

B. F. FLEGEL.
AUTOMATIC ELECTRIC TIME SWITCH.
APPLICATION FILED JUNE 23, 1909.

983,224.

Patented Jan. 31, 1911.

3 SHEETS-SHEET 1.

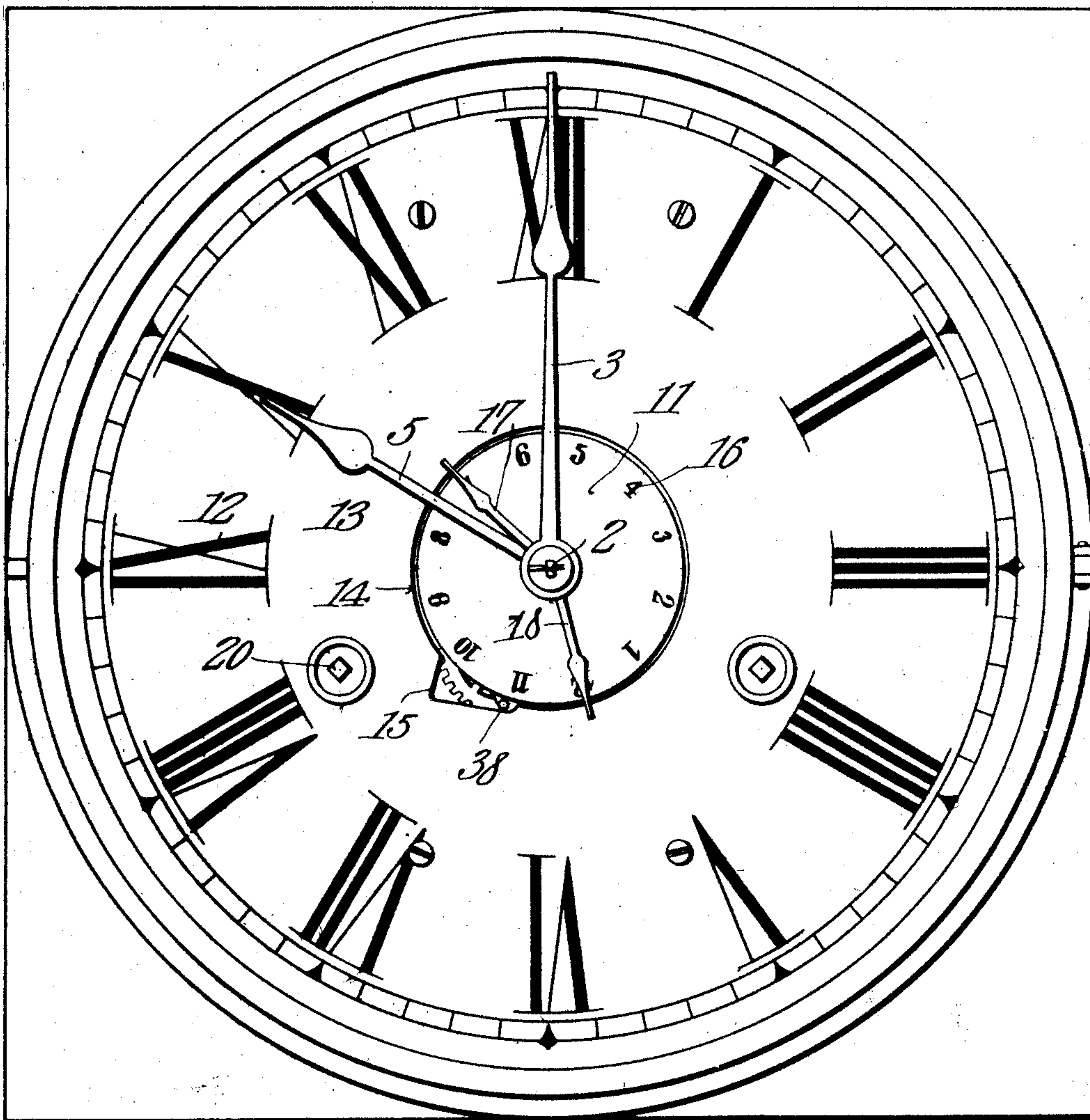


Fig. 1.

Witnesses
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3 SHEETS—SHEET 2.

Fig. 2.

