p. m. and eight o'clock p. m. by manipulating the stud 19 in the opening 7 of the dial 4, while the cam *c* may be adjusted by the stud working in the slot 6 to

break the circuit at any time between four o'clock a. m. and seven o'clock a. m. While this range of adjustment is sufficient for all practical purposes, yet by making the slots 6 and 7 of the proper lengths any desired range of adjustment may be secured.

It being understood that the dial will be rotated continuously by the clockwork (not shown) within the case C or step by step in any suitable manner it will be clear that the contact-arm 10 will ride on the face of the insulating-cam *i* until it reaches the point 15, when it will be released and make the circuit, with the conducting-cam *c*, at the proper time, determined by the adjustment of the cam *i*.

As shown in Fig. 1, a circuit is made when the hand 5 points to "8 p. m." on the face-plate 2, and the contact-arm 10 will of course ride off from the point or top 14 of the cam-face 12 of the conducting-cam *c* and break the circuit at four a. m., as shown by the adjustment of the cam *c*.

The contact-arm 10 and the arbor 3 should of course be connected to opposite sides of the circuit, conductors 25 and 26 being shown herein secured to the usual binding-posts 27 and 28 on the case C.

In Fig. 2 I have illustrated a clock-controlled switch mechanism of duplex construction adapted for controlling two circuits, and as all of the parts at the right-hand side thereof are duplicates of the corresponding parts shown at the left-hand side thereof, and also shown in Fig. 1, a detailed description of these duplicate parts will be unnecessary, prime-marks being employed to designate those corresponding parts of the switch mechanism shown at the right in Fig. 2, which are not referred to more particularly herein.

Obviously the circuit-controlling mechanisms thereof should be capable of regulation independently, as they control different circuits, and this regulation will of course be obtained by the independent adjustments of the respective conducting and insulating cams at opposite sides of the clock. Of course after adjustment thereof all of the cams and the two dials will rotate in unison, owing to the fact that they are carried by the same arbor 3 from which one set is insulated.

The construction shown in Fig. 2 is intended more particularly for use in connection with a three-wire system, in which either of the outside mains may be connected in a circuit with the neutral conductor and employed in the usual manner or, if desired, as a two-wire system when the other outside conductor is cut out.

In Figs. 6 and 7 I have illustrated a modification of the invention in which the contact-arm 10'' is rotatable with a dial 4'' and makes and breaks the branch circuit (hereinbefore referred to) at the proper time by contact with a pair of circuit-controllers or contact-arms *c''* and *i''*, corresponding to the circuit-controlling cams *c* and *i*. The arm *i''* controls the closing of the circuit, while the



arm  $c''$  governs the breaking thereof, and both of these circuit-controllers are adjustable in substantially the same manner as the cams  $c$  and  $i$  to determine the time at which the circuit is to be opened and closed. In this case the face-plate of the clock, which is designated by  $2''$ , has a circuit of indications surrounding the dial  $4''$  in the same manner as in Fig. 1; but the indicator or indicating means governing the adjustments of the two adjustable circuit-controllers is not the same as in Fig. 1. Instead the indicating-scales  $8''$  and  $9''$  are on the fixed face-plate  $2''$ , and the slots  $6''$  and  $7''$  for determining the adjustments of the adjustable circuit-controllers are also formed in said face-plate adjacent to the scales  $8''$  and  $9''$  and are disposed in concentric arcs.

The two adjustable circuit-controllers or contact-arms  $c''$  and  $i''$  are shiftable from one end to the other of their respective slots  $6''$  and  $7''$  and may be secured in place at any desired point in said slots in any suitable manner, as by means of binding-screws, they being insulated from the case.

