

O. P. NOISOM & C. J. LINDEWALD.

ELECTRIC TIME SWITCH.

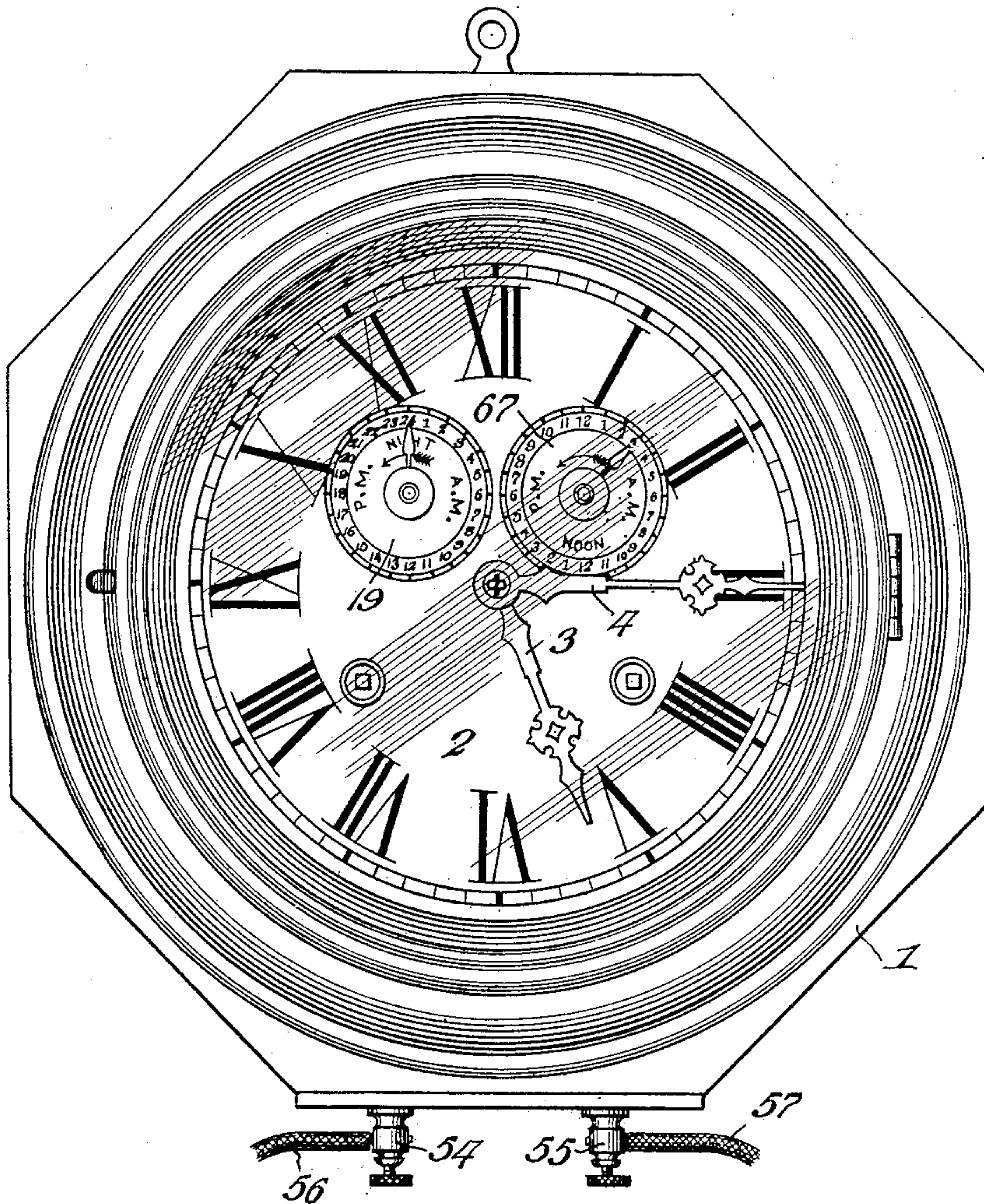
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907,088.

Patented Dec. 15, 1908.

4 SHEETS—SHEET 1.

*Fig. 1.*



Witnesses

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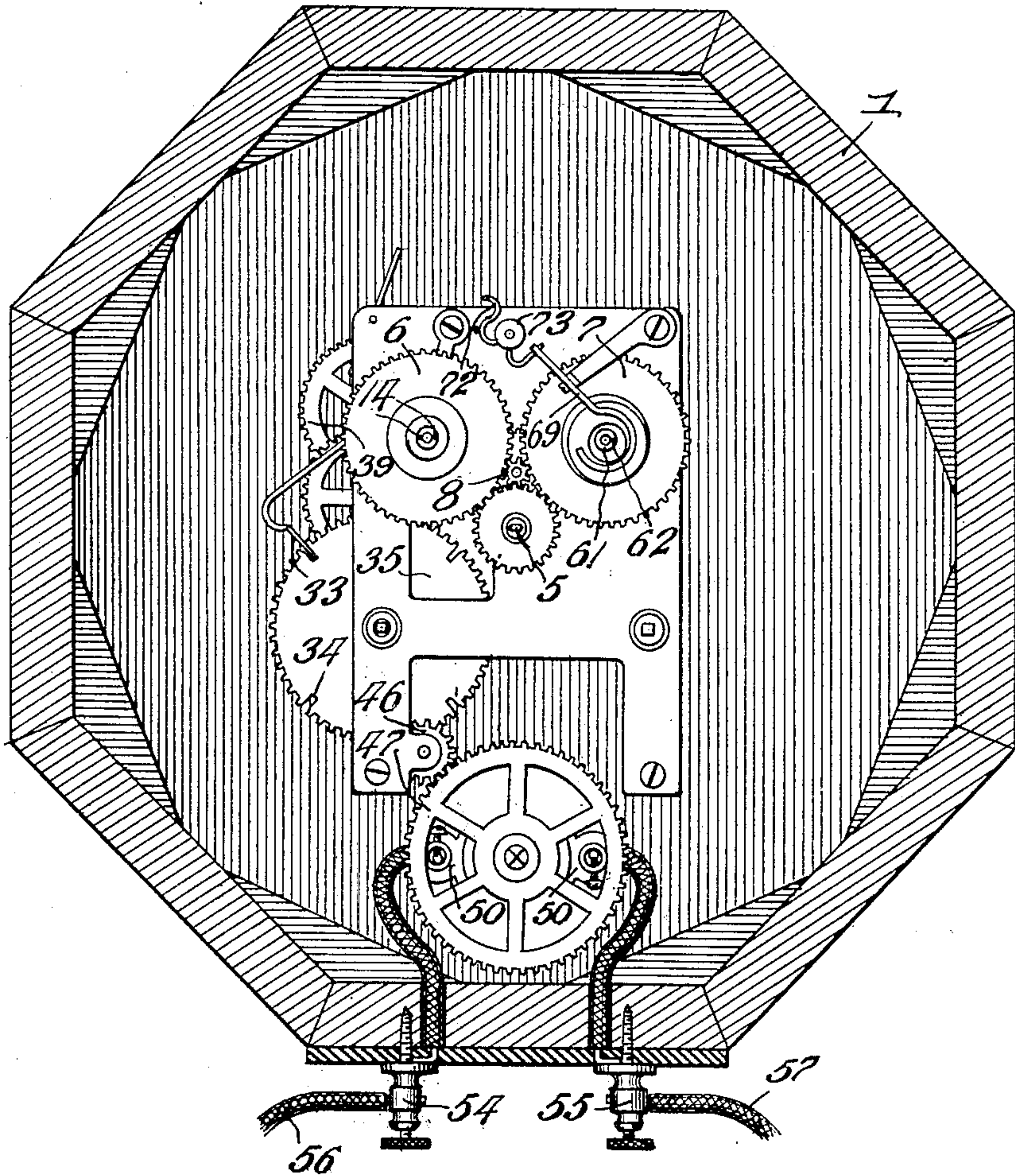
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4 SHEETS—SHEET 2.

