

W. E. RICHTER.  
ELECTRIC TIME SWITCH.  
APPLICATION FILED FEB. 4, 1908.

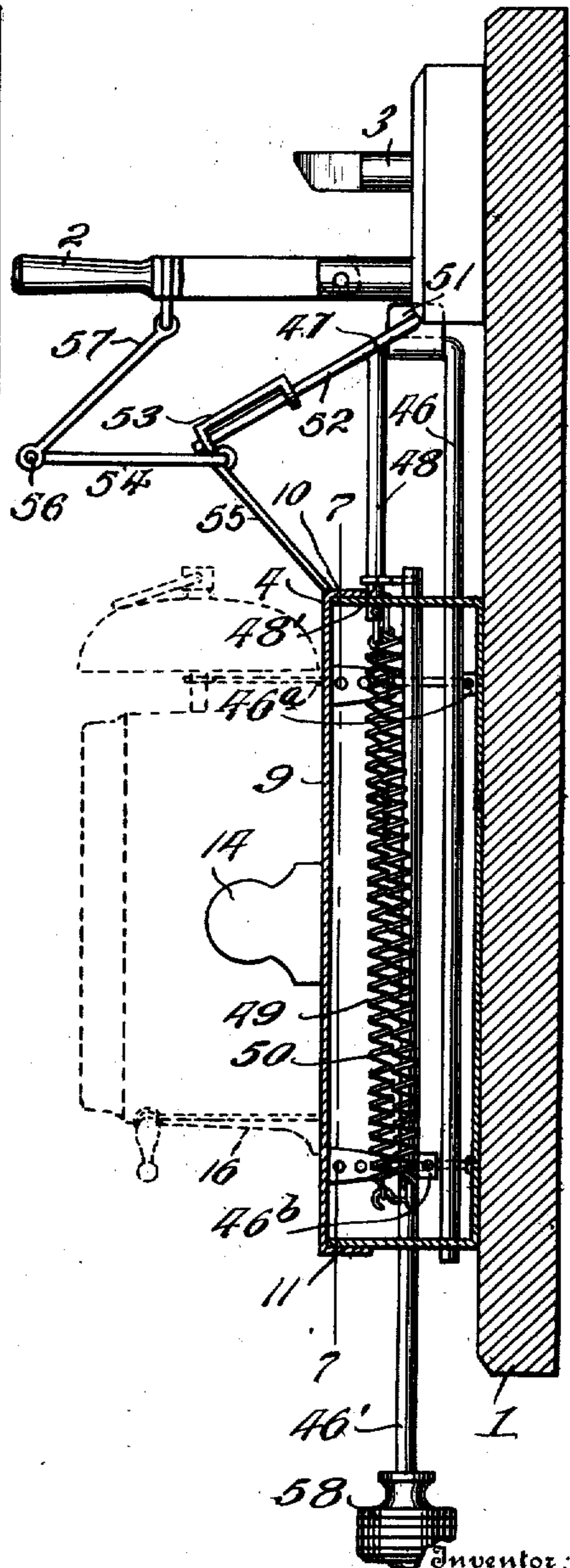
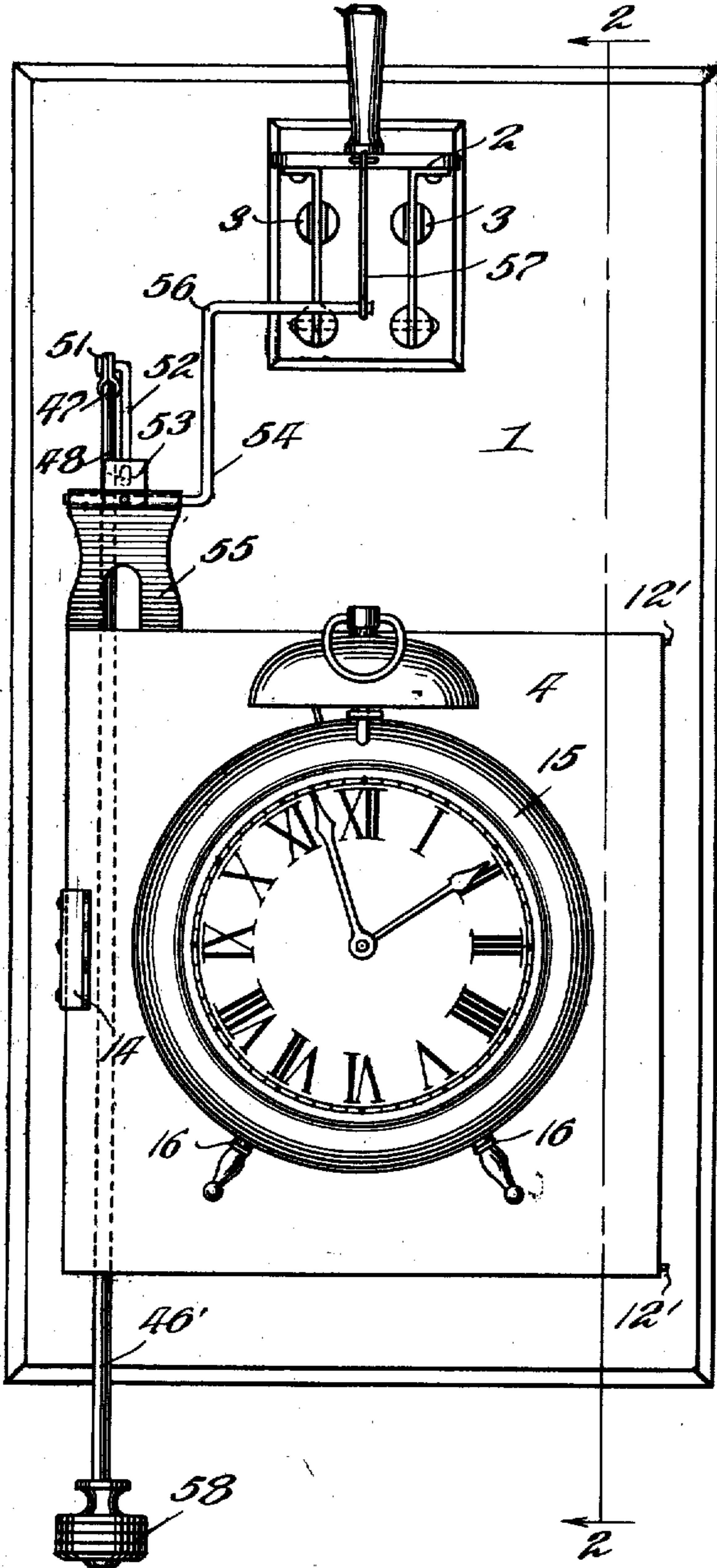
913,052.