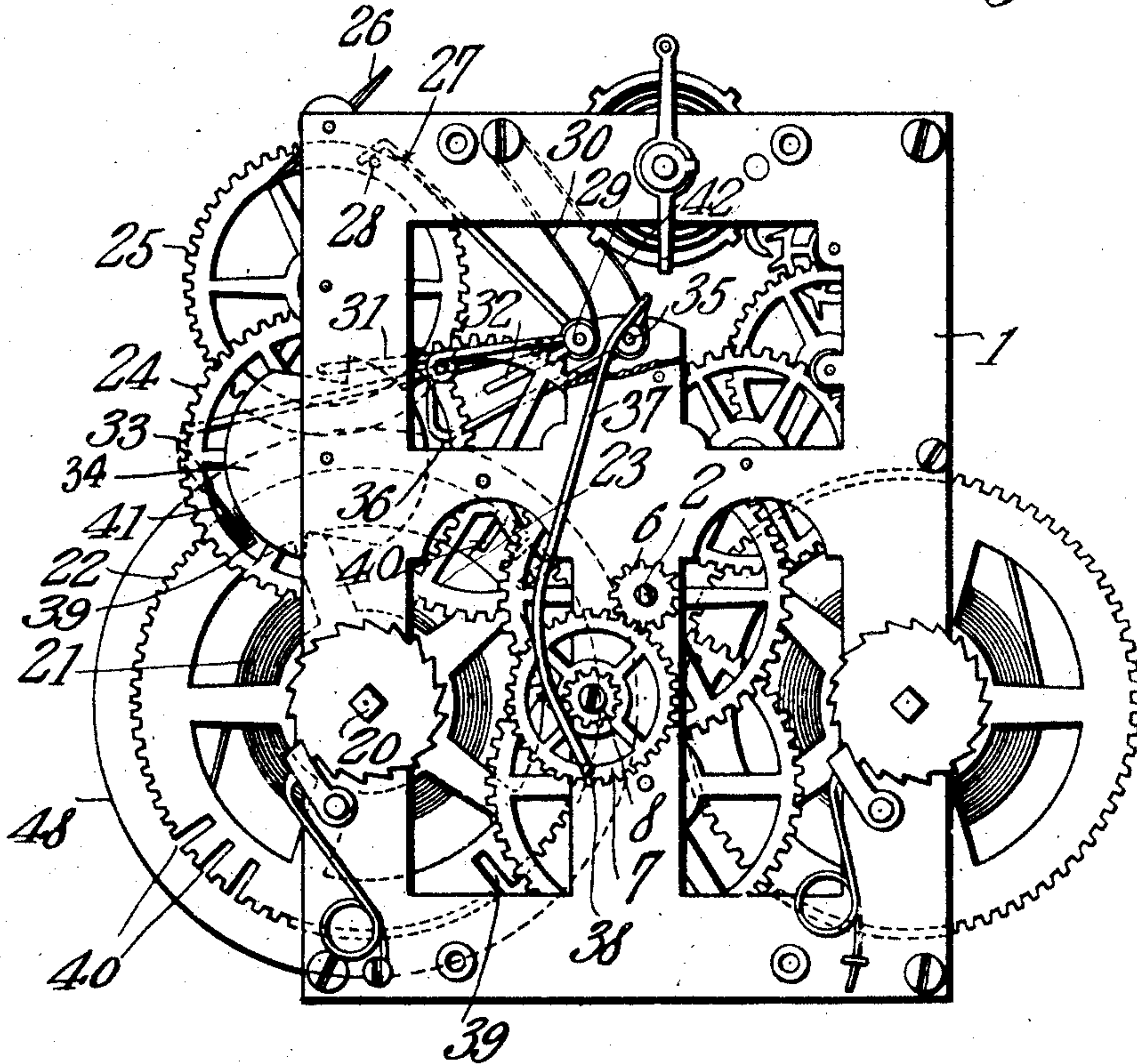
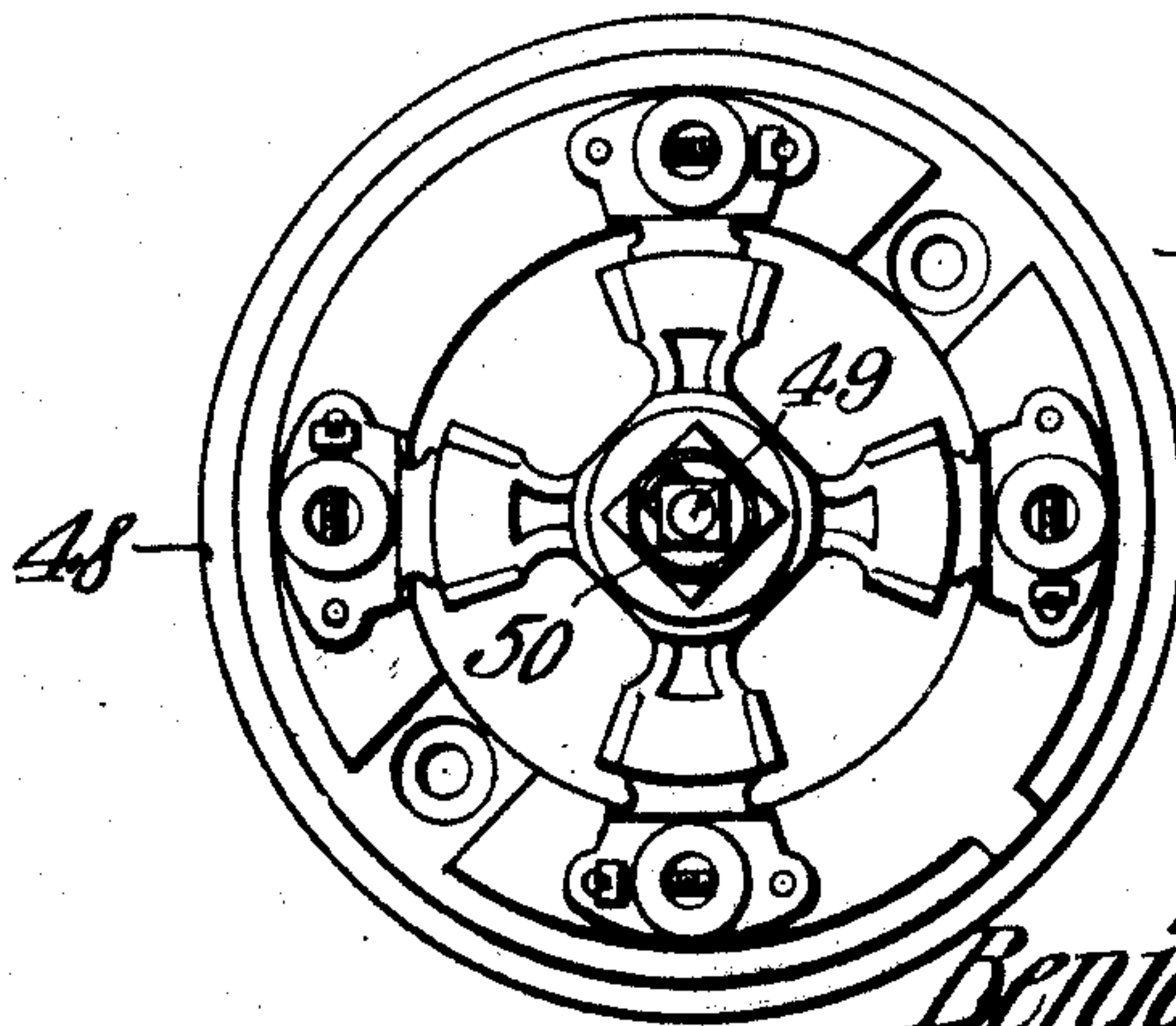


