(No Model.) 4 Sheets—Sheet 1.

T. G. MORSE.

ELECTRIC SIGNALING APPARATUS.

No. 559,397. Patented May 5, 1896.

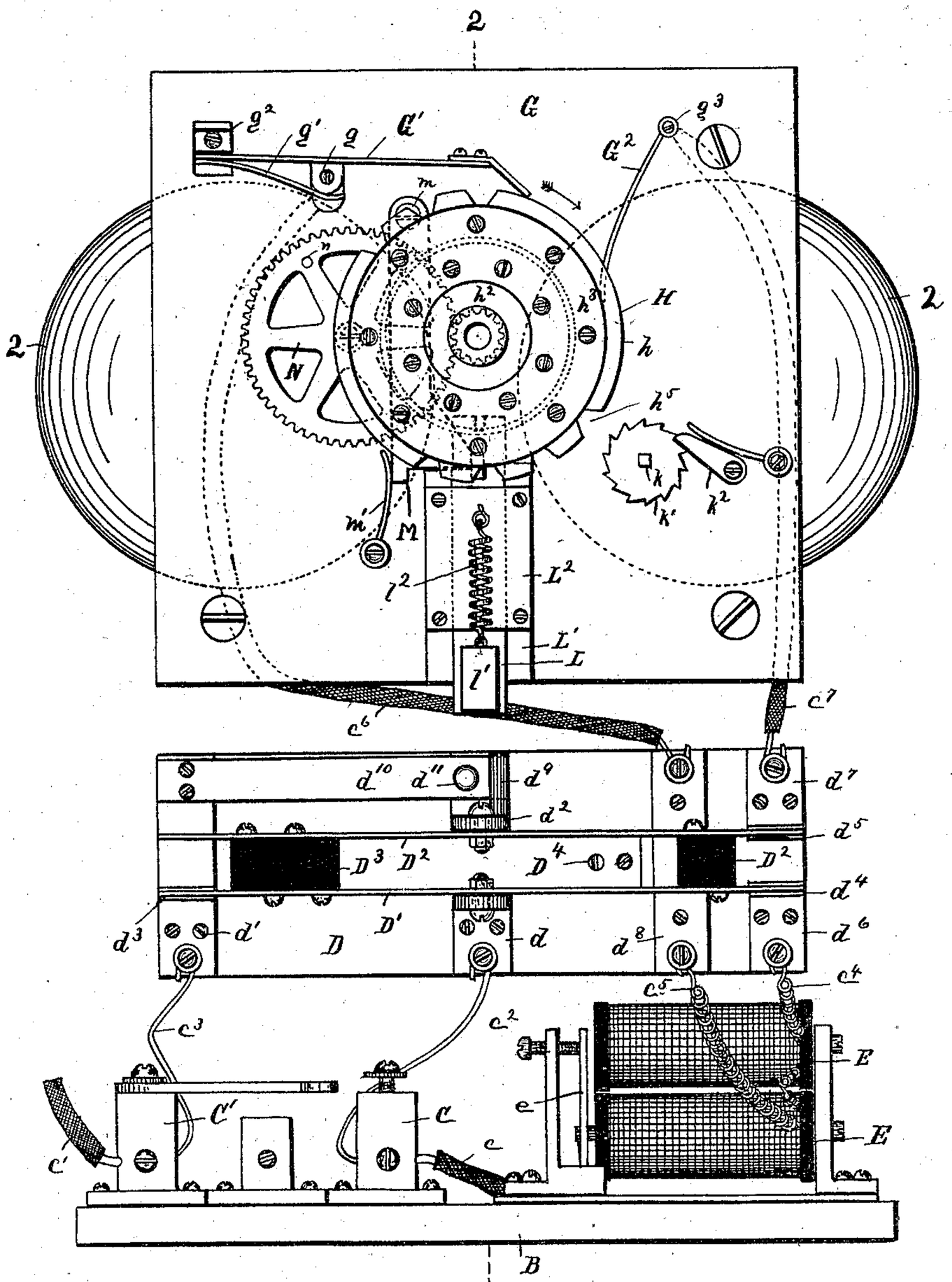

Fig. 1.

