No. 711,635. Patented Oct. 21, 1902.

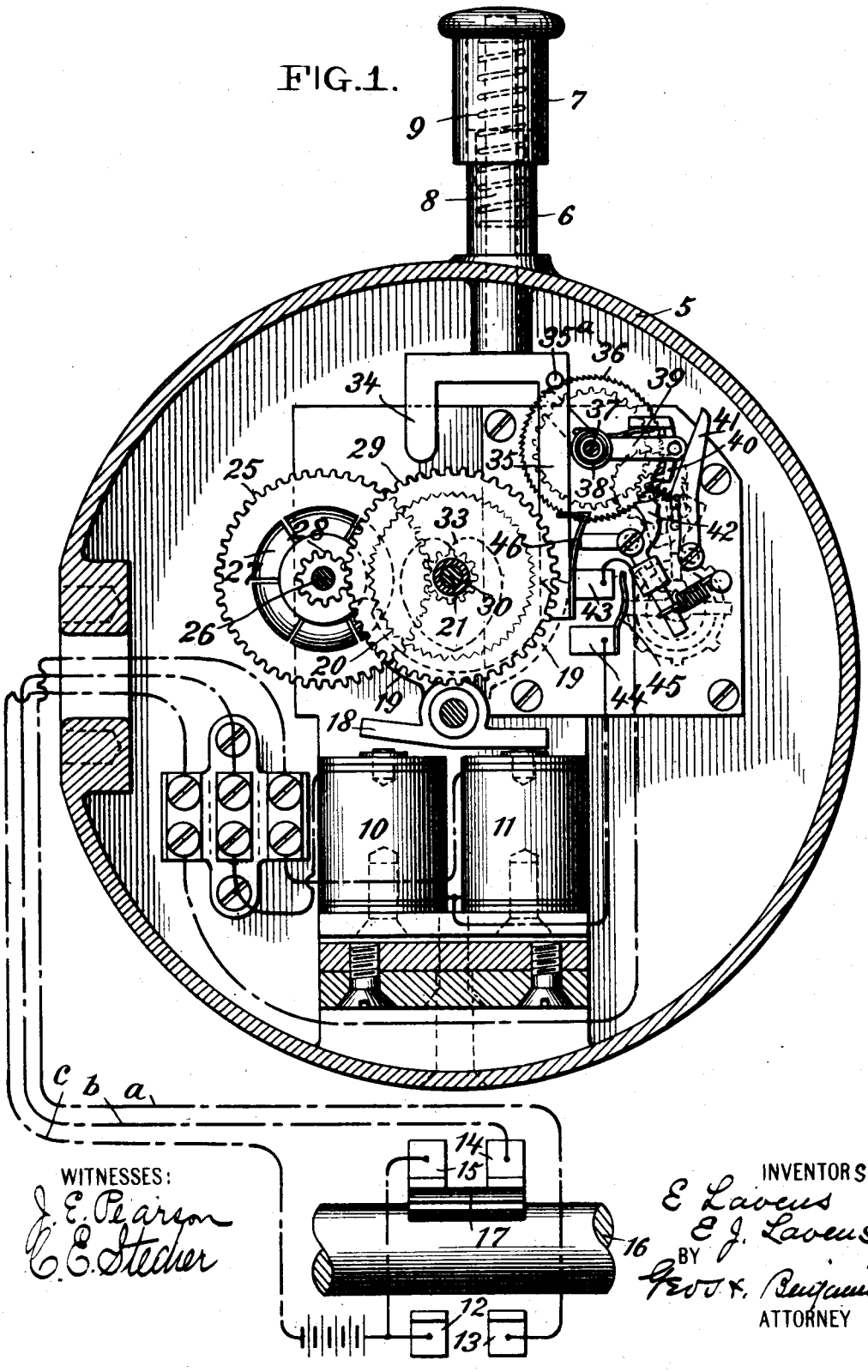
# E. & E. J. LAVENS.

## REVOLUTION INDICATOR.

(Application filed Feb. 8, 1902.)

(No Model.) 3 Sheets—Sheet 1.