Patented Feb. 23, 1909.

4 SHEETS—SHEET 1.

Fig. 1.

Fig. 2.



Witnesses:  
Frank B. Hoffman  
C. C. Hines

Inventor:  
William E. Richter,  
By Victor J. Evans,  
Attorney

W. E. RICHTER.  
ELECTRIC TIME SWITCH.  
APPLICATION FILED FEB. 4, 1908.

913,052.

Patented Feb. 23, 1909  
4 SHEETS—SHEET 2

Fig. 3.

Fig. 4.

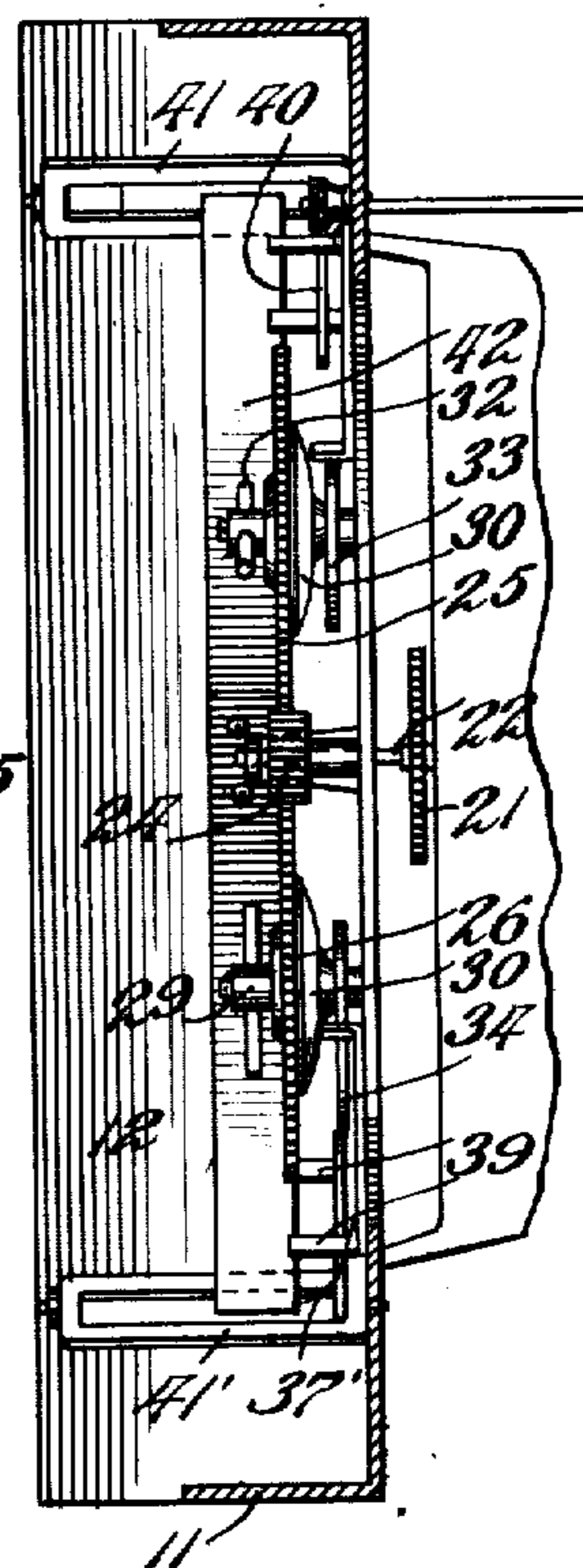
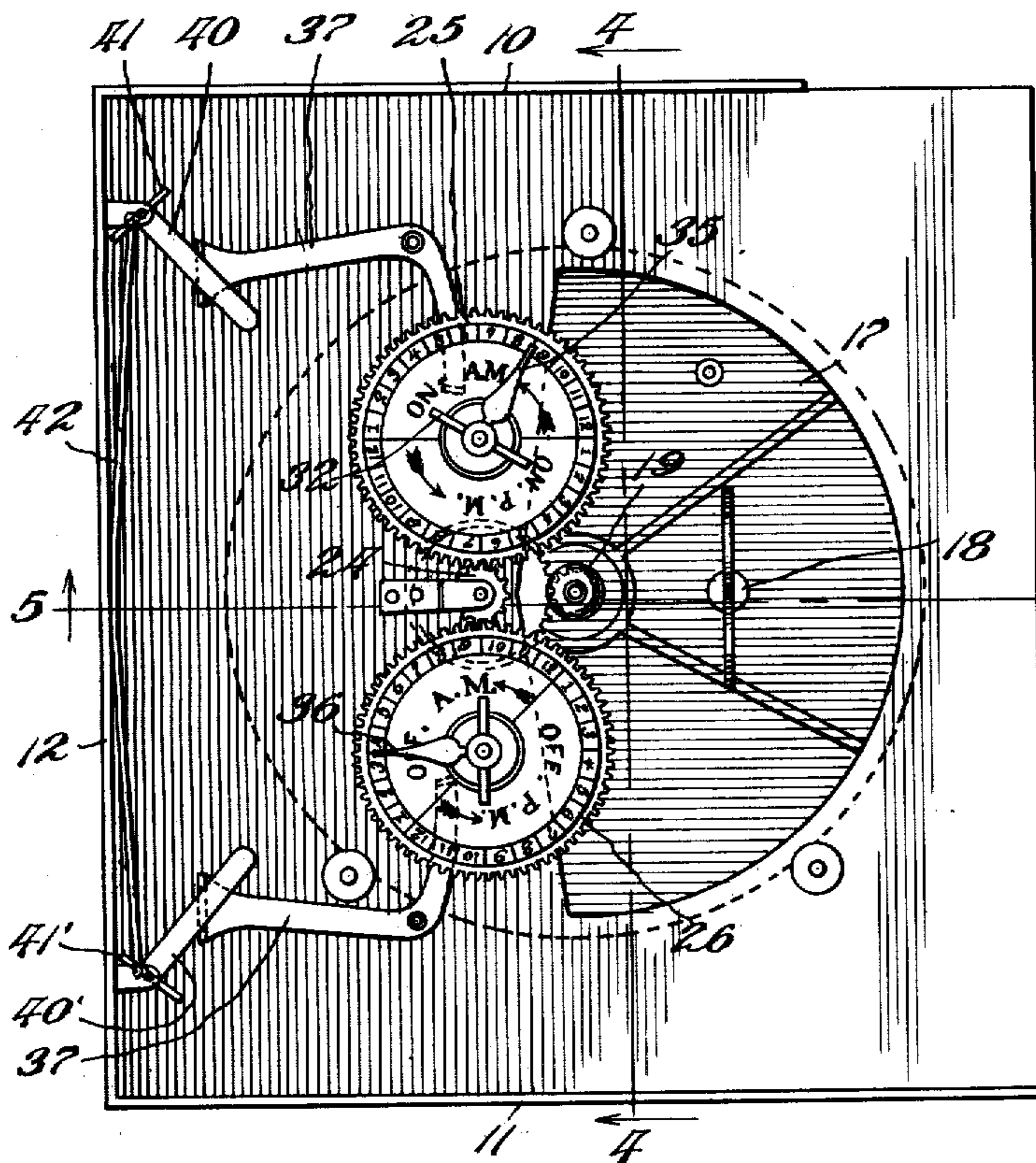
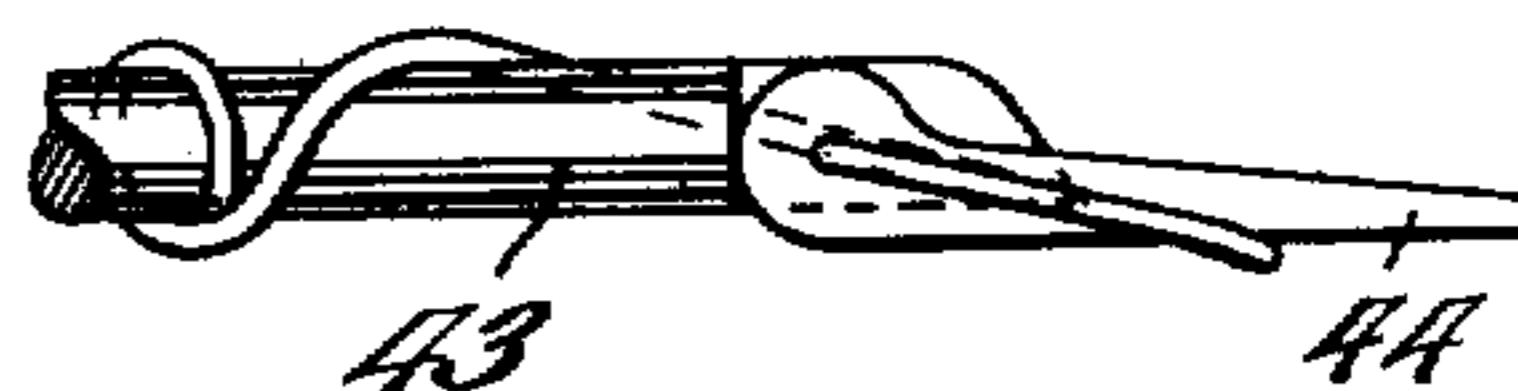
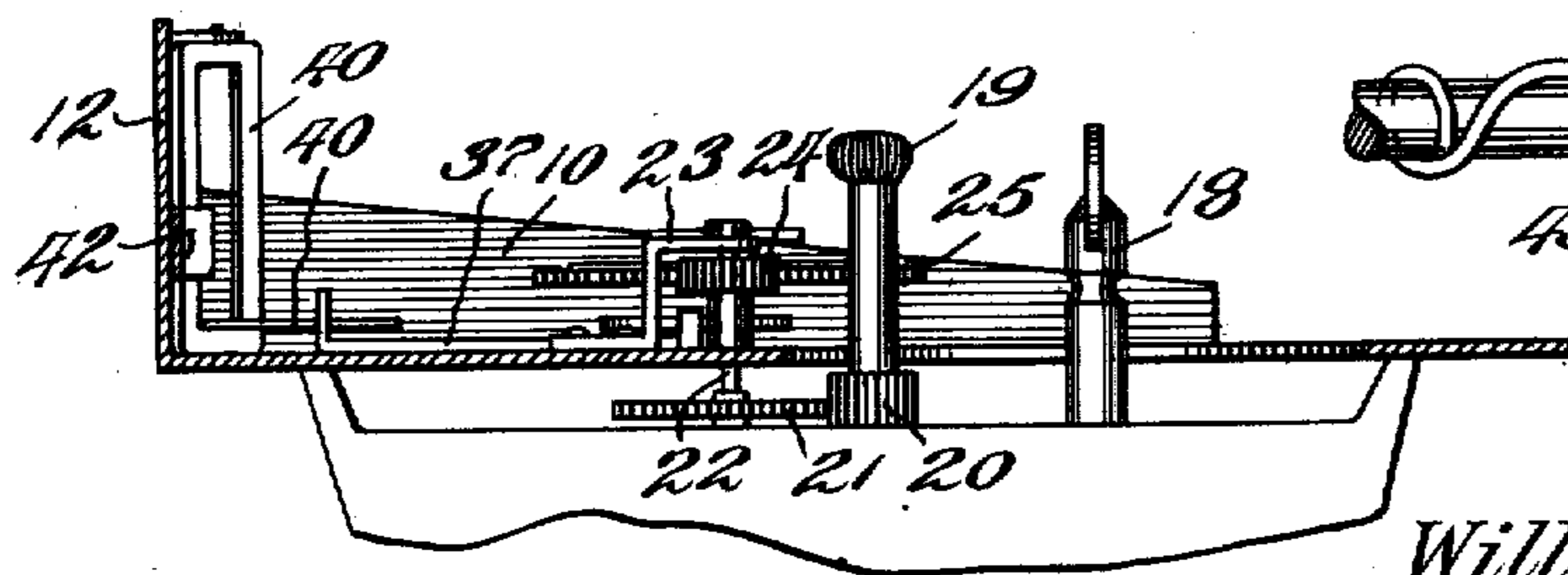


