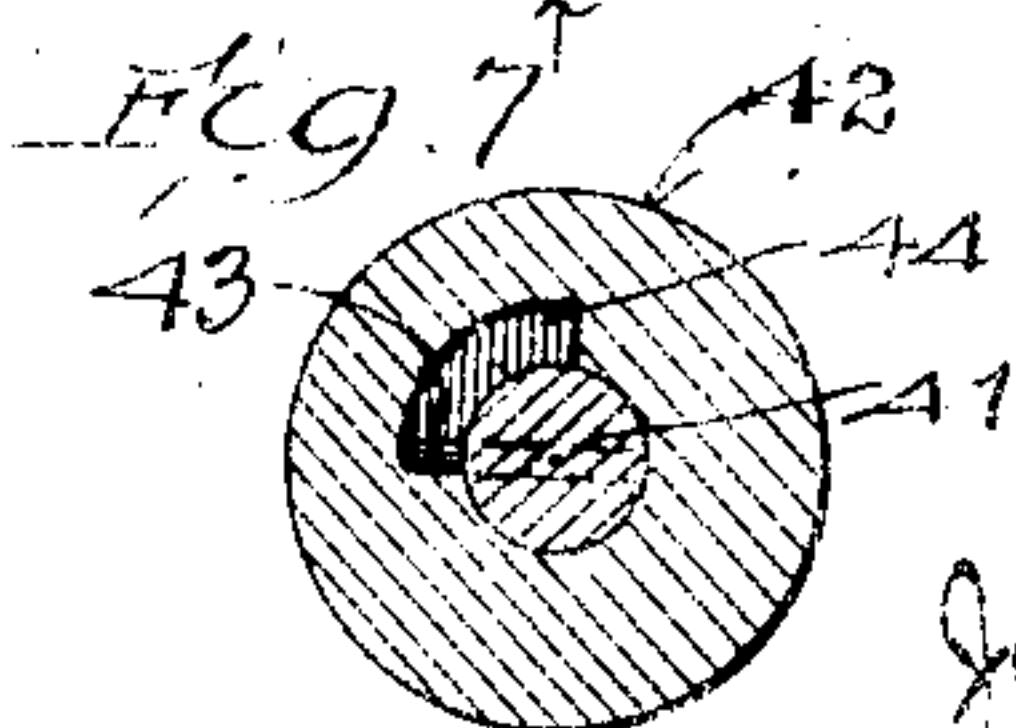
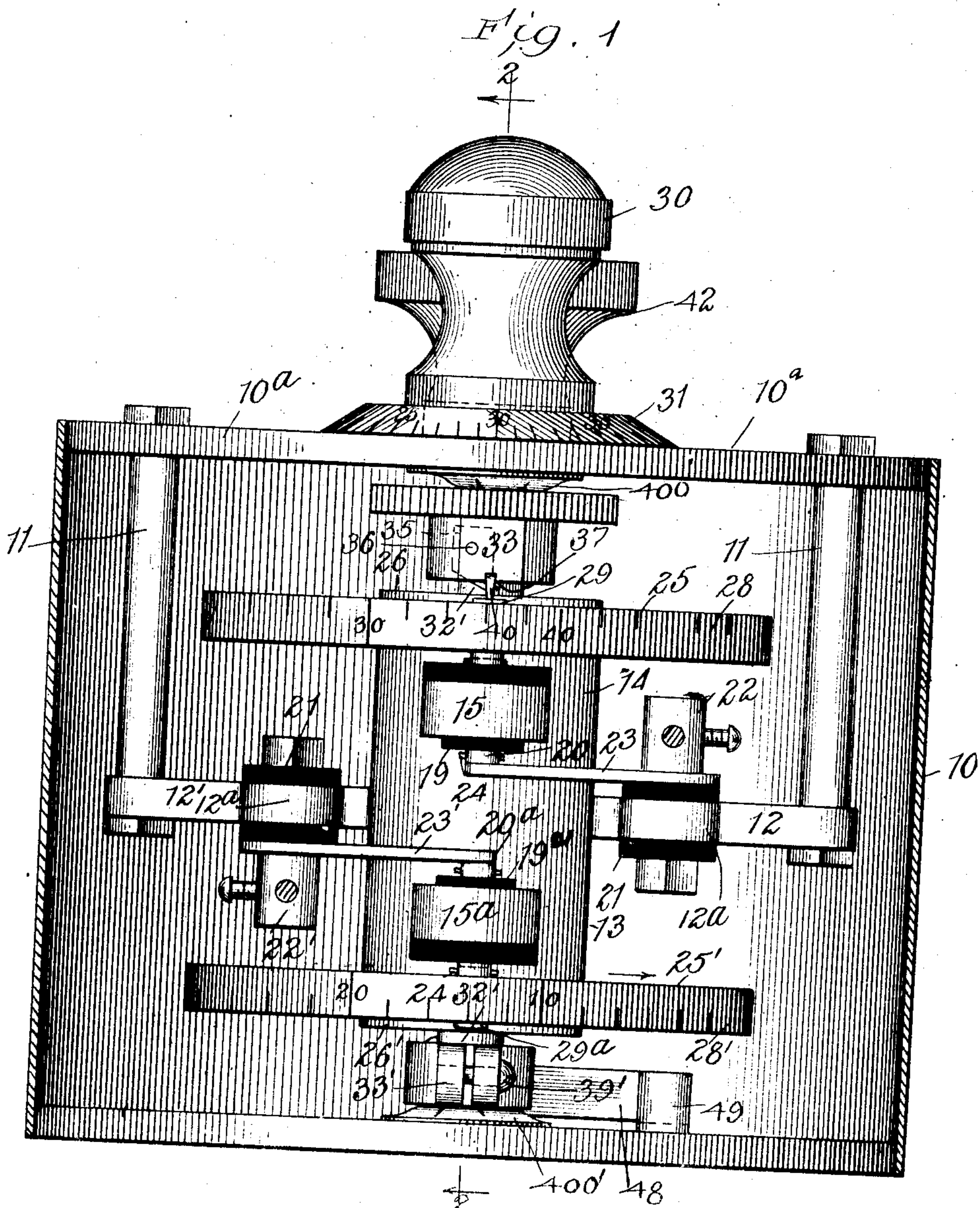