Fig. 3.



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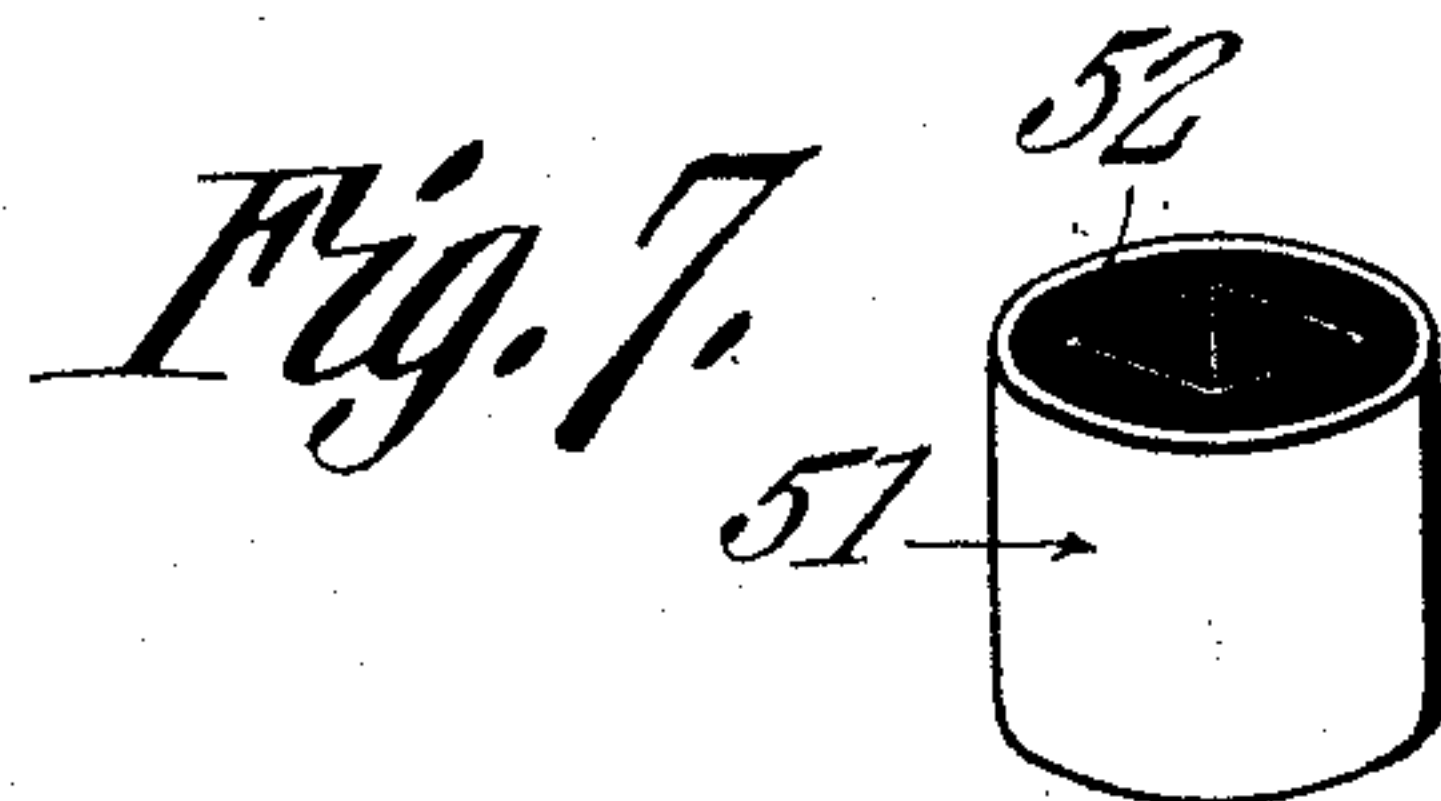
