No. 669,477. Patented Mar. 5, 1901.

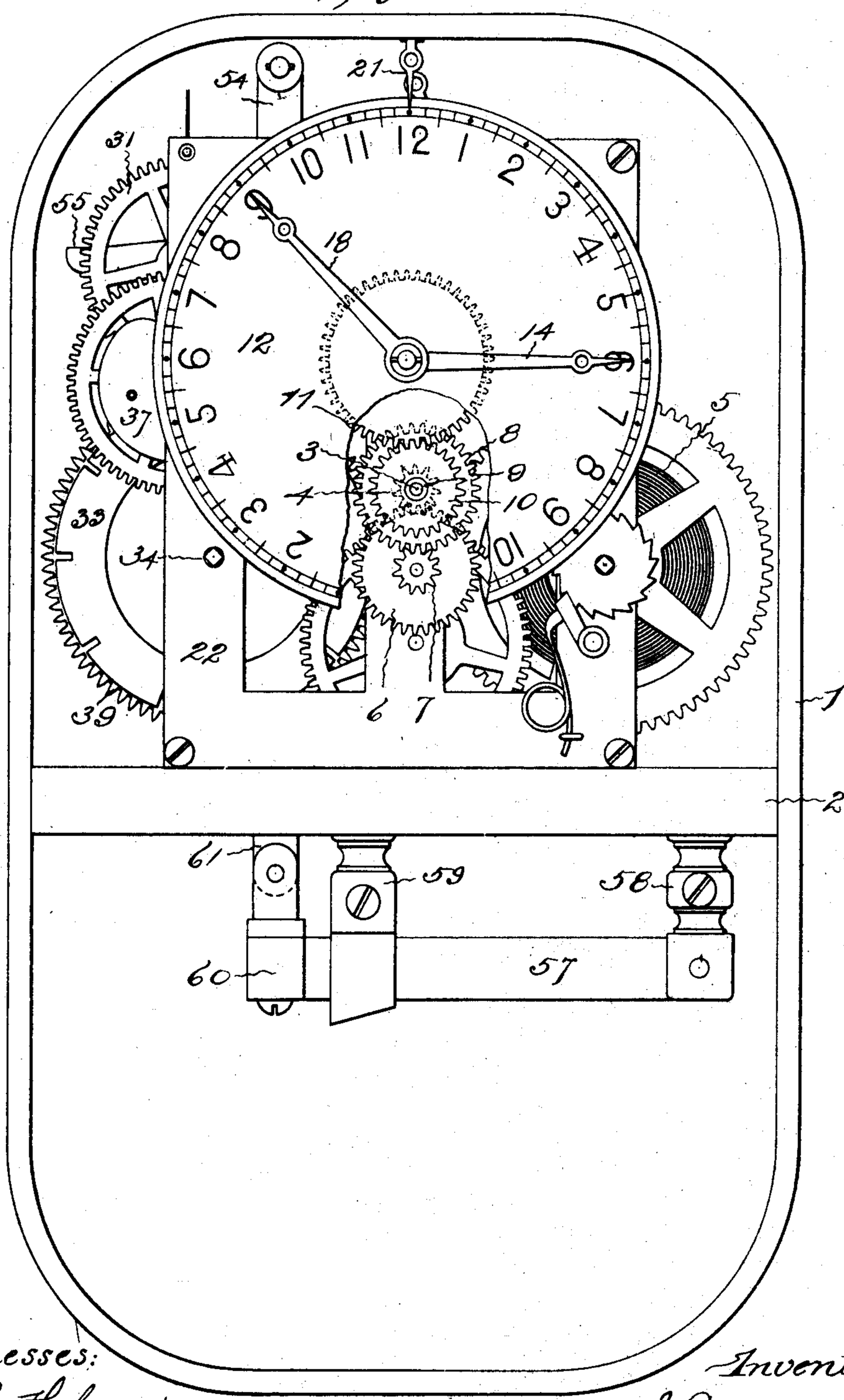
H. J. COGSWELL.

ELECTRIC TIME SWITCH.

(Application filed July 20, 1899. Renewed Aug. 9, 1900.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1