984,325

J. L. WAGNER.
COMBINATION CIRCUIT CONTROLLER.
APPLICATION FILED NOV. 2, 1905.

Patented Feb. 14, 1911.
3 SHEETS-SHEET 1.



Witnesses
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Ray White

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Fig. 2

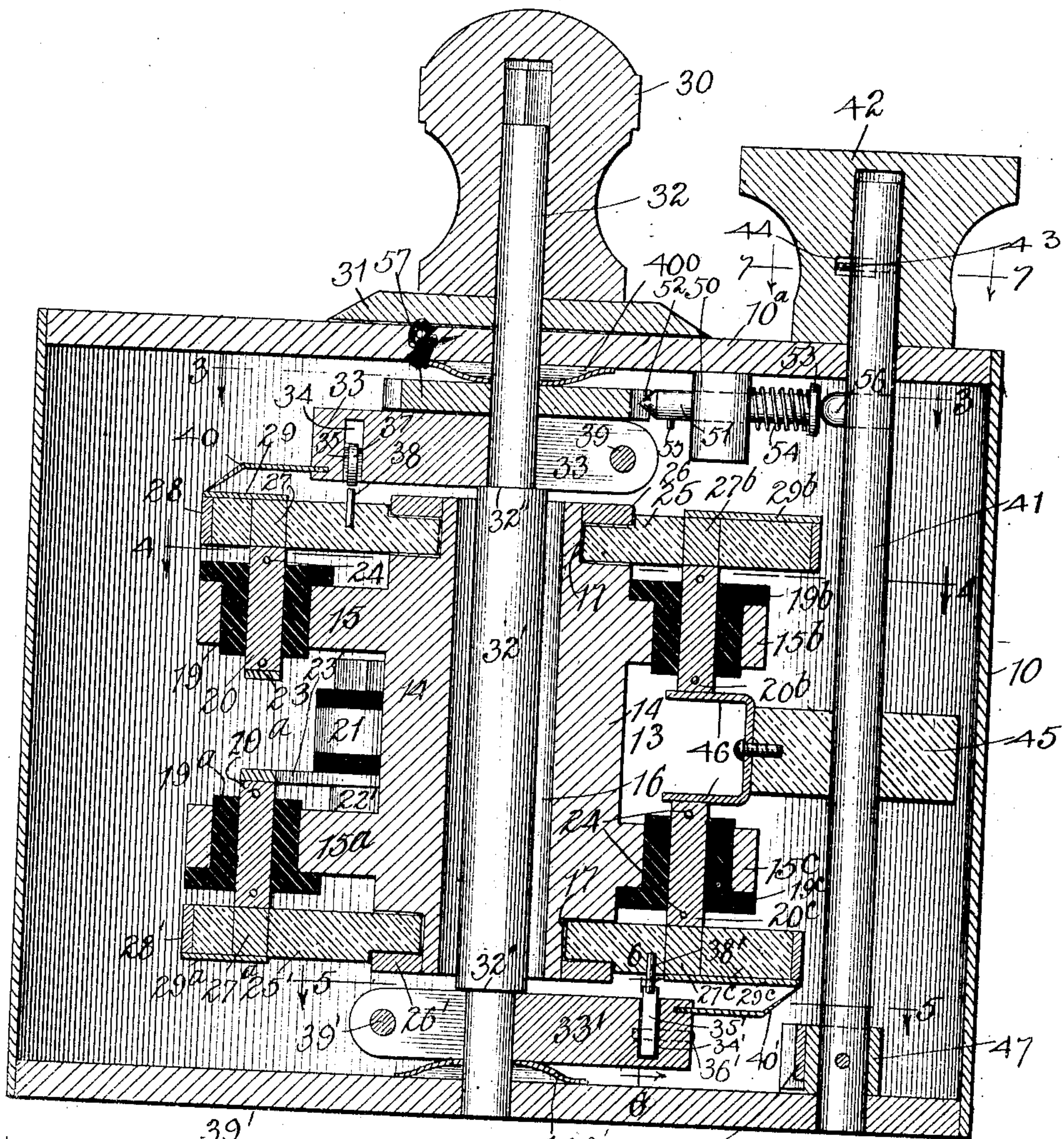
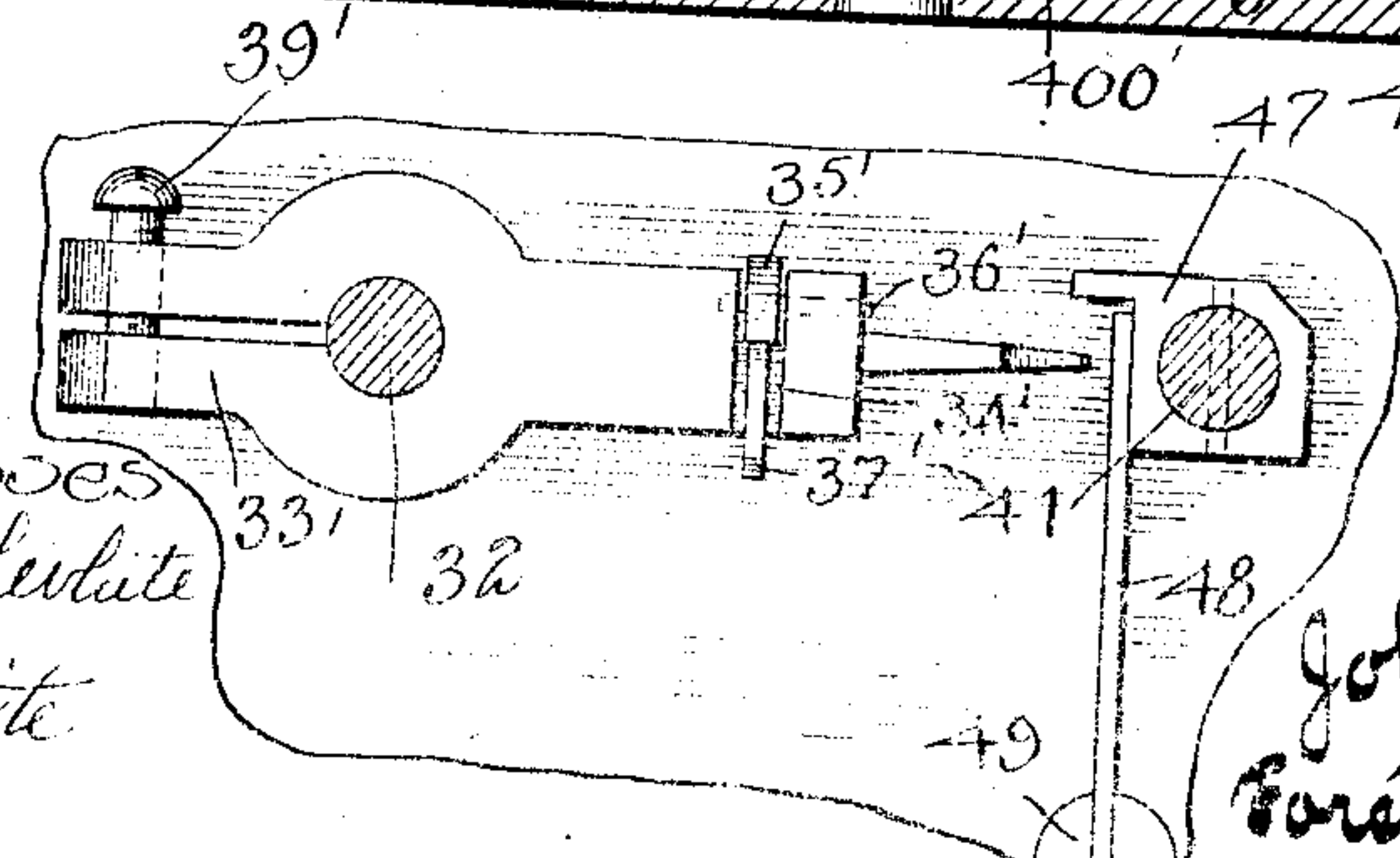