FIG. 1.




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FIG. 2.

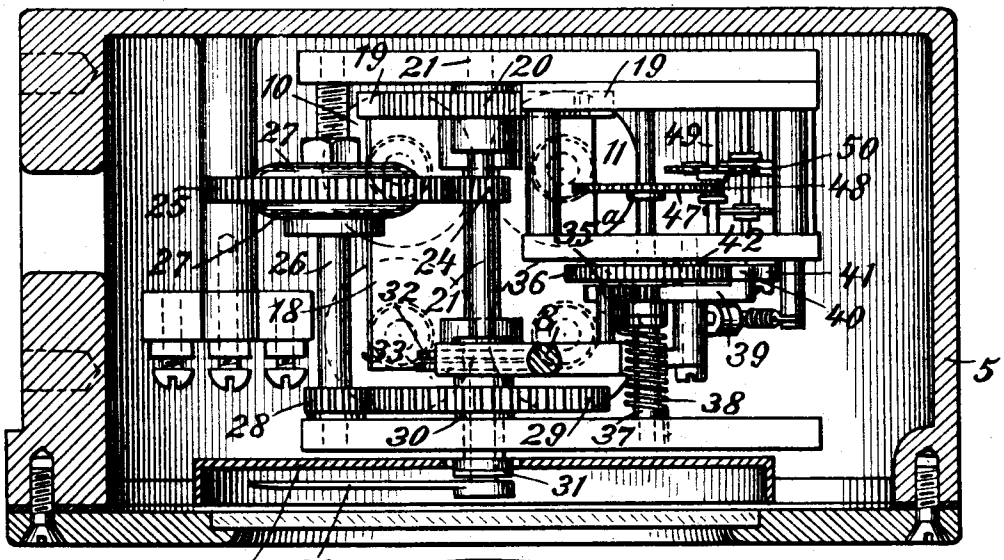
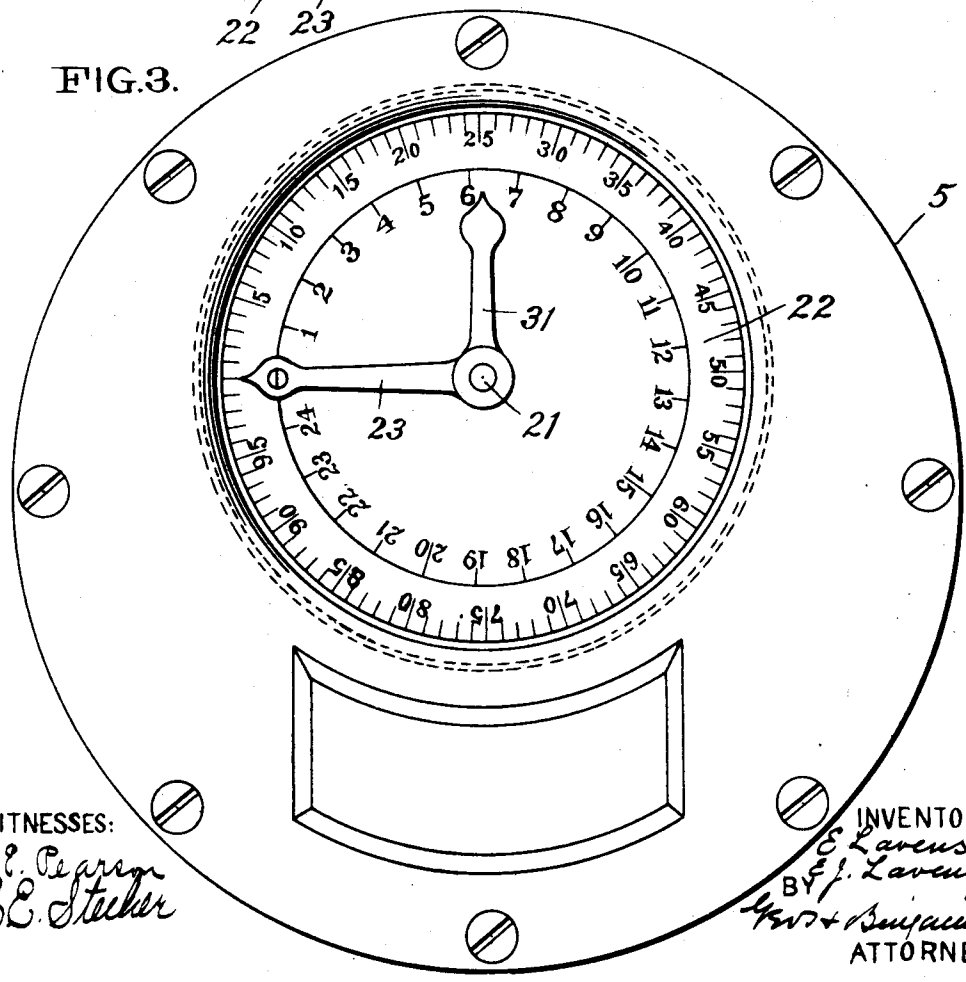



