

(No Model.)

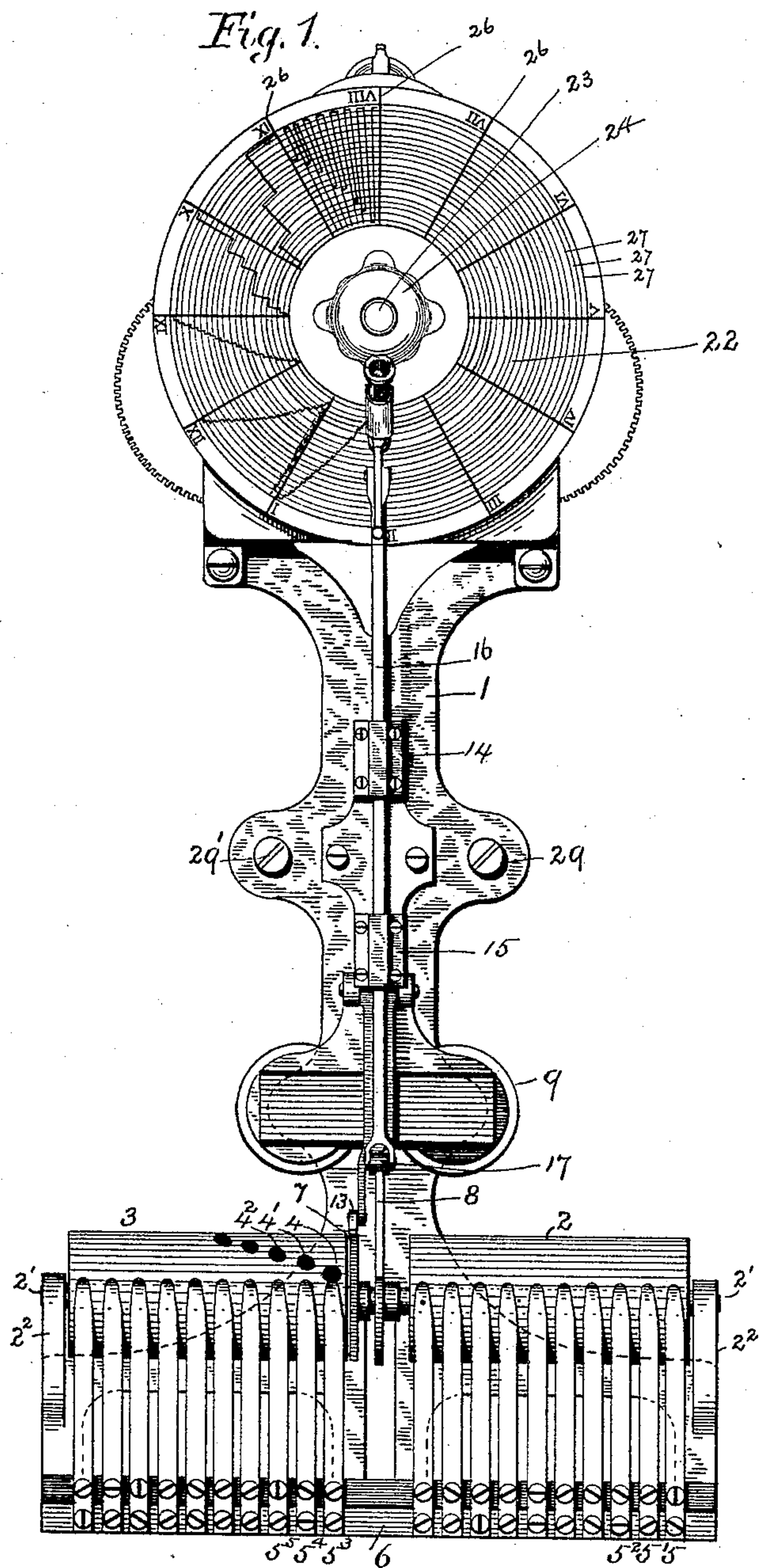
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