Fig. 5.



Witnesses
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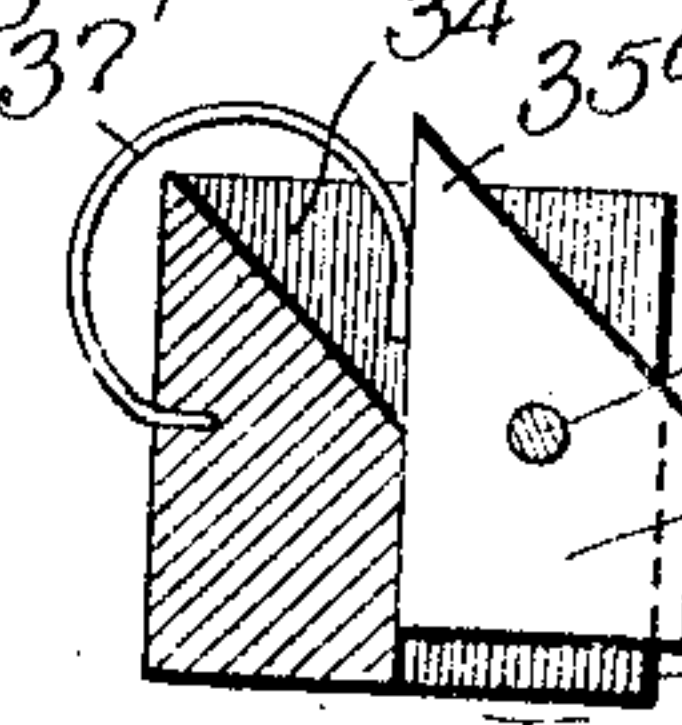


Fig. 6.

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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

JOHN LEO WAGNER, OF CHICAGO, ILLINOIS.

COMBINATION CIRCUIT-CONTROLLER.

984,325.

Specification of Letters Patent.

Patented Feb. 14, 1911.

Application filed November 2, 1905. Serial No. 285,573.

To all whom it may concern:

Be it known that I, JOHN L. WAGNER, subject of the Emperor of Germany, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Combination Circuit-Controllers, of which the following is a specification.

My invention relates to improvements in circuit controllers, and has for one of its salient objects to provide a device for establishing and breaking the electrical continuity of a portion or portions of an electric circuit, wherein the parts movable to establish the continuity of the circuit portion are concealed and arranged for operation after the general manner of the well-known combination lock, thereby safeguarding the circuit to a very great extent against unauthorized tampering which might establish the continuity of the circuit where disconnection of the electric parts was desirable.

A further object of my invention is to provide such a device of advantageous construction and arrangement whereby it is rendered simple, effective and certain in its operation; difficult of manipulation for functional operation by unauthorized or un instructed persons, and readily adjusted to change the "combination" or relation of sequential operation necessary to effect the establishment of the circuit portions controlled.

A further object of my invention is to provide in conjunction with a circuit controller of the character described, a switch for closing the electric circuit after it has been conditioned to be closed by the proper manipulation of the circuit controller, and to so arrange the switch relative to the circuit controller that the circuit controller may not be moved to establish the continuity of the circuit portion controlled thereby while the switch is in closed position, thereby insuring that any arc due to the making and breaking of the circuit shall occur at the properly provided switch contacts instead of in the conducting part of the circuit controller.

