No. 693,355. Patented Feb. 11, 1902.

C. J. SPRINGER.

ELECTRICAL DISTRIBUTER.

(Application filed Oct. 16, 1900.)

(No Model.) 5 Sheets—Sheet 1.

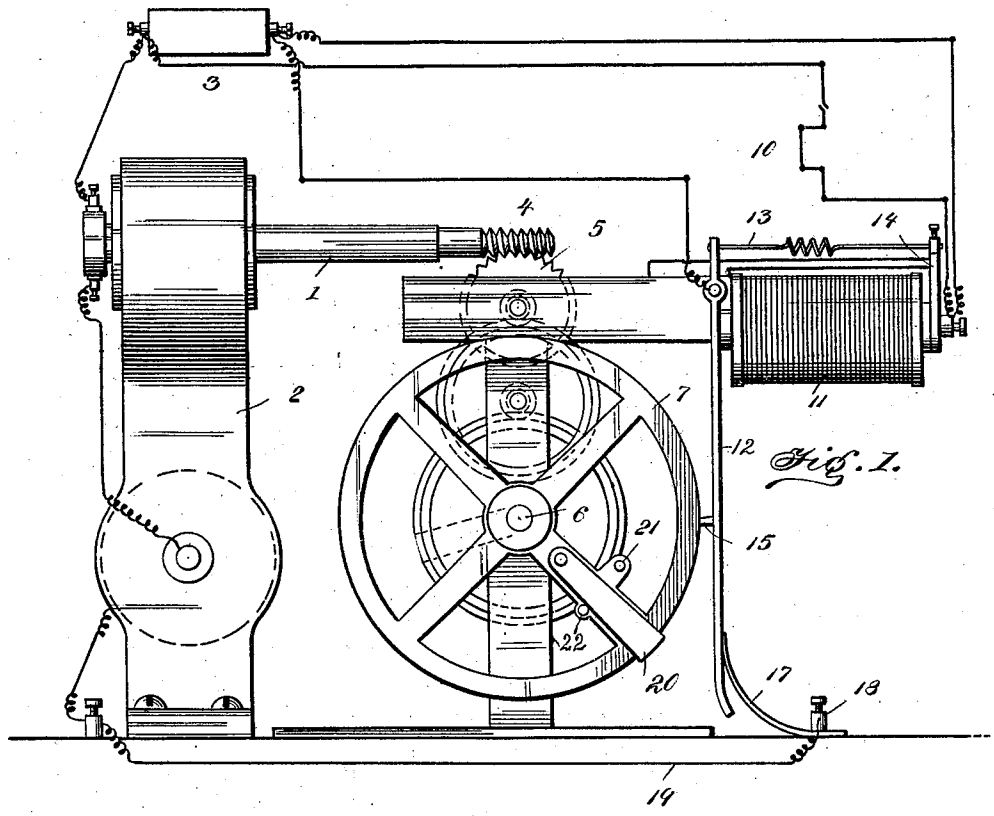


Fig. 1.

Fig. 6.

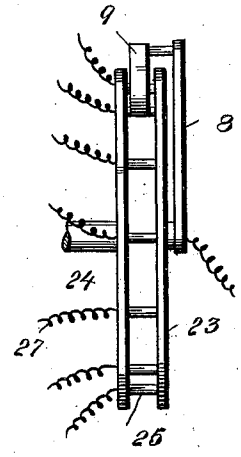
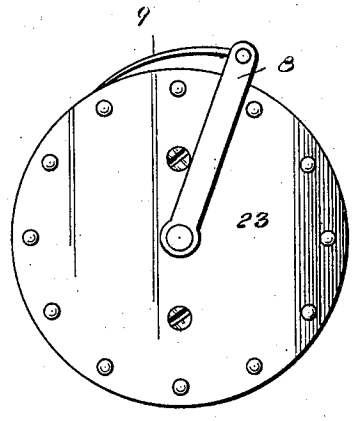


Fig. 5.



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Fig. 2.