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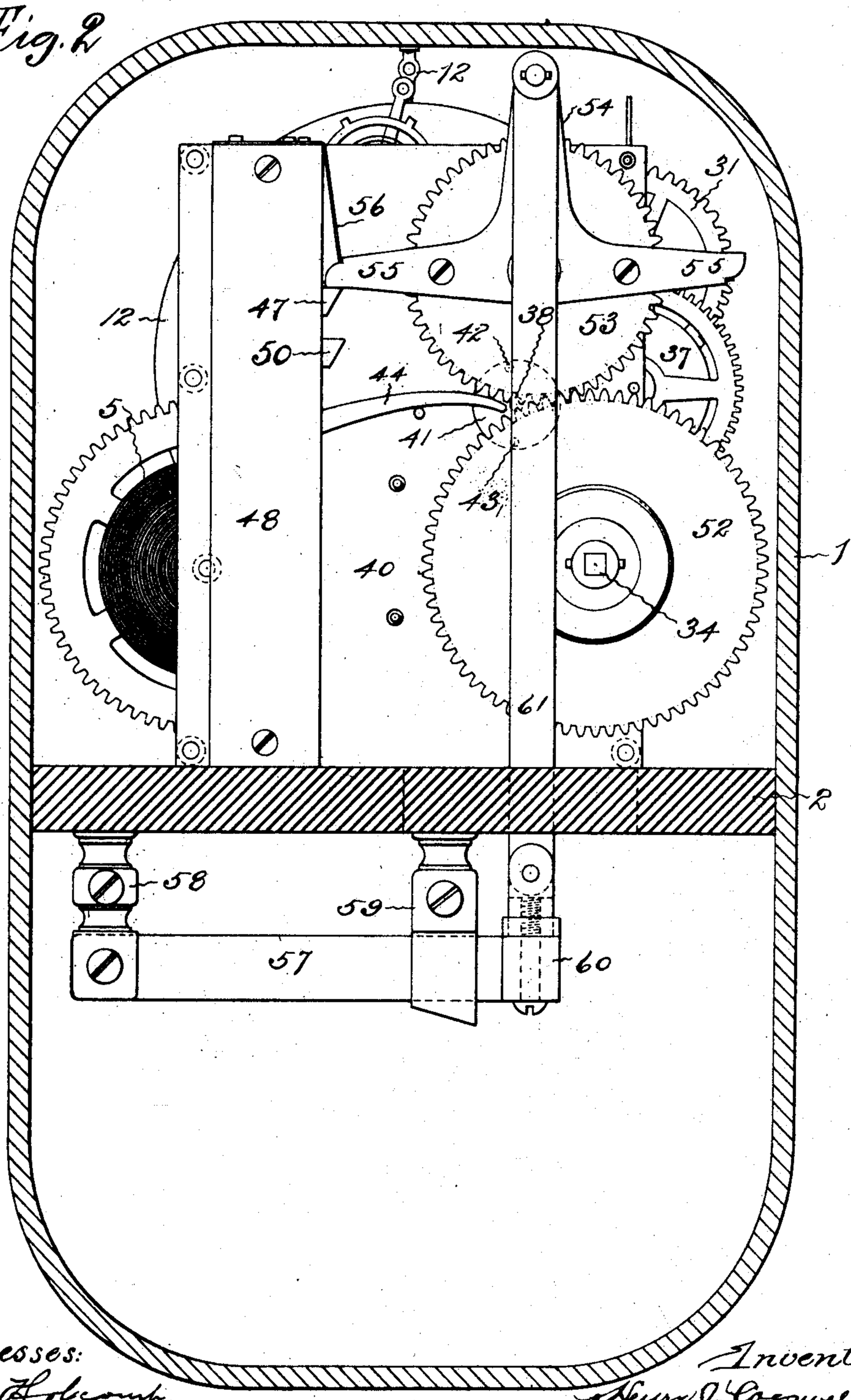
(No Model.) 4 Sheets—Sheet 2.