*Fig. 2.*



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4 SHEETS—SHEET 3.

Fig. 3.

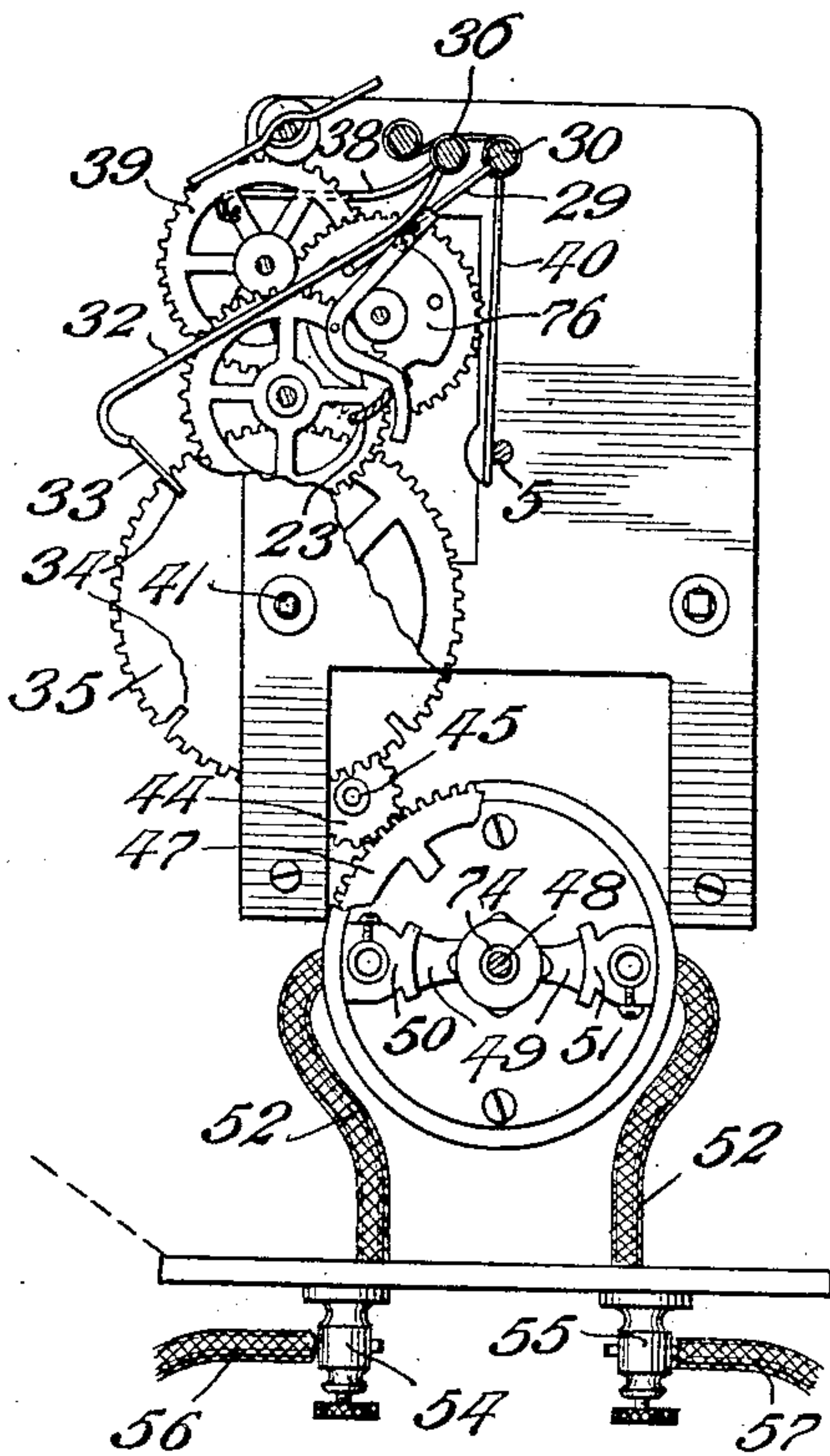


Fig. 4.