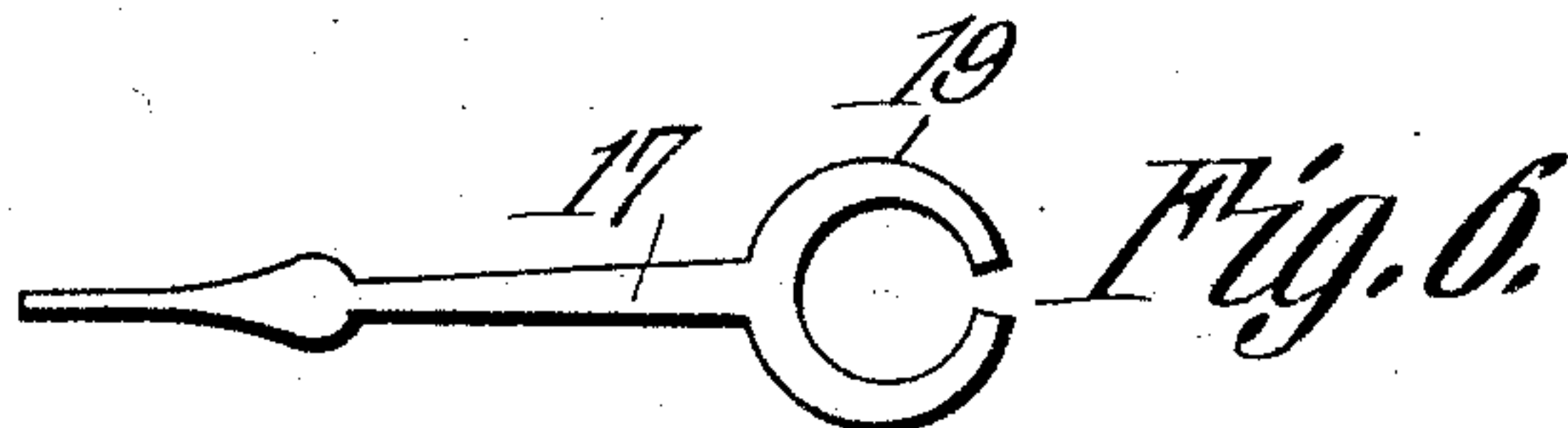
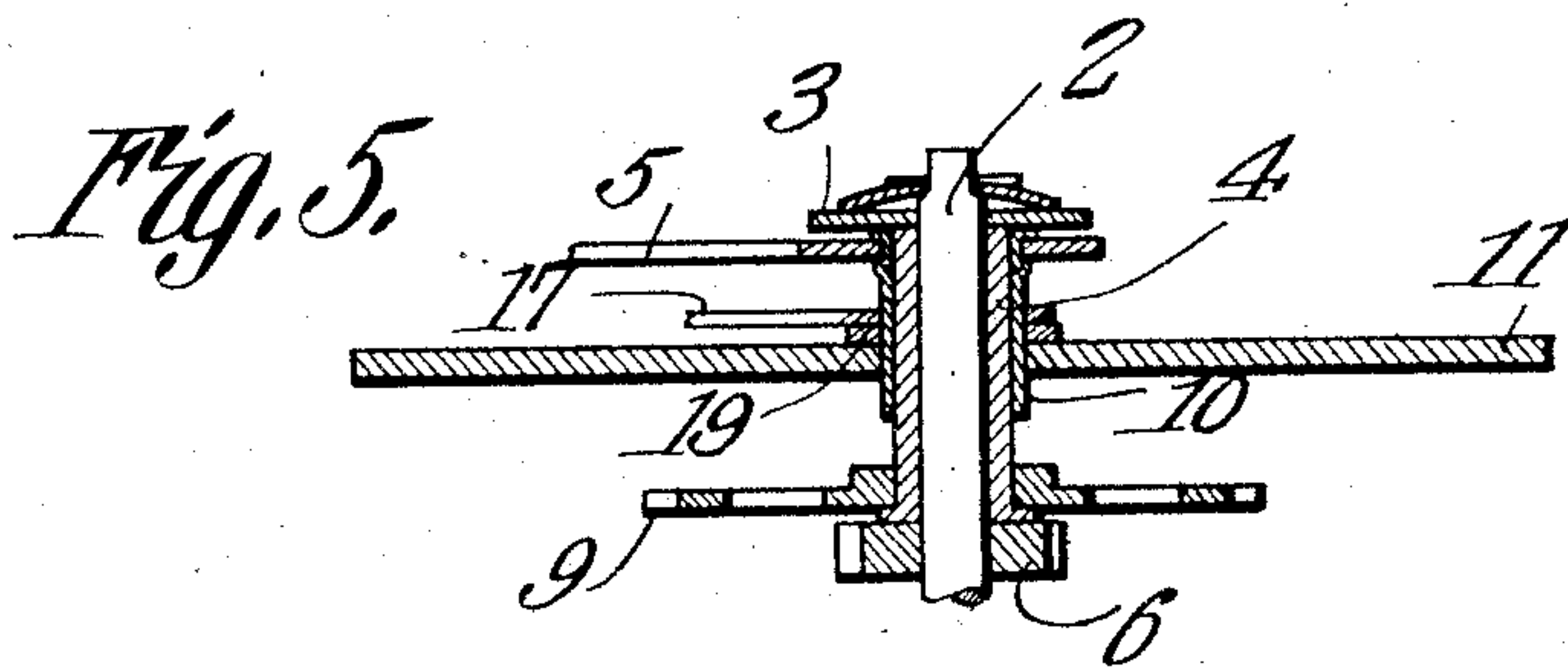