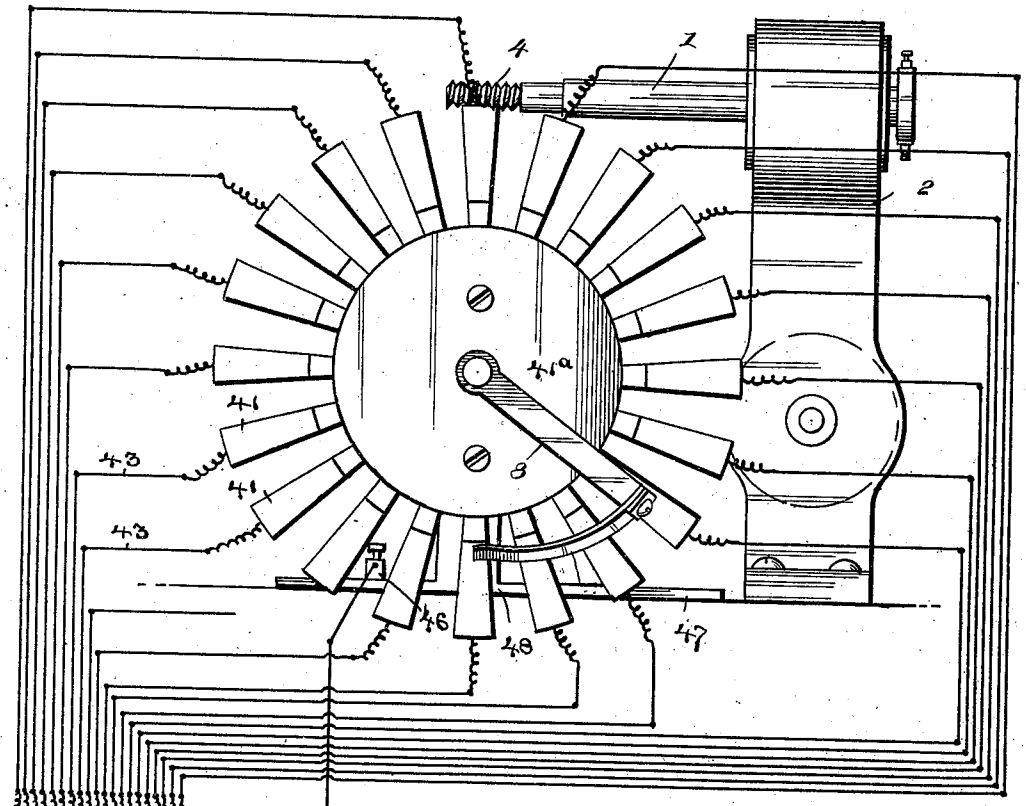
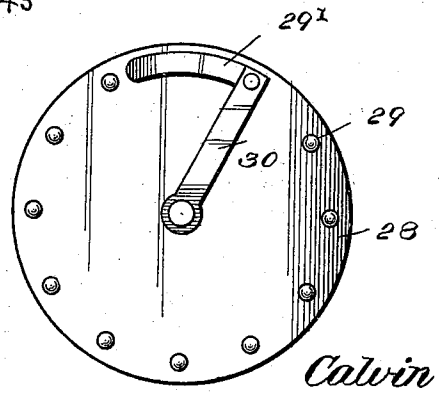


Fig. 7.



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Fig. 3.

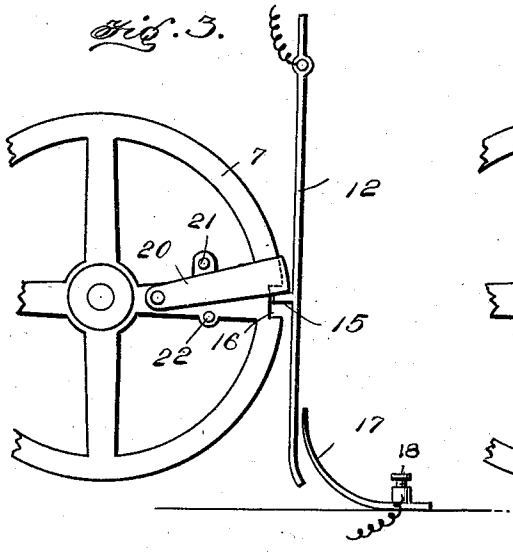


Fig. 4.