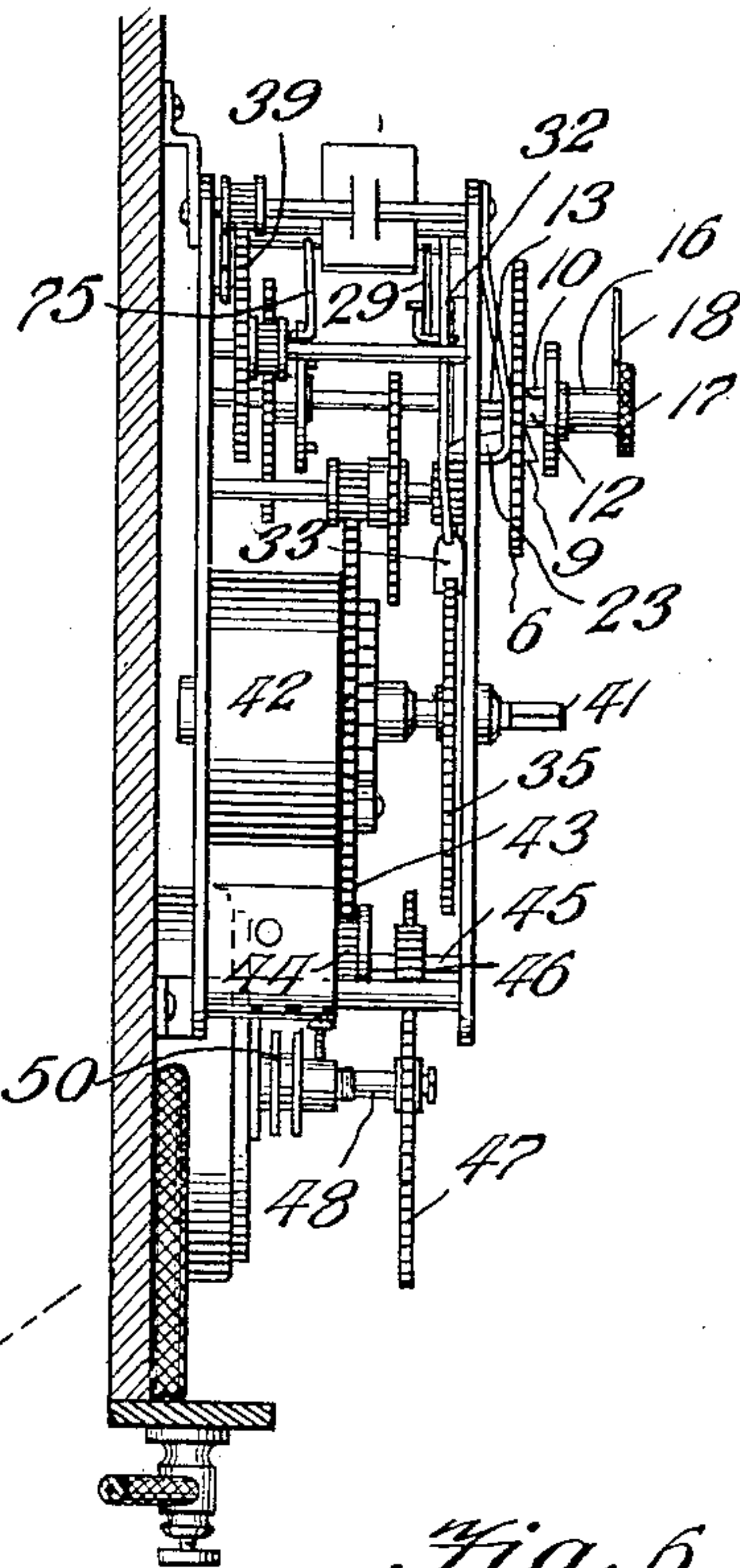


Fig. 6.