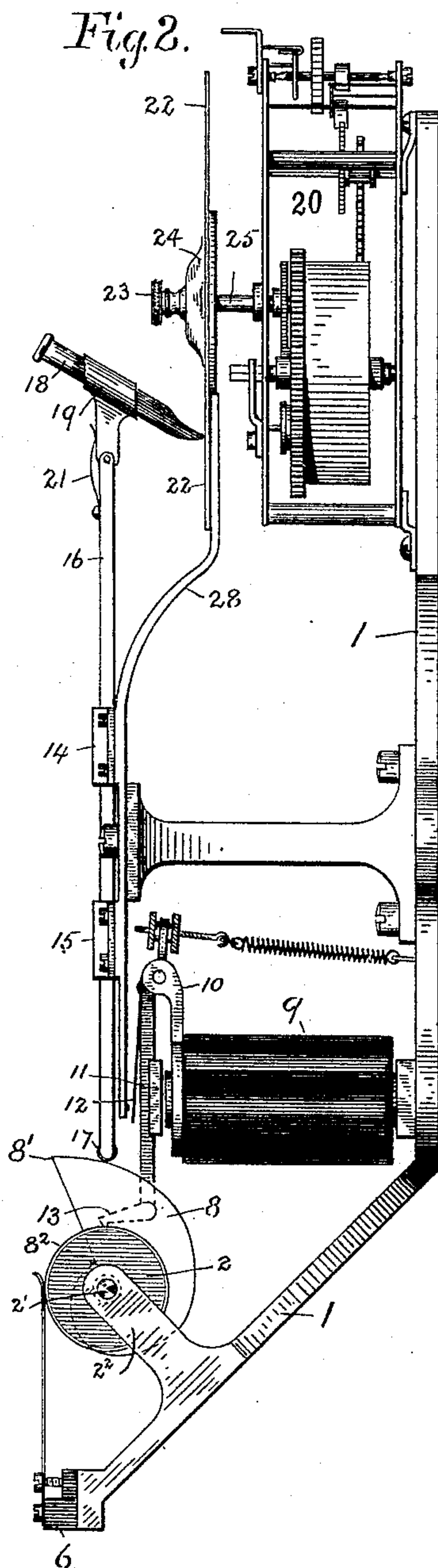
WATCHMAN'S ELECTRIC TIME RECORDER.