Fig. 2



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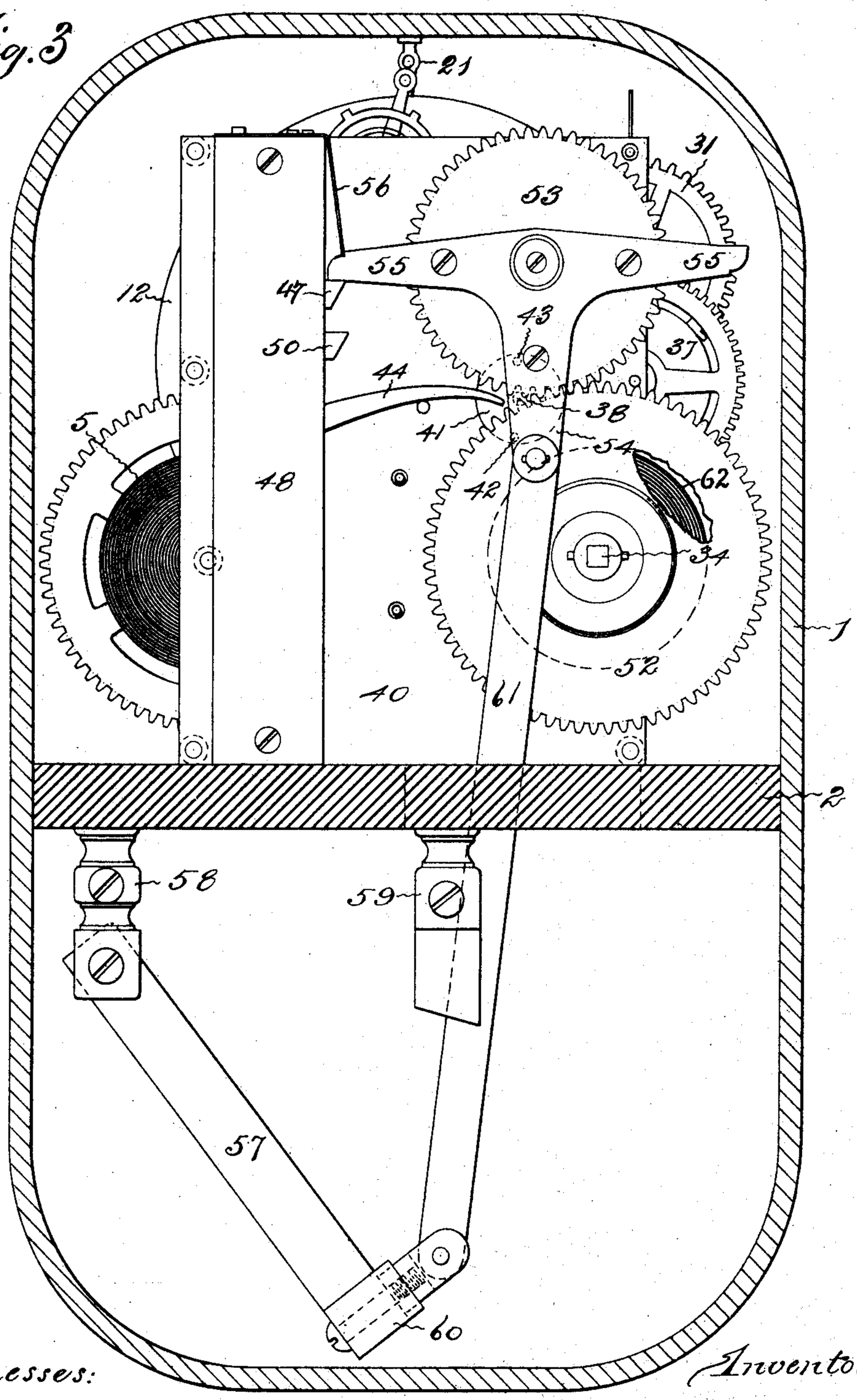
(No Model.) 4 Sheets—Sheet 3.

Fig. 3



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(No Model.) 4 Sheets—Sheet 4.