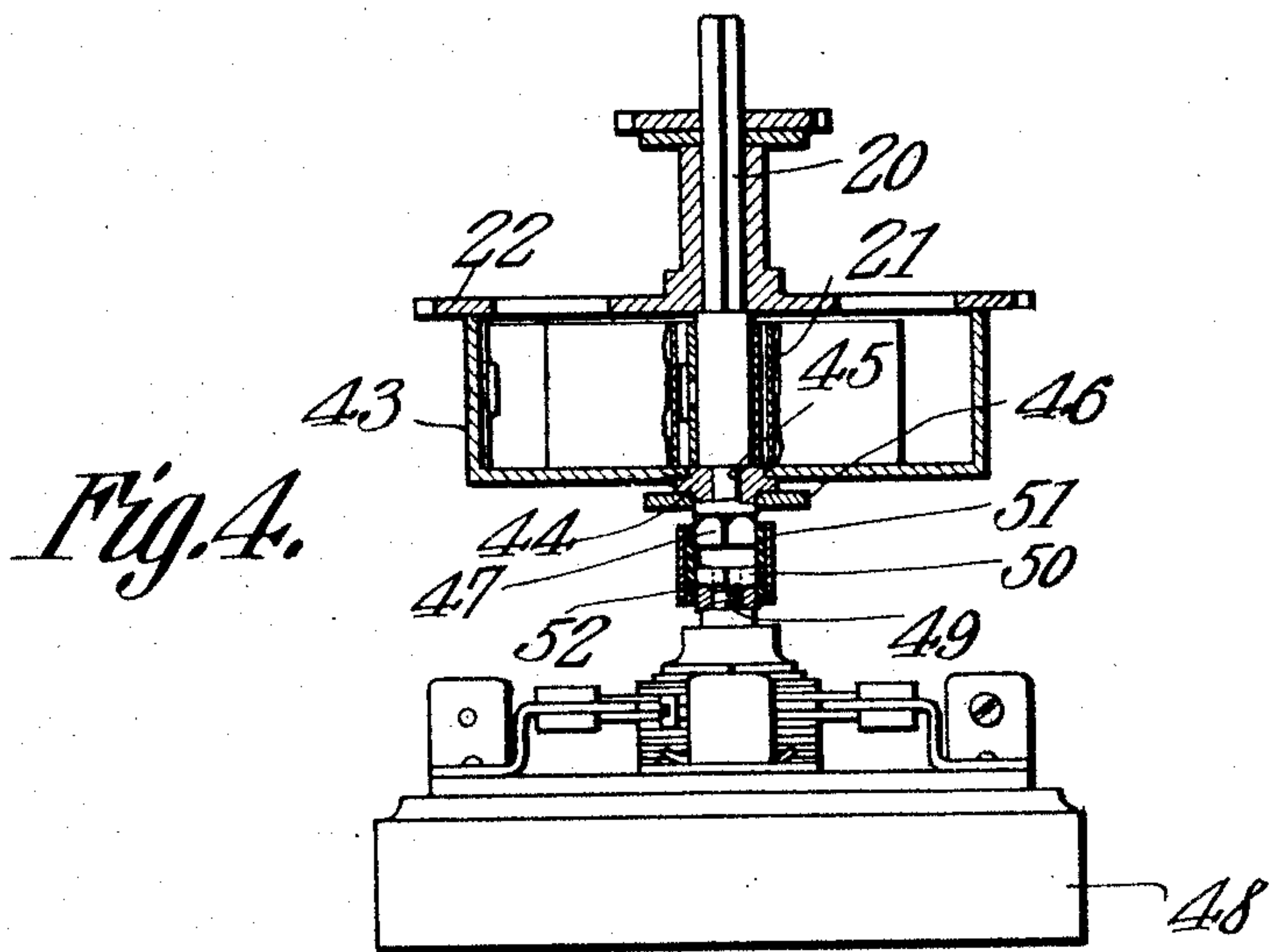
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3 SHEETS-SHEET 3.