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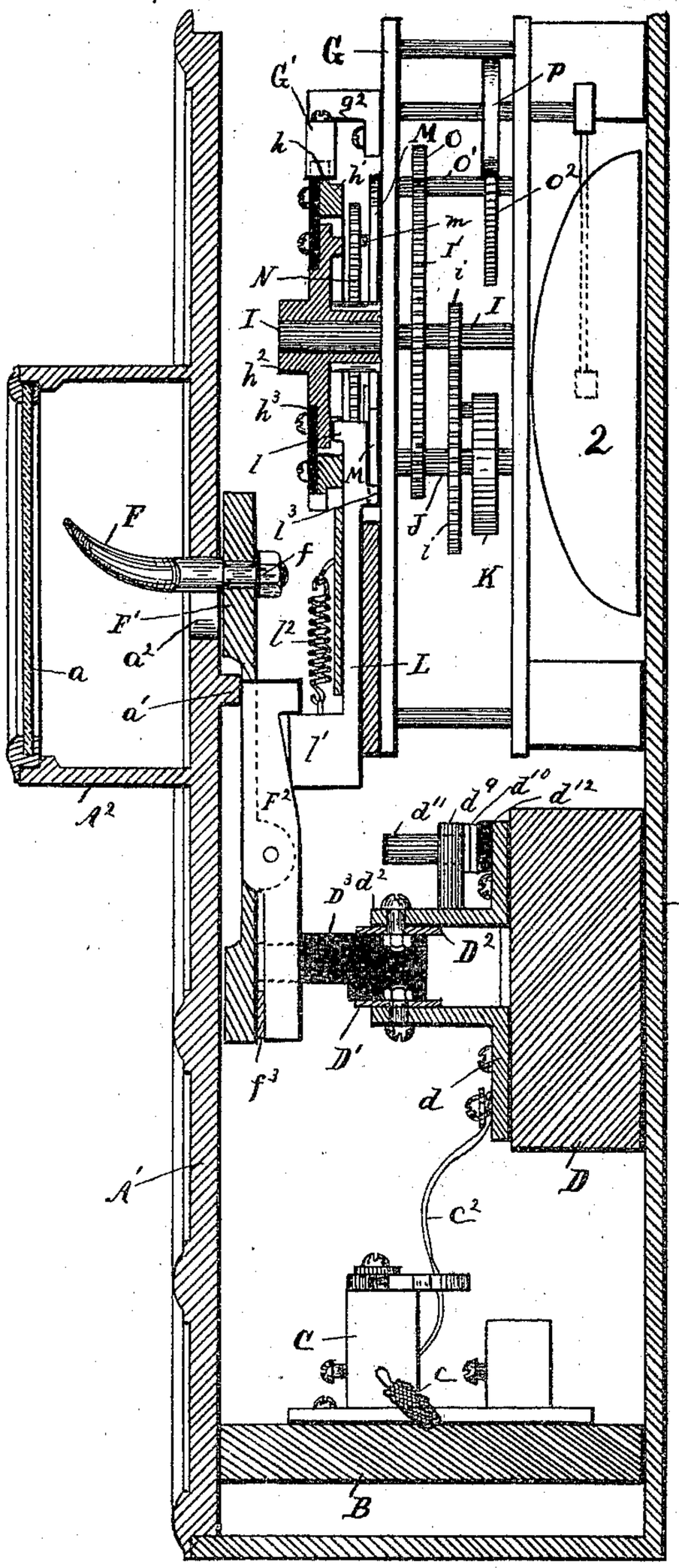

Fig. 2.

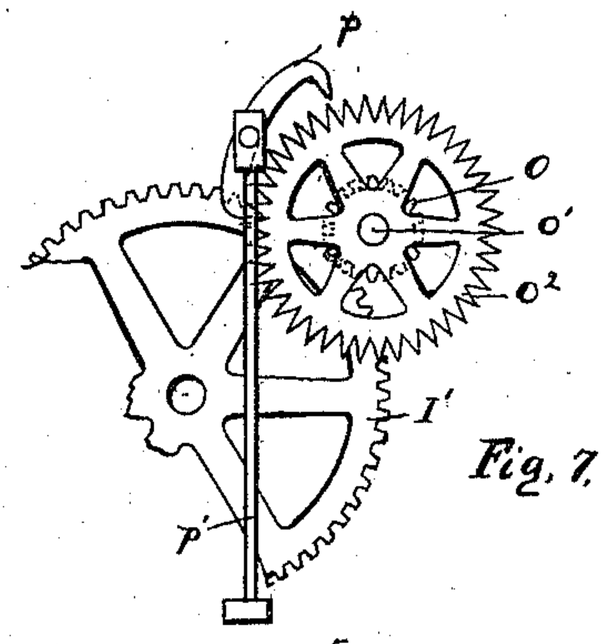

Fig. 7.

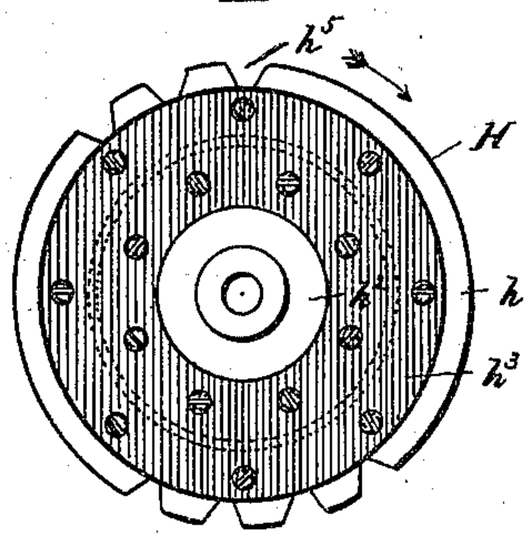

Fig. 8.