In connection with the adjustable circuit-controllers  $c''$  and  $i''$  I have illustrated a pair of relays, (designated herein by  $r$  and  $r'$ ), the coils of the electromagnet of the relay  $r$  being connected, as by means of the conductor 30, with the circuit-controller  $c''$ , while the electromagnet of the relay  $r'$  is similarly connected, as by a conductor 30', with the circuit-controller  $i''$ . The electromagnets of the two relays are connected by conductors 31 and 31' with the same side of the main circuit or lighting-circuit, the mains of which are designated by  $m$  and  $m'$ . The rotary contact member 10'' may be connected with the other side of the lighting-main in any suitable manner, as by means of the conductor 32, secured to the arbor 3, on which the dial  $4''$  is mounted. These two relays are alternately energized periodically and are intended to operate alternately to make and break a third circuit, which, as well as the two circuits of the relays, may be in parallel of the mains  $m$  and  $m'$ . In the present instance one side of this third or branch circuit is interrupted and the ends of the conductors connected to the armatures 35 and 35', respectively, of the relays, the armature 35 being connected to the conductor 36, while the armature 35' is connected with the conductor 36', the conductor 36' of course being connected to one of the mains, as  $m$ , while the conductor 37, forming the other side of the third branch circuit, is connected with the main  $m'$ .

A motor, such as  $M$ , or any other suitable translating device or devices may be connected in circuit with conductors 36' and 37.

The armatures 35 and 35' are limited in their movements in both directions by suitable stops, such as are shown at 38 and 38' and 39 and 39', and cooperate with each other to make and break the third branch circuit just described. Preferably the armature 35

has at the end thereof a detent or catch, such as 40, adapted to engage the free end of the armature 35' and interlock therewith to close such third branch circuit when the armature 35' is attracted by the electromagnet of its relay, both of the armatures preferably having beveled ends.

It will be seen now that when the circuit through the relay  $r'$  is made by the contact member 10'' engaging the circuit-controller  $i''$  the armature 35' will be attracted and will pass by the end of the spring-pressed armature 35 and be latched by the catch 40 of the latter, this catch serving to maintain the third branch circuit closed after the member 10'' passes by the circuit-controlling arm  $i''$ . When the contact member 10'' reaches the circuit-controller  $c''$  and makes contact therewith, the electromagnet of the relay  $r$  will of course be energized and, attracting its armature, will release the spring-pressed armature 35' of the relay  $r'$  and break the third branch circuit.

Having described my invention, I claim—

1. In an electric, clock-controlled switch mechanism, the combination, with an electric circuit, of a clock controlling said circuit and embodying three cooperative circuit-controllers two of which are separately adjustable relatively to each other and are connected with one side of the circuit and control, respectively, the making and the breaking of the latter, and the other of which is connected with the other side of the circuit, indicating means having a pair of slots for receiving, and controlling the adjustments of, the adjustable circuit-controllers, and means for rotating at least one of the circuit-controllers.

2. In an electric, clock-controlled switch mechanism, the combination, with an electric circuit, of a clock controlling said circuit and embodying three cooperative circuit-controllers two of which are separately adjustable relatively to each other and are connected with one side of the circuit and control, respectively, the making and the breaking of the latter and the other of which is connected with the other side of the circuit, indicating means having a pair of slots disposed in concentric arcs and adapted for receiving, and controlling the adjustments of, the adjustable circuit-controllers, and means for rotating at least one of the circuit-controllers.

3. In an electric, clock-controlled switch mechanism, the combination, with an electric circuit, of a clock controlling said circuit and embodying three cooperative circuit-controllers two of which are adjustable and are connected with one side of the circuit and the other of which is connected with the other side of the circuit, a rotary indicating-dial having a pair of slots controlling the adjustments of the adjustable circuit-controllers, and means for rotating the adjustable circuit-controllers and the dial.

4. In an electric, clock-controlled switch mechanism, the combination, with an electric



circuit, of a clock controlling said circuit and embodying a rotary indicating-dial, an adjustable circuit-controller connected with one side of the circuit and movable in unison with said dial, a contact-arm in the path of said circuit-controller and connected with the other side of said circuit, and means for rotating the dial.

