F. W. COLE.

ELECTRIC SIGNALING DEVICE.

APPLICATION FILED DEC. 22, 1910.

1,040,149.

Patented Oct. 1, 1912.

Fig. 1.

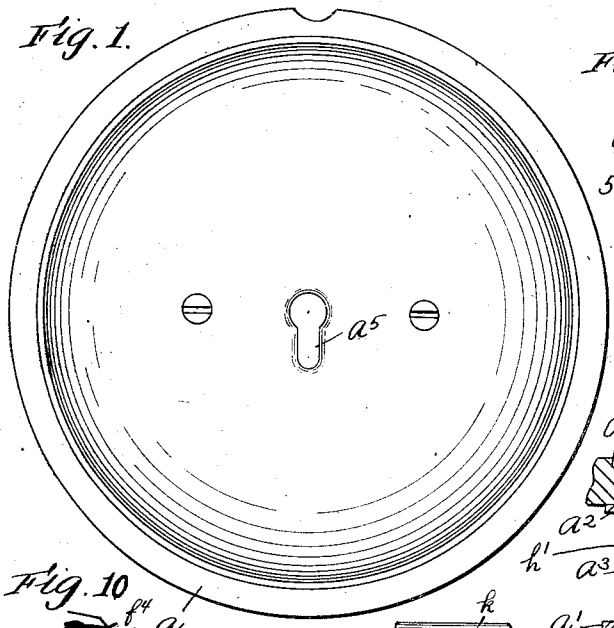


Fig. 4.

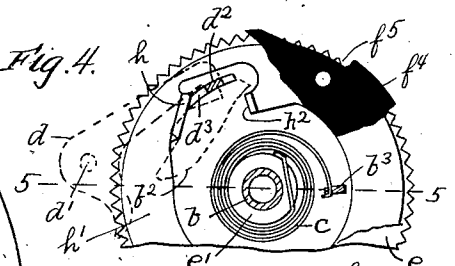


Fig. 5.

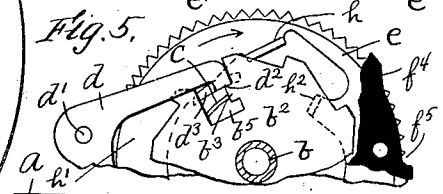


Fig. 6.

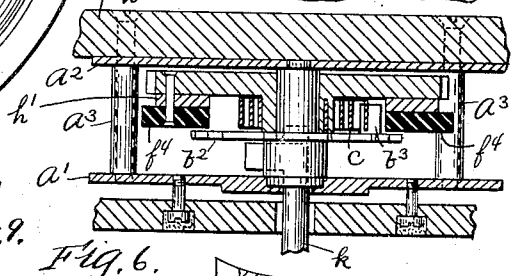


Fig. 10

Fig. 9.

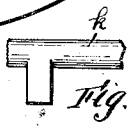


Fig. 2.

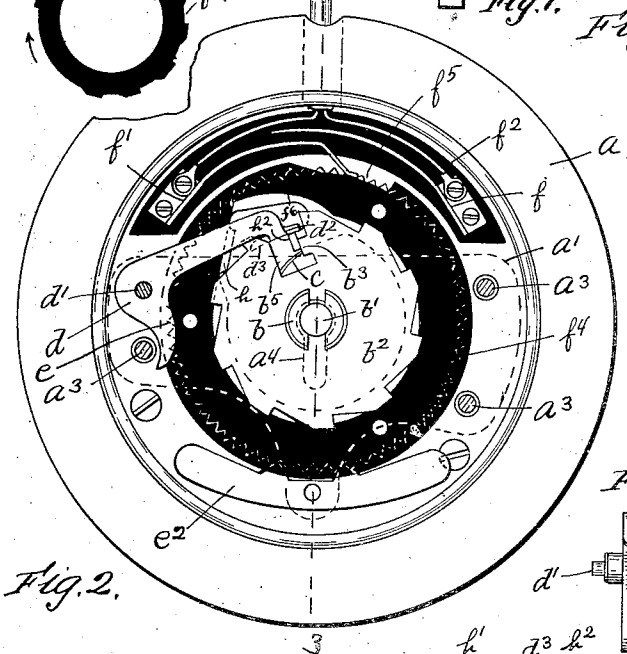


Fig. 3.

