W. J. BURCHETT.

ELECTROMECHANICAL SWITCH.

APPLICATION FILED MAY 28, 1919.

1,339,844.

Patented May 11, 1920.

3 SHEETS—SHEET 1.

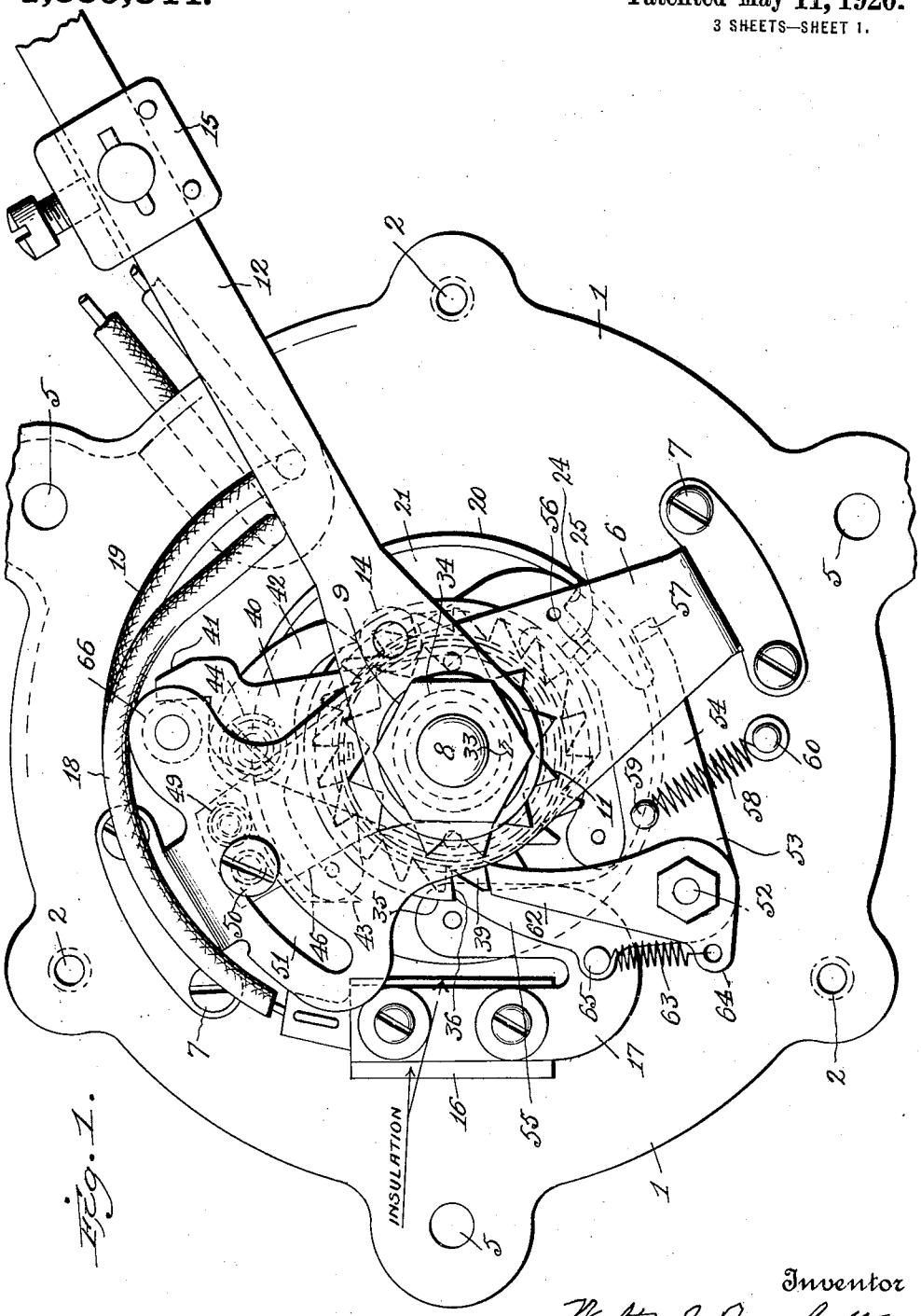


Fig. 1.

Inventor

Walter J. Burchett

by Percy B. Hills

Attorney

W. J. BURCHETT.

ELECTROMECHANICAL SWITCH.

APPLICATION FILED MAY 28, 1919.

1,339,844.