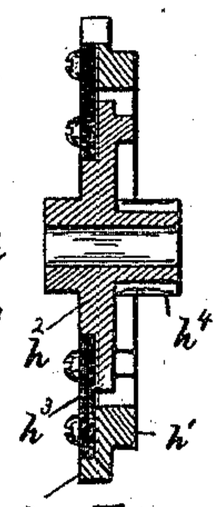

Fig. 10

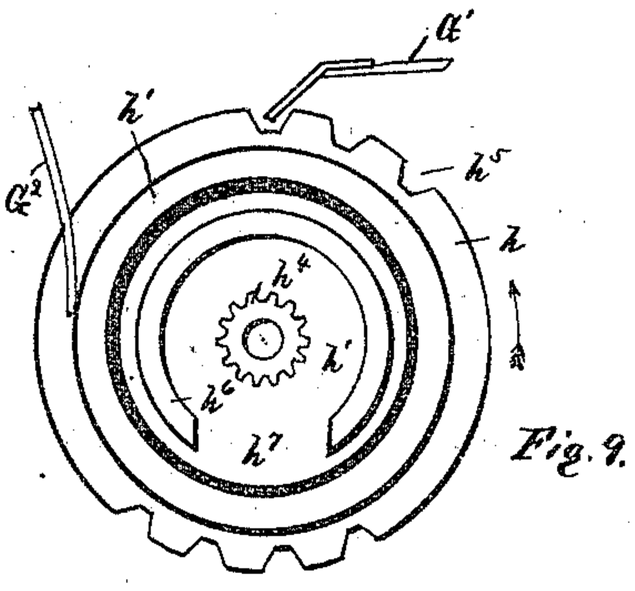

Fig. 9.

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ELECTRIC SIGNALING APPARATUS.

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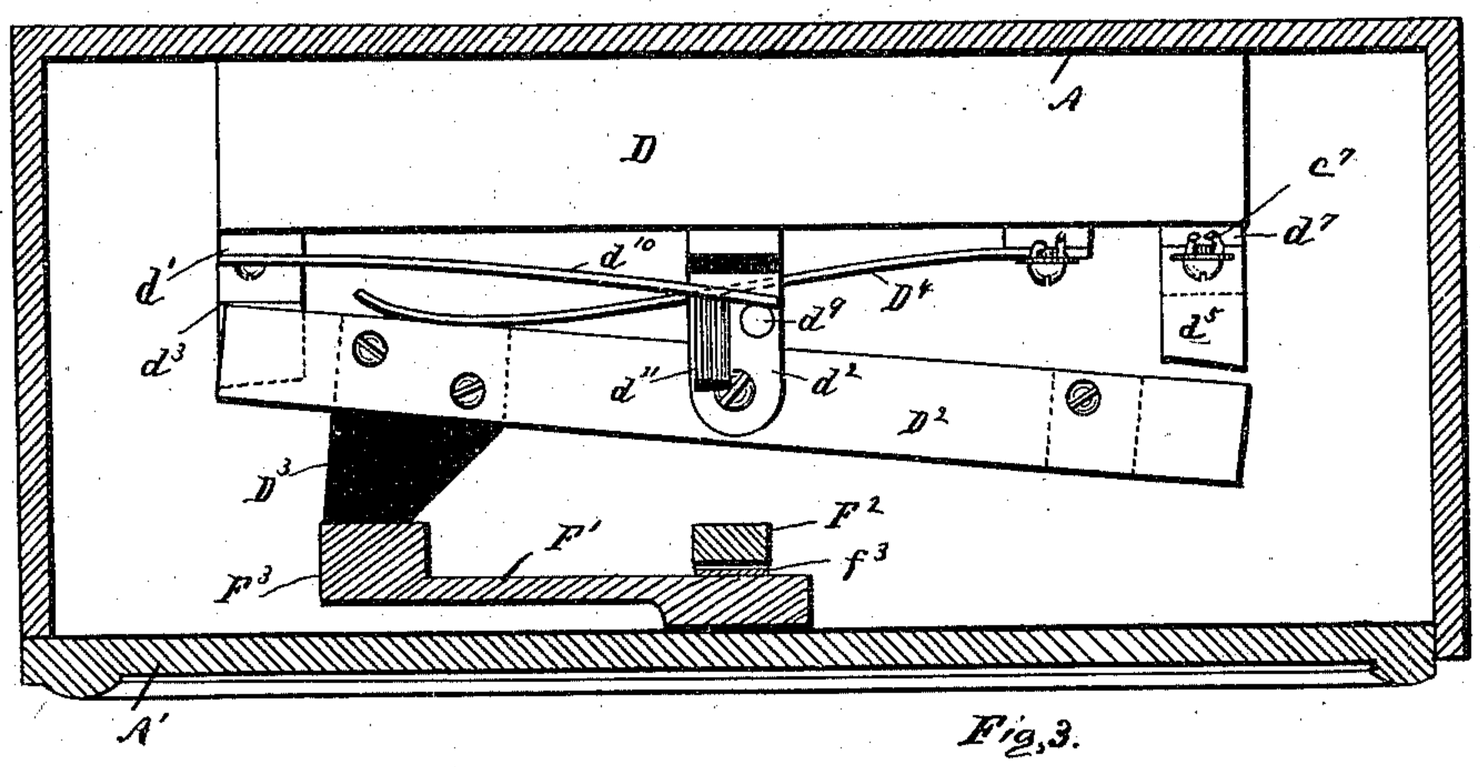