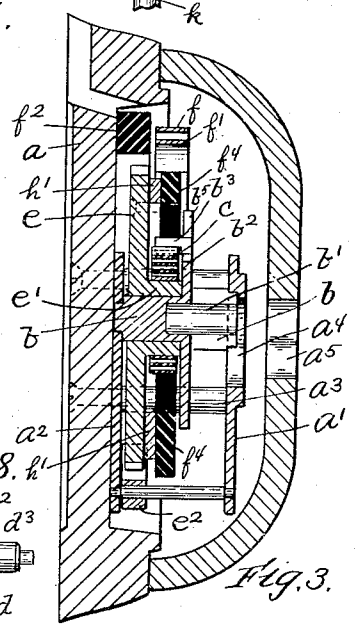


Fig. 8.

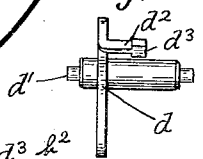
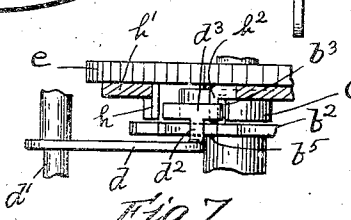


Fig. 7.



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UNITED STATES PATENT OFFICE.

FREDERICK W. COLE, OF NEWTON, MASSACHUSETTS, ASSIGNOR TO GAMEWELL FIRE-ALARM TELEGRAPH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ELECTRIC SIGNALING DEVICE.

1,040,149. Specification of Letters Patent. Patented Oct. 1, 1912.

Application filed December 22, 1910. Serial No. 598,720.

To all whom it may concern:

Be it known that I, FREDERICK W. COLE, residing at Newton, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Electric Signaling Devices, of which the following is a specification.

This invention relates to electric signaling-devices, and has for its object the construction of a signaling-device adapted to be manually set and released, and when released to transmit its signal independently of the manually operated actuating-means, whereby the transmission of the signal is then entirely out of the control of the operator; also to construct a signaling-device, whereby the signaling-circuit contacts are closed only a short but predetermined period of time, long enough, however, to cause the operation of a certain recording-instrument or other signal-receiving device which may be employed to receive the signal, but not long enough to operate other signal-receiving instruments which may be used in conjunction therewith and adapted to respond to other signaling-devices; also to provide the signaling-device with means for temporarily trapping the key, while the signaling-device is being set. Such a signaling-device is of particular importance in signal-systems, such as shown in my application for Letters Patent #555,602 filed April 15, 1910, where two sets of signaling-devices are employed; one adapted to close the circuit for short periods of time and the other for longer periods of time, the closures of the circuit for the different periods of time being employed as a means of differentiation. Such a signaling-device is also adapted for other uses.

The signaling-device embodying my invention comprises circuit-closing members, an operating-device therefor, an actuating-spring for said operating-device, a winding or actuating-member for said spring adapted to be operated by a key or otherwise, manually, and means for arresting the operating-device while the actuating-member is being operated to wind the spring and for releasing said operating-device when said actuating-member has been moved forward a sufficient distance to properly wind the spring, and for arresting the actuating-member when the operating-device is released, to thereby hold said actuating-member while the operating-device is operating the circuit-closing members and thus prevent any manipulation thereof which might interfere with the proper transmission of the signal. The signaling-device also includes means for subsequently releasing said actuating-member and permitting the return of the parts to normal.

The signaling-device also comprises means for temporarily trapping the key while it is being turned to set the signaling-device in condition to transmit its signal and to release the signaling-device thus set, permitting its withdrawal however, only, when the signaling-device has been set and released, thus insuring the proper transmission of the signal whenever the key is inserted and turned.