Patented May 11, 1920.

3 SHEETS—SHEET 2.

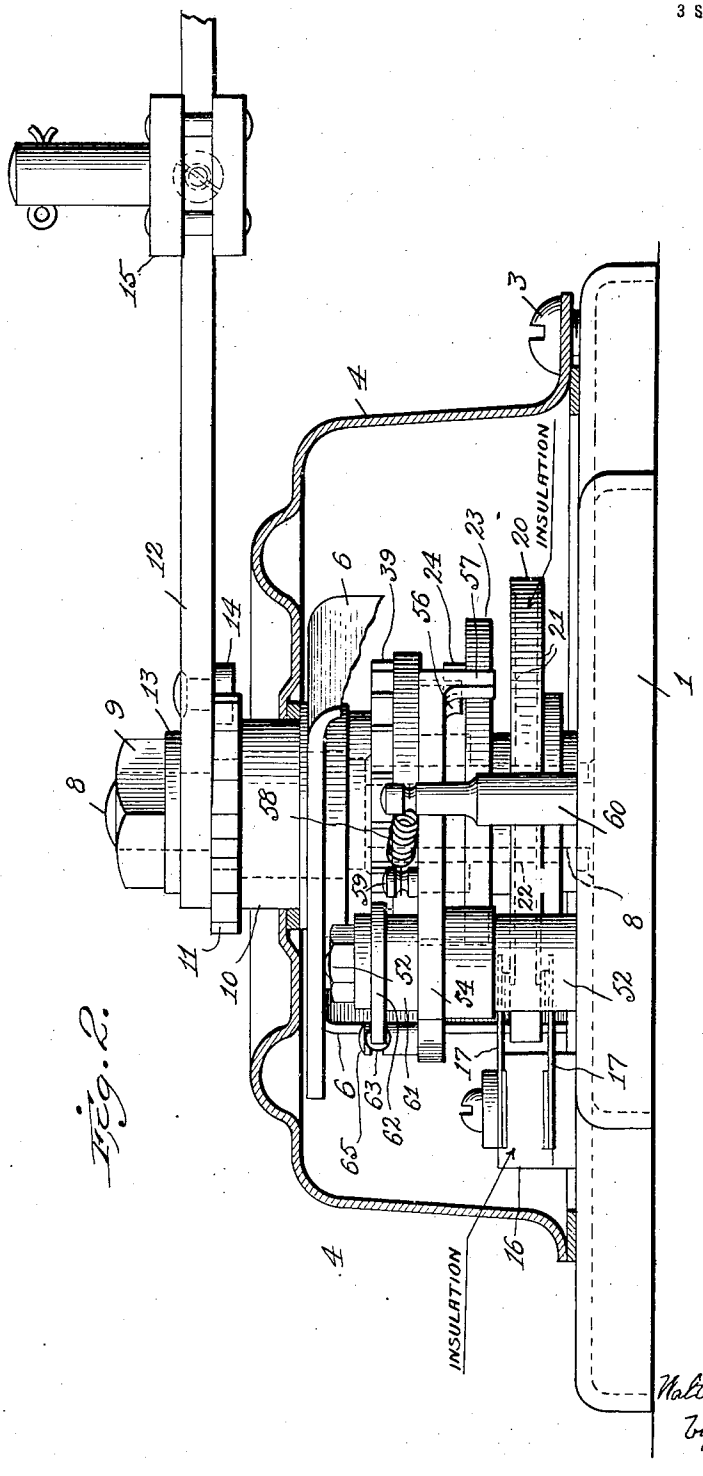


Fig. 2.

Inventor
Walter J. Burchett
by Percy B. Hills
Attorney

W. J. BURCHETT.

ELECTROMECHANICAL SWITCH.

APPLICATION FILED MAY 28, 1919.

1,339,844.

Patented May 11, 1920.

3 SHEETS—SHEET 3.

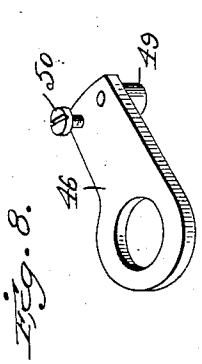


Fig. 8.

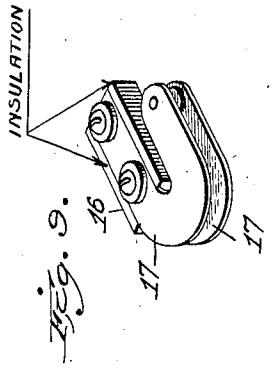


Fig. 9.