No. 485,591.

Patented Nov. 1, 1892.



Witnesses:  
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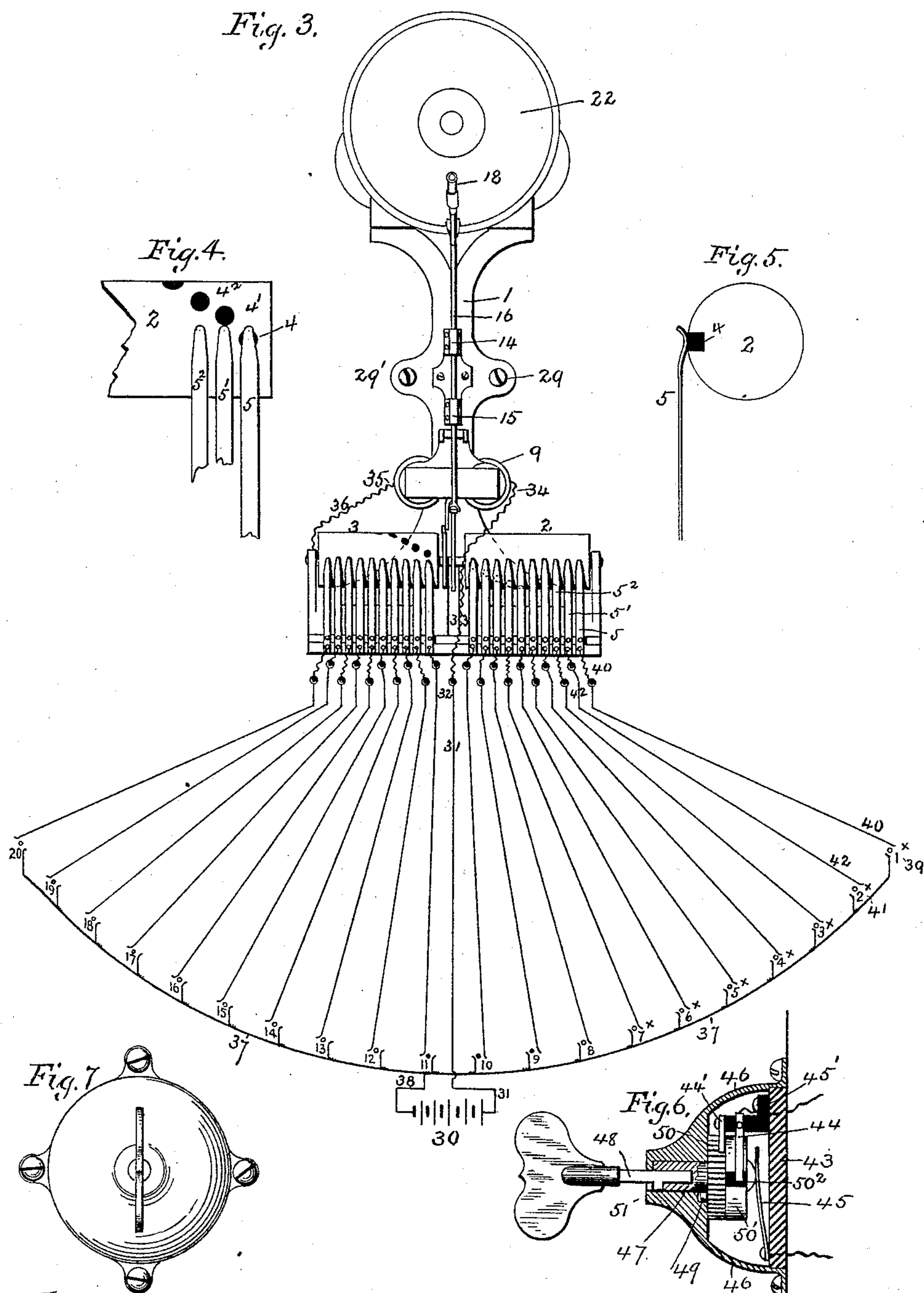
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WATCHMAN'S ELECTRIC TIME RECORDER.

No. 485,591.

Patented Nov. 1, 1892.



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# UNITED STATES PATENT OFFICE.

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## WATCHMAN'S ELECTRIC TIME-RECORDER.

SPECIFICATION forming part of Letters Patent No. 485,591, dated November 1, 1892.

Application filed June 22, 1892. Serial No. 437,671. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES A. TILDEN, a citizen of the United States, residing at Hyde Park, in the county of Norfolk and State of Massachusetts, have invented a new and useful Improvement in Watchmen's Time and Station Recording Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

This invention relates to a device for recording by diagram the movements of a watchman in his rounds from one place to another in the care of property, such diagram being governed at stations or fixed points by means of circuit-closing keys.

The invention consists of certain mechanism controlled by an electro-magnet which records upon a dial the exact station operated by the watchman, the time of its operation being indicated by a clock in the usual manner.

Referring to the drawings, Figure 1 is a front view of the machine. Fig. 2 is a side view of the same. Fig. 3 is a front view of the machine, showing the diagram of circuits for controlling the same. Fig. 4 is a detail of a portion of the controlling-cylinder forming part of the machine. Fig. 5 is a side view of the same. Fig. 6 is a sectional view of the circuit-closing key which I use in connection with this machine. Fig. 7 is a front view of the same.