Other and further objects of my invention will best become apparent from the following description taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a side elevation of the circuit controller, with the containing casing in sec-

tion. Fig. 2 is a sectional view on line 2—2 of Fig. 1 looking in the direction of the arrows. Fig. 3 is a transverse section on line 3—3 of Fig. 2 looking in the direction of the arrows. Fig. 4 is a similar section on line 4—4 of Fig. 2. Fig. 5 is a section on line 5—5 of Fig. 2. Fig. 6 is a detail of one of the pawls, taken on line 6—6 of Fig. 2, and, Fig. 7 is a detail section of a snap switch construction taken on line 7—7 of Fig. 2.

Throughout the drawings like numerals of reference refer always to like parts.

Referring now to the drawings, 10 indicates in general a closed casing, which forms a concealing structure for the parts contained therein, and from the top 10^a whereof depend posts 11 connected with arms 12—12' forming part of a frame structure, generally indicated as 13. The body of the frame structure is preferably a generally cylindrical member 14, of less height than the interior of the casing 10, and having projecting therefrom at suitable points arms 15, 15^a, 15^b and 15^c preferably arranged in vertically alining pairs. The body 14 is provided with an axial aperture 16 extending from end to end thereof, and adjacent its end is reduced as shown at 17, to afford seats for rotating carriers to be described. The projections 15, 15^a, 15^b and 15^c are all apertured for the reception of insulating bushings 19, 19^a, 19^b, 19^c through which extend the electrically conductive contact members 20, 20^a, 20^b and 20^c respectively, which constitute the relatively stationary, electrically-conductive parts of the circuit-controller. The alining contacts 20, 20^a are disposed at a greater radial distance from the axis of the body 14 than are the alining contacts 20^b, 20^c. The lateral arms 12, 12' are preferably provided with offset extensions 12^a, 12^{a'} respectively, apertured for the reception of insulating bushings 21 through which pass the binding posts 22, 22'.

Electrical connection is afforded between the binding post 22 and the stationary contact 20 by a connecting bar 23, preferably a spring member, serving to press the contact member 20 constantly upward; and similar connection is afforded by a conducting spring 23' between the binding post 22' and the stationary contact member 20^a of the controller. Pins 24 may be provided in the members 20, 20^a, etc., above and below the

bushings respectively, to serve as limitation stops for preventing the displacement of the members 20, 20^a, etc.

Mounted for rotation upon the reduced parts 17 of the body 14, are movable carriers 25, 25', preferably of insulating material.

26, 26' indicate retaining washers secured to the reduced portions of the body 14 and overlying the carriers 25, 25' to prevent displacement thereof. The carrier 25 has seated therein at proper radial distances from the axis of rotation, for coaction respectively with the stationary contacts 20 and 20^b, the relatively movable contacts 27, 27^b of the controller; and mounted in the carrier 25' for similar coaction with stationary contacts 20^a and 20^b are the relatively movable contacts 27^a and 27^c.

28 and 28' indicate metallic conducting bands respectively encircling the carrier disks 25 and 25'. Electrical connection is afforded between the several contacts 27, 27^a, etc., and the encompassing bands of the respective disks, by connecting bars 29, 29^a, etc., so there is continuous electrical connection between the contacts 27, 27^b and between contacts 27^a, 27^c. Upon the bands 28, 28', are preferably inscribed indicating numerals, or other suitable indicia, after the fashion of combination lock plates.

It will be seen that all of the electrically conductive circuit parts described are concealed within the containing casing 10.

Means are provided for independently moving the carriers 25, 25', such means extending without the casing and operating preferably after the fashion of a combination lock-operating means.

In the drawings 30 indicates a manually rotatable handle or knob and 31 a combination plate, both secured to a shaft 32, extending through the top 10^a of the casing 10, passing through the aperture 16 in the frame 13, and bearing in the bottom of the casing. The portion of the shaft 32 within the axial bore of the body 14 is preferably enlarged as shown at 32', to form above and below the ends of the body 14, shoulders 32'', against which bear laterally projecting arms 33, 33' respectively, secured to said shaft above and below the body 14. Means are provided for effecting connection between the arm 33 and the carrier 25, whereby the carrier may be rotated in one direction only, and like means are provided for connecting the opposite carrier and arm for movement in the opposite direction only, such means preferably comprising in association with each arm a pawl yieldable in one direction only, and a pin upon the carrier wherewith said pawl engages to move the carrier when the arm is rotated in the proper direction.