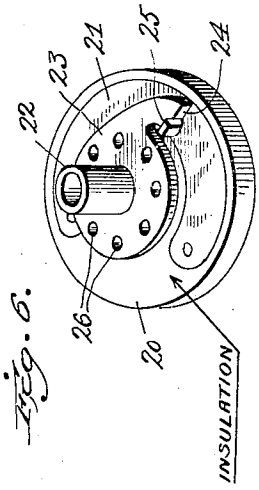


Fig. 6.

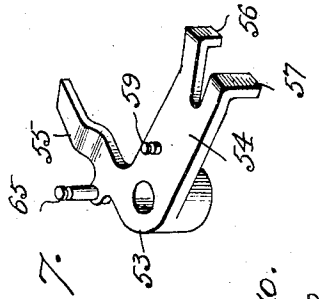


Fig. 7.

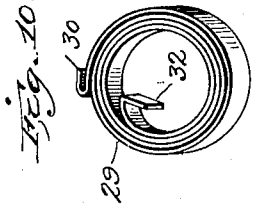


Fig. 10.

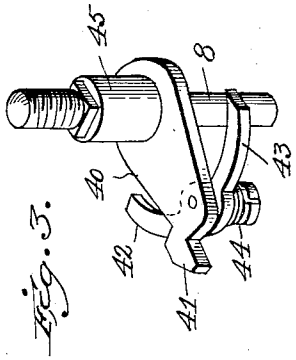


Fig. 3.

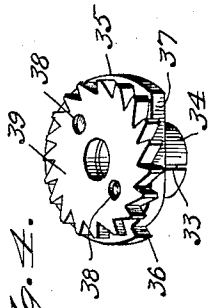


Fig. 4.

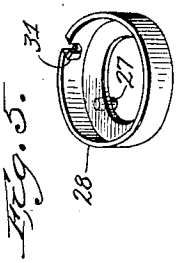


Fig. 5.

Inventor

Walter J. Burchett

by Percy B. Hills

Attorney

UNITED STATES PATENT OFFICE.

WALTER J. BURCHETT, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO SLOCUM, AVRAM & SLOCUM LABORATORIES, INC., OF NEWARK, NEW JERSEY, A CORPORATION OF NEW YORK.

ELECTROMECHANICAL SWITCH.

1,339,844. Specification of Letters Patent. Patented May 11, 1920.

Application filed May 28, 1919. Serial No. 300,365.

To all whom it may concern:

Be it known that I, WALTER J. BURCHETT, a citizen of the United States, residing at East Orange, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Electromechanical Switches, of which the following is a specification.

My invention relates to electro-mechanical switches, and has for its primary object to provide an improved construction of the same, whereby the operations of a machine to be registered will be imparted by electrical impulses to the counting mechanism, through a switch mechanism compact in form and certain in operation, said switch mechanism being of such character that there is no possibility of a sustained circuit being established.

My invention also embodies certain minor details of construction, as hereinafter will be pointed out more definitely, reference being had to the accompanying drawings, in which:—

Figure 1 is a plan view of my improved device, the inclosing cover being removed.

Fig. 2 is a side elevation of the same, the inclosing cover being shown in section, and the main supporting bracket being shown partly broken away.

Fig. 3 is a detail perspective view of the central shaft and the operating pawl mechanism carried thereby.

Fig. 4 is a similar view of the ratchet and cam operated by said pawl.

Fig. 5 is a similar view of the spring inclosing cup.

Fig. 6 is a similar view of the contact plate and its parts.

Fig. 7 is a similar view of the bell-crank trip lever.

Fig. 8 is a similar view of the adjustable stop arm.

Fig. 9 is a similar view of the insulating contact block and its contact arms.

Fig. 10 is a similar view of the spring operating the contact plate.

Similar numerals of reference denote corresponding parts in the several views.