Referring to Fig. 1, 1 is a frame upon which the operative mechanism is mounted.

2 is a cylinder made, preferably, of brass tubing and mounted upon a shaft 2', which is held in bearings 2<sup>2</sup>, forming part of the main frame 1 and free to turn in these bearings.

3 is a cylinder precisely like the other, mounted in the same relation and upon the same shaft, and is, in fact, a continuation of the same cylinder. These cylinders are provided with insulating-plugs 4 4' 4<sup>2</sup>, placed spirally on the surfaces of the cylinders, and there are as many of these plugs as there are stations. In the machine here described I have represented twenty stations. Consequently there are twenty of these plugs, beginning at any point of the cylinder 2 and

running spirally to the end of the second cylinder, ten plugs in each cylinder.

5 5' 5<sup>2</sup> 5<sup>3</sup> 5<sup>4</sup> 5<sup>5</sup> represent metallic springs mounted upon an insulating-base 6, secured to the main frame, the springs resting upon the cylinder with a slight pressure, so that electrical contact is made with the cylinder. The plugs, heretofore referred to, in the cylinder are placed in line with the end of these springs in such a way that as the cylinder revolves the springs will come in contact with the plugs one after another in the order of their spiral form, thus successively breaking the electrical contact. On the same shaft on which the cylinders are mounted is a ratchet-wheel 7, which when operated upon by a ratchet, which will be described later, will cause the two cylinders to rotate. Upon the same shaft is also placed a cam 8 of such shape as to gradually lift an arm, which will be later described, as the cylinders rotate.

9 is an electro-magnet mounted upon the frame 1, upon the front of which is a support-casting 10, (referring to Fig. 2,) upon which is hung an armature 11, which is provided with a contact-spring 12, all arranged so that when said magnet 9 is vitalized it will cause the armature to vibrate in a similar manner to the vibration of an electric bell of ordinary commercial construction. Upon the end of this vibrating armature is a ratchet 13, which engages with the ratchet-wheel 7 and causes it to give a continuous rotary motion to the cylinders and cam so long as the magnet continues to be vitalized.

Mounted in guides 14 15 is an arm 16, upon the lower end of which is a roller 17, which rests upon the cam 8, so that as the cylinders and cam are rotated by the operation of the magnet this arm 16 is gradually lifted until it reaches the end of the cam 8', when it drops to the lowest point 8<sup>2</sup>, ready to start again, so that in each revolution of the cam the arm is lifted a given distance, governed by the form of the cam. Upon the upper end of the arm 16 is a pen 18, preferably formed of glass and fitted into a holder 19, which is pivoted upon the end of the arm 16 and maintained in its position against a dial 22 by means of a delicate spring 21. Upon the



frame 1 is mounted a clock-movement 20, of the ordinary commercial form, adapted to revolve a dial 22, which is secured upon its main spindle 25 once in twelve hours. This clock mechanism requires no particular description, as it is of a well-known construction and is used in other forms of recorders. The dial which I preferably use is a circular disk 22, which can be easily replaced by removing the thumb-screw and pressure-plate 23 24, which hold it upon the spindle 25 of the clock. It is divided into twelve different parts by division-lines 26 26 26, and so on, representing the twelve hours in the day, and they are so marked by figures on the outside edge. It is then divided by circular lines into divisions in numbers corresponding to the number of stations for which the clock is arranged, there being twenty circular division-lines 27 27 27 in the dial shown. An arm 28 is projected up behind the dial in order to give it a backing to support it against the pressure of the pen. The whole apparatus assembled together as described is held in a case by means of the screws 29 29', so that it can be placed in the office or counting-room out of reach of the watchman and where the dials are placed upon it and kept on file. It will be very readily seen that when the cylinder 2 is rotated by means of the electro-magnet the cam mounted upon the spindle will lift the arm carrying the pen and cause a line to be drawn upon the dial radially to the center and to a distance corresponding to the diameter of the cam. If, for instance, the cylinder is revolved a short distance and then remains standing, a vertical line will be made upon the dial, and then as the clock revolves the dial a circular line will be drawn, and if the cylinders are revolved again a short distance another vertical line will be made, and so on, the radial line representing the time a station is visited and the circumferential line the time between stations.