Figure 1, is a full sized front view of a signaling-device embodying this invention. Fig. 2, is a similar view, the front part of the case being removed to expose the operating-mechanism. Fig. 3, is a vertical section of the device shown in Fig. 2, taken on the dotted line 3—3. Fig. 4, is a detail showing in front elevation the locking-device for the operating-device and actuating-member, the parts being in the position they will occupy when the key has been turned to move the actuating-member a short distance, the operating-device being held by the locking-device. Fig. 5, is a detail similar to Fig. 4, the actuating-member being arrested by the locking-device and the operating-device being moved by the actuating-spring to operate the circuit-closing members. Fig. 6, is a horizontal section of a portion of the device taken on the dotted line 5—5, Fig. 4. Fig. 7, is a detail showing particularly a plan view of the locking-device. Fig. 8, is a detail showing particularly an end view of the locking-device. Fig. 9 is a detail of the key which may be used. Fig. 10, is a detail of a modified form of operating-device for the circuit-closing device.

a represents a suitable shell or case containing the operating-parts and the support-

lug-frame thereof, said frame consisting of a front plate a' and a back plate a^2, secured together by lugs a^3.

The winding-shaft b is journaled in the supporting-frame, and its forward end is provided with a key-hole a^4, formed in the front plate a', and a similar key-hole is formed in the case. The forward end of the shaft b is enlarged and has a key-receiving recess b' communicating with a socket adapted to receive the end of the shank of the key k, and a passage leading radially from it for the bit of the key. When the key is inserted through the key-holes and into said recess and turned the bit of the key will then occupy a position back of a solid part of the front plate a', see Fig. 6, until said key has been turned a complete revolution, thereby preventing withdrawal of the key when in any intermediate position.

Upon the shaft b, a wheel b^2 is secured, which has a rearwardly extended lug b^3, to which the outer end of the actuating-spring is attached. In order to permit forward and prevent backward motion of said wheel b^2, its periphery is provided with ratchet-teeth, adapted to be engaged by a pawl d, which latter is also constructed and arranged to serve as a locking-device, as will be hereinafter described. The pawl d is pivoted at d', and is arranged in a plane in front of the ratchet-wheel b^2, and has a rearward extension or lug d^2, see Fig. 7, at its extremity, which is adapted to engage the ratchet-teeth of said wheel. The winding-shaft and ratchet-wheel thereon, as here shown, constitute the actuating-member for the actuating-spring, but my invention is not limited to constructing the actuating-member in this particular manner.

The inner end of the actuating-spring c, is attached to the operating-device for the circuit-closing members, and, as here shown, see Figs. 3 and 4, is attached to the hub e', of an escape-wheel e, which is mounted loosely on the shaft b. This escape-wheel e, bears the movable member of the circuit-closing device, and hence serves as the essential element of the operating-device for the circuit-closing members. A pallet e^2, see Fig. 2, is secured to a pivot-shaft mounted in the frame, and engages the teeth of the escape-wheel e, and said teeth and pallet cooperate to regulate the movement of the movable member of the circuit-closing device.

The circuit-closing members comprise a pair of contact pens f, f', see Fig. 2, attached respectively to the opposite ends of a block of insulating material f^2 which is secured to the back wall of the case. The free ends of said pens extend one over the other, and are normally separated by their own spring action, and circuit-wires f^3 are attached to said pens.

A ring f^4 of insulating material is arranged in front of and secured to one face of the escape-wheel, in the plane of one of the contact-pens, as f', so that the edge of said ring is engaged by said pen, and said ring has a recess in its edge, as at f^5, and serves as the movable member of the circuit-closing device. When the ring is in its normal position, see Fig. 2, the pen f' engages the edge of the ring, but when the ring is revolved said pen f' is lifted and caused to engage the pen f to close a circuit, and such engagement continues until the ring completes its revolution when the pen f' again falls into the recess f^5. The ring, as here shown, operates to close the circuit to transmit a single signal-impulse during its revolution, but it may be arranged to close said circuit any number of times and thereby transmit a code-signal, as is represented in Fig. 10, whereby it will be understood that the movable circuit-closing member is notched to transmit the number of signals during its revolution. As the ring is connected with the escape-wheel and as the actuating-spring is also connected with the said escape-wheel it will be seen that the ring is rotated by the actuating-spring, and its operation is timed by the pallet.

In order that the actuating-member, when moved forward, may wind the actuating-spring, means are provided for holding or arresting the operating-device or movable member of the circuit-closing device to which the inner end of said spring is attached, while said spring is being wound, and, as here shown, the aforesaid pawl d, in conjunction with the ratchet-wheel, is constructed and arranged to perform this function, and thus serve as a locking-device for the operating-device.