In the said drawings, the reference numeral 1 denotes a base plate, provided with a series of small apertures 2 near its edge to receive the screws 3 for detachably fastening the cover 4 thereto, and with a series of larger apertures 5 whereby said base plate may be attached to any suitable support in proximity to or on the machine to be registered. Mounted upon said base plate is a bracket 6 of U-shape, the same being attached to the base plate by screws 7, as shown in Fig. 1. This bracket 6 is apertured centrally to receive a rotatable shaft 8, stepped at its bottom into the base plate 1. Said shaft 8 is screw-threaded at its upper end to receive a suitable retaining nut 9, and below said screw-threaded portion, and just above a sleeve 10, formed integral with the bracket 6, is squared to receive a star wheel 11 thereon, so that said wheel and shaft will rotate together. Removably mounted on said shaft above said star wheel is an operating lever 12, the same having interposed between it and the nut 9 a suitable washer 13. Said lever 12 when in position rests directly upon the star wheel 11, and has fixed to its underside a lug 14 adapted to engage between any two of the teeth of said star wheel to connect said wheel and lever, it being understood that said lever may by this construction be adjusted to any position with respect to the base plate, so as to adapt it for use in any position in connection with different machines. Said lever 12 also has adjustably mounted thereon a fastening device 15 for connecting the same to some operating part of the machine to be registered, whereby the movement of the machine will impart an oscillatory movement to said lever 12.

Bolted to the base plate 1 is an insulating block 16, shown in detail in Fig. 9, which has fixed thereto two electrical spring contacts 17 as shown. These contacts are connected separately to the two circuit wires 18 and 19, which lead from the device through a suitable source of electrical energy to a registering mechanism, whereby the operation of my improved device will be registered. While I contemplate the use of my improved switch with any suitable electric registering mechanism, it is particularly well adapted for use in connection with an electric counter disclosed in an application filed by me of even date herewith, Serial No. 300,367. The contacts 17 project from the block 16, and embrace the opposite faces of a contact wheel 20 of non-conducting material rotatably mounted upon said shaft

8, said wheel being shown in detail in Fig. 6, and having fixed therein a contact plate 21 of conducting material, extending through said wheel from side to side, and also disposed about three-quarters of the distance around said wheel, as shown. Said wheel 20 is fixed to a sleeve 22 fitting on the shaft 8, and said sleeve also has fixed to it a plate 23 projecting at one side to afford a contact surface 24 and an upstanding lug 25, for a purpose hereinafter to be described. The plate 23 is provided with a series of apertures 26, radially disposed equidistant from each other, whose function is to receive a pin 27 fixed in the underside of a cup 28, shown in detail in Fig. 5, which is apertured centrally to fit over the sleeve 22, said pin 27 and apertures 26 affording a means for adjusting said cup 28 with respect to the plate 23 and for maintaining it in any desired adjusted position. Said cup 28 receives a coiled spring 29, shown in detail in Fig. 10, the same being like an ordinary watch spring, and having its outer end bent at 30 to engage a lug 31 struck inwardly from the side of the cup 28, the inner end 32 of said spring being bent to engage in a slot 33 formed in a sleeve 34, also adapted to fit over the shaft 8, and in turn formed integral with a cam plate 35, shown in detail in Fig. 4, said cam plate having an abrupt cam face 36 and a gradual cam face 37, as shown. The upper face of said cam plate 35 is provided with two oppositely disposed pins 38, which are adapted to engage in apertures in a ratchet wheel 39 superimposed upon said cam plate and also fitting on the shaft 8, whereby said cam plate and ratchet wheel are adapted to move in unison. Formed integral with the shaft 8 is an arm 40 projecting from one side of said shaft and formed at its outer end with a stop 41. Said arm has pivoted to it a pawl 42, the same being provided with a tail 43, and said pawl being normally pressed toward the shaft 8 by a light coiled spring 44 mounted on its pivot. Said pawl is adapted to engage the ratchet wheel 39 to impart a step-by-step movement to the latter when the shaft 8 is reciprocated by the movement of the lever 12, in a manner readily understood. Freely mounted upon the enlarged hub 45 of the shaft 8, shown in detail in Fig. 3, and immediately above the arm 40, is an arm 46, shown in detail in Fig. 8, said arm projecting to one side and having mounted on its underside near its outer end an anti-friction roller 49, adapted to be contacted with by the tail 43 of the pawl 42 during the backward reciprocation of the latter, the function of said roller being to rock the pawl so that while said tail 43 is in contact with said roller the pawl 42 will be out of engagement with the teeth of the ratchet 39. The plate 46 carrying said roller 49 is freely rotatable on the hub 45, and is provided in its upper face with a set screw 50 adapted to pass through an elongated slot 51 formed in the bracket 6, as shown in Fig. 1. By means of this construction, the position of the arm 46, and consequently of its roller 49, with respect to the tail 43 of the pawl 42 may be adjusted within certain limits to vary the time of engagement of said pawl 42 with its ratchet wheel 39.