Witnesses

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UNITED STATES PATENT OFFICE.

BENJAMIN FRANKLIN FLEGEL, OF WARREN, OHIO, ASSIGNOR OF ONE-HALF TO
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AUTOMATIC ELECTRIC TIME-SWITCH.

983,224.

Specification of Letters Patent. Patented Jan. 31, 1911.

Application filed June 23, 1909. Serial No. 503,958.

To all whom it may concern:

Be it known that I, BENJAMIN F. FLEGEL, a citizen of the United States, residing at Warren, in the county of Trumbull and State of Ohio, have invented a new and useful Automatic Electric Time-Switch, of which the following is a specification.

This invention has reference to improvements in automatic electric time switches and is designed for the turning on and off of an electric switch at predetermined times by means of time mechanism and the arrangement is such that although the time mechanism be of the ordinary twelve hour type the switch will be actuated but once in twenty-four hours to the on position and then to the off position, or the reverse if such be desired. Switches of this character are ordinarily though not necessarily used in connection with electric signs which, it is desirable, should be set in operation at a certain time, and then be cut out of operation at a certain later time without the necessity of attention on the part of an operator.

The arrangement of the mechanism, under the present invention, is such that the clock may run for a day, or for a week, or for a month, or for any time, and indicate the time in the usual manner with a twelve hour dial, but the switch will be turned on once a day at the desired time and will then be turned off after the lapse of a predetermined time and will remain off until the return of the same hour on the next succeeding day.

The invention also comprises certain features of construction which will be made apparent in the following detail description taken in connection with the accompanying drawings forming a part of this specification, in which drawings—

Figure 1 is a face view of the clock embodying the present invention, the main portion of the mechanism being hidden by the dial. Fig. 2 is a plan view of the clock mechanism with the present invention applied but with the dial removed. Fig. 3 is a plan view of one form of electric switch which may be used in connection with the present invention. Fig. 4 is a section through the spring drum containing the spring for actuating the switch and showing the latter in elevation. Fig. 5 is a section through a portion of the structure at the hand arbor, the minute hand arbor being

shown in elevation. Fig. 6 is a plan view of one of the switch dial hands. Fig. 7 is a perspective view of a coupling for connecting the switch to its driving spring.

Referring to the drawings, and more particularly to Fig. 2 there is shown a clock works 1 which, so far as the time indicating side thereof is concerned, need not differ from ordinary clock works and in the particular instance shown may be taken as indicative of the eight day type of clock works. The minute hand arbor of the time side of the clock works is indicated at 2 and while this arbor carries the usual minute hand 3 and is surrounded by a sleeve 4, shown in Fig. 5, which sleeve carries the usual hour hand 5, shown in Figs. 1 and 5, and is connected to the minute hand arbor by the usual reducing gear and pinions 6, 7, 8 and 9 respectively and in this respect does not differ from the ordinary clock movement, still some of these parts are provided with other members which enter into the present invention. These additional parts are best shown in Figs. 1 and 5 where it will be seen that the sleeve 4 is surrounded by another sleeve or collar 10 which sleeve or collar, it will be understood, is made fast to the sleeve 4 or it may be made in one piece therewith.

The sleeve 10 is not as long as the sleeve 4 and forms at its outer end an abutment for the hour hand 5. Near the other or inner end of the sleeve 10 there is secured thereto a disk 11 concentric with the arbor 2 and occupying a portion of the space interior to the usual dial figures 12 of the ordinary twelve hour dial 13 which latter is cut away to receive the disk 11. Furthermore the dial 13 at one portion of the cut away part indicated at 14 is provided with another cut away portion 15 wider at one end than at the other, and as shown in the drawings substantially triangular in shape. It will appear further on that said cut away portion 15 may be curved on a suitable arc since it is only designed to provide a path for a member to be referred to.

The disk 11 is provided with a circumferential series of figures 16 ranging from one to twelve like the clock dial but in reverse order thereto.

Mounted on the sleeve 10 are two hands 17 and 18 arranged to co-act with the numerals 16 and sufficiently long to project beyond the edge of the disk and for a short distance

over the adjacent face of the dial 13. As will be seen best from Fig. 6 the butt ends of the hands 17 and 18 are provided with split eyes or rings 19 so as to grasp the sleeve 10 with elastic pressure permitting the hands to be moved about the sleeve 10 on the exercise of sufficient force but causing these hands to remain in adjusted positions so long as they do not encounter a resistance to their movement greater than the grip of the rings 19 upon the sleeve 10, the hands then participating in the rotative movement of the sleeve 10 with the sleeve 4 so that these hands 17 and 18 move with the same speed as the hour hand 5 and therefore each makes two complete rotations in twenty-four hours.

Mounted at an appropriate point in the frame of the clock works 1 is a winding arbor 20 best shown in Figs. 2 and 4. This arbor carries a spring 21 of usual type and also a gear wheel 22 imparting motion to gear wheels 23, 24 and 25, the gear train terminating in a fan 26 for retarding the movement thereof under the action of the spring 21. This gear train may be similar to that of an ordinary striking movement such as is usually found in clock works of the character shown in the drawings. The train of gears driven by the spring 21 is normally held inactive by an arm 27 in the path of a pin 28 on the gear wheel 25, this arm projecting from a shaft 29 suitably mounted in the frame of the clock works and normally under the control of a spring 30 tending to hold the arm 27 in the path of the pin 28. The shaft 29 also carries other arms 31, 32, 33. The arm 31 is at its free end in operative relation to a lifting disk 34, on the arbor of the gear wheel 24 after the manner of the ordinary striking movement and for the same purpose. Adjacent to the shaft 29 is another shaft 35 carrying an arm 36 arranged to engage the arm 32 projecting from the shaft 29 under certain circumstances. The shaft 35 also carries another arm 37 projecting across the top of the clock works and having an upturned end 38 extending through the cut away portion 15 of the dial 13 in the path of the hands 17 and 18 where they project beyond the periphery of the disk 11.