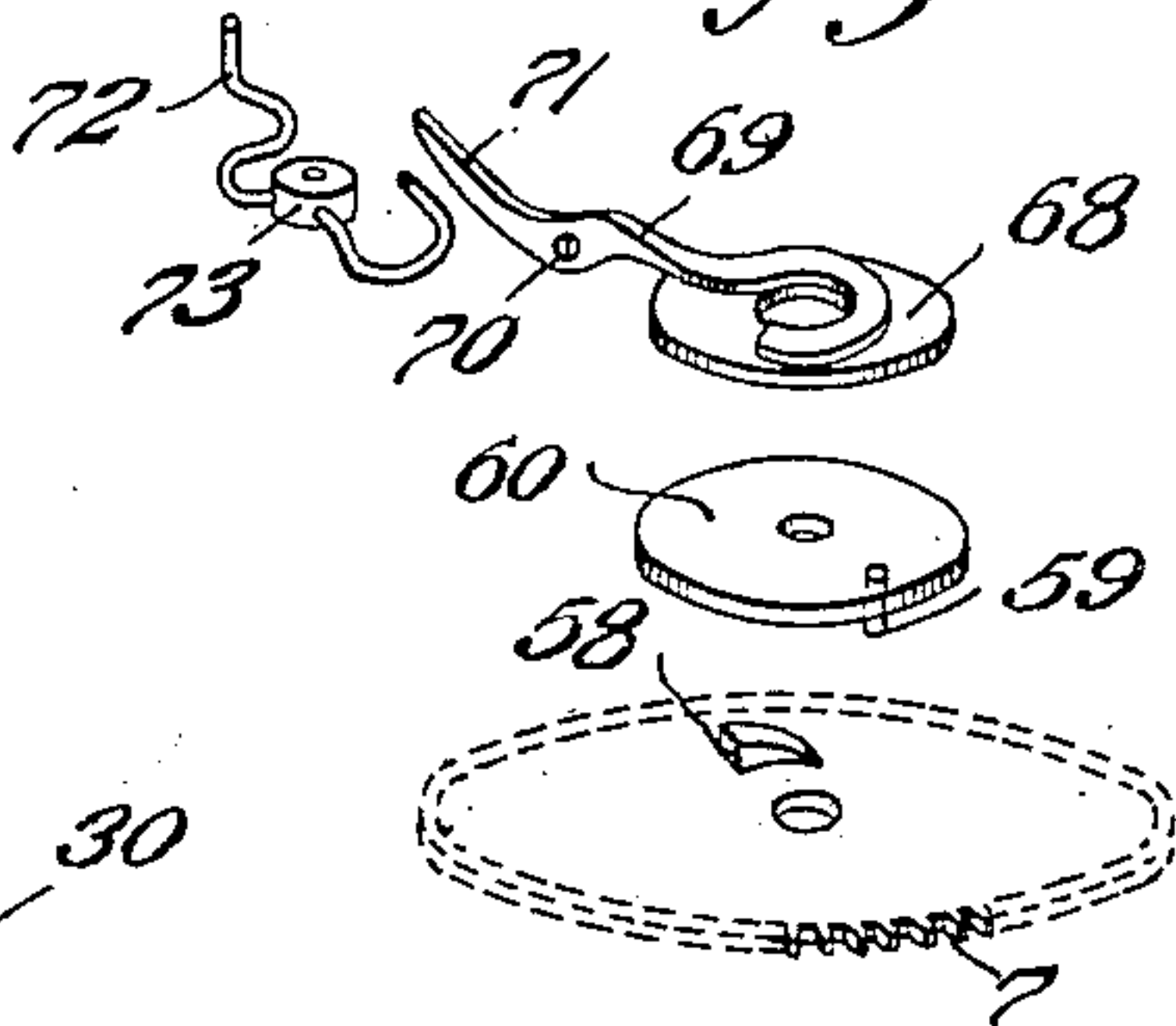
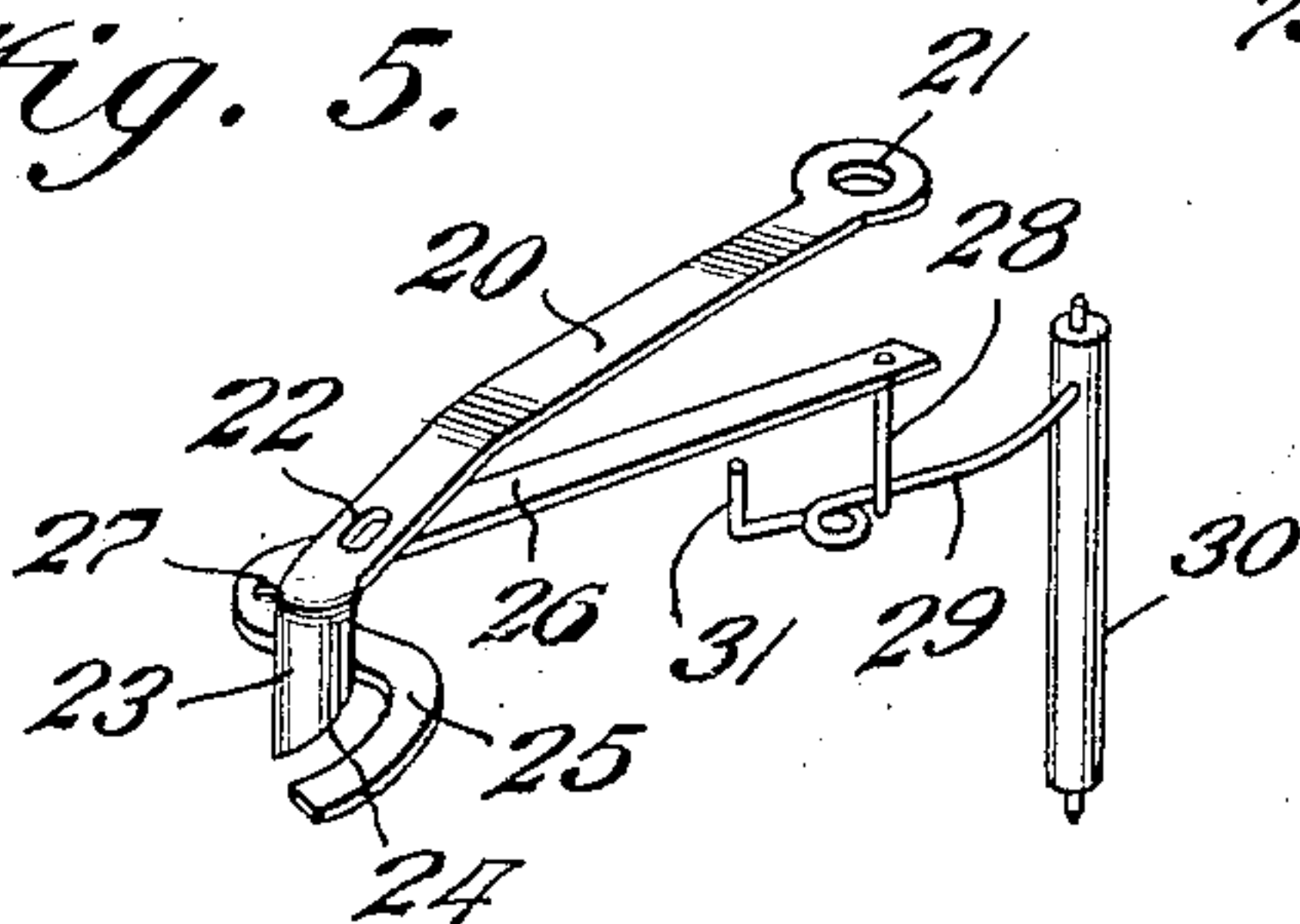


Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 7.