Referring now to Fig. 3, upon which is a diagram of the circuits, a more complete description of the operation of the clock will be given.

30 is a battery located at any convenient point, one terminal of which is connected with the wire 31, which connects through binding-post 32 through wire 33 to one terminal of the magnet 34 and from the other terminal of the magnet 35 through the back contact-spring 12, which forms the vibrating contact of the armature, thence by wire 36 to the shaft upon which the cylinders are mounted, bringing them both into electrical connection with this wire. From this cylinder are various contact-springs 5 5' 5<sup>2</sup>, &c., which are connected by wires with the respective stations distributed throughout the premises, (indicated as stations 1<sup>x</sup> 2<sup>x</sup> 3<sup>x</sup>, &c.) and which include circuit-closing keys at the various points, which are connected by return-wires 37 and 38 to the other terminal of the battery. It will be seen now that if any circuit-closing

key—such as 39, which is located at station 1—is operated a current will flow from the battery through the wires 38 37 and through the contact-key, through wire 40, through a spring 5, through the cylinder 2, through wire 36, through the magnet 9, wire 33, wire 31, to the other terminal of the battery, and the magnet 9 will become vitalized and cause the cylinder to rotate. It will continue to rotate until the insulated point upon its surface arrives opposite the contact-spring 5, when the circuit will be immediately cut out and cause the magnet to be devitalized and the apparatus will stand still. This will be better understood by reference to Figs. 4 and 5, in which it will be seen that the spring 5 directly over the insulated point 4 breaks the electrical continuity of the circuit. The pen, which is resting against the dial, has been lifted by the rotation of the cylinder and its cam a distance equal to one of the spaces upon the dial, which represents one station. Now, of course, if the watchman then proceeds to station No. 2 and operates that key a circuit will be established from the battery through wire 38, wire 37, contact-key 41, wire 42, through spring 5', through the cylinder, through wire 36, magnet 9, wire 33, wire 31 to the battery, and it will cause the cylinder to make a further revolution until the insulating-point has arrived opposite the spring, where it is again cut out and causes the apparatus to stand still. During the lapse of time between the operation of the key at station 1 and station 2 the dial has been rotating, and therefore records the time between stations by the circumferential line, which time can be readily ascertained by dividing the dial into divisions of minutes—five minutes, or whatever may be desired. The same operation will take place when the watchman operates the next key. The cylinder will be rotated until the insulating-point arrives opposite its spring, when the circuit will be cut out and the apparatus cease to move. When the stations are operated in regular succession in the order of their numbers, a diagram will be made upon the dial in a regular step-by-step line. If, however, the watchman should proceed out of the regular order of the numbered stations, an irregular diagram would be given in the following manner.

Having operated two stations as we have just described, if he should proceed to station 10 and operate its key the continuity of the circuit would be maintained upon the cylinder until it has rotated a sufficient distance to bring the insulated point opposite the spring, and as a result the cam will have traveled through a greater distance and cause the pen to be lifted farther up on the dial until it has reached the space indicating station "10" upon the dial—that is, the cylinder would revolve until it cut out the spring representing station "10." It can be readily seen by the above description that this apparatus is arranged so that it records precisely the move-