At diametrically opposite points the gear wheel 22 is provided with a recess 39 formed by deepening the space between two adjacent teeth of the gear wheel. At points 90° displaced from recesses 39 are other recesses 40 similarly formed to the recesses 39 and arranged in groups of three separated by two gear teeth. This exact arrangement is not mandatory but may be varied as will become clear when the purpose of these recesses or notches is made evident.

The free end of the arm 33 is formed with a prolongation 41 adapted to engage

the periphery of the gear wheel 22 between the teeth thereof and also to drop into the recesses 39 and 40 when coincident therewith. The shaft 35 is under the control of a spring 42 tending to maintain the arms 36 and 37 in normal position.

The gear wheel 22 carries a barrel 43 projecting from one face and together with the gear wheel housing the spring 21. Fast to the barrel 43 at the center thereof is a block 44 projecting axially from the barrel and provided with a step bearing for the bearing end of the winding arbor 20. The block 44 has a bearing in a portion 46 of the frame of the clock works and beyond this bearing it is squared as indicated at 47.

There is provided an electric switch 48 of any suitable type but preferably of the rotary snap type and in the particular instance shown this switch, which is indicated separately in Fig. 3, is of the double pole type, though so far as the present invention is concerned a single pole or a double pole switch or any suitable type of switch may be used indifferently. Since the construction of the switch does not enter into the present invention, and since the showing of the drawings is that of a switch of commercial type, no description of the switch is deemed necessary. These switches as found on the market are provided at the upper end of the stem with a threaded extension indicated at 49 in Fig. 4, and in order to adapt this type of switch for the purposes of the present invention there is applied to this threaded end 49 a bushing 50 having a square exterior of the same area in cross section as the square end of the block 44 although of course this is not mandatory. The square end 47 of the block 44 and the square bushing 50 are connected together by a sleeve 51. For purposes of strength the sleeve 51 may be made of metal and to prevent any danger of electric currents reaching the clock works from the switch this sleeve may be lined with insulating material indicated at 52 so that the bushing 50 and the extension 47 of the block 44 are insulated one from the other against accidental electric contact. Under these circumstances the metal portion of the connection may be cylindrical while the insulating lining therein may have the passage therethrough squared in cross section to snugly fit the square bushing 50 and the square end 47 of the block 44. This connection is best shown in Figs. 4 and 7.

Let it be assumed that the clock is in running position and it is desirable to have the electric current turned on at the switch at, say, 7 o'clock p. m. and turned off at 12 o'clock p. m. Although the indications on the disk or dial 11 are counter clockwise, the motion on the dial 11 is with the hour hand 5 or clockwise. If the hand 17 be set say at 7 o'clock and the hand 18 be set say at 12 but

before the hour hand has reached the 7 o'clock designation, that is 7 o'clock p. m., then when the hand 17 reaches the end 38 of the arm 37 it will move this arm along the cut away portion 15, but because the shaft 35 is removed a considerable distance from the arbor 2 the end 38 of the arm 37 passes through a comparatively flat arc and therefore slides along the hand 17 and finally escapes therefrom. The first movement of the arm 37 causes the release of the gear wheel 25 from the arm 27 by the engagement of the arm 36 with the arm 32 but the arm 36 is shaped at its free end to be thereby brought into the path of the pin 28 after the gear wheel 25 has made one half a revolution or thereabout. This however has been sufficient to cause the lifting disk 34 to retain the arm 27 out of the path of the pin 28 because of the engagement of the periphery of the disk with the arm 31. As soon as the end 38 of the arm 37 escapes from the hand 17 then the arm 36 is moved out of the path of the pin 28 and the gear train under the control of the spring 21 is permitted to move. The movement of the shaft 29 to carry the arm 27 out of the path of the pin 28 at the same time moved the arm 33 so that its end 41 was lifted out of the recess 40 in which it was housed before the operation described took place.

It will be observed that the disk 34 is provided with recesses on opposite sides into which the free end of the arm 31 may drop as the disk is rotated but except at the deep recesses 39 and 40 in the gear wheel 22 the arm 31 is prevented from dropping to any material extent into the recesses on the disk 34 by the engagement of the end 41 of the arm 33 in the spaces between the teeth of the gear wheel 22 and it is only when a deep recess 39 or 40 is reached that the arm 27 may move into the path of the pin 28 and so stop the gear train from further movement.

Under normal conditions the end 41 of the arm 33 was in a terminal one of the recesses 40 at the beginning of the operation described and from this point until a recess 39 is reached the gear train under the influence of the spring 21 continues to move. By using a switch 48 of familiar type in which the switch shaft or arbor 49 must be turned through a predetermined distance to put a spring under tension after which the switch is released, this arbor is turned by the direct connection with the spring drum 43 through the block 44 and the extent of movement of this spring drum 43 under the action of the spring 21 is sufficient to cause the snapping over of the switch 48 before the end 41 of the arm 33 reaches the notch 39. The result of this is that the switch is moved to the on position before the action of the gear train under the control of the spring 21 is arrested. The current is now

turned on at the switch and whatever is controlled by the current remains in action until the hand 18 engages the end 38 of the arm 37 and the end 41 of the arm 33 is lifted out of the particular notch or recess 39 with which it is in engagement and at the same time the gear train is released as before and continues to operate until the next succeeding notch or recess 40 is reached when the end 41 of the arm 33 drops therein and the gear train is again arrested.