Referring to Figs. 4 to 8, the rearwardly extended lug d^2 on the pawl has at its extremity a cross-piece d^3, arranged at right angles to the lug, and extended at both sides thereof, so as to provide two engaging portions, respectively, at its front and rear ends. The engaging-portion at the rear end of the cross-piece is adapted to be moved into the path of movement of a lug h, which is extended forward from a plate h' secured to the front side of the escape-wheel, when the pawl is lifted, so as to be engaged by said lug, for the purpose of arresting forward movement of the operating-device, to thereby hold the inner end of the actuating-spring while the outer end of said spring is being moved by the forwardly moving actuating-member. The plate h', as here shown, is arranged between the insulating ring f^4 and the escape-wheel, and its lug h is arranged within the ring f^4, but said plate may be otherwise disposed, it only being necessary that it shall be rigidly connected with

said escape-wheel and ring, so as to form a part of or be connected with the operating-device for the circuit-closing members. The lug h is arranged at an angle to the radius and to the periphery of the escape-wheel, so that it engages the end of the cross-piece on the pawl obliquely, and as soon as the pawl bearing the cross-piece is no longer held in elevated position by the ratchet-wheel, pressure of said lug h upon the cross-piece, due to the force of the actuating-spring, will move said pawl toward the ratchet-wheel. The ratchet-wheel b^2 has a deep notch b^5, cut in its edge, which is formed with straight side walls, and the pawl d normally occupies a position with its lug d^2 at said notch, but held out of the deep portion thereof by a lug h^2, as shown in Fig. 2 which projects forward from the plate h' on the escape-wheel. At the beginning of the forward movement of the ratchet-wheel said pawl is lifted by the inclined side of the deep notch of the ratchet-wheel engaging the lug d^2, and its cross-piece d^3 is raised and held in the path of movement of the lug h on the operating-device, to thereby arrest forward movement of said operating-device, and said pawl will be held in such engaging position by the ratchet-wheel, while the latter revolves, even when bottoming in the interdental spaces, and until the deep notch b^5 is again brought into position beneath the lug d^2. During this time said pawl also acts to prevent backward rotation of the ratchet-wheel by engaging the ratchet-teeth thereof. In Fig. 4, the ratchet-wheel is represented as partly turned, the pawl is elevated, the cross-piece d^3 thereon is engaged by the lug h, and the operating-device is arrested. When the ratchet-wheel has been turned a complete revolution or thereabout and the actuating-spring has been wound, it is then necessary to disengage the lug h from the pawl to permit the operating-device to be revolved by the actuating-spring, independently, and to accomplish this result, at this particular time only, the deep notch b^5 in the ratchet-wheel arrives in position beneath the lug d^2 on the pawl, and said pawl being no longer held in elevated position by the ratchet-wheel, is moved by the pressure of the lug h upon the cross-piece d^3, far enough to permit the lug h to pass over the cross-piece. The lug h being thus disengaged, the operating-device will be revolved by the spring in the same direction as the actuating-member was turned to wind the actuating-spring. As the pawl is moved to disengage the lug h, its lug d^2 enters the square part of the notch b^5 far enough to positively lock the ratchet-wheel, see Fig. 5, and in such position acts to hold the actuating-member at rest while the operating-device revolves independently thereof. When the pawl thus enters the square part of the notch b^5 and locks the ratchet-wheel, it will be prevented from being removed therefrom while the operating-device is revolving by the inner edge of the ring f^4, on said operating-device, which moves over the cross-piece during such time. This ring f^4, however, has a notch f^6 also on the inside, which arrives in position above the cross-piece as the operating-device resumes its normal position to allow the pawl to be again lifted. Just before the operating-device comes to rest the lug h^2 on the plate h' and extending forward from it, will engage the cross-piece d^3 and lift and hold the pawl above the squared left hand side of the deep notch b^5, thus again releasing the ratchet-wheel for another operation. It will thus be seen that while the actuating-member is being operated to wind the actuating-spring, the operating-device is locked, and while the operating-device is moving to operate the circuit-closing members, the actuating-member is locked, and for simplicity of construction the same locking-device is employed for accomplishing both results, said locking-device being first moved by the actuating-member to lock the operating-device, and then temporarily held in locking position, and then released to release the operating-device, and upon release of the operating-device is then moved by the operating-device to lock the actuating-member, and finally is moved to release said actuating-member. Thus the actuating-member and operating-device alternately control the operation of each other, each operating to prevent the operation of the other during its own operation, but leaving the other free to operate at the end of its own operation.