Fig. 3.

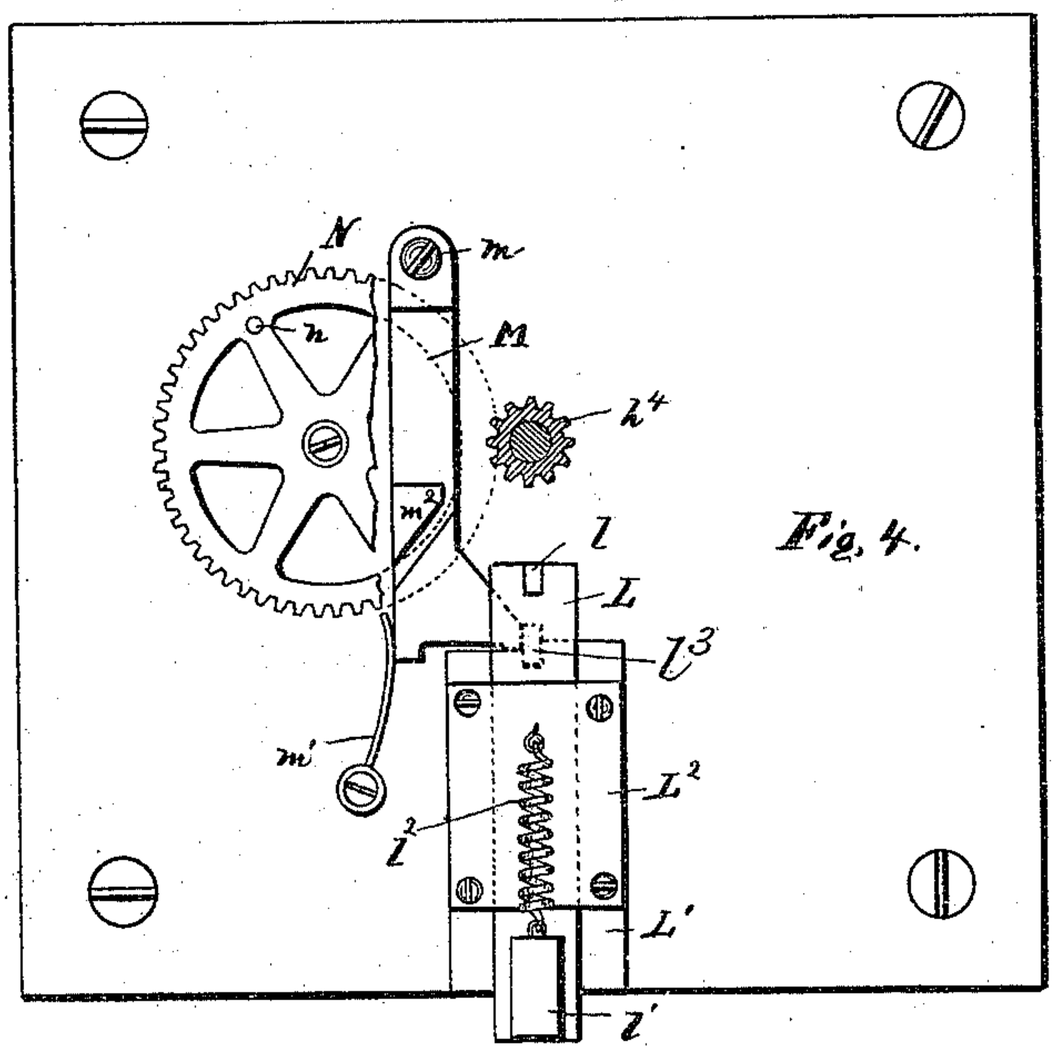

Fig. 4.