ments of the watchman. Whether he operates the keys in the precise order of their arrangement or whether he takes them in any erratic order, a perfect diagram of the stations at which he operates the key will be recorded and also the time elapsing between the visits to the different stations. In order that the circuit may be closed a sufficient time to provide for the full revolution of the cylinder covering all the stations, so that the watchman may operate in any order, I provide a specially-arranged key, which is shown in Figs. 6 and 7 and is constructed as follows: 43 is a base upon which is mounted a spring 45, which is in connection with one wire forming part of the circuit, and upon the base is mounted a case 46, in which is located a stud 47, which can be pushed in and rotated by means of a key 48. This stud is provided with a pin 49, which rests in a slot made in the case 46. When the key has been pushed in, this pin will slide over the flat surface of the case until it comes opposite the slot, where it will drop in, so that it will always rest in one place. On the end of this stud is a ratchet-wheel 50 and a circular disk 51', in which is an insulated strip 50<sup>2</sup>. Mounted upon the base is a support 45', to which is secured a contact-spring 44. This spring is connected with the other wire forming part of the circuit. There is also mounted upon this support a ratchet 44', which engages with the ratchet-wheel 50, so that it will allow the key to be turned only in one direction. The spring 45 is always in metallic contact with the circular disk and the spring 44 is insulated from it, except during the time the key is being turned, when it rubs upon the metallic surface and causes the two ends of the circuit to be brought into metallic contact. The operation is precisely this: The key is placed into an elongated hole like that usually formed for keys in locks and when it is depressed and turned metallic connection between the two wires forming part of the circuit will be established during the complete turning of the key and the key must be turned the whole revolution before it can be withdrawn. When the complete revolution has been made, the pin 49 drops back into the opening or slot in the case 46 and the connection is cut out between the circular disk and the spring 45. This operation allows ample time for the current to operate the cylinder a complete revolution, as the electromotor operates to move the cylinder very rapidly, so that the record would be complete if the watchman should operate station 1 and then 20.

The whole apparatus as described forms a very simple, compact, and effective recording apparatus. Modifications may be made in the apparatus without departing from the principle of its construction and operation—such, for instance, as the use of a series of notched disks in lieu of the insulated points for breaking the contact at the ends of the springs. Spring-motors controlled by mag-

nets of different construction to that shown for moving the cylinders can be arranged. Disks can also be used in lieu of the cylinders, such disks being provided with insulated points and rotated against contact-springs. These modifications are fully included in my invention. I do not claim as my invention a recording device to be operated by a step-by-step movement to obtain record of the location of the operator, as I am not confined to any particular order of operation to obtain a correct record of the movements of the operator.

Having thus fully set forth and described my invention, what I desire to secure by Letters Patent is—

1. The combination of a cylinder operated by a motor controlled by electrical contact, the said cylinder being in contact with a series of spring-current brushes and provided with a series of insulating-points which pass under, successively, said spring-brushes, whereby the motor is devitalized by the cutting out of the current and the cylinder caused to stop at the point determined by the spring so cut out, and a marking device controlled by said cylinder, which will indicate the relative location to each other of the several insulated points on the cylinder as they become cut out and the cylinder comes to rest, substantially as set forth and described.

2. The herein-described electric time and station recording apparatus, composed of an electro-magnetic motor in electrical connection with a series of circuit-closers, a series of insulated circuit-breakers located in the circuit of said station-keys and controlled by the operation of said motor, a cam controlled by said motor to operate a marking pen or pencil, a clock-movement carrying a recording-dial in such relation to the pen or pencil, so combined that a diagram will be traced upon the dial representing the operation of the station-keys and the time of their operation, substantially as set forth and described.

3. The herein-described time and station recording apparatus, composed of an electro-magnetic motor controlled by circuit-closing keys, a series of circuit-breakers arranged to interrupt the motor-circuit in successive order by the operation of said motor, and a cam arranged to rotate with said circuit-breakers and formed to lift a recording-pen which traces upon a dial mounted upon a clock-movement the exact movement of the arm and also the movement of the dial, substantially as set forth and described.