In Fig. 6 is shown a specific embodiment of a pawl construction which may be em-

ployed, and which I will now describe. 34' indicates an angular slot in the arm 33', and in said slot is pivotally mounted the pawl 35' mounted upon the pivot pin 36', and having its end diagonally cut away to provide the tooth 35^a, which in the normal position shown projects beyond the surface of the arm 33', the side of the pawl coacting with the side of the slot so that the position shown in Fig. 6 is a limit of movement of the pawl in one direction. The pawl may, however, be pivotally moved in the opposite direction, (to the left in Fig. 6) so that its point 35^a is entirely withdrawn into the diagonal portion in slot 34'. A spring 37' is suitably disposed to exert a constant pressure tending to move the pawl 35' to the position shown in Fig. 6. It will be understood that a similar pawl is arranged in the arm 33, it being in every way similar to the construction just described, save that it yields in the direction opposite to that in which the pawl 35' yields. 38, 38' indicate respectively the pins carried by the carriers 25, 25', and arranged for coaction respectively with the pawls 35 and 35'. Preferably one of the pawl and pin members is adjustable to change the position at which the pin will engage, and to this end I preferably make the arm 33' adjustable, by bifurcating the portion thereof surrounding the stem 32 and providing a clamping screw 39' wherewith to tighten the bifurcated portion to clamp the arm tightly upon the shaft in any desired position. It will be understood that similar construction is provided upon the arm 33, like parts being indicated by like numerals of reference without the exponent prime (''). 40, 40' indicate pointers associated with the respective arms 33, 33' to indicate upon the scales upon the bands 28, 28' the relative positions at which the respective pawls and pins of the arms and carriers engage. I also provide in conjunction with the parts described, tension devices for increasing the resistance to movement of the rotatable members to such an extent as to render the action of the pawls and pins in engaging or passing each other practically imperceptible to the touch of the operator. Specifically 400, 400' indicate cup springs bearing against the top and bottom of the casing 10 respectively and against the upper and lowermost members of the structure secured to the rotating shaft 32. Constant pressure of these springs in opposite directions produces a frictional resistance to movement of the shaft which does not hinder the manipulation of the parts to any disadvantageous extent, but at the same time prevents the rotating parts from being so responsive as to betray to the touch the points at which the respective pawls may engage their pins,

and at which the movable contacts engage the stationary contacts. It will now be apparent, (assuming the stem 32 to be free for rotation) that the continuity of the portions of the electric circuit afforded by the conducting parts of the controller may be broken and established at will. Assuming the parts to be in the conditions shown in Figs. 1 and 2, so far as circuit conditions are concerned, it is apparent that an electrically conducting path is provided from the binding post 22 by the connector 23 to the relatively stationary contact 20, through its coacting relatively movable contact 27, the corresponding bar 29, to the encompassing ring 28 surrounding the movable carrier, to the opposite side of the carrier, and thence by bar 29^b and movable contact 27^b to the stationary contact 20^b, while on the other hand the binding post 22' is connected through parts 23', 20^a, 27^a, 29^a, 28', 29^c and 27^c to the relatively stationary contacts 20^c. It appears, therefore, that the controller is in position to allow the circuit to be closed between the stationary contacts 20^b, 20^c, by a suitable switch, such as will be hereafter described. By rotation of the handle 30, in either direction, however, the electrical continuity of the circuit portions described may be destroyed, as rotation of the handle in one direction, carrying with it both arms 33, 33' causes the pawl 35 of the arm 33 to engage the pin 38 of the carrier 25, to rotate the latter, thereby moving the movable contact members 27, 27^b out of engagement with their respective stationary contact members 20, 20^b, while movement of the handle in the opposite direction causes the rotation of the carrier 25' in the opposite direction in like manner. It will be apparent furthermore, that the movements of the carriers 25, 25' are always alternate in effect and each independent of the other, as rotation of the handle in the direction proper to effect a movement of the carrier 25 merely causes the pawl 35' to slip over the pin 38' of the opposite carrier without moving said carrier, the pawl yielding against the spring 37' so that its tooth 35^a is pressed into the angular portion of the slot 34' in the arm 33'. Conversely, movement of the carrier 25' does not affect carrier 25.

