(No Model.)

J. H. CARY.

ELECTRIC SIGNALING APPARATUS.

No. 265,753. Patented Oct. 10, 1882.

Fig. 2.

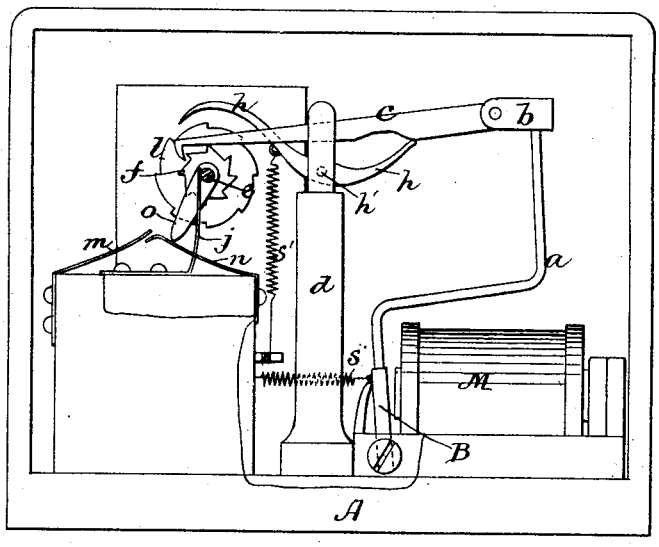
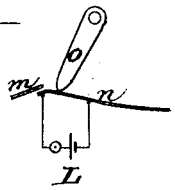


Fig. 4.



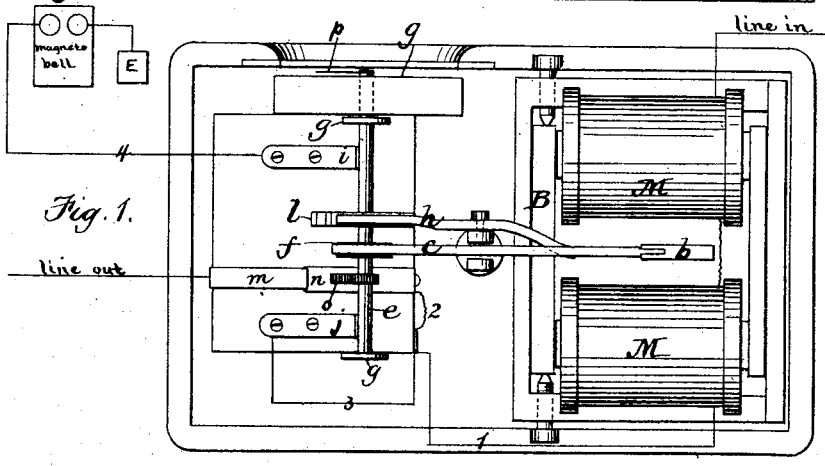
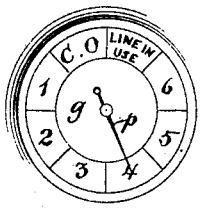


Fig. 1.

Fig. 3.



Witnesses.
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UNITED STATES PATENT OFFICE.

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ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 265,753, dated October 10, 1882.

Application filed February 4, 1882. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. CARY, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Electric Signaling Apparatus, of which the following is a specification.

This invention relates to electric signals of that class which are adapted to be used in circuits in any number, known as "individual signals," and arranged to be operated from a central station in such a manner that the bell in the desired sub-station only of the whole series will be rung.

My invention consists in the employment of instruments at each sub-station composed of an electro-magnet with a neutral armature arranged to operate a ratchet on a shaft by a step-by-step movement caused by pulsations of definite polarity sent to line from the central station, (all the instruments in the circuit operating synchronously by such pulsations,) combined with a circuit-breaking device, whereby the main line at any desired sub-station is broken by the employment of strong battery-currents of electricity operating said step-by-step movement, and when the main line is so broken and a new circuit made through a call-bell ringing said bell by means of weak magneto-currents from the central station, all of which will be hereinafter specifically described and claimed.

Of the accompanying drawings, forming a part of this specification, Figures 1, 2, and 3 represent a practical embodiment of my invention. Fig. 1 represents a top or plan view of my invention. Fig. 2 represents a side view, a portion of the apparatus being broken away to more easily show the working of the same. Fig. 3 represents an opposite side view, showing the face of the indicator.

The same letters of reference indicate the same parts in all the figures.

In the drawings, A is a base-piece, upon which the various parts are arranged.