FIG. 3.




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FIG.4.

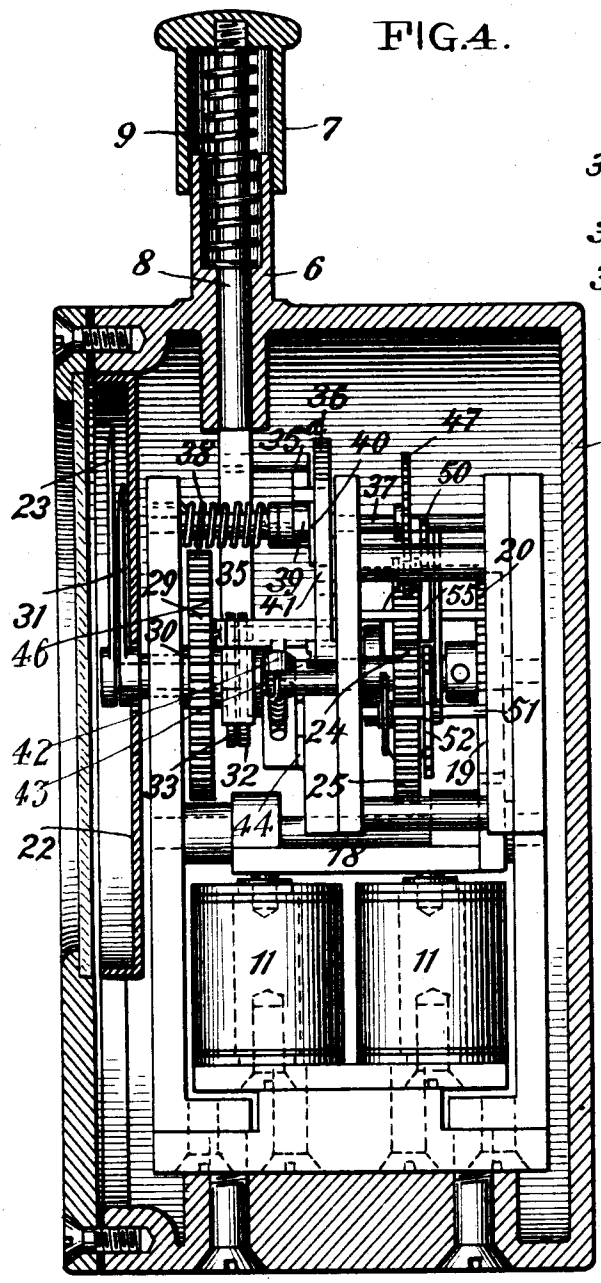



FIG.5.

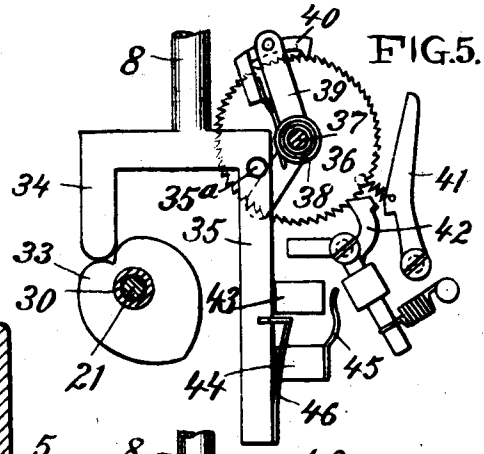



FIG.6.