Fig. 4

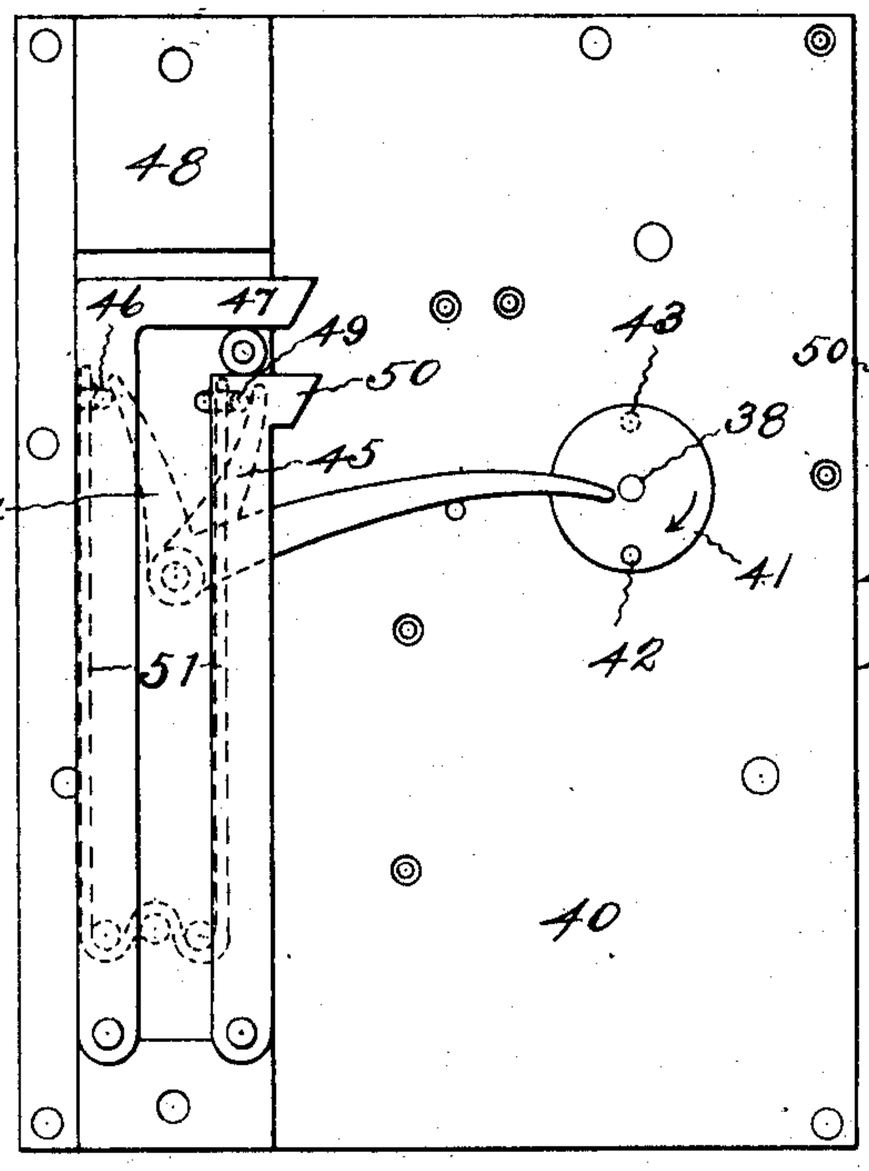


Fig. 5

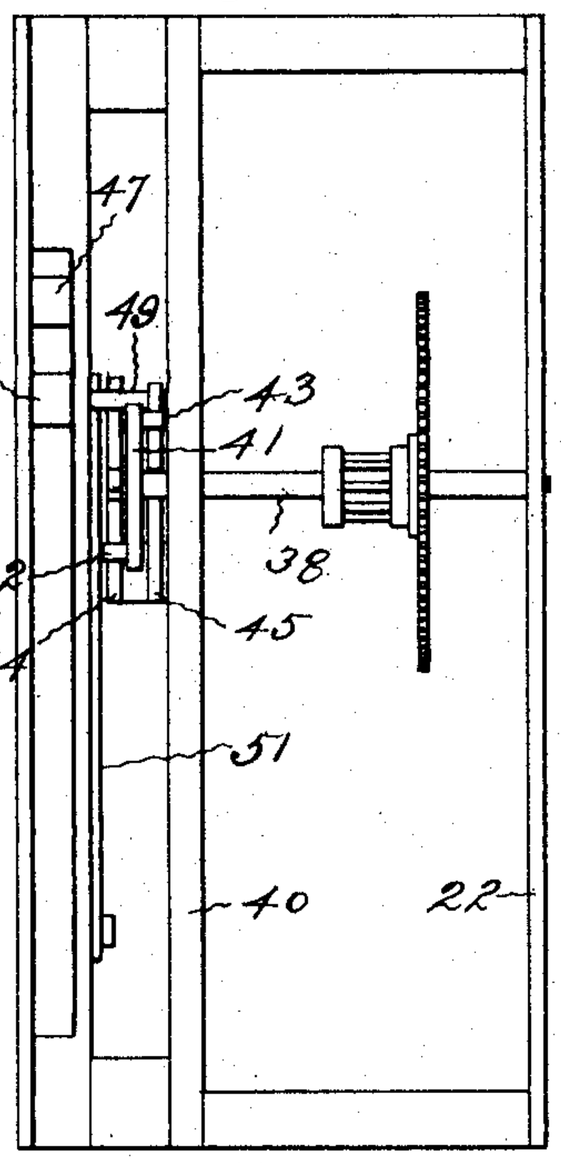


Fig. 6

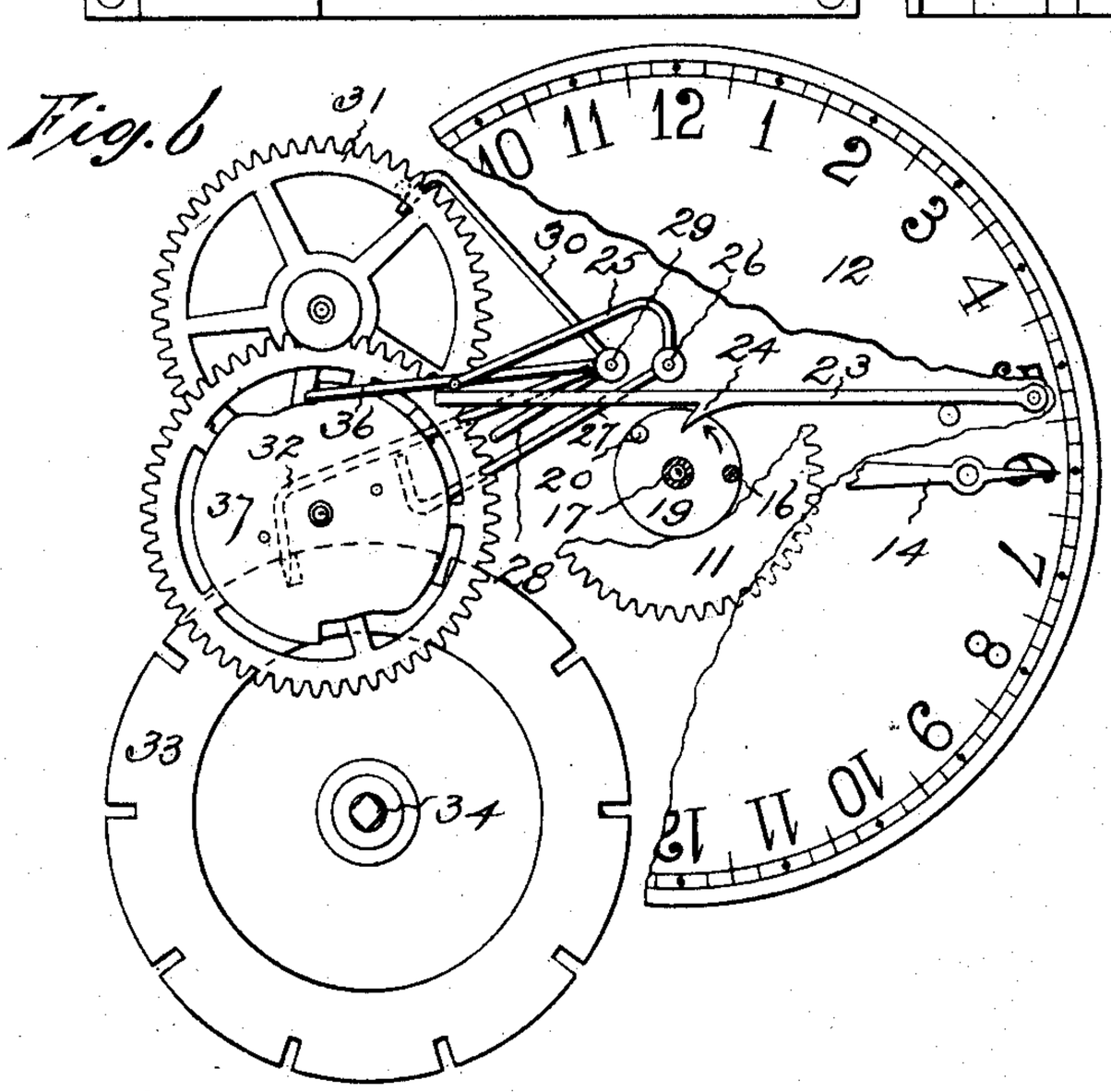
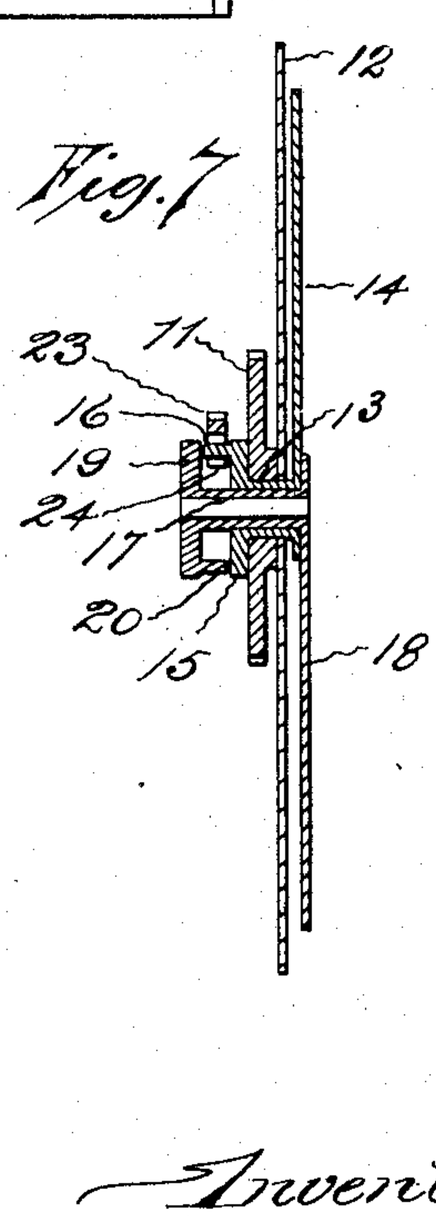


Fig. 7



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UNITED STATES PATENT OFFICE.

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ELECTRIC TIME-SWITCH.

SPECIFICATION forming part of Letters Patent No. 669,477, dated March 5, 1901.

Application filed July 20, 1899 Renewed August 9, 1900. Serial No. 26,448. (No model.)

To all whom it may concern:

Be it known that I, HENRY J. COGSWELL, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Automatic Electrical Switches, of which the following is a specification.

This invention relates to an automatic electrical switch that is actuated for opening and closing a circuit at predetermined times by a clock-movement.

The object of the invention is the production of a compact switch of this nature that is simple to set for operating at the desired moments and that has a strong and durable mechanism which will surely open and close a knife-switch many times with a very rapid, powerful, and extended movement.

In the embodiment of the invention illustrated by the accompanying drawings an ordinary striking marine movement provided with a lettered rotating dial that is so geared with the time-train that it makes one rotation in twenty-four hours is mounted upon an insulating-base and inclosed in a suitable case. This dial is fitted with adjustable trips that may be set by moving the indicating-pointers in front for causing the release of the striking-train at the desired moments. Geared so as to be rotated rapidly by the striking-train spring is a crank that is connected with the free end of a knife-switch. Attached to the crank are stop-arms that engage with catches operated by the striking-train, and when the striking-train is released the catches are temporarily withdrawn from the path of the arms, allowing the crank to make a semirevolution. The trips, which rotate with the dial, can be set to cause the release of the striking-train twice in twenty-four hours, and when the crank is half-rotated in one direction by the striking-spring the switch-blades are thrown from engagement with the contact-posts for opening the circuit, and when the crank is moved the other half of its revolution after the next release of the striking mechanism the knife-blades are brought into engagement with the contact-posts and close the circuit.