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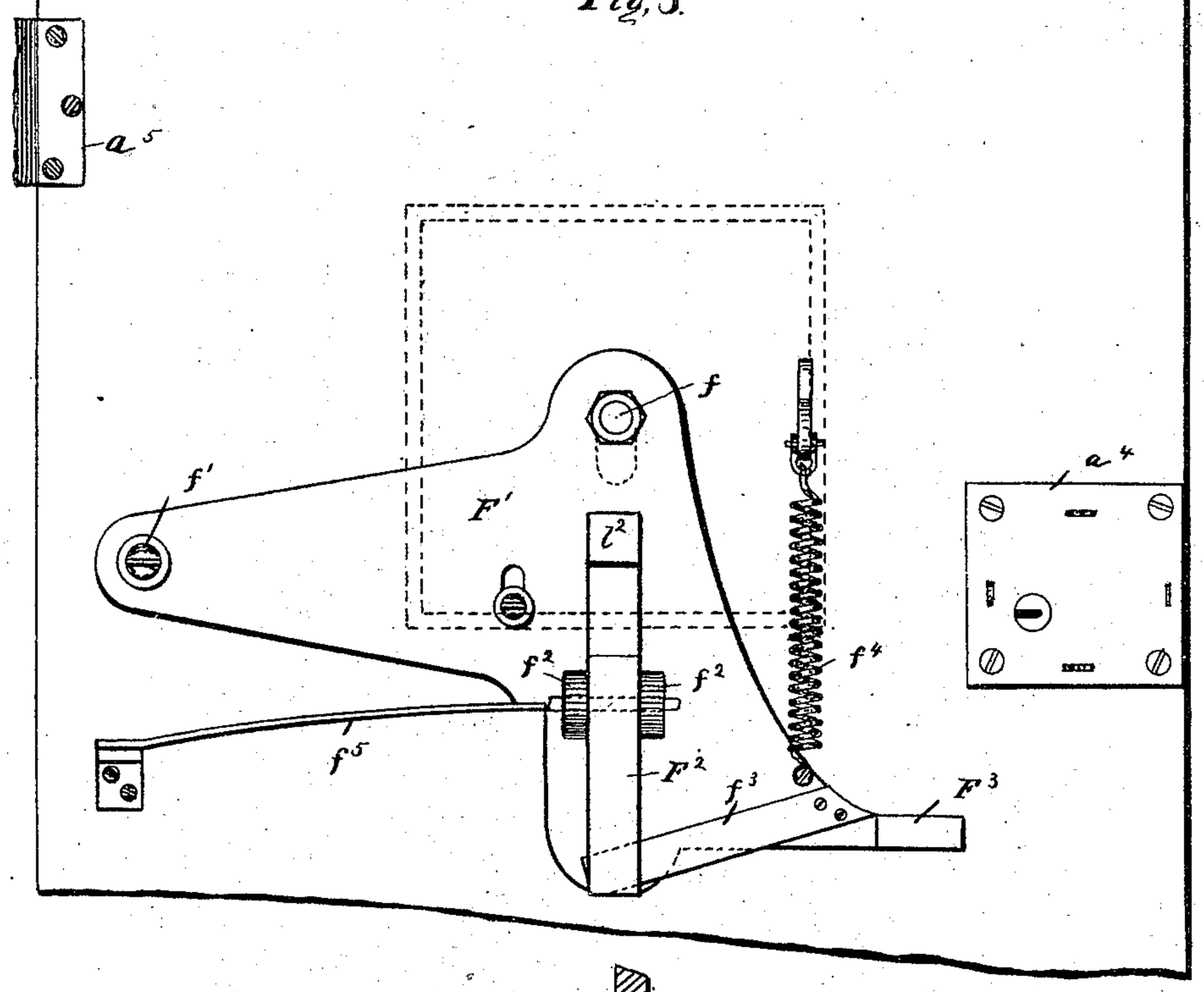
ELECTRIC SIGNALING APPARATUS.

No. 559,397. Patented May 5, 1896.

Fig. 5.



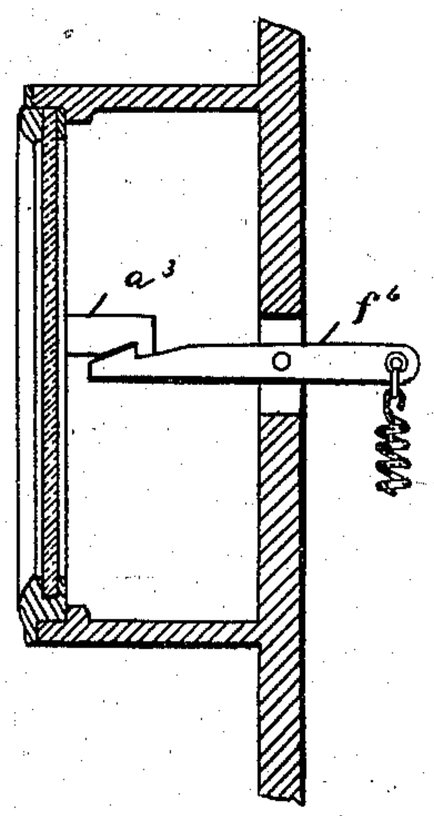


Fig. 6.

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UNITED STATES PATENT OFFICE.

THOMAS G. MORSE, OF ERIE, PENNSYLVANIA.

ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 559,397, dated May 5, 1896.

Application filed October 8, 1895. Serial No. 565,030. (No model.)

To all whom it may concern:

Be it known that I, THOMAS G. MORSE, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Electric Signaling Apparatus; and I do hereby 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.

This invention relates to electric signaling apparatus; and it consists in certain improvements in the construction thereof, as will be hereinafter fully described, and pointed out in the claims.

More particularly my invention relates to electric signaling apparatus for fire-alarm purposes.

The objects of the invention may be briefly stated as follows: to provide a surer and more accessible means to actuate the apparatus to send in an alarm; to provide a switch to effect a change of circuit while maintaining a continuous closed circuit; to provide means of sounding a local or box alarm during the operation of the apparatus for protection against false alarms, and to provide a simpler and more effective construction of various parts than those now in vogue, details of which will appear in the following description and claims.

The invention is illustrated in the accompanying drawings, as follows:

Figure 1 shows the inside mechanism of a signaling-box of my construction. Fig. 2 shows a section of a box on the line 2 2 in Fig. 1. Fig. 3 shows a section of the box and a plan of the switch mechanism. Fig. 4 shows a detail of the mechanism for regulating the number of repetitions of the signal. Fig. 5 shows a rear view of the box-door, with a detail view of the "pulling" mechanism. Fig. 6 shows a section of the glass-covered box for covering the pull-hook. Fig. 7 shows a detail of the gear mechanism for actuating the local-alarm bell. Figs. 8 and 9 show front and rear elevations of the circuit making and breaking wheel. Fig. 10 shows a central vertical section of said wheel.

The apparatus is placed in a box A of the fire-alarm type, having a door A′, by which to get access to the works. The current enters and leaves the box by the wires c and c', respectively. They are connected with contact-posts C and C′, which are placed on a fiber or insulator base B. A wire c^2 connects the post C with a contact-plate d on a switch-base D, of insulating material.

The switch is formed of two side plates D′ and D^2, pivoted to the plates d and d^2. These side plates are secured together but insulated from each other by fiber blocks D^2 and D^3. The return end of the switch contacts, normally, with a friction contact-post d^3, which extends from a plate d' on the fiber switch-base D. A wire c^3 connects the plate d' with the return-post C′, thus closing the by-circuit. When the apparatus is operated to send in an alarm, the mechanism for holding the switch in its normal position releases the switch and allows the spring D^4 (see Fig. 3) to press the return end of the switch out of contact with the post d^3 and the side plates D′ and D^2 into contact with the friction contact-posts d^4 and d^5, respectively. The post d^4 extends from a plate d^6, which is connected with a set of magnetic test-coils E E. The return-wire c^5 from these coils connects with a plate d^8 on the base D, and a wire C^6 connects this plate with the make-and-break mechanism of the apparatus. The return-wire C^7 from the make-and-break mechanism is attached to a plate d^7, from which extends the post d^5, and the current returns through the side plate D^2, plate d^2, lug d^9, extending from the plate d^2, and through a spring break-lever d^{10} to the plate d^3. The break-lever d^{10} is provided with a handle d^{11}, by pressing which a single break of the circuit is made, so that by repeating the operation arbitrary signals may be sent.

The posts d^3 and d^4 d^5 are arranged to act frictionally upon the plates as they are brought to position in order that the contact-surfaces may be kept bright and perfect connection assured. The posts d^3 and d^4 d^5 are also so proportioned to each other and so placed with relation to the pivot of the switch-plates that the contact with the posts d^4 d^5 is accomplished before the circuit at the post d^3 is broken, and vice versa. The object of this construction is to permit the switch to be thrown without effecting a single break-

signal, which would be the case if one connection were broken before the other contact was made. This is desirable when an alarm is sent in, as it prevents confusion, and when the box is reset, as it does away with a false signal incident to a single break.

The test-coils E E are provided with the usual cores and the base-armature *e*, by means of which the presence or non-presence of a current can be detected.

A pull-hook F extends through a slot a^2 in the door and is surrounded by a small box A^2, which is provided with a glass front *a*, which, when broken, gives immediate access to the pull-hook F. The pull-hook F has a bolt extension, by means of which it is secured to a rock-lever F′, pivoted at f' on the rear of the door. This rock-lever is kept normally in an elevated position by the action of the springs f^4 and f^5. The spring f^4 also serves to actuate a spring-catch f^6, (see Fig. 6,) which engages with a hook a^3, carried by the frame of the glass front, thus forming a spring-lock for said front.