I provide in conjunction with the controller described a switch, for effecting connection between contacts 20^b and 20^c, said switch being preferably of the "snap" variety, and preferably so associated with the circuit controller that it is impossible to first close the switch and subsequently move the circuit controller to make or break the circuit.

Referring to the specific embodiment shown, 41 is a rotatable switch stem extending through the casing and connected with

an exterior handle 42 in such manner as to permit the handle to have rotative movement relative thereto throughout a short arc. Specifically the connection is shown as established through a pin 43 carried by the stem 41, and arranged in an arc-shaped slot 44 in the handle 42.

Mounted upon the stem 41 is an insulating block 45 carrying the switch-contact-member 46, illustrated as a U-shaped bar of electrically-conductive spring metal, the legs whereof are arranged for coaction respectively with relatively stationary contacts 20^b and 20^c. At its bottom the stem 41 has secured thereto a generally square block 47, against which bears a stiff leaf spring 48, suitably secured at its remote end in a stud 49. It will be apparent now that if the switch be turned to the right from the position shown in Figs. 2 and 5, when it has partially completed a quarter turn, so that the angle of the member 47 passes the position at which the spring 48 is tangent thereto, the spring snaps the switch stem quickly through the remainder of the quarter arc, the lost motion connection between the stem 41 and handle 42 permitting such snapping action independently of the volition of the operator. In like manner the return of the switch to circuit closing position is accomplished with the snap action.

To secure the cooperation of the switch and controller described in such a way as to keep independent the controlling and circuit-closing functions of the switch and controller, and to positively prevent the circuit controller from being used for circuit-closing purposes, I provide a structure specifically shown as follows: 50 indicates a stud depending from the top 10^a of the casing, and 51 indicates a sliding bolt through a suitable aperture in said stud. The bolt is preferably pointed at one end, as indicated at 52, and at its other end provided with a head 53 between which and the stud 50 is arranged a coiled spring 54. 55 is a stop pin for limiting the movement of the bolt in the direction of the spring pressure. 56 indicates a cam, or rounded stud, upon the stem 41 of the switch, arranged to move the bolt 51 against the tension of its spring to its limit of movement in the opposite direction whenever the switch is brought to circuit-closing position. 57 indicates a star wheel fixed upon the shaft 32 and arranged to receive the pointed end of the bolt 51 between its teeth when said bolt is moved inwardly by the cam 56, as described.

It will be apparent now that whenever the switch is moved to circuit closing position the bolt 51 acts as a positive lock of the star wheel 57, preventing the rotation of the shaft 32, and thereby preventing the movement of either of the movable carriers 25, 25'. Therefore, it is impossible to first close the switch

and afterward move the circuit controlling part to position to establish the continuity of the electrical connections in the controller, and it is always necessary in order to close the circuit, to first condition the controller to establish the continuity of the circuit portion effected thereby, and thereafter move the switch to circuit closing position. Correspondingly when this has been done and the circuit properly completed it is impossible to move the circuit controller parts to break the circuit without having first opened the circuit by the operation of the switch.

For purposes of a full disclosure of my invention, I have herein described in some detail a specific embodiment thereof, but it will be apparent that numerous changes might be made in the physical embodiment of my invention within the scope of the claims, and I do not desire, therefore, to be understood as limiting myself in the broader aspect of my invention to the specific construction shown and described.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, of the United States is:

1. In a circuit controller, the combination of a plurality of movable conducting parts, relatively stationary conducting parts where- with said movable parts coact when properly positioned to establish the electrical continuity of portions of a circuit, a common means for independently moving said movable parts, and a switch for closing the circuit, and locking the movable parts of the circuit controller.

2. In a device of the character described, a stationary supporting structure, stationary conducting parts carried thereby, a plurality of movable conducting parts, independently movable carriers for said movable conducting parts, and common means for independently moving said carriers to establish or break the electrical connection of the relatively movable and stationary conducting parts, and a switch for closing the circuit, and locking the movable parts of the circuit controller.

3. In a device of the character described, a relatively stationary frame, conducting parts carried thereby, a plurality of relatively movable carriers mounted for movement relative to said frame, conducting parts carried by said movable carriers and coacting, only when properly positioned with the relatively stationary conducting parts in the establishment of parts of a circuit, a concealing structure for the circuit controlling parts, means, comprising a manually operable member extending without said structure, for independently moving said carriers, and a switch for closing the circuit, and locking the movable parts of the circuit controller.