The parts are so proportioned and adjusted that, under the conditions noted, the switch is turned to the on position at 7 p. m. and is then turned to the off position at 12 p. m., it being assumed that the current is used for illumination at night during the hours mentioned. While the invention is especially adapted for the automatic lighting and cutting out of electric advertising signs it may be employed for illumination or for the cutting in and out of power at predetermined times as may be desired where it is advisable to so cut in and out power automatically. The time side of the clock then proceeds in the customary manner and twelve hours from the time the hand 17 engaged the end 38 of the arm 37 it is brought into engagement again with such end and the arm is moved as before thus setting the gear train controlled by the spring 21 in motion. However the end 41 of the arm 33 after the mechanism was set in motion by the action of the hand 18 finally rested in the first one of one of the series of notches or recesses 40 and when this arm again is moved so as to escape from the recess 40 it permits the movement of the gear train but a very short distance before the next one of the recesses 40 in order is reached and the gear train is stopped, this action ceasing long before the switch 48 can be actuated. When the hand 18 reaches the end 38 of the arm 37 and again causes the release of the gear train controlled by the spring 21 the movement of the gear train progresses but a short distance before the third one of the particular series of recesses 40 is brought coincident with the end 41 of the arm 33 and the gear train is again arrested. When however the hand 17 is once more brought into engagement with the end 38 of the arm 37 the gear wheel 22 may move through an arc of nearly 90° before the end 41 of the arm 33 can drop into the next succeeding deep recess which is the following recess 39 and when the hand 18 again actuates the arm 37 the gear wheel 22 may move through another arc of nearly 90° or quite 90° before reaching the first one of the next series of notches or recesses 40.

By this means the switch is actuated to the on position and then to the off position only once in twenty-four hours although the gear train is released each time the hands

17 and 18 pass the end 38 of the arm 37 but except at the twenty-four hour period the release of the gear train is of such short duration that the switch cannot be operated even though the gear train be released two times in succession.

It will be observed that while the structure may be made in various ways it is particularly adapted, so far as the salient features of the invention are concerned, to existing types of electric switches and clock works and requires but a minimum amount of change in the latter.

What is claimed is:

1. In a device of the character described, a time mechanism provided with a time indicating dial having a central cut-away portion with another cut-away portion leading therefrom, an electric switch, power mechanism for actuating the switch, a release for the switch-actuating mechanism, a second dial plate or disk and independently adjustable hands carried by the hour-hand side of the time mechanism, said plate being located in the said central cut-away portion of the main dial and said hands being located above the outer face of the second dial plate and projecting beyond the said dial plate and over the main dial of the time mechanism, and connections from the release extending into the path of said hands through the extended cut-away portion of the main dial.

2. In a device of the character described, a time mechanism, an electric switch, a power mechanism for actuating the switch comprising a drum, a spring housed therein, a winding arbor for the spring independent of the drum and in axial alinement with the said switch arbor, connections between the drum and the switch comprising a block secured axially to the drum and having at one end a non-circular portion, a like block on the arbor of the switch, and a coupling sleeve receiving both blocks, and a release mechanism for the drum controlled by the time mechanism.

3. In a device of the character described, a time mechanism, an electric switch, a power mechanism for actuating the switch comprising a drum, a spring housed therein, a winding arbor for the spring independent of the drum, connections between the drum

and the switch consisting of squared axial extension from and fast to the drum, an exteriorly squared bushing on the switch arbor, a coupling matching and connecting the squared extension and squared bushing, and a release mechanism for the drum controlled by the time mechanism.

4. In a device of the character described, a time mechanism, an electric switch, a power mechanism for actuating the switch comprising a drum, a spring housed therein, a winding arbor for the spring independent of the drum, a release for the drum controlled by the time mechanism, and connections between the drum and the switch comprising a squared extension from the drum, an exteriorly square bushing on the switch, and a coupling sleeve matching and connecting the squared extension and the square bushing and having the portions engaging the said connections and the bushing made of insulating material.

5. In a device of the class described, an arbor, a spring attached at one end thereto, a rotatable casing housing the spring and to which the other end of the spring is attached, the said casing having an axially projecting member rotatable therewith, an electric snap switch having its arbor in axial alinement with the axis of the spring casing, and means for coupling the axial projection of said casing to the switch arbor.

6. In a device of the character described, a time mechanism, an electric switch, a power mechanism for actuating the switch, a release mechanism for the switch actuating mechanism and means for setting the release mechanism comprising a dial carried by the hour hand side of the time mechanism and hands also carried by the hour hand side of the mechanism above and in operative relation to the outer face of the dial and adapted to trip the release mechanism, the said hands being frictionally held to the hour hand side of the time mechanism and adjustable with relation to the dial.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

BENJAMIN FRANKLIN FLEGEL.

Witnesses:

WARREN THOMAS,

NATHAN GUNLEFINGER, Sr.