Fixed to the base plate 1 to one side of the shaft 8 is a post 52, which has mounted to rock thereon a bell crank 53 comprising arms 54 and 55, shown in detail in Fig. 7, said arm 54 being bifurcated and said bifurcated ends being downturned to provide the stops 56 and 57, the stop 57 extending below the stop 56. The outer end of the arm 55 contacts with the periphery of cam wheel 35, whereby the movement of the bell crank 53 is controlled in a manner readily understood, said arm 55 being retained normally in contact with said cam wheel by the tension of a spring 58 attached at one end to a pin 59 on the arm 54 and at its other end to any suitable point, such as a post 60 fixed to the base 1. Also mounted on the post 52 above the bell crank 53, and separated therefrom by a washer 61 is a stop pawl 62, adapted also to engage the ratchet wheel 39, said pawl being normally pressed into contact with said ratchet wheel by a light spring 63, connected with an apertured projection 64 thereon and with a post 65 on the arm 55 of the bell crank 53, it being understood that the tension of said spring 63 is less than that of the spring 58.

The operation of my improved device is as follows: The arm 40 is limited in its movement in one direction by the engagement of the stop 41 thereon with a post 66 fixed to the underside of the bracket 6, and by the engagement of said stop 41 with the vertical portion of the bracket 6 itself, so that the reciprocating movement of the lever 12, which, through the shaft 8, moves with said arm 40, must be within the limits of these two stops. When the device is positioned to register the movements of a particular machine, therefore, the lever 12 must be adjusted on the shaft 8, through the engagement of its lug 14 with the star wheel 11 so that the movement imparted to said lever by the machine will be within the limits of the two stops hereinbefore referred to. The downward stroke of the lever 12 will impart movement in one direction to the ratchet wheel 39 by the engagement therewith of the pawl 42, carried by the arm 40, and this engagement may be varied by an adjustment of the plate 46 carrying the roller 49, which roller contacts with the tail 43 of the pawl 42 at some point in the upward movement of the lever 12. Thus by loosening the set-screw 50, the arm 46 may

be adjusted, within the limits of the slot 51, in the bracket 6 so as to vary the time of contact between the roller 49 and the tail 43 of the pawl 42, whereby the ratchet 39 will be moved a greater or less number of teeth upon each stroke of the lever 12, as may be desired. Thus, the ratchet 39 may be moved two teeth or a greater number of teeth, according to the adjustment of the roller 49 with respect to the tail 43 of the ratchet 42. Inasmuch as it requires a complete rotation of the ratchet 39 for each closing of the electric circuit by the device, it follows that by means of this adjustment the number of electric impulses per operations of the machine being registered may be varied as desired. The step-by-step movement of the ratchet 39 carries with it the sleeve 34, to which the inner end of the spring 29 is attached, and as the outer end of said spring is held fixed temporarily by the cup 28, in a manner hereinafter described, the result will be that the reciprocations of the lever 12 gradually will wind said spring 29, it being understood that the ratchet 39 is held against reverse movement by the engagement therewith of the pawl 62. This winding of the spring will continue until the cam plate 35, which rotates with the ratchet 39, has moved to the position shown in Fig. 1, when the inner end 55 of the bell crank 53, which rides against the exterior cam surface of said plate 35, will register with the abrupt shoulder 36 of said cam, thereby admitting it, under the tension of the spring 58, to spring inward, thus moving its other end 54 outward. During this step-by-step winding of the spring 29, the plate 23, which is connected to the cup 28 carrying said spring by means of the engagement of the pin 27 with any one of the apertures 26 in said plate 23, will be held by the tension of said spring so that its projecting contact surface 24 will be in engagement with the down-turned stop 57 of the arm 54 of the bell-crank 53, thereby preventing rotation of the cup 28, plate 23 and contact wheel 20 to which said plate 23 is fixed. But when the ratchet 39 has been rotated to bring the arm 55 into register with the abrupt cam face of the cam plate 35, thereby rocking the arm 54 outward, this movement will carry said stop 57 outwardly away from the contact surface 24, thereby releasing the arm 23, and consequently the cup 28 and contact wheel 20. The spring 29 now being under a maximum tension will cause an immediate rotation of said parts 20, 23 and 28, which will result in a circuit-closing contact between the contact plate 21 of the wheel 20 and the contacts 17, thereby transmitting an electric impulse to the counting mechanism or other point to be energized. It is essential that the rotation of the contact wheel 20 shall be one complete rotation and no more, in order that the contacts 17 may come to rest upon the insulated portion of said wheel, so that all danger of an established circuit shall be avoided. This I accomplish by providing the stop 56 on arm 54 slightly in advance of the stop 57. When the bell crank lever 53 is rocked to release the plate 23, the stop 56 is rocked outward to lie in the path of the stop 25 on the plate 23, so that as the tension of spring 29 rotates its parts one complete revolution, the stop 25 will come into contact with the stop 56, which arrests further movement. Now, upon the further reciprocation of the lever 12, the movement of the ratchet 39 a distance of three teeth will bring the gradual cam face 37 into contact with the arm 55 of the bell crank 53, thus gradually rocking said arm 55 outward, and consequently the arm 54 thereof inward. This movement will carry the stop 56 inside of the stop 25, thereby releasing the latter, but said movement also carries the stop 57 into the line of movement of the outer stop 24 on plate 23, so that beyond a very slight movement necessary to disengage stops 25 and 56 the movement of the contact wheel 20 still is arrested, and said wheel remains stationary until the arm 55 again registers with the abrupt cam face 36, whereupon the operation hereinbefore described will be repeated.