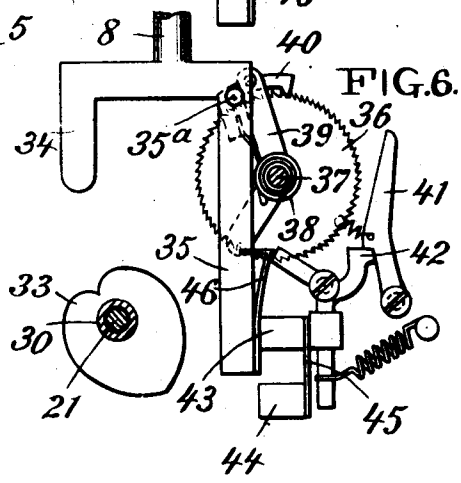



FIG.8.

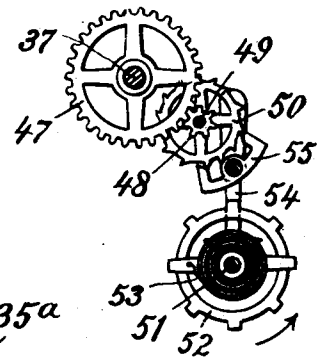
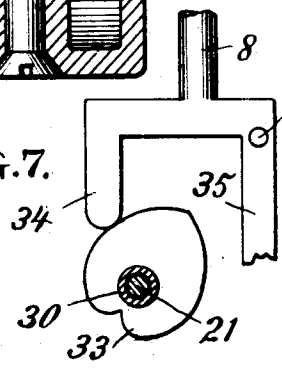



FIG.7.




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# UNITED STATES PATENT OFFICE.

ERWIN LAVENS AND EDWARD JOSEPH LAVENS, OF BROOKLYN, NEW YORK.

## REVOLUTION-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 711,635, dated October 21, 1902.

Application filed February 8, 1902. Serial No. 93,156. (No model.)

*To all whom it may concern:*

Be it known that we, ERWIN LAVENS and EDWARD JOSEPH LAVENS, citizens of the United States, residing at New York city, borough of Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Revolution-Indicators, of which the following is a specification.

Our invention relates to a device which when manually acted upon will count the revolutions of a driven shaft or other moving body located at a distance and for a definite period of time and then automatically be thrown out of operation.

The object of our invention is to construct a device which will be positive in its action when thrown into operation, which will count the number of revolutions of a driven shaft or reciprocations of a moving body, and visibly indicate such count and also reset itself at zero before the next count begins.

The accompanying drawings will serve to illustrate our invention, and in which similar numerals and letters indicate like parts.

Figure 1 is a front elevation and also illustrates in diagram the connection of the instrument to a revolving shaft. Fig. 2 is a horizontal section through the top of the case and a top view of the mechanism contained within the case. Fig. 3 is a front elevation of the case, showing the indicator-scale. Fig. 4 is a vertical section through the case and the operating-key and a side view of the mechanism contained within the case. Figs. 5, 6, and 7 are views showing the mechanism for throwing the clock mechanism into action and for restoring the indicating-pointers of the device to their zero position. Fig. 8 is a detached view of the clock-escapement device.

5 indicates an inclosing casing, from the top of which projects a tubular projection 6, over which is placed a cap 7. Located within the projection 6 is a shaft 8, which forms a part of the operating-key. Surrounding this shaft and bearing at one end upon the casing and on the other end upon the under side of the cap 7 is a helical spring 9. By depressing the cap 7 the key 8 is pushed downward. When the pressure is relieved, the cap restores itself to its original position. Located within the casing are the magnets 10 11, respectively in circuit with the contact-plates 12 13 14 15 through the conductors *a*, *b*, and *c*.