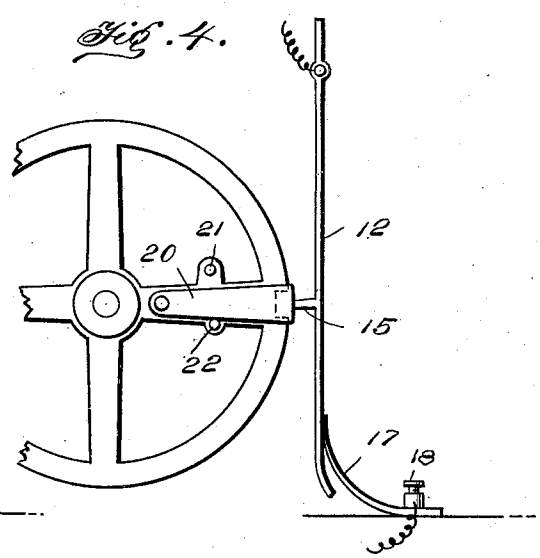


Fig. 8.

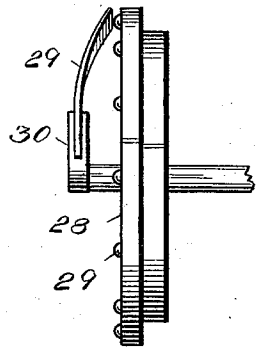
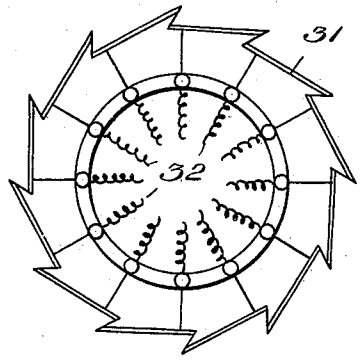


Fig. 9.



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Fig. 10

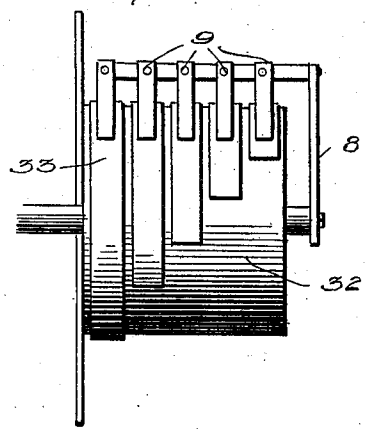


Fig. 11

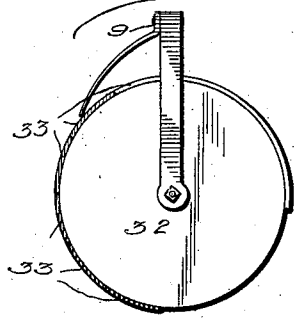


Fig. 15.

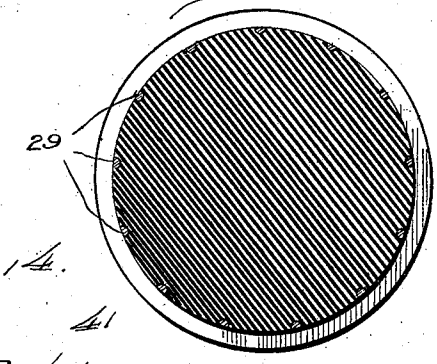
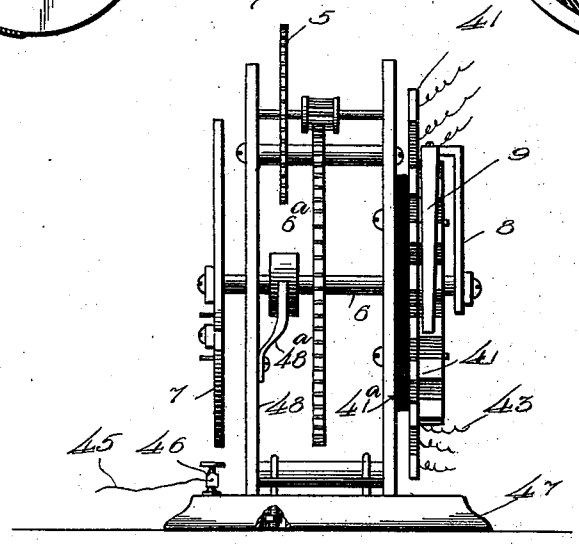