To arrest forward movement of the operating-device at the end of its complete revolution the forwardly extended lug h^2 on the plate h', is arranged to travel in the path of movement of the lug b^3, on the actuating-member, and to engage said lug b^3, at such time; and, as at this time the part to which the inner end of the actuating-spring is attached is in engagement with the part to which the outer end of said spring is attached, said spring cannot further cause relative operation of either part.

In Fig. 2, wherein the parts are represented in their normal positions, it will be observed that the lug h^2 on the operating-device is in engagement with the lug b^3, on the actuating-member, but is disposed at the back side of said lug b^3, so that the actuating-member is free to be moved forward by the key. As the key is turned and the lug b^3 is moved forward with the ratchet-wheel, the operating-device will follow until arrested by the lug h engaging the cross-piece d^3. It will also be observed that just before said ratchet-wheel has been turned a complete revolution said lug b^3 will be brought to the opposite side

of the lug h^3, and if movement of the key is continued, and the operating-device does not start, said lug h^3 will engage said lug h^2 and act to positively turn the operating-device and thus force the lug h over and by the cross-piece d^3, to forcibly depress said cross-piece and pawl downward and its lug d^4 into the deep notch in the ratchet-wheel to release the operating-device and lock the actuating-member. Ordinarily, however, as soon as the key has been turned a complete revolution the pawl will fall into the notch h^6, by pressure upon it of the lug h, but in case it should not fall it will be forcibly moved. Thus provision is made for releasing the operating-device whether the key is turned quickly or slowly at the end of a complete revolution of the ratchet-wheel, or when the actuating-member has been moved forward a predetermined distance to wind the actuating-spring. As the key is turned to wind the actuating-spring, its bit remains behind the solid part of the front plate until it has been turned a complete revolution and the operating-device of the circuit-closing device has been released, and not until this time can the key be withdrawn. Furthermore, it cannot be withdrawn at any time after it has been turned ever so little, until it has been properly turned and the operating-device released, being thus trapped as soon as inserted and turned ever so little, and remaining trapped until the signaling device has been released.

[illegible] circuit-closing device consisting of circuit-closing members, an operating device therefor, an actuating-member, an actuating-spring connecting said operating-device with said actuating-member, means for moving said actuating-member forward to wind said spring, a locking-device moved by the actuating-member into position to lock the operating-device while the actuating-member is being thus moved forward, and means connected with the operating-device, adapted to be engaged by said actuating-member, when said member has been moved forward a predetermined distance, to move said operating-device and in turn move the locking-device out of engagement with it, to thereby release said operating-device, substantially as described.

2. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, a rotatable actuating-member having ratchet-teeth, an actuating-spring connecting said operating-device with said actuating-member, means for moving said actuating-member forward to wind said spring, a pawl adapted to engage the ratchet-teeth of said actuating-member and prevent backward rotation thereof, said pawl having means for engaging the operating device, and said pawl being moved by the forwardly-moving actuating-member into position to lock the operating-device, and moved by the forwardly-moving operating-device to release said operating-device when the actuating-member has been moved forward a predetermined distance, substantially as described.

3. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, an actuating-member, an actuating-spring connecting said operating-device with said actuating-member, means for moving the actuating-member to wind said spring, means to arrest the operating-device while said spring is being wound by the actuating-member, which is moved by the operating-device to disengage said operating-device and to arrest the actuating-member when the actuating-member has been moved forward a predetermined distance, substantially as described.

4. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, an actuating-member, an actuating-spring connecting said operating-device with said actuating-member, means for moving the actuating-member to wind said spring, means to arrest the operating-device while said spring is being wound by the actuating-member, which is moved by the operating-device to disengage said operating-device and to arrest the actuating-member when the actuating-member has been moved forward a predetermined distance, and means arranged on the actuating-member to arrest said operating-device at the end of a cycle of its operation, substantially as described.

5. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, an actuating-member, an actuating-spring connecting said operating-device with said actuating-member, means for moving the actuating-member to wind said spring, means to arrest the operating-device while said spring is being wound by the actuating-member, which is moved by the operating-device to disengage said operating-device and to arrest the actuating-member when the actuating-member has been moved forward a predetermined distance, and means arranged on the operating-device to engage means arranged on the actuating-member to arrest said operating-device at the end of a cycle of its operation and to release said actuating-member, substantially as described.

6. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, an actuating-member, an actuating-spring connecting said operating-device with said actuating-member, means for moving the actuating-member forward to wind said spring, a locking-device arranged to lock the operating-device while the spring is being wound by a forward movement of the actuating-member, and moved by the oper-

ating-device into position to release said operating-device and lock the actuating-member when said actuating-member has been moved forward a predetermined distance, substantially as described.

7. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, an actuating member, an actuating-spring connecting said operating-device with said actuating-member, means for moving the actuating-member forward to wind said spring, a locking-device arranged to lock the operating-device while the spring is being wound by a forward movement of the actuating-member and moved by the operating-device into position to release said operating-device, and lock the actuating-member when said actuating-member has been moved forward a predetermined distance, said operating-device having means to hold said locking-device in engagement with the actuating-member while it is operating the circuit-closing members, substantially as described.

8. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, an actuating-member, an actuating-spring connecting said operating-device with said actuating-member, means for moving the actuating-member forward to wind said spring, a locking-device held by the actuating-member in position to lock the operating-device while the spring is being wound by a forward movement of the actuating-member and moved by the operating-device into position to release said operating-device and lock the actuating-member when said actuating-member has been moved forward a predetermined distance, substantially as described.

9. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, an actuating-member, an actuating-spring connecting said operating-device with said actuating-member, means for moving the actuating-member forward to wind said spring, a locking-device arranged to lock the operating-device while the spring is being wound by a forward movement of the actuating-member, and moved by the operating-device into position to release said operating-device and lock the actuating-member when said actuating-member has been moved forward a predetermined distance, said operating-device having means to hold said locking-device in engagement with the actuating-member while it is operating the circuit-closing members, substantially as described.

10. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, an actuating-member, an actuating-spring connecting said operating-device with said actuating-member, means for moving the actuating-member forward to wind said spring, a locking-device arranged to lock the operating-device while the spring is being wound by a forward movement of the actuating-member and moved by the operating-device into position to release the operating-device and lock the actuating-member when said actuating-member has been moved forward a predetermined distance, and means arranged on the operating-device to engage means arranged on the actuating-member to arrest said operating-device at the end of a cycle of said operation, substantially as described.

11. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, an actuating-member, an actuating-spring connecting said operating-device with said actuating-member, means for moving the actuating-member forward to wind said spring, a locking-device arranged to lock the operating-device while the spring is being wound by a forward movement of the actuating-member and moved by the operating-device into position to release said operating-device and lock the actuating-member when said actuating-member has been moved forward a predetermined distance, and to restore said locking-device to normal, substantially as described.

12. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, an actuating-member, an actuating-spring connecting said operating-device with said actuating-member, means for moving the actuating-member forward to wind said spring, a locking-device moved by the actuating-member into engagement with the operating-device to lock it and then moved by the operating-device into engagement with the actuating-member to lock it and then moved again by the operating-device to normal to release said actuating-member, substantially as described.

13. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, an actuating-member, an actuating-spring connecting said operating-device with said actuating-member, means for moving the actuating-member forward to wind said spring, a locking-device moved by a forward movement of the actuating-member to lock the operating-device while the actuating-member is being thus moved forward, and to disengage said operating-device and lock the actuating-member when said actuating-member has been moved forward a predetermined distance, substantially as described.

14. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, an actuating-member, an actuating-spring connecting said operating-device with said actuating-member, means for moving the actuating-member forward to wind said spring, a locking-device moved by a forward

movement of said actuating-member to lock the operating-device while the actuating-member is being thus moved forward, and moved by a forward movement of the operating-device to release said operating-device and to lock said actuating-member when said actuating-member has been moved forward a predetermined distance, substantially as described.

15. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, an actuating-member, an actuating-spring connecting said operating-device with said actuating-member, means for moving the actuating-member forward to wind said spring, a locking-device moved by the actuating-member into position to lock the operating-device while the actuating-member is being moved forward, and means on the operating-device adapted to be engaged by the actuating-member when said member has been moved forward a predetermined distance, to move said operating-device and in turn move the locking-device out of engagement with it and into engagement with the actuating-member, to lock said actuating-member while the operating-device is operating, substantially as described.

16. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, a rotatable actuating-member having ratchet-teeth, an actuating-spring connecting said operating device with said actuating-member, means for moving said actuating-member forward to wind said spring, a pawl adapted to engage the ratchet-teeth of said actuating-member and prevent backward rotation thereof, having means for engaging the operating-device, said pawl being moved by said actuating-member into position to lock the operating-device while said actuating-member is being thus moved forward, and permitted to release said operating-device and engage said actuating-member when said actuating-member has been moved forward a predetermined distance, substantially as described.

17. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, a rotatable actuating-member having ratchet-teeth, an actuating-spring connecting said operating-device with said actuating-member, means for moving said actuating-member forward to wind said spring, a pawl adapted to engage the ratchet-teeth of said actuating-member and prevent backward rotation thereof, having means for engaging the operating-device, said pawl being moved by said actuating-member into position to lock the operating-device while said actuating-member is being thus moved forward, and moved by the operating-device when the actuating-member has been moved forward a predetermined distance, to release said operating-device and lock said actuating-member, substantially as described.

18. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, an actuating-member, an actuating-spring connecting said operating-device with said actuating-member, means for moving the actuating-member forward to wind said spring, a locking-device arranged to lock the operating-device while the spring is being wound by a forward movement of the actuating-member and to release said operating-device and lock the actuating-member when said actuating-member has been moved forward a predetermined distance, and means moved by the operating-device for subsequently moving said locking-device to release said actuating-member, substantially as described.

19. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, a rotatable actuating-member having ratchet-teeth, an actuating-spring connecting said operating-device with said actuating-member, means for moving said actuating-member forward to wind said spring, a pawl adapted to engage the ratchet-teeth of said actuating-member and prevent backward rotation thereof, having means for engaging the operating-device, said pawl being moved by said actuating-member into position to lock the operating-device while said actuating-member is being thus moved forward and permitted to release said operating-device and engage said actuating-member when said actuating-member has been moved forward a predetermined distance and means on the operating-device for subsequently moving said pawl to release the actuating-member, substantially as described.

20. A circuit-closing device consisting of circuit-closing members, a rotating operating-device therefor, a rotating actuating-member, an actuating-spring connected at one end to said operating-device and at the other end to said actuating-member, means for rotating said actuating-member to wind said actuating-spring, a pivoted locking-device moved in one direction by said actuating-member into position to lock the operating-device while said member is being turned to wind the actuating-spring, and moved in the opposite direction to disengage said operating-device and to lock the actuating-member while the operating-device is being moved by the actuating-spring, substantially as described.

21. A circuit-closing device consisting of circuit-closing members, a rotating operating-device therefor, a rotating actuating-member, an actuating-spring connected at one end to said operating-device and the other end to said actuating-member, means for rotating said actuating-member to wind

said actuating-spring, a pivoted locking-device moved in one direction by said actuating-member into position to lock the operating-device while said member is being turned to wind the actuating-spring, and moved in the opposite direction to disengage said operating-device and to lock the actuating-member while said operating-device is being moved by the actuating-spring, and means, connected with said operating-device for subsequently moving said locking-device to release said actuating-member, substantially as described.

22. A circuit-closing device consisting of circuit-closing members, an operating-device therefor, a ratchet-wheel having a recess at its edge, an actuating-spring connected at one end with said operating-device and at the other end with said ratchet-wheel, means for turning said ratchet-wheel forward to wind the actuating-spring, a pivoted locking-device normally occupying a position in the recess of said ratchet-wheel, which is moved in one direction by said ratchet-wheel into position to lock the operating-device, while said ratchet-wheel is being turned to wind the actuating-spring, and is moved in the opposite direction to disengage said operating-device and lock the ratchet-wheel while the operating-device is being moved by the actuating-spring, said locking-device having a portion to engage the teeth of the ratchet-wheel to prevent the backward movement thereof, substantially as described.

23. A circuit-closing device consisting of circuit-closing members and an actuating-spring, a key for winding said spring to set the signal and to release the signal thus set and means to prevent withdrawal of the key until the signal has been set and released, but permitting withdrawal thereof at such time, substantially as described.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERICK W. COLE.

Witnesses:
B. J. NOYES,
H. B. DAVIS.