Fig. 5.

Fig. 6.



Witnesses:

Frank B. Hoffman.  
C. C. Hines.

Inventor:

William E. Richter,

By

Victor J. Evans,

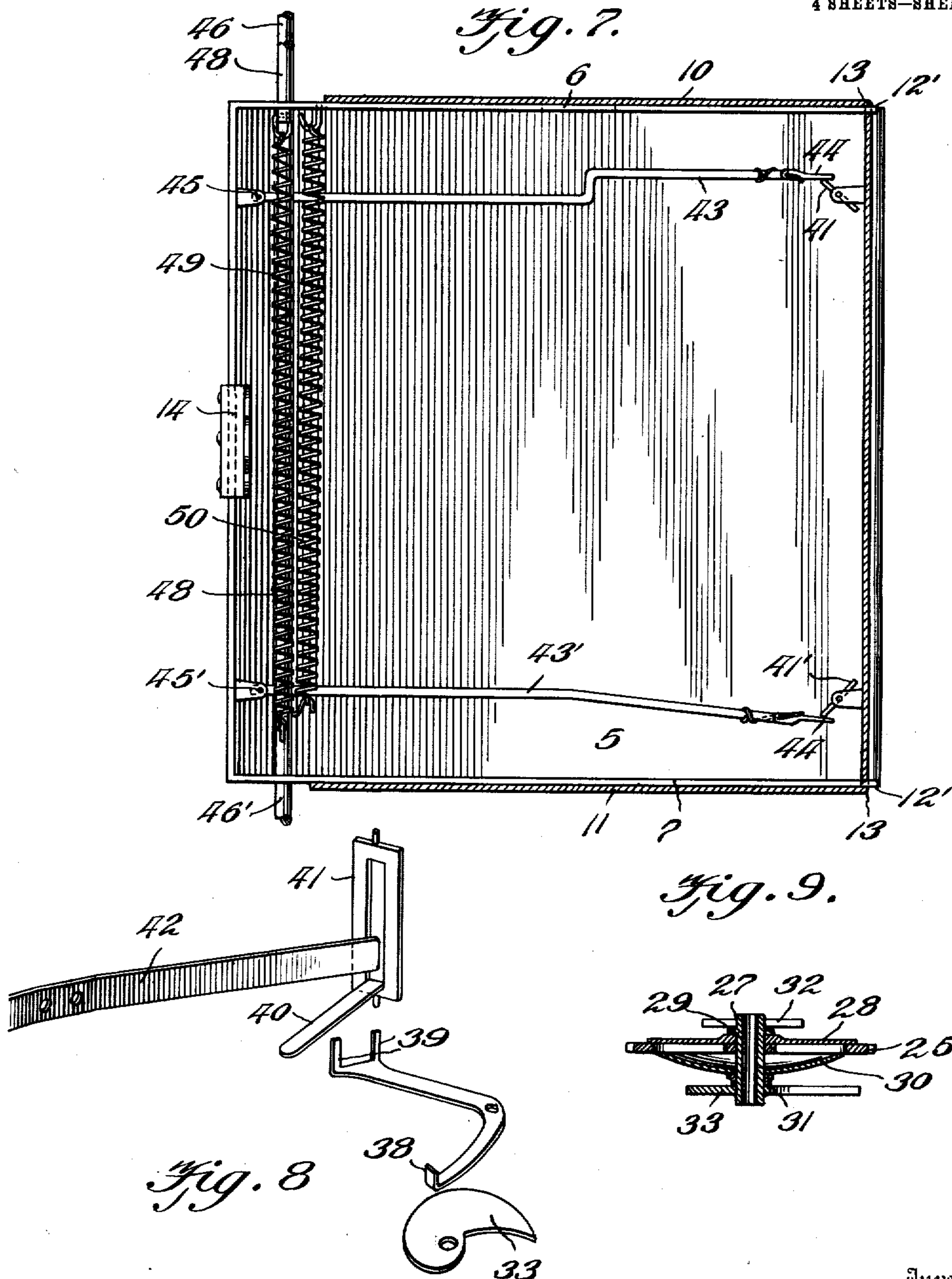
Attorney

W. E. RICHTER.  
ELECTRIC TIME SWITCH.  
APPLICATION FILED FEB. 4, 1908.

913,052.

Patented Feb. 23, 1909.