Figure 1 of the views shows a front elevation of the switch with the circuit closed, the cover being removed and a portion of the dial broken away to show how the dial is geared with the time-train. Fig. 2 is a view of the back of the switch with the circuit closed, the case being cut in section to show the mechanisms. Fig. 3 is a similar back view with the circuit open. Fig. 4 is a view of the back plate of the clock-movement, showing the crank-arm catches. Fig. 5 is an edge view of the crank-arm catches and connected parts. Fig. 6 is a view illustrating the trip and the striking-train-releasing mechanism; and Fig. 7 is a sectional view of the dial and trip, showing the connection of these parts with the setting-pointers.

The case 1, which surrounds the switch, may be made of iron, brass, or wood, or any desired material; but the base 2 is formed of insulating material, preferably slate. Fastened to the upper face of the insulating-base is an ordinary striking marine movement, and as the arrangement of the gears, pinions, and springs is common they are not shown in detail.

The arbor 3, Fig. 1, is that to which the minute-hand is usually attached. This arbor and the pinion 4, fast to it, are driven by the time-spring 5 through the intermediate gears and pinions of the common time-train, so as to make one complete rotation each hour. The pinion 4 meshes with a gear 6, to which is attached a pinion 7, that meshes with a gear 8, fastened to a sleeve 9, that is loosely mounted upon the arbor 3. The gear 8 and sleeve 9 make one rotation every twelve hours, and usually to this sleeve an hour-hand is attached. In this switch a gear 10 is fastened to the sleeve 9, and meshing with this is a gear 11, that has twice as many teeth as the gear 10. Therefore the gear 11 makes one rotation every twenty-four hours in a direction reverse to the ordinary movement of clock-hands, Fig. 1.

Fastened to the gear 11 is the dial 12, which is marked with numerals representing twelve hours before and twelve hours after meridian. A sleeve 13 extends through the dial and attached gear, and fastened to this sleeve in front of the dial is a pointer 14, while fastened to this sleeve back of the gear is a disk 15, with an inwardly-projecting pin 16. Extending through the sleeve 13 is a sleeve 17, and fastened to this latter sleeve in front of

the dial is a pointer 18, and fastened to it back of the disk 15 is a disk 19, with an outwardly-projecting pin 20, Fig. 7.

The pointers are fastened upon the sleeves in such positions as will indicate the location of the pins, and the sleeves and the disks move with the pointers independently of the dial for adjusting the pins; but they are so held by friction that the pointers and pins rotate with the dial when driven by the time-train. The pointers by this arrangement may be turned to any hours, and the pins will then be so located that when those hours arrive opposite the index-hand 21 at the top, Fig. 1, the pins will be in position to trip the striking-train release. The dial and the dial-gear, with the pointers and trip-pins, are mounted in a common manner upon a stud projecting from the front plate 22.

Pivoted to the front plate near one edge is a bar 23, Fig. 6. This bar extends across the front plate, back of the dial and dial-gear, in the plane of the pins 16 and 20, Fig. 7, and directly above the pins the bar has a wedge-finger 24, that is adapted to be engaged by each pin as it comes around with the dial, so as to lift the bar. The bar is raised to its highest point when a pin reaches its highest position, which is directly below the index-hand, and after the highest position of the pin has been reached the continued movement of the dial carries the pin from under the wedge-finger and allows the bar to drop down.

The bar when lifted strikes and raises the end of a wire 25, that projects from the arbor 26, from which extends a wire 27. When this arbor is rocked by the lifting of the bar, the wire 27 engages the wire 28, projecting from the arbor 29, and so rocks that arbor that the stop-wire 30 is withdrawn from in front of the stop-pin on the gear 31, and the pawl 32 is lifted from a notch of the count-wheel 33, that is mounted upon the arbor 34 of the striking-spring 62. At the same time the wire 36 is lifted from a depression to the higher part of the striking-period cam 37, Fig. 6. All of these parts which are thus moved by the lifting of the bar when the latter is engaged by the trip-pins are formed and arranged exactly as in a well-known striking marine movement.

The arbor 38 of the second gear that is driven by the gear 39 on the arbor of the striking-spring is extended through the back plate 40. Fastened to this arbor outside of the back plate is a disk 41, that has a pin 42 projecting from one face and a pin 43 projecting from a diametrically opposite point of the other face, Figs. 4 and 5.