5. In an electric, clock-controlled switch mechanism, the combination, with an electric circuit, of a clock controlling said circuit and embodying a rotary slotted indicating-dial, an adjustable circuit-controller connected with one side of the circuit and movable in unison with said dial and adjustable with respect to said slot, a contact-arm in the path of said circuit-controller and connected with the other side of said circuit, and means for rotating the dial.

6. In an electric clock-controlled switch mechanism, the combination, with an electric circuit, of a clock controlling said circuit and embodying a rotary indicating-dial; a pair of cooperating circuit-controlling elements connected with opposite sides of the circuit, one of said elements embodying a pair of members adjustable relatively to each other and each having a long gradually-rising circuit-controlling cam-face defined by a curve eccentric to the axis of said dial, and the other of said circuit-controlling elements having a contact-face spanning the cam-faces of both members of the other circuit-controlling element; and means for rotating the dial and one of said circuit-controlling elements in unison.

7. In an electric clock-controlling switch mechanism, the combination, with an electric circuit, of a clock controlling said circuit and embodying a rotary indicating-dial; a pair of circuit-controlling cams adjustable relatively to each other and connected with one side of the circuit and movable in unison with the dial, and each having a long gradually-rising circuit-controlling cam-face defined by a curve eccentric to the axis of rotation of the dial; a contact-arm having a contact-face spanning the cam-faces of both of said cams, and connected with the other side of the circuit; and means for rotating the dial.

8. In an electric, clock-controlled switch mechanism, the combination, with an electric circuit, of a clock controlling said circuit and embodying a rotary indicating-dial, a pair of adjustable circuit-controlling cams movable in unison with the dial and having cam-faces eccentric to the axis of rotation of the dial, one of said circuit-controllers being connected with one side of the circuit, a contact-arm cooperative with said circuit-controlling cams and connected with the other side of the circuit, and means for rotating the dial.

9. In an electric, clock-controlled switch

mechanism, the combination, with an electric circuit, of a clock controlling said circuit and embodying a rotary indicating-dial, a circuit-controlling conducting-cam movable in unison with the dial and having a peripheral cam-face eccentric to the axis of rotation of the dial and connected with one side of the circuit, an insulating-cam also movable in unison with the dial and adjustable independently of the conducting-cam and having a peripheral cam-face eccentric to the axis of rotation of the dial, a contact-arm cooperative with the cam-faces of said cams, and means for rotating the dial.

10. In an electric, clock-controlled switch mechanism, the combination, with an electric circuit, of a clock controlling said circuit and embodying three cooperative circuit-controllers at least one of which is rotatable and one of which circuit-controllers is connected with one side of the circuit, and a pair of relays connected with two of said circuit-controllers and with the other side of the circuit and in parallel of said circuit and having coacting pivoted armatures interlocking at their free ends and controlling a third circuit.

11. In an electric, clock-controlled switch mechanism, the combination, with an electric circuit, of a clock controlling said circuit and embodying three cooperative circuit-controllers at least one of which is rotatable and one of which circuit-controllers is connected with one side of the circuit, and a pair of alternately-energized relays connected with two of said circuit-controllers and with the other side of the circuit and in parallel of said circuit and having coacting interlocking armatures controlling a third circuit.

12. In an electric, clock-controlled switch mechanism, the combination, with an electric circuit, of a clock controlling said circuit and embodying three cooperative circuit-controllers at least one of which is rotatable and one of which circuit-controllers is connected with one side of the circuit, and a pair of relays connected with two of said circuit-controllers and with the other side of the circuit and in parallel of said circuit and having coacting pivoted armatures interlocking at their free ends and controlling a third parallel branch of the main circuit.

13. In an electric, clock-controlled switch mechanism, the combination, with a pair of electric circuits, of a clock controlling said circuits and embodying a driving-arbor and two independently-regulable circuit-controlling mechanisms mounted on said arbor and insulated from each other, one for each of said circuits.

ROBERT W. ROLLINS.

Witnesses:

F. N. CHASE,

J. L. EDWARDS, Jr.