16 represents a driven shaft or other moving body. Mounted upon the shaft is a bridge-piece 17. By the rotation of the shaft the bridge-piece 17 alternately bridges the contacts 12 13 14 15 and when such bridging occurs (if the circuit is closed) alternately excite the magnets 10 11. Situated over the magnets is a pivoted armature 18, carrying the escapement-arms 19, which are of different length and which take in the toothed periphery of the escapement-wheel 20. The escapement-wheel 20 is mounted upon the shaft 21, and on the outer end of this shaft and over the dial 22 is secured a pointer 23. Also mounted upon the shaft 21 is a small gear 24, which meshes with the gear 25, held upon the shaft 26 by friction-washers 27. Mounted on the shaft 26 is a small pinion 28, which meshes with the gear 29, mounted upon the hollow shaft 30, which incloses the shaft 21. Connected to the outer end of the shaft 30 is a pointer 31. The movement of the different shafts is so arranged that the pointer 23 will make one hundred revolutions to one revolution of the pointer 31.

Mounted upon the shaft 21 is a heart-shaped cam 32 and upon the shaft 30 a similar heart-shaped cam 33.

Depending from the operating-key 8 are the operating-arms 34 35, the latter provided with a horizontally-projecting arm $35^a$. The arm 34 makes frictional contact with the heart-shaped cams 32 33 in the manner indicated in Figs. 1, 5, 6, and 7 to restore the pointers 23 31 to the zero position after a count is finished, as will later on be described. The pin $35^a$ on the arm 35 coacts with one arm of a bell-crank forming a part of the clock-escapement mechanism (shown at the right of Fig. 1) for the purpose of making the circuit through the magnets and energizing the clock mechanism in order that the circuit through the magnets may be maintained for a definite period of time.

The escapement device is illustrated in Figs. 1, 5, 6, and 8. This device consists of a toothed wheel 36, loosely mounted on shaft 37. Surrounding the shaft 37 and secured at one end to the supporting-frame is a helical spring 38 and secured at its opposite end to

the shaft 37, and fixedly mounted on the shaft 37 is a bell-crank 39, carrying the pawl 40, which coacts with the wheel 36. Normally the spring exerts no tension upon the shaft 37, but will tend to rotate the shaft to the right, and with it the bell-crank, if tension is made upon the spring by previously rotating the bell-crank to the left. At the right of the wheel 36 is a pivoted latch 41 and under the latch a pivoted spring-actuated pawl 42. 43 44 represent contact-plates in circuit with the magnets 10 11 and contacts 12 13 14 15, 45 a spring bridge-piece, and 46 a spring connected to the arm 35 of the operating-key 8. The contacts 43 44 are situated to the rear of the arm 35 and the spring 46 upon this arm, and hence do not interfere with the vertical movement of such spring. The operation of this portion of our device is as follows: The normal position of the parts is shown in Fig. 1—*i. e.*, with the circuit open between the contacts 43 44, the pawl 40 at the right of the wheel 36, and pawl 42 in engagement with the wheel. Upon depression of the key 8 the pin $35^a$ coacts with the left-hand arm of the bell-crank 39, and the bell-crank and pawl 40, carried by it, is rotated to the left over the toothed surface of the wheel 36. At the same time the helical spring 38 is put under tension. As the arm 35 moves downward the spring 46, carried by the arm, is pushed backward into the arm and moves under the left-hand arm of the pawl 42 and finally into the position shown in Fig. 5. After the cap 7 and the key 8 have been pushed to the lowest position these parts are released, and under the action of the spring 9 the arm 35 moves upward. This brings the spring 46 under the left-hand arm of the pawl 42, raising this arm and causing the right-hand arm to catch under the latch 41. The bell-crank 39 under the action of the spring 38 is now rotated to the right, and with it the pawl 40 and wheel 36. This rotation is timed by the action of the escapement shown in Fig. 8, or, in other words, a time limit is effected through such escapement, the parts continuing in motion until the upper arm of the bell-crank strikes the latch 41, pushing it backward and releasing the pawl 42, which coacts with the wheel 36, holding it in a fixed position, but allows the bell-crank 39 and pawl 40 to resume their original position, as shown in Fig. 1. By altering the angular position of the arms of the bell-crank relative to each other the time within which the count will take place can be previously determined. The escapement device consists of a gear 47, mounted on shaft 37. This gear meshes with the pinion 48 on shaft 49. Mounted also on shaft 49 is an escapement-wheel 50. Mounted on shaft 51 is a balance-wheel 52, connected through the spring 53 to the escapement-arm 54, carrying the escapement 55. The operation of the escapement device is as follows: When the tension of the spring 38 is exerted on the shaft 37, movement is communicated through the wheels 47 48 to the balance-wheel 52, which is set in oscillation and in oscillating operates the escapement 55, which permits the wheel 47, which is secured to the shaft 37, to make a step-by-step movement forward. This movement of the shaft 37 is communicated to the bell-crank 39, and the pawl 40, taking in the toothed periphery of the wheel 36, causes said wheel 36 to have a similar corresponding movement forward to the left until the left-hand arm of the bell-crank strikes the latch 41 and releases the pawl 42.