Levers 44 and 45 are pivoted to the back plate, with the end of the former extending on one side of the disk and the end of the latter extending on the other side of the disk in the paths of the pins. The upper end of the lever 44 engages a pin 46, that projects from a catch 47, which is pivoted in a mortise in a block 48, attached to the back plate, and the upper end of the lever 45 is arranged to engage a pin 49, that projects from a catch 50, that is also pivoted in the mortise in the block. The pins 46 and 49 extend through slots cut in the block for that purpose, and they are, besides being engaged by the upper ends of the levers, engaged by the ends of a spring 51 in such manner that the upper ends of the catches are normally forced out of the mortise in the block and the outer ends of the levers are forced down, Fig. 4.

When the striking mechanism is released, the disk 41 is rotated by the striking-train and the pin 42 on one face oscillates the lever 44 and causes it to draw the upper catch 47 into the mortise, and then the pin 43 on the other side of the disk oscillates the lever 45 and causes it to draw the lower catch 50 into the mortise in the block. The upper catch is first drawn in by one lever and thrown out by the spring, and then the lower catch is drawn in by the other lever and thrown out by the spring, Fig. 4.

Fastened to the arbor 34, to which one end of the striking-spring is attached, outside of the back plate, is a gear 52, and mounted upon a stud in position to mesh with the gear 52 is a gear 53. Secured to the gear 53 is a crank 54, which has outwardly-extending stopping-arms 55, lying in the plane of the catches 47 and 50, Figs. 2 and 3.

The tension of the striking-spring upon the arbor 34 through the gears 52 and 53 tends to rotate the crank, which is temporarily held from rotation by the engagement of one or the other of the stop-arms with the catches. When the catch 47 is withdrawn from the path of an arm by the movement of the lever 44, that arm drops onto the catch 50. As the catch 50 is being drawn into the block the catch 47 is again thrown out, so that when the catch 50 is completely withdrawn from under the arm the crank is free to be rotated until the other arm is stopped by the catch 47. The gear 52 is larger than the gear 53, so that the motion of the crank will be accelerated, and there are two catches, so that one will surely be returned into position for stopping an arm when the crank rotates. A leaf-spring 56 is attached to the block in position to prevent the arms from rebounding when they strike a catch and also from turning backwardly when the striking-spring is being wound up, Figs. 2 and 3.

Fastened to the under side of the insulating-base is a knife-switch of suitable electrical capacity. In the form shown the blades 57 are pivoted to binding-posts 58 and are adapted to be moved on their pivots into and out of contact with the posts 59. There may be any number of blades, and they are connected at the free ends by an insulating-head 60 in the usual manner, Figs. 1, 2, and 3.

A link 61 connects the crank with the insulating-head at the free end of the knife-switch. When the crank stands upwardly,

as in Fig. 2, the link holds the knife-switch, so that the blades complete the circuit between the binding-posts, and when the crank is thrown to its lower position, Fig. 3, the link forces the blades from the contact-posts, so as to open the circuit. The crank-arm is of such length that a semirevolution gives a long throw to the switch-blades, causing an extended break, and the crank-arm is rotated so rapidly by the gearing under the influence of the striking-spring that the break of the circuit is accomplished exceedingly quick. By the employment of two catches the upper one is sure to be returned to position for stopping an arm when the crank is thrown, for an arm after being released from the upper catch has a slight dwell on the lower catch. The catches are made exceedingly strong, for a hard blow is imparted to them when the crank revolves and they are employed in stopping an arm. The block which supports the catches is so connected with the back plate that it rests upon the insulating-base, and the blows received by the catches from the arms are resisted by the base and not directly by the clock-movement.

The pointers in front of the dial may be set so that at any predetermined two hours of the day or night the trip-pins will lift the bar that releases the striking mechanism and allow that mechanism to withdraw the catches from beneath the stop-arms, so that the striking-spring will throw the crank and alternately open and close the knife-switch. The parts arranged in this manner are very strong and very durable. The mechanisms are sure in action, and a very quick and extended break is given to a switch of the approved form, so that circuits with large currents can be operated automatically with safety by one of these switches. The mechanisms are compact and not complicated.

I claim as my invention—

1. An automatic switch consisting of a time-train, a spring for driving the time-train, a time-indicating dial rotated by the time-train, a trip adjustable independently of and also rotationally movable with the dial, a striking-train, a spring with its outer end arranged for driving the striking-train, stop mechanism holding the striking-train and adapted to be moved by the trip to periodically release the striking-train, a crank connected with and rotated by the inner end of the striking-train spring, a catch temporarily holding the crank and moved by the striking-train for releasing the crank and allowing it to be rotated by the striking-train spring, and switch-blades connected to the crank, substantially as specified.

2. An automatic switch consisting of a time-train, a spring for driving the time-train, a time-indicating dial rotated by the time-train, a trip adjustable independently of and also rotationally movable with the dial, pointers in front of the dial and connected with the trip, a striking-train, a spring with its outer end arranged for driving the striking-train, stop mechanism holding the striking-train and adapted to be periodically moved by the trip to release the striking-train, a crank connected with and rotated by the inner end of the striking-train spring, a catch temporarily holding the crank and moved by the striking-train for releasing the crank and allowing it to be rotated by the striking-train spring, and switch-blades connected to the crank, substantially as specified.