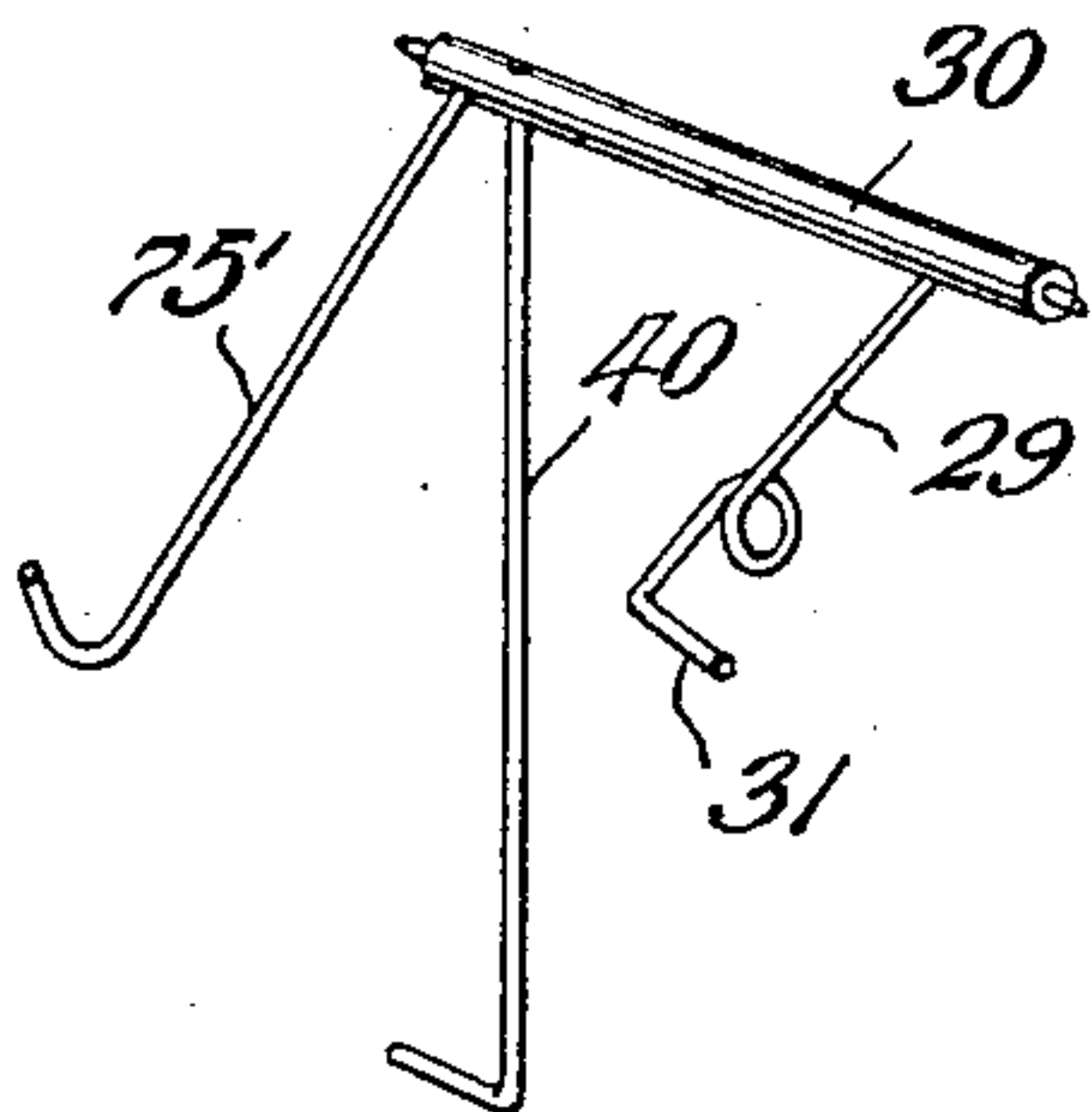


Fig. 8.

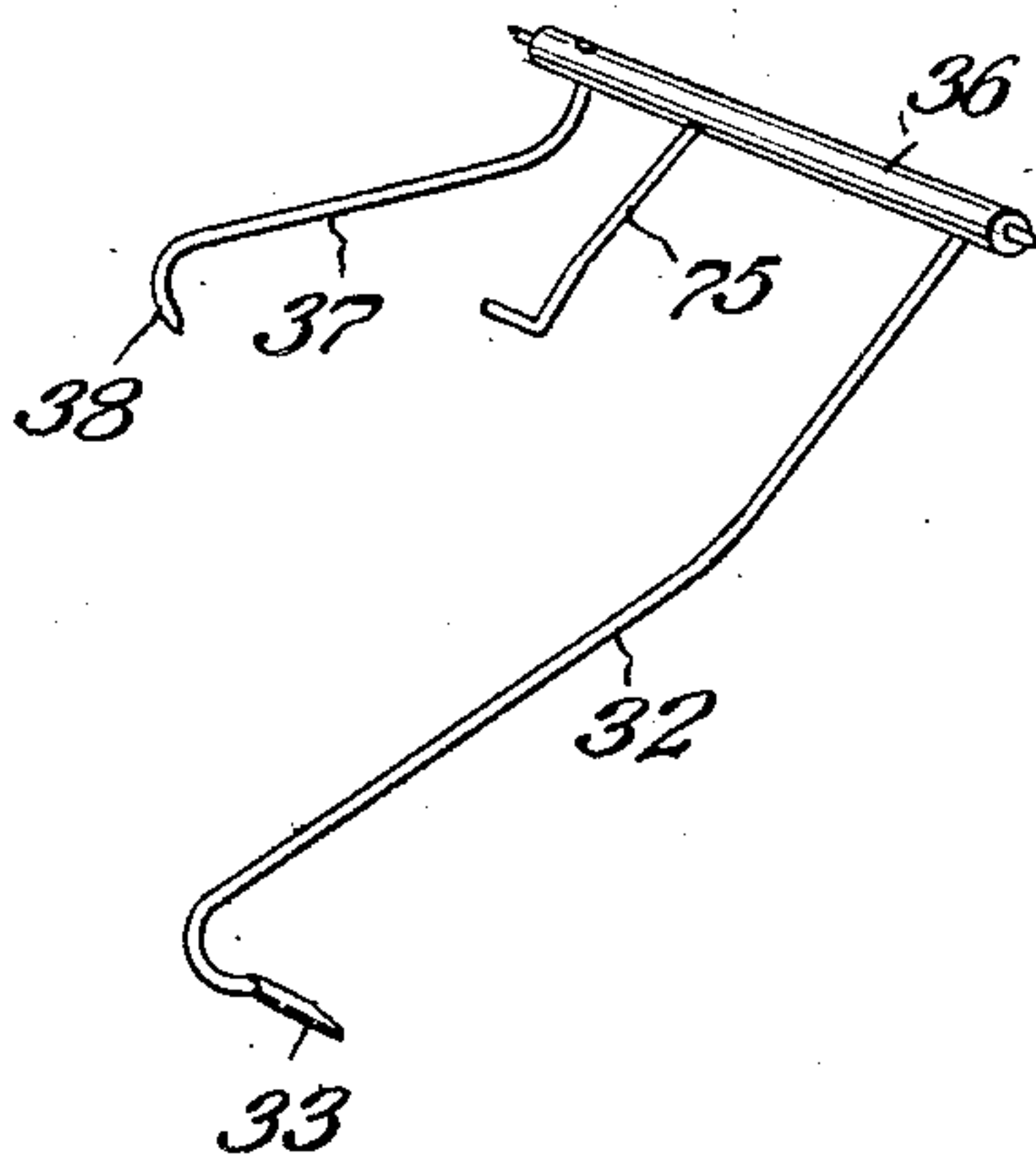


Fig. 9.