By this construction I am enabled to impart an electric impulse through the wires 18 and 19 to any suitable counting mechanism once for any desired number of reciprocations of the lever 12 within certain limits. That is to say, an electrical impulse may be imparted once in six strokes of said lever, or may be accelerated up to once in three strokes, the frequency of the electrical impulses being dependent upon the adjustment of the roller 49 with respect to the tail 43 of the pawl 42, whereby the ratchet 39 is moved a greater or less number of teeth for each reciprocation of the lever 12. It will be observed that when the device is at rest the contacts 17 rest upon the insulated portion of the contact wheel 20, and when said wheel 20 and its parts are released to be subjected to the tension of the spring 29, a complete rotation of said wheel takes place, thereby sweeping the contact plate 21 of said wheel between the contacts 17, but bringing said wheel at rest in substantially the position from which it started, thus effectually preventing any closed circuit.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:—

1. In a device of the character described, a lever adapted to be oscillated by the machine to be registered, a shaft carrying and operated by said lever, a contact wheel, circuit closing contacts in engagement with

said wheel normally upon its non-conducting portion, a spring adapted when put under tension, to rotate said wheel in one direction, connections intermediate said lever and spring for winding said spring, and means automatically released for permitting the tension of said spring to be exerted upon said wheel to rotate it one complete turn.

2. In a device of the character described, a lever adapted to be oscillated by the machine to be registered, a shaft carrying and operated by said lever, a contact wheel, circuit closing contacts in engagement with said wheel normally upon its non-conducting portion, a spring adapted, when put under tension, to rotate said wheel in one direction, connections intermediate said lever and spring for winding said spring, means automatically released for permitting the tension of said spring to be exerted upon said wheel to rotate it one complete turn, and means for stopping said wheel when it has completed said turn.

3. In a device of the character described, a lever adapted to be oscillated by the machine to be registered, a shaft carrying and operated by said lever, a contact wheel also mounted rotatably upon said shaft, circuit closing contacts in engagement with said wheel normally upon its non-conducting portion, a spring adapted, when put under tension, to rotate said wheel in one direction, connections intermediate said lever and spring, and also mounted on said shaft, for winding said spring, and means automatically released for permitting the tension of said spring when wound to be exerted upon said wheel to rotate it one complete turn.

4. In a device of the character described, a lever adapted to be oscillated by the machine to be registered, a shaft carrying and operated by said lever, a contact wheel also mounted rotatably upon said shaft, circuit closing contacts in engagement with said wheel normally upon its non-conducting portion, a spring adapted, when put under tension, to rotate said wheel in one direction, connections intermediate said lever and spring, and also mounted on said shaft, for winding said spring, means automatically released for permitting the tension of said spring when wound to be exerted upon said wheel to rotate it one complete turn, and means for stopping said wheel when it has completed said turn.