A catch F^2, pivoted between lugs f^2 and f^2 and actuated by a spring f^3, snaps under and engages a shoulder a' (see Fig. 2) on the door when the rock-lever F′ is depressed, and so locks the rock-lever in this position until it is released to reset the apparatus. An extension F^3 of the rock-lever engages, when in its elevated or normal position, the fiber block D^3 on the switch and holds the switch in its normal position (the position shown in Fig. 3) in contact with the post d^3. As the rock-lever is depressed when the hook F is pulled, the extension F^3 passes below the fiber block D^3 and the spring D^4 throws the switch, as heretofore explained. When the box is to be reset, the door A′ is opened and the catch F^2 is thrown out of engagement with the shoulder a'. When the door is closed, the extension F^3 engages the fiber block D^3 and throws the switch back to normal. While the door is open the catch f^6 (see Fig. 6) can be operated so as to allow the opening of the small auxiliary box front in order that the glass may be replaced.

In signaling apparatuses of this kind two classes are used, in one of which a continuous circuit is maintained and the signals effected by breaking this circuit, and in the other the signal is effected by closing a broken circuit. The continuous-circuit arrangement is now almost exclusively used with the class of apparatus to which my invention relates for the reason that breaks in the line can be more easily detected. I have shown, therefore, my make-and-break signal mechanism as applied to a continuous-circuit system, although it may be applied to either with equal facility.

The wires C^6 and C^7 are attached to the posts *g* and g^8, respectively, both of which extend from the frame for the signal-actuating mechanism. The post *g* forms the pivot of the brush G′, which is acted upon by a spring g' to ride a ring *h* of the make-and-break wheel H. The ring *h* is connected with the inner or hub portion h^2 of the wheel by a fiber ring h^3. By this means the ring *h* is insulated from the rest of the mechanism. The ring *h* is provided with notches h^5, into which, as the wheel H is revolved, the brush G′ drops. A stop g^2 prevents the brush from reaching the bottom of the notch, so that during the passage of a notch under the brush (see Fig. 9) the circuit is broken. In the drawings an apparatus is shown which will send in a signal of "34"—three breaks, a short pause, and then four breaks. By varying the number and arrangement of the notches any signal may be effected. A brush G^2, attached to the post g^3, rides a shoulder h' and keeps the ring *h* in continuous connection with the return-wire.

The wheel H is keyed to a shaft I. (See Fig. 2.) A gear *i* on this shaft meshes a gear *j*, journaled on a shaft J. A coiled spring K, connected with the shaft J and the wheel *j*, furnishes the motor for driving the make-and-break wheel H. The shaft J has a squared end K and a ratchet-wheel k' and spring-actuated pawl k^2, by means of which the spring K can be wound and locked with the frame.

To make the apparatus effective, it is necessary to provide means for locking the mechanism against movement until the box is "pulled." It is also desirable that there should be means provided for stopping the mechanism after the signal has been repeated a fixed number of times. This I accomplish by the following mechanism: On the rear of the hub portion h^2 of the wheel H is a shoulder h^6, (see Fig. 9,) in which is a segmental notch h^7. A grooved plate L′, placed on the front plate G of the frame, forms a guide for a stop-slide L, which carries at its upper end a stop-lug *l*. (See Fig. 4.) The slide L is held normally in an elevated position by a spring l^2, attached to the slide, and a cover for the guides L^2. When in this elevated position, the lug *l* is in the notch h^7 and so locks the mechanism against movement. At the lower end of the slide L is a forwardly-projecting lug l', which is engaged by a hook l^2 on the catch-lever F^2 when the rock-lever F′ is in its normal position. When the box is pulled and the hook l^2 pulled down, it carries with it the slide L and so unlocks the mechanisms and allows the signaling mechamism to proceed. When the catch-lever F^2 snaps under the shoulder a', the slide L is released. To prevent its relocking the mechanism until the signal is repeated a desired number of times, a trip M, pivoted at *m*, is provided, which, just as the slide reaches its lower position, is swung by a spring m' over a shoulder l^3 on the back of slide L and so locks it in its lower position. A gear h^4 at the back of the wheel H meshes a wheel N, journaled on the frame. A pin *n* on this wheel engages, as the wheel is revolved, a cam m^2 on

the trip M and swings the trip back off the shoulder l^3 on the slide L. This allows the spring l^2 to raise the slide, so that the lug l enters the notch h^7 in the shoulder h^6. The length of notch h^7 allows a slight forward movement after the slide is raised. During this further movement the pin n passes by the cam m^2 and leaves the trip free to act when the box is next pulled. The relative sizes of the gear-wheels h^4 and N are such that the wheel h^4 and wheel H will turn as many times to one revolution of the wheel N as it is desired the signal shall be repeated.

It is desirable, in order to detect the pulling of a box for a false alarm, to have a local alarm which is sounded when the box is pulled. This I accomplish by the following mechanism: A gear I′ on the shaft I meshes a gear O on the shaft O′. A scape-wheel O^2 is placed on the shaft O′, which acts on an anchor P, similar to a clock escapement. The anchor P carries a tappet P′, which, as the mechanism proceeds, oscillates between and sounds two bells Q. The peculiar feature of this local-alarm system is that it is driven by the signal mechanism and continues and stops with it.