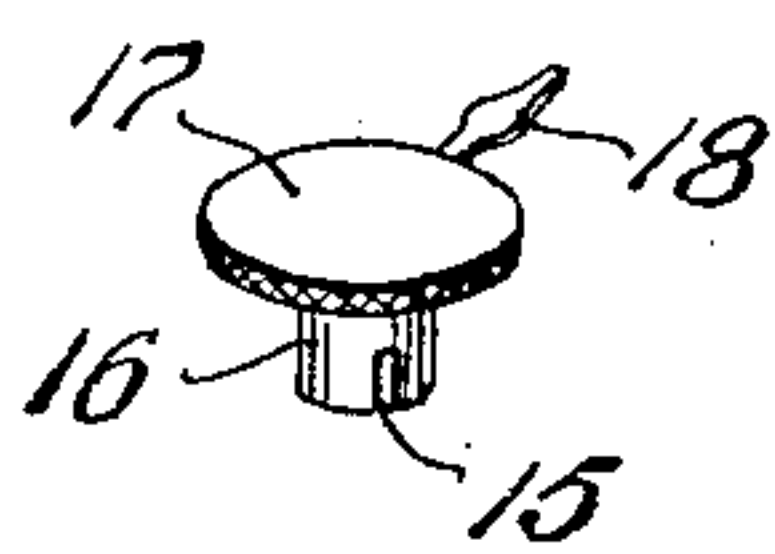


Fig. 10.

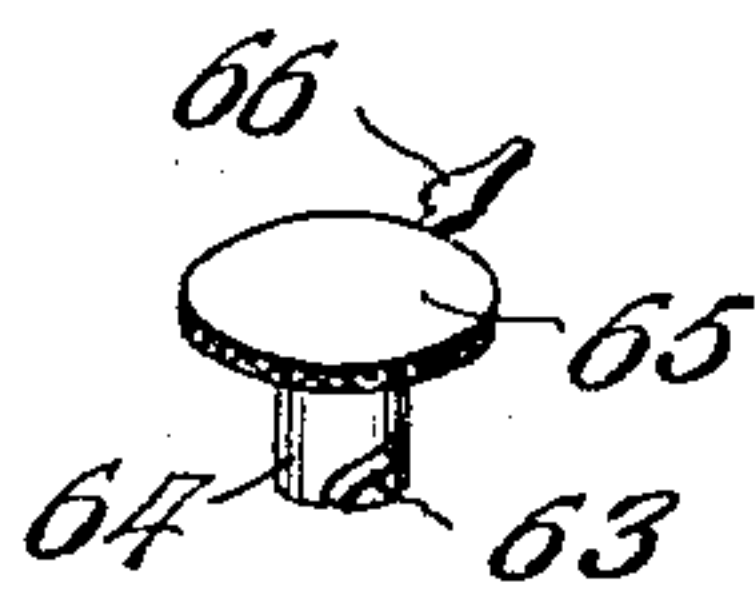
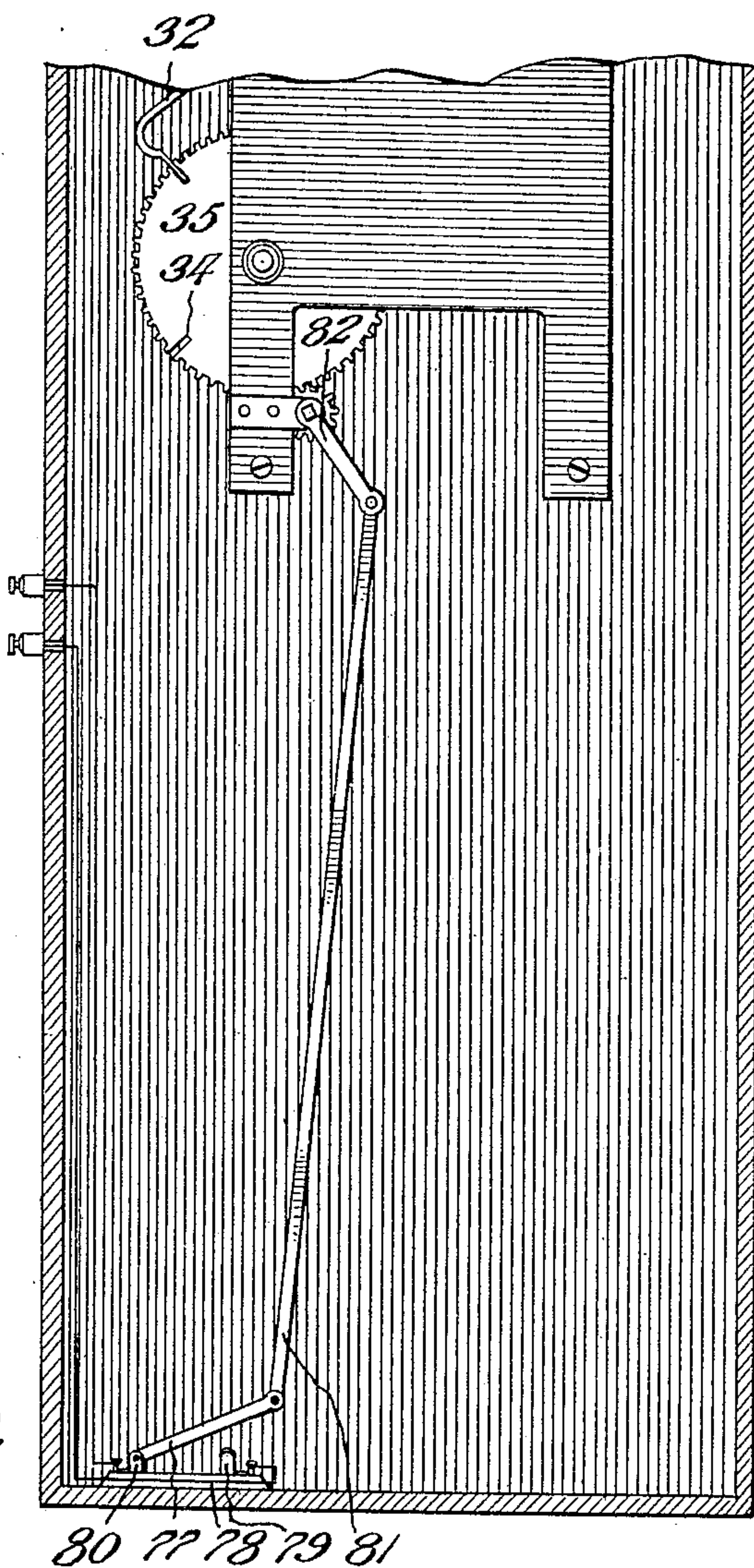


Fig. 11.