3. An automatic switch consisting of a time-train, a spring for driving the time-train, a rotary time-indicating dial, gears connecting the dial with the time-train, a trip adjustable independently of and also movable with the dial, a striking-train, a spring with its outer end arranged for driving the striking-train, stop mechanism holding the striking-train and adapted to be periodically moved by the trip to release the striking-train, a crank connected with and rotated by the inner end of the striking-train spring, a catch temporarily holding the crank and moved by the striking-train for releasing the crank and allowing it to be rotated by the striking-train spring, and switch-blades connected to the crank, substantially as specified.

4. An automatic switch consisting of a time-train, a spring for driving the time-train, a time-indicating dial rotated by the time-train, disks adjustably connected to and movable with the rotary dial, trip-pins projecting from the disks, pointers in front of the dial connected with the disks, a bar adapted to be moved by the trip-pins, a striking-train, a spring with its outer end arranged for driving the striking-train, stop mechanism holding the striking-train and adapted to be periodically moved by the bar to release the striking-train, a crank connected with and rotated by the inner end of the striking-train spring, a catch temporarily holding the crank and moved by the striking-train for releasing the crank and allowing it to be rotated by the striking-train spring, and switch-blades connected to the crank, substantially as specified.

5. An automatic switch consisting of a time-train, a spring for driving the time-train, a rotary time-indicating dial, gears connecting the dial with the time-train, sleeves extending through the dial, pointers fixed to the sleeves in front of the dial, disks fixed to the sleeves back of the dial, trip-pins projecting from the disks, a bar pivoted to the front plate in the plane of the pins, a striking-train, a spring with its outer end arranged for driving the striking-train, stop mechanism holding the striking-train and adapted to be periodically moved by the lifting of the bar to release the striking-train, a crank connected with and rotated by the inner end of the striking-train spring, a catch temporarily holding the crank and moved by the striking-train for releasing the crank and allowing it to be

rotated by the striking-train spring, and switch-blades connected to the crank, substantially as specified.

6. An automatic switch consisting of a time-train, a spring for driving the time-train, a time-indicating dial rotated by the time-train, a trip adjustable independently of and also rotationally movable with the dial, a striking-train, a spring with its outer end arranged for driving the striking-train, stop mechanism holding the striking-train and adapted to be periodically moved by the trip to release the striking-train, gears connected with the inner end of the striking-train spring, a crank rotated by the gears, a catch temporarily holding the crank and moved by the striking-train for releasing the crank and allowing it to be rotated by the striking-train spring, and switch-blades connected to the crank, substantially as specified.

7. An automatic switch consisting of a time-train, a spring for driving the time-train, a time-indicating dial rotated by the time-train, a trip adjustable independently of and also rotationally movable with the dial, a striking-train, a spring with its outer end arranged for driving the striking-train, stop mechanism holding the striking-train and adapted to be periodically moved by the trip to release the striking-train, a crank connected with and rotated by the inner end of the striking-train spring, stop-arms connected with the crank, a catch temporarily holding the arms and moved by the striking-train for releasing the crank and allowing it to be rotated by the striking-train spring, and switch-blades connected to the crank, substantially as specified.

8. An automatic switch, consisting of a time-train, a spring for driving the time-train, a dial rotated by the time-train, a trip movable with the dial, a striking-train, a spring for driving the striking-train, stop mechanism holding the striking-train and adapted to be periodically moved by the trip to release the striking-train, a crank rotated by the striking-train spring, stop-arms connected with the crank, a catch for temporarily holding the crank against rotation, a catch for stopping the rotation of the crank, a catch-moving mechanism operated by the striking-train, and a switch connected with the crank, substantially as specified.

9. An automatic switch, consisting of a time-train, a spring for driving the time-train, a dial rotated by the time-train, a trip movable with the dial, a striking-train, a spring for driving the striking-train, stop mechanism holding the striking-train and adapted to be periodically moved by the trip to release the striking-train, a crank rotated by the striking-train spring, stop-arms connected with the crank, a catch for temporarily holding the crank against rotation, a catch for stopping the rotation of the crank, a spring for moving the catches outwardly, levers for withdrawing the catches, cam-pins revolved by the striking-train for operating the levers, and a switch connected with the crank, substantially as specified.

10. An automatic switch consisting of a clock having a time-train and a striking-train, springs for driving the trains, a crank connected to and rotated by one of the springs, a catch temporarily holding the crank against rotation, mechanism periodically moved by one of the springs for withdrawing the catch from the crank, and a knife-switch connected to the crank, substantially as specified.

11. An automatic switch consisting of a time-train, a spring for driving the time-train, a striking-train, a spring for driving the striking-train, a trip connected with the time-train for periodically releasing the striking-train, a crank connected with the inner end of the striking-train spring, a catch temporarily holding the crank and moved by the striking-train spring for releasing the crank, and a knife-switch connected to the crank, substantially as specified.

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