Fig. 14.



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No. 693,355. Patented Feb. 11, 1902.

C. J. SPRINGER.

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(No Model.) 5 Sheets—Sheet 5.

Fig. 12.

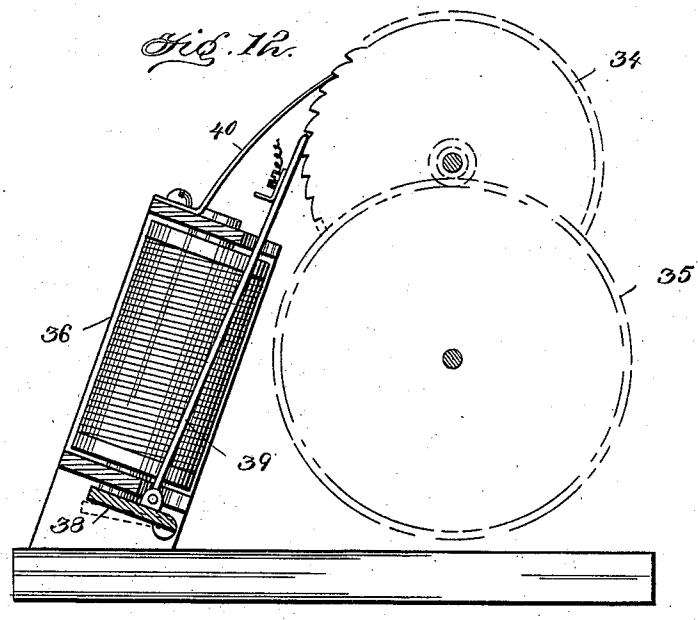
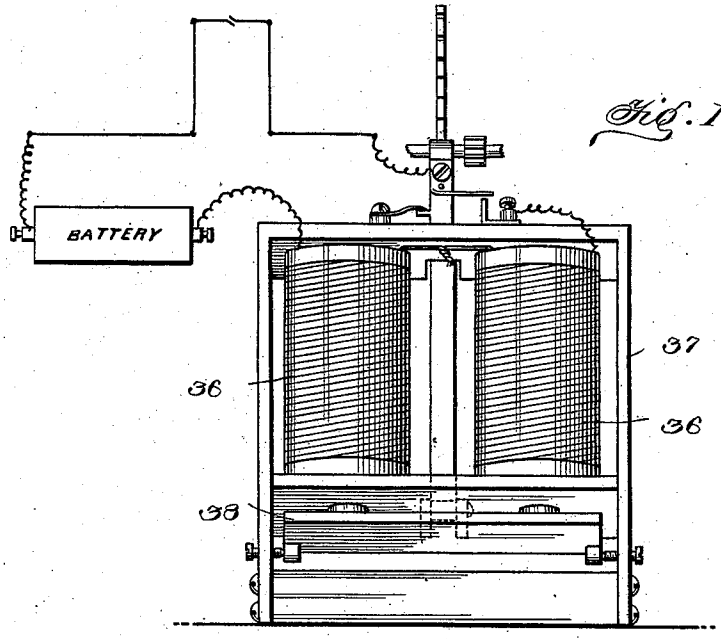


Fig. 13.



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UNITED STATES PATENT OFFICE.

CALVIN J. SPRINGER, OF SOMERVILLE, MASSACHUSETTS.