4 SHEETS—SHEET 3.



Witnesses:  
Frank B. Hoffman  
C. C. Hines

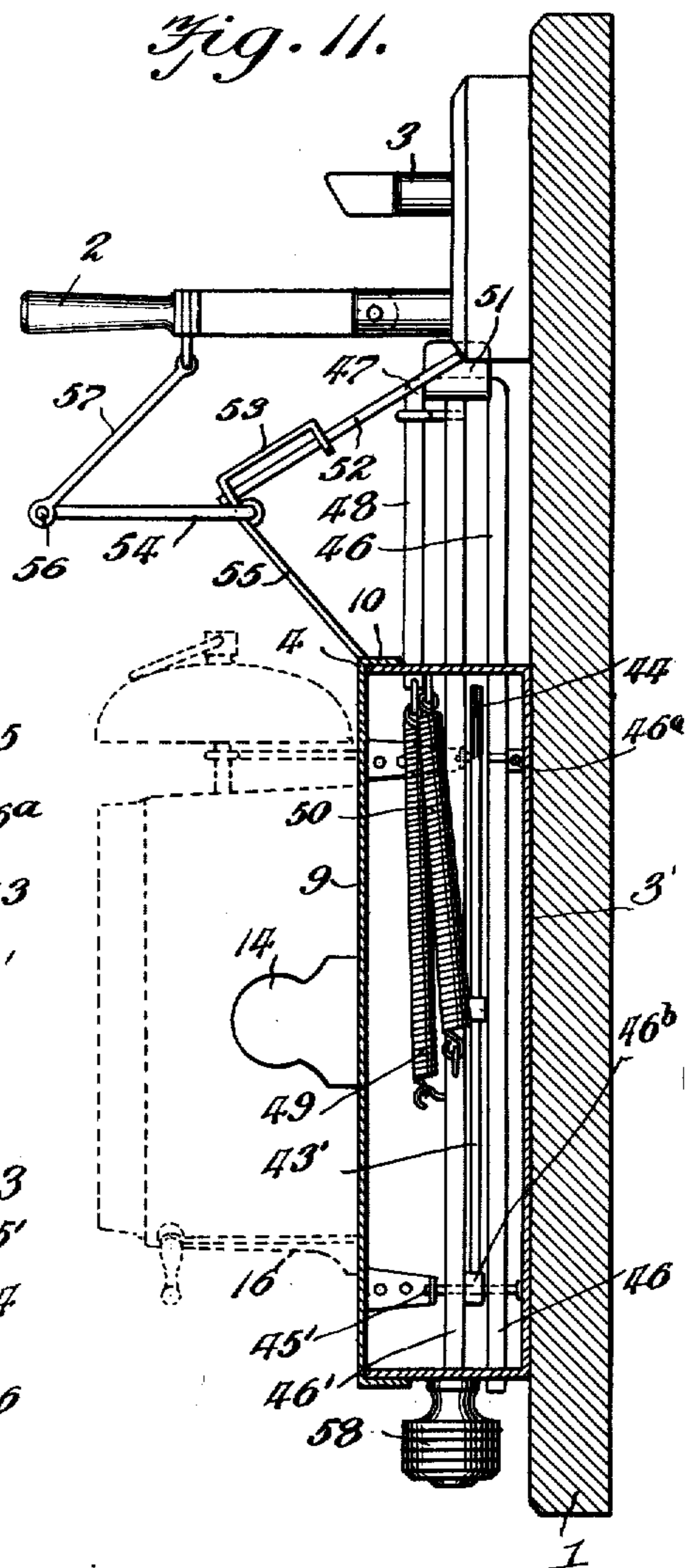
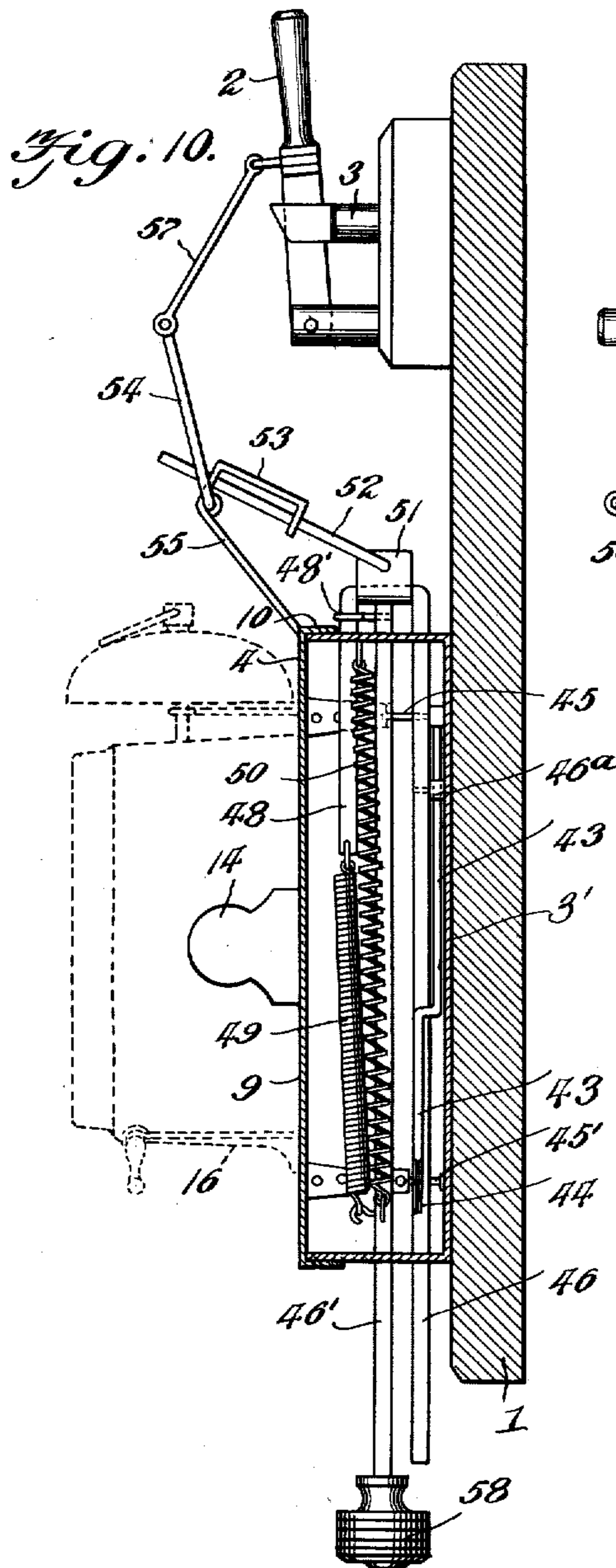
Inventor:  
William E. Richter,  
By Victor J. Evans  
Attorney

W. E. RICHTER.  
ELECTRIC TIME SWITCH.  
APPLICATION FILED FEB. 4, 1908.

913,052.