4. A watchman's electric time and station recording apparatus composed of an electro-magnetic motor, a cylinder or cylinders rotated by the action of said motor, spirally-arranged contact-breakers forming part of said cylinder or cylinders, a series of separately-insulated springs in contact with said cylinder or cylinders, an arm carrying a recording-pen governed by a rotating cam, and a clock-movement carrying a dial in such relation to



the marking-arm that a record is made of the movement of the marking-arm and the rotation of the dial, substantially as set forth and described.

5 5. An electric time and station recording apparatus composed of an electro-magnetic motor adapted to rotate a cylinder having spirally-arranged circuit-breakers upon its surface and carrying a cam formed to lift an  
10 arm upon which is a marking-pen, a series of insulated springs or arms in electrical contact with said cylinder and arranged to be insulated from the cylinder in successive order as it revolves by means of spirally-arranged  
15 contact-breakers, and a clock-movement carrying a recording-dial in such relation to the recording-pen that a diagram will be traced upon the dial corresponding to the movement of the pen and the rotation of the dial, substantially as set forth and described.

20 6. The combination, in a watchman's time and station recording apparatus, of an electro-magnet, a vibrating armature controlled by said magnet, a ratchet mounted upon the end  
25 of said armature, a ratchet-wheel mounted upon a shaft and engaging with said ratchet so that the operation of the vibrating armature causes a rotation of said shaft, a cylinder or cylinders mounted upon said shaft to rotate with it, a series of circuit-breakers spirally arranged upon said cylinder or cylinders, a series of separately-insulated contact-springs in electrical connection with said cylinders, a series of circuit-closers respectively  
35 in electrical connection with said contact-springs, a cam mounted upon the cylinder-shaft and rotating therewith, a sliding arm arranged to rest upon said cam to be lifted by its movement, and a marking pen or pencil mounted upon the opposite end of said  
40 arm, a clock-movement set in relation to the marking pen or pencil so that a diagram will be traced upon a dial secured to and operating with said clock, said diagram representing by a step-by-step movement the operation of the several station-keys and time of their operation, substantially as set forth and described.

7. The combination, in a time and station  
50 recording apparatus, of a battery one terminal of which is connected with a series of circuit-closers, a series of electric wires leading from said circuit-closers to a series of separately-insulated circuit-breaking springs, a

cylinder or cylinders mounted upon a shaft 55 and in electric contact with said circuit-breaking keys, a series of insulated points arranged spirally upon said cylinder and in line with said springs, an electro-magnet one terminal of which is connected with said cylinder, the  
60 other terminal of which returns through a vibrating armature-spring to the battery, a ratchet-wheel mounted upon the cylinder-shaft and arranged to engage with a ratchet mounted upon the magnet-armature, a cam  
65 mounted upon the cylinder-shaft to rotate with it, a sliding arm resting upon said cam to move in accordance with the form of the cam, a pen or pencil hinged upon the opposite end of said arm, and a clock-movement  
70 and dial, the whole organized and assembled as described, so that by the operation of one of said circuit-closers the magnet would be caused to vibrate and rotate the cylinder until its corresponding circuit-breaker engages  
75 with the insulated point upon the cylinder and causes an interruption of the circuit, at the same time causing the marking-pen to be moved by the cam a distance corresponding to the circuit-closers operated and at the same  
80 time indicating by the diagram the interval of space between the operation of other circuit-closers, substantially as set forth and described.

8. The combination, in a time and station  
85 recording apparatus, of an electrically-controlled motor adapted to rotate a cylinder having spirally-arranged circuit-breakers upon its surface, a series of circuit-brushing springs in contact with said cylinder and arranged to  
90 come in successive contact with said breakers, a series of slow contact-keys in electrical connection with said brushes, constructed to occupy sufficient time in their operation to equal the time consumed in the complete revolution of the cylinder, a marking device controlled by said cylinder and arranged to record upon a dial placed upon a clock-movement the relative location to each other of the said circuit-breakers as they interrupt the  
100 passage of the current from the brushes to the motor, substantially as set forth and described.

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