ELECTRICAL DISTRIBUTER.

SPECIFICATION forming part of Letters Patent No. 693,355, dated February 11, 1902.

Application filed October 16, 1900. Serial No. 33,288. (No model.)

To all whom it may concern:

Be it known that I, CALVIN J. SPRINGER, a citizen of the United States, residing at Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Electrical Distributers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to relays for electrically-operated apparatus; and one of its objects is to employ a duplex automatically-operating relay adapted to be set in motion by the closing of an electric circuit and in turn either successively or simultaneously close one or more secondary circuits, which may include lights, bells, or other electrically-operated devices. By holding the first-mentioned or primary circuit closed the above operation will be repeated continuously, thereby rendering the apparatus especially adapted for use in connection with changeable electrical displays, panoramas, and other similar electrically-operated devices.

A further object of the invention is to so construct the apparatus that upon closing and then immediately breaking the primary circuit the relay will be set in motion and continue so until each secondary circuit has been closed thereby, whereupon the relay will be automatically stopped. This feature of my invention adapts it for use in connection with program-clocks or like devices, whereby a single impulse received from a master-clock serves to operate a series of suitably-arranged signals.

Another object of this invention is to provide a novel arrangement of circuits whereby when the primary circuit is closed its current will release the relay and then automatically break and enter a second circuit, to which a motor is electrically connected. This motor serves to operate the circuit closing and breaking mechanism of the relay.

With these and other objects in view the invention consists in the novel construction and combination of parts hereinafter more fully described and claimed, and illustrated in the accompanying drawings, showing the preferred form of my invention, and in which—

Figure 1 is a front elevation of the apparatus with the commutator removed. Fig. 2 is a rear elevation of one form of commutator employed with the apparatus and showing secondary circuits. Figs. 3 and 4 are side views of the armature of the relay, showing the same in different positions. Figs. 5 and 6 are respectively a side elevation and an edge view of a modified form of commutator which may be employed with the apparatus when a very short contact is desired. Fig. 7 is a side elevation of still another form of commutator which may be used in connection with my improvement. Fig. 8 is an edge view of the commutator shown in Fig. 7. Fig. 9 is a side elevation of a still further modification of the commutator. Figs. 10 and 11 are respectively a side elevation and an end view of another form of commutator adapted for use with my invention, the brush being shown in position thereon. Fig. 12 is a side elevation of a modified form of propelling mechanism for the relay, comprising a pawl-and-ratchet device adapted to be used in lieu of the electric motor shown in Figs. 1 and 2. Fig. 13 is a front elevation of the mechanism shown in Fig. 12. Fig. 14 is an end view of the commutator shown in Fig. 2, the circuit-breaker, the shaft, &c.; and Fig. 15 is a central vertical section through the commutator shown in Figs. 5 and 6.

The reference-numeral 1 designates the shaft of an electric motor, said motor being supported in suitable framework 2 and in electrical connection with a battery 3. Upon the inner end of the shaft 1 is formed a worm 4, which meshes with a gear 5, constituting a part of the train which revolves a shaft 6, upon one end of which is mounted a rotary circuit-breaker 7, while upon the other end of the shaft is located an arm 8, carrying a contact-brush 9, which travels around in contact with a circular commutator. The commutator illustrated in Fig. 2 consists of a series of preferably metallic angular contacts 41, secured upon and extending from disks 41^a of an insulating material, within which is mounted the revoluble shaft 6. Each seg-

ment excepting the segment 42 is connected by wires 43 with an electrically-operated device which is in circuit with a battery 44 or other source of electricity. The return-wire 45 extends from a battery to a binding-post 46 upon the base-plate 47 of an arbor 48. The shaft 6 is journaled in this arbor and the current of electricity from wire 45 will obviously pass into plate 47, arbor 48, spring 48^a, collar 6^a, shaft 6, arm 8, and brush 9. While the commutator above described may be used in apparatus of this character employed for various purposes, it is especially adapted for use in connection with time-annunciators, &c. The construction of the commutator may be varied according to the purposes for which the apparatus is used, and several different constructions of commutators, any one of which may be used with the improved apparatus, are illustrated in the drawings and will be described hereinafter.