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# UNITED STATES PATENT OFFICE.

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ASSIGNOR OF ONE-HALF OF HIS RIGHT TO SAID NOISOM.

## ELECTRIC TIME-SWITCH.

No. 907,088.

Specification of Letters Patent.

Patented Dec. 15, 1908.

Application filed January 27, 1908. Serial No. 412,923.

*To all whom it may concern:*

Be it known that we, OLE P. NOISOM and CARL J. LINDEWALD, citizens of the United States, residing at South Bend, in the county of St. Joseph and State of Indiana, have invented new and useful Improvements in Electric Time-Switches, of which the following is a specification.

This invention relates to electric time switches, the object of the invention being to provide a switch of the character described adapted to cut in and cut out an electric current such, for example, as is used in connection with electric light circuits, the said mechanism involving the use of a time piece embodying in connection with the usual clock mechanism, means for setting the electric time switch, and means controlled by position of the setting mechanism for operating the switch at predetermined times, both for making and breaking the circuit.

By means of the construction hereinafter particularly described, the mechanism may be set, for example, to turn on electric lights at a given time, permit said lights to burn for a stated period and at the predetermined time cut out the lights.

With the above and other objects in view, the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination and arrangement of parts as hereinafter fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a face view of a time piece embodying the present invention. Fig. 2 is a sectional front elevation of the time piece with the dial and front portion of the case removed to illustrate the interior mechanism. Fig. 3 is a broken front elevation of the clock mechanism, showing the locking and tripping gearing by means of which the switch is controlled. Fig. 4 is an edge view of the same. Fig. 5 is a detail perspective view of a portion of the tripping mechanism. Fig. 6 is a perspective view of the segregated parts of another portion of the tripping mechanism. Fig. 7 is a detail perspective view of the lifting arbor and its arms. Fig. 8 is a perspective view of the pawl arbor and its arms. Figs. 9 and 10 are detail perspective views of the thumb pieces and setting hands. Fig. 11 is a sectional view of the mechanism applied to a vibratory or knife switch.

Referring to the drawings, 1 designates the clock case which is provided with the usual dial 2 and the hour or minute hands 3 and 4, respectively, mounted on the arbor 5, the said parts being of the usual construction and arrangement now found in ordinary clocks.

In carrying out the present invention, oppositely arranged gears 6 and 7 are mounted to mesh with the interposed minute pinions 8 the latter being driven in the usual manner and imparting motion simultaneously to the gears 6 and 7. These gears are continuously driven by the minute pinions 8 in the same direction.

The wheel 6 is provided on its outer face with a cam projection 9 which resembles an ordinary saw tooth in shape as illustrated in Fig. 4, the said cam projection or tooth being adapted to come in contact with the fixed pin 10 on a setting disk 11 which is mounted fast on a sleeve 12 surrounding a fixed arbor 13. The sleeve 12 passes through the dial 2 and is provided with oppositely arranged keys 14 adapted to enter correspondingly arranged notches 15 in the hub 16 of a thumb piece 17 preferably in the form of a knurled disk as shown in Fig. 9 from which projects an indicating hand 18 which connection with the small auxiliary dial 19 is adapted to indicate the time at which the operating mechanism will be tripped.

The wheel 6 is mounted to slide inward and outward on the arbor 13 but is held yieldingly outward by means of a spring 20 shown in detail in Fig. 5, the said spring being fastened at one end 21 to the frame of the clock mechanism and being further held at a point distant from the end 21 by providing said spring with a slot 22 which engages a stay pin connected with the clock frame. The end of the spring 20 is bent at an angle to form a cam finger 23 one side of which is beveled or inclined as shown at 24 so that when the finger 23 is pushed inward by the action of the wheel 6 as the latter slides inward on the arbor 13, the cam finger operates on the crooked arm 25 of a trip lever 26, the latter being fulcrumed at its elbow 27 on the frame of the movement.

The lever 26 is provided with a listing pin or finger 28 which operates against the lifting arm 29 of a lifting arbor 30, which is journaled at its opposite ends on the frame of the



movement. The arm 29 terminates in a laterally bent extremity or lifting finger 31 which lies under the arm 32 of a locking pawl 33 which is adapted to interlock with a series of notches 34 in a locking wheel 35 the purpose of which will hereinafter appear. The arm 32 is connected to a pawl arbor 36 which is journaled at its opposite ends in the frame of the movement and the arbor 36 is provided with a stop arm 37 having a hooked extremity 38 adapted to engage a pin on one of the gears 39 of the train of gears actuated by the main power spring of the switch operating mechanism, which spring will be hereinafter referred to, the stop arm 37 acting to check and lock the whole train of gearing of the switch mechanism. The lifting arbor 30 is also provided with a stop arm 40 adapted to strike against the arbor 5 of the minute and hour hands as indicated in Fig. 3 the arbor 5 thus acting to limit the movement of the arm 40 although said arm may operate against any other suitable stop in lieu of the arbor 5, this not being essential.

The locking wheel 35 is mounted on an arbor 41 to which motion is communicated by means of a main power spring 42 resembling the main spring of the clock mechanism and mounted fast on the same arbor 41 as a main power gear 43 which meshes with a pinion 44 on an arbor 45 having also fast thereon another pinion 46 which meshes with a switch gear 47 fast in the switch spindle 48 of a rotary switch comprising one or more blades 49 movable into and out of engagement with the contacts 50 and 51. From these contacts wires 52 and 53 lead to binding posts 54 and 55 on the outside of the clock case, said binding posts being adapted to receive the terminals 56 and 57 of the circuit wires in which may be included electric lights or any other appliance to be controlled by the switch mechanism of this invention.