4. In a device of the character described,

a relatively stationary frame, relatively stationary conducting parts carried by said frame, a plurality of relatively rotatable carriers mounted for rotation relative to said frame, conducting parts carried by said carriers and arranged for coaction with the relatively stationary parts when properly positioned, a concealing structure for said contact parts, a shaft extending through said concealing structure, a handle upon said shaft without the structure, means carried by said shaft for independently rotating said carriers, means operable from without the concealing structure for conditioning said contact parts to complete a circuit, means on the outside of said concealing structure for operating said conditioning-means, and means, controllable by the last said means, for maintaining the parts so conditioned.

5. In a device of the character described, a relatively stationary frame, a conducting part carried by said frame, a carrier rotatable relatively to said frame, a movable conducting part carried by said carrier, a concealing structure for said conducting parts, a shaft extending through said concealing structure, a handle upon said shaft without the structure, an arm extending laterally from said shaft, means carried by said arm for effecting connection with the carrier to connect the carrier and arm for movement together in one direction only.

6. In a device of the character described, a relatively stationary frame, a relatively stationary conducting part carried by said frame, a plurality of carriers rotatable relatively to said frame, movable conducting parts carried by said carriers, and coacting, when properly positioned, with the stationary conducting means, a concealing structure for said coacting conducting parts, a rotatable shaft, means without the concealing structure for rotating the shaft, means for connecting each of the carriers with the shaft for rotation therewith in one direction only and means, comprising an interior lock, an exterior handle for controlling the lock, and a conducting part operable by the handle, for locking the movable contacts whereby the contacts when unlocked are disabled from completing a circuit.

7. In a device of the character described, relatively stationary conducting parts, two rotatable conducting parts, coacting when properly positioned, with the relatively stationary parts, a rotatable shaft, and means for connecting one of said rotatable conducting parts with the shaft for rotation in one direction, and for connecting the other rotatable conductor with the shaft for rotation in the opposite direction and a switch mechanism independently operated for closing an electric circuit through the device

and coincidentally locking said shaft in fixed position.

8. In a device of the character described, a relatively stationary frame, conducting means carried by said frame, two carriers independently rotatable relatively to said frame, conducting parts carried by said carriers coacting, when properly positioned, with the relatively stationary conducting means, a rotatable shaft, means for effecting connection between said shaft and each carrier at some definite point of movement of the carriers, in relatively opposite directions only, by properly directed rotation of the shaft, a concealing structure for the electrically conductive parts, means for rotating the shaft, and visible means for definitely indicating the relation of certain points upon the shaft relative to stationary points of the structure, whereby either carrier may be accurately moved to definite position relative to the stationary conducting parts and means within said concealing structure operable from without for locking said shaft in fixed position.

9. In a device of the character described, a relatively stationary frame, relatively stationary conducting means carried by said frame, a plurality of carriers rotatable relatively to said frame, movable conducting parts carried by said carriers, a concealing structure for the conducting parts, a shaft extending through said structure, means carried by said shaft for connecting each carrier therewith for rotation in one direction only, such means comprising arms rotatively adjustable relative to the shaft.

10. In a device of the character described, a relatively stationary frame, an electrically conducting part carried thereby, carriers mounted for rotation on said frame, rela-

tively movable conducting parts carried by said carriers, a concealing structure, a shaft extending through the frame, rotatively adjustable arms carried by said shaft, pawls yieldable in one direction carried by said arms, and parts upon the carriers wherewith said pawls engage.

11. In a device of the character described, a relatively stationary frame, a conducting part carried by said frame, a carrier rotatable relative to the frame, a movable conducting part carried by the carrier adapted and arranged to be brought into electrical contact with the conducting part of the frame, a concealing structure for the coacting parts, a rotatable shaft, means for connecting the shaft with said carrier at predetermined points for rotation, and means for resisting to a predetermined degree the rotation of the shaft, means for indicating the relative positions of said conducting parts and means for locking said parts operable from without the casing.

12. In a device of the character described, a circuit controller comprising relatively movable conducting parts, relatively stationary conducting parts wherewith said movable parts coact when properly positioned to establish the electrical continuity of portions of the circuit, certain of said contacts being electrically disconnected, a common means for independently moving the movable parts, and a switch for connecting the disconnected circuit parts.

In testimony whereof I hereunto set my hand in the presence of two witnesses.

JOHN LEO WAGNER.

In the presence of—
GEO. T. MAY, Jr.,
MARY F. ALLEN.