The circuit-closer, which may be a push-button, a switch, or a master-clock, according to the purposes for which the apparatus is used, is located at the point designated by the numeral 10 and is electrically connected with the battery 3 and with an electromagnet 11, said magnet being supported upon the framework of the device.

12 designates a pivoted-lever armature adapted to be attracted by the magnet 11 when the latter is energized. This lever is pivotally supported upon the frame of the apparatus, and its upper end is connected by a spring 13 with a bracket 14, projecting from the frame, the function of said spring 13 being to retract the lever when the magnet 11 is de-energized. The lever 12 is provided with a lug or projection which engages a notch 16, formed in the periphery of the circuit-breaking wheel 7, and the lower free end of the lever 12 is adapted to contact with a spring 17, secured to the base of the apparatus and having a binding-post 18, to which is secured a conducting-wire 19, leading to the motor.

20 designates a guard-arm pivotally secured to one side of the circuit-breaking wheel 7 and adapted to cover one side of the notch 16 and extend slightly beyond the periphery of the wheel. Pins 21 and 22 serve to limit the movement of this arm 20. The lug 15 of the lever 12 normally rests within the notch 16, and the guard 20 is supported thereby above the notch.

When it is desired to operate the devices connected to the relay, the primary circuit is made by means of the closer 10, and the magnet 11, becoming energized, attracts the armature-lever 12 and withdraws the lug 15 from notch 16. Arm 20 immediately falls over the side of the notch and the wheel 7 is released. As soon as the lug 15 on arm 12 is withdrawn from notch 16 said arm is brought into contact with the spring 17, thereby closing the circuit from battery 3 through the motor 2, wire 19, spring 17, and lever 12. The motor will transmit motion to shaft 6 and its arm 8 and wheel 7 through the train-gearing 5, and the brush 9 will be brought successively into contact with the segments 41, thereby closing each circuit including the battery No. 2. When the circuit of the brush has been completed, the lug 15 will contact with and raise the arm 20, and spring 13 will press said lug into notch 16, provided the primary circuit has been broken. If, however, the primary circuit remains closed, the wheel 7 will continue to revolve. The segment which is located in horizontal alinement with the notch 16 is "dead," or, in other words, not connected to any electrically-operated device. The entire apparatus is thus enabled to stand at rest.

In Figs. 5 and 6 I have shown a form of commutator which may be used in lieu of the one hereinbefore described. This is formed of a disk 23, of insulating material, having a groove 24 in the periphery thereof. Embedded in the bottom of said groove at desired intervals is a series of pins or bolts 25, electrically connected, by means of wires 27, with the devices to be operated. As in the first-described form, this commutator also has a dead bolt or contact therein.

The form of commutator shown in Figs. 7 and 8 consists of a disk 28, of insulating material, provided with equidistant contact-points 29, which are connected up in the circuit in the same manner as illustrated in Fig. 2 and provided with a brush 29′, carried by a revoluble arm 30.

In Fig. 9 is illustrated another form of commutator, through the use of which electric lights may be suddenly lighted or put out successively during the operation of the relay. The commutator comprises a toothed wheel 31, having electrical connections and adapted to coöperate with a suitable brush, which springs into contact successively with the several teeth of the commutator.

In Figs. 10 and 11 the commutator is shown as comprising a roller or drum 32 and a plurality of conducting-strips 33 of varying length, upon which contact-brushes are adapted to bear. These brushes are preferably constructed as shown in Fig. 15, and each is in a circuit including one of the strips 33 and an electrically-operated device. By employing this form of commutator several lights can be lighted successively, remain lighted, and then be put out simultaneously or one at a time, according to the way the strips are arranged on the drum, this operation being repeated as the brush revolves.