Patented Feb. 23, 1909.

4 SHEETS—SHEET 4.



Witnesses

*Frank B. Hoffman*  
*C. C. Hiner*

Inventor

*William E. Richter*

By

*Victor J. Evans*

Attorney

# UNITED STATES PATENT OFFICE.

WILLIAM E. RICHTER, OF ALBUQUERQUE, TERRITORY OF NEW MEXICO.

## ELECTRIC TIME-SWITCH.

No. 913,052.

Specification of Letters Patent.

Patented Feb. 23, 1909.

Application filed February 4, 1908. Serial No. 414,244.

*To all whom it may concern:*

Be it known that I, WILLIAM E. RICHTER, a citizen of the United States, residing at Albuquerque, in the county of Bernalillo and Territory of New Mexico, have invented new and useful Improvements in Electric Time-Switches, of which the following is a specification.

This invention relates to automatic time switches for controlling electric circuits, and particularly to a switch designed for controlling electric light circuits.

The primary object of the invention is to provide a switch controlling mechanism which is adapted to be set for operation at any predetermined times to connect the lamp circuit with a supply circuit to light the lamps and at a desired period thereafter to disconnect said lamp circuit from the supply circuit to turn out the lamps.

A further object of the invention is to provide a switch controlling mechanism which is simple of construction, inexpensive of production, efficient in use, and adapted to be easily set and to be employed in conjunction with an ordinary clock and any ordinary throw switch.

With these and other objects in view, the invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a front elevation of the complete switch controlling mechanism. Fig. 2 is a vertical front-to-rear section on line 2—2 of Fig. 1. Fig. 3 is a rear view of the front section of the casing and parts of the switch mechanism supported thereby. Figs. 4 and 5 are sections taken, respectively, on the lines 4—4 and 5—5 of Fig. 3. Fig. 6 is a detail view of one of the restraining levers or arms and the spring finger connected therewith. Fig. 7 is a section on line 7—7 of Fig. 2, showing particularly the parts of the switch mechanism supported upon the rear section of the casing. Fig. 8 is a view of one of the spring-actuated detents and the trip lever and cam associated therewith. Fig. 9 is a sectional view through one of the cam-actuating gears and the cam and setting mechanism connected therewith. Figs. 10

and 11 are views similar to Fig. 2 showing different positions of the switch mechanism.

Referring to the drawings, 1 designates a base-board or other suitable support, upon which is pivotally mounted an ordinary throw switch 2 adapted to swing into engagement with contacts 3 to connect the light circuit with a supply circuit. I have not deemed it necessary to show the circuit connections, as these form no part of my invention.

Supported upon the board 1 below the switch is a casing formed of sections 3' and 4', the section 3' being secured in any suitable manner to the board. The said sections of the casing may be of any suitable construction, but in the present instance I have shown the stationary section 3' as comprising a back plate 5, top and bottom walls 6 and 7, and a side wall 8, the opposite side of said section being open, while the removable front or cover section 4 comprises a front plate 9 having top and bottom flanges or walls 10 and 11 and a side flange or wall 12, the opposite side of said section being open. The front wall of the cover section is adapted to close the open front of the stationary section 3', and the walls 10 and 11 fit over upon the outer faces of the walls 6 and 7, the wall 8 of the section 3' closing the open side of the cover section while the wall 12 of the cover section covers the open side of the stationary section. This construction is employed to mount the parts of the switch operating mechanism and the time piece to admit of ready access thereto for repairing and setting said mechanism and renewing the parts as occasion requires, the top and bottom walls of the cover section being relatively shorter than the corresponding walls of the stationary section to provide for the passage of the members of the switch-actuating device, as hereinafter described. The cover section is shown in the present instance as removably secured in position by tongues or projections 12' on the walls 6 and 7 engaging slots or openings 13 in the wall 12, thus connecting the sections at one side while a spring catch 14 is provided upon the wall 8 to engage the wall 9, and thus connect the sections together at the opposite side. Pressure upon the finger piece of the catch 14 will

move the same outwardly from engagement with the wall 9, allowing the section 4 to be moved laterally for disconnection from the tongues 12', thus separating said section from the section 3'.