5. In a device of the character described, a lever adapted to be oscillated by the machine to be registered, a shaft carrying and operated by said lever, a ratchet wheel on said shaft adapted to be operated step-by-step in one direction by the vibration of said lever, a cup also on said shaft, a contact wheel fixed to said cup, circuit closing contacts in engagement with said wheel normally upon its non-conducting portion, a spring in said cup adapted to be put under tension by the step-by-step operation of said ratchet wheel, and means for automatically releasing said spring periodically to permit it to exert its tension on said cup to rotate the latter and said contact wheel.

6. In a device of the character described, a lever adapted to be oscillated by the machine to be registered, a shaft carrying and operated by said lever, a ratchet wheel on said shaft adapted to be operated step-by-step in one direction by the vibration of said lever, a cup also on said shaft, a contact wheel fixed to said cup, circuit closing contacts in engagement with said wheel normally upon its non-conducting portion, a spring in said cup adapted to be put under tension by the step-by-step operation of said ratchet wheel, means for automatically releasing said spring periodically to permit it to exert its tension on said cup to rotate the latter and said contact wheel, and means automatically stopping said rotation of the contact wheel upon the completion of one rotation.

7. In a device of the character described, a lever adapted to be oscillated by the machine to be registered, a shaft carrying and operated by said lever, a ratchet wheel on said shaft adapted to be operated step-by-step in one direction by the vibration of said lever, a cup also on said shaft, a contact wheel fixed to said cup, circuit closing contacts in engagement with said wheel normally upon its non-conducting portion, a spring in said cup connected at one end to said cup and at its other end to said ratchet wheel, means for holding said cup and contact wheel against rotation whereby the step-by-step movement of said ratchet wheel will wind said spring, and means for automatically releasing said cup and contact wheel periodically to rotate the same.

8. In a device of the character described, a lever adapted to be oscillated by the machine to be registered, a shaft carrying and operated by said lever, a ratchet wheel on said shaft adapted to be operated step-by-step in one direction by the vibration of said lever, a cup also on said shaft, a contact wheel fixed to said cup, circuit closing contacts in engagement with said wheel normally upon its non-conducting portion, a spring in said cup connected at one end to said cup and at its other end to said ratchet wheel, means for holding said cup and contact wheel against rotation whereby the step-by-step movement of said ratchet wheel will wind said spring, means for automatically releasing said cup and contact wheel periodically to rotate the same, and means automatically stopping said rotation of the cup and contact wheel upon the completion of one rotation.

9. In a device of the character described, a rotary contact wheel having a contact surface therein, a circuit closer engaging said wheel normally upon the non-conducting portion thereof, a spring, means operated by the machine to be registered for winding said spring, and means automatically releasing said spring to permit it to exert its tension on said contact wheel to rotate the latter one complete rotation, thus sweeping its contact surface past said circuit closer.

10. In a device of the character described, a rotary contact wheel having a contact surface therein, a circuit closer engaging said wheel normally upon the non-conducting portion thereof, a spring, means operated by the machine to be registered for winding said spring, means automatically releasing said spring to permit it to exert its tension on said contact wheel to rotate the latter to sweep its contact surface past said circuit closer, and means automatically stopping said rotation of the contact wheel upon the completion of one rotation.

11. In a device of the character described, a rotary contact wheel having a contact surface therein, a circuit closer engaging said wheel normally upon its non-conducting portion thereof, a spring, means operated by the machine to be registered for winding said spring, a cam movable with said spring winding mechanism, a bell crank lever operated by said cam, coöperating stops on said lever and wheel operating during the winding of said spring to retain said wheel against rotation, and other stops on said lever and wheel coöperating to check said wheel when it has completed one rotation under the tension of said spring, the action of said stops being controlled by the action of said cam on said lever.

12. In a device of the character described, a rotary contact wheel having a contact surface therein, a circuit closer engaging said wheel normally upon its non-conducting portion thereof, a spring, means operated by the machine to be registered for winding said spring, a cam movable with said spring winding mechanism, a bell crank lever having one arm operated by said cam and carrying on its other arm an inner and an outer stop out of alinement, and an inner and an outer stop fixed to said contact wheel and coöperating with said lever stops, the whole operating through the cam control so that while the spring is being wound the contact wheel first will be held against rotation, then will be released to be rotated by said spring, and finally will be stopped upon the completion of one rotation.

In testimony whereof I hereunto affix my hand, this 21st day of May, 1919.

WALTER J. BURCHETT.