In lieu of the electric motor shown in Figs. 1 and 2 I may, if desired, employ other means for actuating the brush, and in Figs. 12 and 13 I have illustrated an electrically-operated pawl-and-ratchet device for this purpose. This mechanism comprises a ratchet-wheel 34, geared to the circuit-breaking wheel 35. An electromagnet 36 is mounted on a suitable frame 37 and is provided with an armature 38, connected to a pawl 39, normally engag-

ing the teeth of the wheel 34. A spring 40 serves to retain said wheel in the position to which it is moved. The magnet 36 is adapted to be substituted for the motor 2 in the circuit containing battery No. 1. As shown in Fig. 13, one wire of the circuit is connected to the magnet, while the other wire extends to the pawl 39. A contact 49 is in circuit with the magnet and is adapted to bear against a spring-arm 50, extending from the pawl. A spring 51 serves to hold the arm and contact normally together. When the circuit containing battery No. 2 is made, the magnet 36 becomes energized and attracts its armature 38, thereby forcing pawl 39 against ratchet 34 and moving it one notch. As the pawl rises its arm 50 breaks from contact with 49 and the armature immediately falls back to its original position. This vibrating action continues as long as the circuit remains closed. This form of vibrating motor is especially adapted for use with the apparatus when employed as a time-annunciator.

I claim—

1. In an automatic relay, the combination with a motor-shaft, of a second shaft driven thereby, a train of gearing between said shafts, a commutator arranged concentric to said driving-shaft, a contact-brush carried by said driving-shaft, a wheel fixed on the driving-shaft and formed with a peripheral notch, an armature pivotally supported adjacent to said notch and provided with a lug or projection adapted to enter said notch, an electromagnet controlling said armature, a contact-spring against which the free end of the armature is adapted to bear to close the motor-circuit, and means for energizing the electromagnet.

2. In an automatic relay, the combination with a motor-shaft, of a second shaft driven thereby, a train of gearing between said shafts, a commutator concentric with said driving-shaft, a contact-brush carried by said driving-shaft, a wheel fixed upon the driving-shaft and having a peripheral notch, an armature located adjacent to said wheel and provided with a lug or projection adapted to enter said notch, an electromagnet for controlling the armature, a pivotally-secured guard on said wheel adapted to cover the notch therein, and means for energizing the electromagnet.

3. In an automatic relay, the combination with a power-shaft, of a second shaft driven thereby, a train of gearing between said shafts, a commutator concentric to said driving-shaft, a contact-brush carried by the driving-shaft, a wheel fixed on said driving-shaft and formed with a peripheral notch, a guard for said notch comprising an arm pivotally secured to the wheel and extending across the periphery thereof, and stop-pins to limit the movement of said arm, an armature pivotally adjacent to said wheel and provided with a lug or projection adapted to enter the notch in the wheel, an electromagnet for controlling said armature, a contact-spring against which the free end of the armature is adapted to bear, and means for energizing the electromagnet.

4. In an automatic relay, the combination with a fixed commutator, one or more contacts of which are in a circuit with an electrically-operated device, of a rotary brush adapted to successively close said circuits through the contacts, a notched wheel revoluble with the brush, an armature normally engaging the notch and thereby adapted to lock the brush and wheel against revolution, a spring adapted to project the armature into engagement with the notch, a magnet to the armature, a motor for the brush and wheel, and means whereby the armature is attracted to the magnet and disengaged from the wheel and a circuit, including the motor, is formed.

5. In an automatic relay, the combination with a motor-shaft, of a second shaft driven thereby, a commutator, an electrically-operated device in circuit with one or more contacts of the commutator, a brush operated by the driven shaft and adapted to close said circuits successively, a wheel revoluble with the brush, an armature adapted to engage the wheel, an electromagnet controlling said armature, a contact-spring against which the free end of the armature is adapted to bear to free the wheel and close the motor-circuit, and means for energizing the electromagnet.

In testimony whereof I affix my signature in presence of two witnesses.

CALVIN J. SPRINGER.

Witnesses:
MARTIN L. WALLS,
GEORGE H. IRELAND.