It will be understood that by means of the thumb piece 17 and with the aid of the hand 18 and dial 19, the fixed pin 10 may be positioned at any desired point in its circular movement as indicated by the numbers on the face of the dial 19, the dial being numbered from one to twenty-four to indicate all of the hours of the day and night. As the wheel 6 revolves, when the predetermined time arrives, the cam projections or tooth 9 rides against the pin 10 and the wheel 6 is caused to slide inward on its arbor thereby operating the cam finger 23 of the spring 20, shifting the lever 26, raising the arm 29 and causing the latter to raise the arm 32, thereby carrying the pawl 33 out of the notch 34 which it occupies in the locking wheel 35. This unlocks the wheel 35 and also the arbor 41 which is then driven by the power spring 42, motion being carried through

the transmission pin 45 and the switch gear 47 and switch spindle 48 so as to operate the switch and turn the current on or off as the case may be.

The wheel 7 is also provided on its inner face with a cam projection or saw shaped tooth 58 which coöperates with a slide pin 59 in an opening in a setting disk 60.

An arbor 61 on the disk 60 is provided at one side with a key 62 in the form of a pin adapted to engage in a bayonet or crooked slot 63 in the tubular hub 64 of a thumb piece 65 to which is attached an indicating hand 66 which operates in conjunction with a second auxiliary dial 67 shown in Fig. 1 on the main dial of the clock, the dial 67 being also numbered from one to twelve throughout half of its circumference to indicate the hours of day and again from one to twelve to indicate the hours of the night. When the hand 66 is set at the desired hour on the dial 67 at which the switch is to be operated, the pin 59 is correspondingly positioned and when the cam projection or tooth 58 arrives at the pin 59 it slides said pin through the opening in the setting disk 60 causing said pin to act on the disk-shaped extension or head 68 of a trip lever 69 fulcrumed intermediate its ends at 70, the other arm 71 of said lever being adapted to act on one of a pair of arms 72 projecting from a lifting pinion 73 which is fast on the lifting arbor 30. The arm 72 is inclined so that when the arm 71 operates against the arm 72, the lifting arbor 30 is turned far enough to cause the finger 31 carried thereby and lifting the pawl arm 32 and moving the pawl 33 out of engagement with the locking wheels 35. This, as stated before, unlocks the arbor 41 and allows the power spring 42 to drive the switch spindle 48.

The switch, as a whole, with the exception of the driving gear therefor is of the construction now in common use and needs no particular description further than to say that the blade or blades 49 are connected to the spindle 48 by means of a coil spring 74 which allows the wheel 47 to turn as it is actuated by the power spring 42 without immediately throwing the blades 49. As the wheel 47 turns, however, the spring 74 is gradually wound up or placed under tension and when the tension thereof becomes sufficient to carry the blades 49 out of frictional engagement with the contacts 50 and 51 a quick movement is effected, the blades 49 swinging through one-fourth of the revolution and being stopped out of touch with the contacts 50 and 51. The wheel 35 continues to revolve until the next deep notch comes opposite to the pawl 33 which vibrates inward and outward for each short tooth in said wheel whereupon the pawl 33 enters the top notch and again actuates the switch mechanism. When the mechanism is again tripped, the



switch is thrown another one-fourth of a turn thereby closing the circuit. In this way the circuit is alternately closed and opened. 75 designates the striking arm on arbor 36, which arm coöperates with the striking cam 76 shown in Fig. 3, said parts being of the usual construction and arrangement as well as the remainder of the train of gearing shown in Figs. 3 and 4.

From foregoing description, the invention is shown as applied to a rotary switch but it will be apparent that the mechanism is also applicable to the ordinary knife switch as shown in Fig. 11 in which the blades of the knife switch are represented at 77 and the base of the switch at 78, the base being provided with the usual contacts 79 and 80. In order to operate the blade or blades 77, a connection 81 extends from the movable element of the switch to an arm 82 connected with the shaft or arbor of a pinion 83 which meshes with it and is driven by the wheel 35 as shown in said Fig. 11. In the upward movement of the arm 82, the circuit is broken by lifting the blade or blades 77 out of touch with the contacts 79 and in the return or downward movement of the arm 82 the circuit is closed by pressing the blades 77 into touch with the contacts 79. In all respects, the mechanism is the same as hereinabove described.

It will be understood that the switch may be set to complete the electrical circuit at any predetermined time and break the circuit at a subsequent time, the times at which the circuit is completed and broken being governed by the positions of the pins 10 and 59 which are moved to the desired positions by means of the thumb pieces 17 and 65. It will further be observed that the locking wheel 35 is provided with four notches 34 at equi-distant points which agree with the four one-fourth moves which agree with the rotary switch 49. Another advantage of the construction described is that the switch gear is driven almost directly by the main spring or power wheel 43, thereby giving ample power to operate or shift the switch. Instead of the spur gearing between the power spring 42 and the switch spindle, a belt drive may be employed. Furthermore, the switch may be arranged at any side of the spring as may be found the most convenient. It will also be apparent that the switch mechanism above described may be applied to any clock which actuates either by springs, weights or electricity.

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

1. An electric time switch comprising a movable switch element, a power spring geared to said element, a locking wheel fast on the arbor of said spring, a pawl movable into and out of engagement with said locking wheel, a lifting arbor provided with an arm coöperating with the pawl, a lifting pinion on said arbor, a trip lever coöperating with said pinion, a setting disk, a pin having a sliding connection with said disk and a time wheel provided with a cam projection which is adapted to slide said pin and cause it to actuate the trip lever, substantially as described.

2. An electric time switch comprising a switch element movable in a circular path with a step by step movement, a power spring geared to said switch element, a locking wheel fast on the arbor of said power spring, a pawl movable into and out of engagement with said locking wheel, a lifting arbor having an arm which coöperates with said pawl, a lifting pinion on said arbor, a trip lever coöperating with said pinion and provided with a disk-shaped extension, a time wheel provided with a cam projection, and a setting disk provided with a slide pin and interposed between the time wheel and provided with notches corresponding in number to the number of steps of the switch element in each complete movement, a locking pawl movable into and out of engagement with said notches, and setting and tripping mechanism adapted to move said pawl out of engagement with the locking wheel, at a predetermined time, substantially as described.

3. A mechanically operated electric time switch comprising a switch element having a step by step movement, a power spring geared to said element, a locking wheel for said spring, a time wheel, a trip lever, a setting disk, a slide pin movable through an opening in said disk and a disk-shaped extension on the trip lever adapted to be operated by said slide pin which in turn is acted upon by a cam projection on the time wheel, as the latter revolves, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

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