We do not limit ourselves to the particular form of clock-escapement device illustrated, as many other forms may be used.

The operation of our device will be readily understood. When the revolutions of a moving part are to be counted, the operator depresses the cap 7, thereby moving down the key 8, which movement, transmitted through the arms 35, throws the pawl 40 to the left. When the cap 7 and key 8 move upward, the pawl 42 is released from engagement with the wheel 36, which moving forward presses the bridge device 46 across the contacts 43 44, thereby closing the circuit through the magnets 10 11. The rotation of the bridge-piece 17 on the shaft 16 now alternately closes the circuit between the contacts 12 13 14 15, alternately exciting the magnets, which acting upon the armature 18 rotate the pointers 23 31 over the dial 22. When the clockwork mechanism has run down, the pointers on the dial will indicate the number of revolutions within a given time—as, for instance, thirty seconds or one minute. When the instrument is next to be used, the motion of the key 8 downward, acting upon the heart-shaped cams 32 33, serves to restore the pointers to their zero position.

We wish it understood that we do not limit ourselves to the specific mechanism described for counting the revolutions of the shaft or to the specific mechanism employed in connection with the counting mechanism for making and breaking the circuit and determining the time limit, as various other instrumentalities may be used or changes made in those described without departing from the intent of our invention.

Having thus described our invention, we claim—

1. In a device such as described, the combination with a moving part carrying a bridge device, a series of electrical contacts, means for closing the circuit through the indicating mechanism of such device, a motor device in circuit with said contacts, and means energized by the motor device for indicating the passing of the bridge device over the contacts.

2. In a device such as described, the combination with a moving part carrying a bridge device, a series of electrical contacts, a motor device in circuit with said contacts, means energized by the motor device for indicating

the passing of the bridge device over the contacts, and means for opening the circuit to the motor after a predetermined time.

3. In a device such as described, the combination with a moving part carrying a bridge device, a series of electrical contacts, a motor device in circuit with said contacts, means for closing the circuit between said contacts and motor device, means energized by the motor device for indicating the passing of the bridge device over the contacts, and means for opening the circuit to the motor after a predetermined time.

4. In a device such as described, the combination with a moving part, of an electromotor, means for energizing said motor carried by the moving part, means actuated by the motor for indicating the rapidity of movement of the moving part, and means for permanently opening the circuit to the motor after a predetermined time.

5. In a device such as described, the combination with a moving part carrying a circuit-closing device, a series of electrical contacts, a motor device in circuit with said contacts, a device for closing the circuit to said motor, and means for determining the length of time during which said circuit shall be closed.

6. In a device such as described, the combination with a moving part, of a pair of magnets, means carried by said moving part for alternately exciting said magnets, means energized by said magnets for indicating the movements of said moving part, an operating-key, and means energized by said key for determining the time during which the magnets shall be actuated by the moving part.

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

ERWIN LAVENS.
EDWARD JOSEPH LAVENS.

Witnesses:
J. E. PEARSON,
C. E. STECHER.