Upon the front portion of the cover section 4 is supported a time piece 15, which may be of any suitable type, and which is secured in position by clamping rods or other suitable fastenings 16. The back of this time piece is exposed through an opening 17 in the wall 9, thus allowing the winding and setting stems 18 and 19 of said time piece to be manipulated when the cover section is detached. The time piece is preferably of a character in which the setting stem 19 makes one complete revolution every twenty-four hours, and in accordance with my invention said stem is provided with a pinion 20 meshing with a gear 21 on a shaft or arbor 22 journaled in the plate 9 and a bracket 23 carried thereby and carrying upon the rear side of said plate 9 a pinion 24. The pinion 24 is arranged between and meshes with a pair of gear wheels 25 and 26, which respectively control sets of devices governing the action of the switch operating means to close and open the switch. The gears 25 and 26 are adapted to be rotated in a counterclockwise direction by the pinion 24 and are similar in construction, and each has associated therewith a setting mechanism and a device controlled thereby to operate the coacting switch closing or switch opening means. The gear 25, for example, is loosely mounted upon a spindle 27 journaled in the plate 9 and carries a fixed dial 28 bearing against a shoulder 29 on the upper end of the spindle. Below the gear wheel is arranged a spring pressure or friction disk 30, loosely fitted on the spindle between the underside of the disk and a collar 31 fixed to the spindle, said disk being preferably of concavo-convex form and serving to normally connect the parts for rotation in unison, while permitting independent manual rotation of the spindle through the medium of a finger piece 32. The lower ends of the spindles of the two gears 25 and 26 respectively carry cams 33 and 34, each preferably of the form shown in Fig. 8, said cams being fixed to the spindles, while upon the upper ends of the spindles are respectively fixed hands or pointers 35 and 36 arranged to cooperate with the dials of the respective gears. The gear 25 controls the mechanism for closing the switch, while the gear 26 controls the mechanism for opening the switch. Each of these gears has its dial transversely divided by a suitable division line into normally upper and lower portions, the upper portion bearing the numerals 1 to 12 inclusive and intermediate half hour division lines, representing the first twelve hours of the day, while the lower portion is similarly marked to represent the last

twelve hours of the day. In addition, the upper half of the dial of gear 25 is marked "On A. M.", and the lower half thereof "On P. M.", while the corresponding portions of the dial of gear 26 are respectively marked "Off A. M." and "Off P. M.", thus indicating the required degree of adjustment of the hands or pointers to set the switch mechanism for respectively closing and opening the switch at any time during the twenty-four hours of the day.

Bell-crank trip levers 37 and 37' are pivotally mounted upon the cover section of the casing for operation by the respective cams 33 and 34. Each lever has one of its arms provided with a finger 38 adapted to be engaged by the convex surface of the coacting cam, and its other arm formed with a pair of spaced fingers 39. The fingers 39 of the two trip levers loosely engage the arms 40 of corresponding oscillatory detents 41 and 41' pivotally mounted upon the wall 12 and body of the cover section, each of said detents being in the form of an open rectangular loop, into the receiving spaces of which detents project the opposite free ends of a plate spring 42 intermediately fixed to the wall 12, said spring operating to move the detents to retracted position. This action of the spring is resisted by the frictional engagement of the cam with the fingers 38 of the two trip levers, so that when the points of the cams move out of engagement with said fingers the spring will operate to throw the detents to their fully retracted position. As the cams turn with the gears 25 and 26, they swing the trip levers 37 and 37' and thus gradually permit retractive movement of the detents, which, however, reach a full retracted position only when the points of the cams pass out of engagement with the fingers 38.

Arranged upon the rear casing section 3' is a pair of restraining arms or levers 43 and 43', each having at one end a spring-actuated finger 44, the fingers of the two arms or levers being arranged for engagement with the respective detents 41 and 41', whereby the arms or levers, when set, are held from movement until released by the detents when the latter reach their fully retracted position. The said arms or levers are pivotally connected at their opposite ends with the wall 8, as respectively indicated at 45 and 45', and adjacent to their points of pivotal connection with the casing are also pivotally connected with the switch-operating devices, whose movements they control through the action of the trips. The spring fingers 44 are freely movable in a direction to permit them to engage the trips, but rigid from movement in the opposite direction to maintain them in engagement with the trips until released by the retractive movement of the latter.

The switch-operating devices comprise a pair of sliding rods 46 and 46' vertically mounted in the top and bottom walls of the section 3', said rods being pivotally and slidably connected with the arms 43 and 43' by collars or sleeves 46<sup>a</sup> and 46<sup>b</sup> slidably engaging the arms and pivotally mounted on the rods, thus permitting swinging movement of the arms under the sliding motion of the rods. The rod 46 is provided at its upper end with a downwardly bent portion forming a wrist 47 and an arm 48, the free end of which latter is slidably mounted in the upper wall of the casing section 3' and projects into the latter. A coiled spring 49 is connected at its upper end to the arm 48 and at its lower end to the rod 46', and a second coiled spring 50 is connected at its upper end to the top wall 6 of the casing section 3' and at its lower end to the rod 46', the spring 49 thus yieldably connecting the two rods 46 and 46' together, while the spring 50 acts directly upon the rod 46' and indirectly upon the rod 46 through the spring 49 connecting the two rods together. A bracket 51 engages the wrist 47 and has pivotally connected therewith a rod 52 which slidably engages a bracket 53 rigidly connected with a rock shaft 54 journaled in a bearing member 55 on the upper wall of the section 3', said shaft having an angular arm 56 which is connected by a link rod 57 with the cross piece or handle of the switch 2. The lower end of the rod 46' extends below the casing and carries a knob or other suitable finger piece 58 by which the switch-operating devices may be drawn downward to swing the restraining arms 43 and 43' into engagement with the trips 41 and 41' when the latter are set to control the operation of the apparatus.

It will be understood from the foregoing description that the gear 25 and associated cam 33 controls the switch-operating device 46 through the trip 41 and arm 43, which latter is held against movement under the action of the spring 49 by the trip, to normally maintain the switch open and to close the switch and also the lamp circuit when the lever 37 is released by the cam 33, while the gear 26 and associated cam 34 controls the switch-operating device 46' through the trip 41' and arm 43', which latter is held against movement under the action of both springs 49 and 50 by said trip, to allow the switch to remain closed and to effect the opening of said switch at a predetermined interval after it has been closed by the action of the cam 34 in releasing the trip lever 37'. As the distance which the operating portions of the cams act upon the trip levers is regulated in an obvious manner by the adjustment of the cams to have a determined range of movement through their adjusting spindles, it will be apparent that said cams may be set so that one will effect the throw of the switch

to closed position at any determined time during the day or night, while the other will effect the opening of the switch at any subsequent hour or predetermined time thereafter. Thus, by moving the pointer 35 opposite the numeral 9 on the portion A. M. of the dial, the switch will be closed at that hour, while by moving the pointer 36 to the mark 3 on the P. M. portion of the dial of gear 26, the switch will be opened at that hour, it being understood from the foregoing description that the gears 25 and 26 turn synchronously with the pinion 30 and rotate in a counterclockwise direction, in which direction the pointers are also turned to set the cams for releasing action at predetermined periods.