The operation of the box may be summarized as follows: To send in an alarm the glass in front of the small box A^2 is broken and the hook F pulled down. This downward movement of the hook carries the rock-lever F with it and the extension F^3 clear of the switch-block D^3. The switch is then thrown by the spring D^4 into the contacts d^4 d^5, through which a circuit is completed to the make-and-break mechanism. The catch F^2 on the rock-lever F′ carries down with it the slide L, and also catches and holds the rock-lever down and releases the slide L at the termination of the downward movement. The movement of the slide L releases the make-and-break wheel, so that the alarm is started. The trip M locks the slide from reëngaging the make-and-break wheel until the signal is repeated, as desired. The wheel N, driven by the make-and-break wheel, carries the pin n against the trip M and actuates the trip to release the slide L, which stops the mechanism. In the meantime, during the continuation of the movement of the apparatus, the bells or local alarm are sounded by the anchor and scape-wheel mechanism.

To reset the box the door A′ is opened, the spring-catch f^6 pulled down, and the front to the small box A^2 opened and a new glass inserted. The catch F^2 is released from the shoulder a' and the spring rewound if necessary. The closing of the door completes the operation, throwing the switch to the short circuit.

What I claim as new is—

1. In an electrical signaling apparatus, the combination of an electrical supply; an electric circuit; mechanism operating upon said circuit to effect a signal; a closed box containing said mechanism; a locking means for normally locking said signal-operating mechanism against movement; a "pull" mechanism extending without said box; means actuated by said pull mechanism for releasing the signal-operating mechanism; and a catch that locks said pull mechanism against actuating a second operation.

2. In an electric signaling apparatus, the combination of an electrical supply; an electric circuit; mechanism operating upon said circuit to effect a signal; a closed box containing said mechanism; a locking means for normally locking said signal-operating mechanism; a hook as F extending through a slot in said box; a rock-lever carrying said hook; a catch F^2 engaging with the said locking means of the operating mechanism to release said lock when said hook is depressed; and a shoulder as a' with which said catch engages when said hook is depressed.

3. In a switch for an electric signaling apparatus, the combination of the pivoted side plates D′ and D^2; the fiber blocks securing said plates; the contact-posts d^3 d^4 d^5; the spring acting upon said switch to contact the posts d^4 d^5; and means released by the operation of the pull mechanism and acting upon a fiber block.

4. In a switch for an electrical signaling apparatus, the combination of the contact-plates d and d'; the plates D′ and D^2 pivoted therein; the posts d^3 and d^4 at the opposite throws of the switch; the post d^5 receiving the return-wire from the post d^4; and a connection between the plate d^2 and post d^3.

5. In an electric signaling apparatus, the combination with the electrical supply; the circuit; and the driving mechanism; of the notched ring h in said circuit; the brushes G′ and G^2 connecting said ring with said circuit; the insulating-ring h^3 and the hub portion h^2 of metal driven by said driving mechanism.

6. In an electric signaling apparatus, the combination with the driving mechanism; of a make-and-break wheel; means of normally locking said wheel; means connected with the pull mechanism for releasing said locking mechanism; a trip that locks said lock mechanism out of engagement; a wheel driven with said make-and-break wheel and speeded in such ratio to the make-and-break wheel as it is desired to repeat the signal; means carried by said auxiliary wheel that moves the trip out of engagement after a predetermined number of signals.

7. In an electric signaling apparatus, the combination with the driving mechanism; of the make-and-break wheel driven by said mechanism; the slide L for normally locking said make-and-break wheel; means for actuating said slide with the pull mechanism to release the make-and-break wheel; a trip M for locking said slide out of engagement with the make-and-break wheel; and a wheel N driven with the make-and-break wheel and speeded relatively to said wheel in the ratio described and carrying means to actuate the trip M to release the slide L.

8. In an electric signaling apparatus, the combination with the driving mechanism; of the slide L for normally locking said mechanism against movement; a pull mechanism; means carried by said pull mechanism for actuating said slide L to release the drive mechanism which means also releases its connection with the slide L when the release of the drive mechanism is effected; a trip M for locking said slide out of engagement with the drive mechanism; and means of actuating said trip to release said slide after a predetermined time of movement of the drive mechanism.

9. In an electric signaling apparatus, the combination with the driving mechanism; of the make-and-break wheel driven by said mechanism; the slide L for normally locking said make-and-break wheel and having a shoulder l' thereon; a rock-lever actuated by the pull mechanism; a spring-actuated catch F^2 carried by said rock-lever and provided with a hook l^2 that engages the shoulder l' on the slide L; a shoulder a' under which said catch is sprung out of engagement with the slide L; a trip M that engages said slide and locks it in its lower position; a wheel N driven with the make-and-break wheel and speeded relatively to said wheel in the ratio described and carrying means to actuate the trip M to release the slide L.

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

THOMAS G. MORSE.

Witnesses:
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WM. MARKS, Jr.