After the setting mechanism has been adjusted and the detents moved thereby to projected position, the switch-operating devices are set by drawing downward on the knob 58. By this action both rods 46 and 46' will be drawn downward, the rod 46 to a very slight degree and the rod 46' to a greater degree to bring the fingers of the arms 43 and 43' into engagement with the detents, which action but slightly moves the switch toward the contacts 3, as shown in Fig. 2, and simultaneously expands both springs 49 and 50 to place them under tension under which they exert a down pull on the rod 46 and an up pull on the rod 46', motion of the rods in the stated directions being prevented by the engagement of the arms with the detents. When the cam 33 retracts the detent 41, however, the rod 46 will be released for movement, and will be pulled downward by the spring 49, thus throwing the switch to closed position through the intervening connections and closing the lamp circuit, as shown in Fig. 10. When at a later period the trip 41' is similarly retracted by the cam 34, the rod 46' will be released and will be drawn upward, as shown in Fig. 11, by the spring 50 and will strike the coupling 51 and force the rod 46 upward, whereby both rods will be returned to normal position and the switch thrown open, thus cutting the lamp circuit out of connection with the supply circuit.

From the foregoing description, the construction and mode of operation of the apparatus will be readily understood, and it will be seen that the same may be set to open and close the switch at any desired predetermined periods and intervening intervals. When the setting mechanism is adjusted for opening and closing the circuit at fixed hours, it will be apparent that by simply pulling down upon the knob 58 the apparatus may be set for action, thus enabling it to be controlled in a simple manner.

Having thus fully described the invention, what is claimed as new is:—

1. In an electric time switch, the combina-

tion of a switch, a sliding operating device connected therewith, said device being adapted in normal position to hold the switch open and in its operating movement to close the switch, a second sliding device for returning said operating device to normal position after the switch closing action to open the switch, a contractile spring connecting said devices, a second contractile spring connecting the second sliding device with a fixed support, means associated with the second sliding device for setting said devices for action, restraining means for holding the devices from action by their springs, and time-controlled means governing said restraining means to release such devices for action at prescribed intervals.

2. In an electric time switch, the combination of a switch, a sliding element connected with the switch, said element being adapted in normal position to hold the switch open and on its operating movement to close the switch, a second sliding operating element adapted to return the first named element after actuation to normal position, springs for operating said elements, restraining devices for holding said elements against action by their springs, and time-controlled means for throwing the restraining devices out of action at prescribed intervals.

3. In an electric time switch, the combination of a switch, a sliding operating element connected therewith, said element being movable in one direction to open the switch and in the reverse direction to close the switch, a second sliding element for returning the first-named element to switch-opening position, springs for operating said elements, means for simultaneously setting said elements to place their springs under tension, restraining means for independently holding the elements against action by their springs, and time-controlled means for successively rendering said restraining means inoperative to release said devices for action in successive order at prescribed intervals.

4. In an electric time switch, the combination of a switch, a sliding operating element connected therewith, said element being movable in reverse directions to open and close the switch, a second sliding element operative to return the first-named device to normal or switch-opening position, setting means connected with said second sliding element, a contractile spring connecting the elements, a second contractile spring connecting the second-named element with a fixed support, restraining devices for holding said element against operation by their springs, and time-controlled means governing said restraining devices.

5. In an electric time switch, the combination of a switch, a sliding operating element therefor, a second sliding element for returning said operating element to normal position,

the operating element being adapted in such position to hold the switch open, spring means for operating said elements, means for holding the elements against operation by their springs, and time-controlled means governing the holding means to successively effect the actuation of the operating element and said second element to close and open the switch at prescribed intervals.

6. In an electric time switch, the combination of a switch, a sliding operating device therefor movable in reverse directions to open and close the switch, a second sliding element having a setting knob or handle connected therewith and adapted to return the operating element to normal position, a spring connecting the elements, a spring connecting the second element with a stationary support, devices for respectively holding said elements from operation by their springs, and time-controlled means governing said devices to successively release the elements for operation at prescribed intervals.

7. In an electric time switch, the combination of a switch, a sliding operating device connected therewith, a second sliding device having a setting knob or handle and operative to return said operating device to normal position, springs for operating said devices, retaining arms slidably and pivotally connected with said sliding devices, detents for engaging said retaining arms, and time-controlled means for retracting the detents at prescribed intervals.

8. In an electric time switch, the combination of a switch, a sliding operating device therefor, a second sliding operating device for returning said operating device to normal position, means for holding said operating devices from action, a time piece and releasing devices operated by the time-piece and controlling said holding devices for releasing said operating devices to close and open the switch at prescribed intervals.

9. In an electric time switch, the combination of a switch, a time piece, switch-operating means embodying two sliding members spring actuated to successively close and open the switch, retaining devices including detents for holding said members from action, operating devices for throwing the detents out of action, gears operated in unison by the time piece cams directly operated by said gears for actuating the operating devices, and setting means associated with said gears for adjusting said devices to operate at variable intervals.

10. In an electric time switch, the combination of a switch, a sliding operating element for closing the switch, a second sliding operating element for opening the switch and returning the first named element to normal position, springs for actuating said elements, detents for holding the elements in

set position against movement, a time piece,  
operating devices controlling the detents in-  
cluding releasing elements, gears actuated by  
the time piece and carrying cams for directly  
5 operating said releasing elements, and setting  
means associated with said gears for adjust-  
ing the cams to operate at variable intervals.

In testimony whereof I affix my signature  
in presence of two witnesses.

WILLIAM E. RICHTER.

Witnesses:

GEO. W. HICKOX,  
FRED C. WRIGHT.