M is an electro-magnet; B, a neutral armature hung on pivots and kept from the electro-magnet by the retractile spring *s*. The armature has attached to its upper side the bent wire *a*, having on its upper end the slotted block *b*, of insulating material, to which is pivoted one end of the metal arm *c*, which passes through a guiding-slot in the upright part *d*.

e is a horizontal shaft, resting in standard-bearings *g g* at each end.

f is a ratchet secured to shaft *e*, arranged to be rotated step by step by means of the hooked end of the lever *c*.

l is a ratchet secured to the shaft *e*, and having its teeth arranged opposite in direction to the teeth of the ratchet *f*.

h is a lever pivoted on the standard or part *d* at *h'*. One end of lever *h* projects under the lever *c*, and is held in yielding contact with a portion of the lever *c* by a spring, *s'*. The portion of the lever *c* against which the lever *h* bears is curved, as shown in Fig. 2, so as to act as a cam-surface. The opposite end of lever *h* is caused by said cam-surface to automatically approach and recede from the ratchet *l*.

i and *j* are spring-contacts, arranged to bear against the shaft *e*. To the shaft *e* is attached a circuit-breaker, *o*, which consists of an arm, preferably of insulating material. Underneath the circuit-breaker, upon the base-piece, are fastened spring contact pieces *m n*, their free ends normally resting against one another. One of said contact-pieces is arranged to be separated from the other by the circuit-breaker *o* once during each rotation of the shaft *e*.

g is an indicator card or dial, having marked upon its circumference the numbers of the stations in the circuit, in addition to which are two spaces, marked respectively "Central office," and "Line in use."

p is a pointer attached to the end of the shaft *e*, and rotated thereby, step by step, over the dial *g*.

The circuit-breakers *o* at each sub-station are fixed upon their shafts *e* at different angles relatively to their pointers *p*, so that only one circuit-breaker *o* in the series of instruments will rest upon a contact-spring, *n*, at the same time, the space on the indicator-card marked "Central office" being the unison-space of all the instruments. When the instruments in the circuit are at unison, or when all their pointers *p* point to the space "Central office," the circuit through each will be from "Line in" through the electro-magnet, wires 1 and 2, contact-springs *n m*, to "Line out" or ground. When the circuit-breaker *o* at any sub-station bears upon contact-spring *n* and breaks the above-described circuit by separating the springs *n m* the circuit is from "Line in," electro-magnet M,

wires 1 and 3, suitable metallic connections to the call-bell C at the sub-station, and through the call-bell to ground.

In the operation of my invention, supposing the operator at the central station desires to call sub-station No. 4 in the circuit, he presses a battery-key four times in succession, thereby sending to line four pulsations, each of which causes the armatures at all the sub-stations to be attracted to their respective electro-magnets M, drawing the levers *c* with them, thus rotating the ratchets *f* and shafts *e*, and causing the pointers *p* to rest opposite the space marked 4 on the several dials. The circuit-breakers *o* at the several instruments are so arranged that when the pointers stand at 4, as described, the circuit-breaker at station No. 4 only will bear upon the spring *n*, depress the same and break the main-line circuit. The signal-bell at sub-station 4 is now added to the main-line circuit, and to ring said bell the central-station operator sends through the line which now includes the bell at sub-station 4, but no other bell, currents of insufficient strength to cause the armatures B to be attracted to the electro-magnets, but strong enough to ring the bell at sub-station 4. I prefer to employ magneto-currents for this purpose. After sounding a call at any required station the battery-current is used to set the signals at the point "Line in use," and again at the termination of the conversation to set the signal at the point "Central office." This leaves the alternating armatures of the magneto-bells charged usually with the same polarity, and the use of the same current again will not cause them to strike; or if by chance one of the armatures should be reversed at the time the impulse of the battery passed through a magneto-bell, in the process of calling some station beyond, it could only give one light tap, which could never be mistaken for the signal, which is a long and distinct peal on the magneto bell. In point of fact it has been shown by actual trial that in the course of several hundred calls the magneto-bells do not ring except at the station wanted.

The cam-surface of the lever *c* is so timed relatively to the rotation of the ratchet *f* that the hooked end of the lever *h* is raised from the ratchet *l* before the lever *c* commences to rotate the ratchet *f*, and is caused to fall upon the ratchet *l* and prevent the shaft *e* from rotating more than a single step, thus preventing any further movement which might ensue from the inertia of the moving parts and bring the pointer *p* to the wrong number or division of the dial. I do not limit myself, however, to operating the signal by magneto or other currents sent from the central office, for the circuit-breaker may be caused to connect a local battery with a vibrating bell at each sub-station, which battery will operate the bell, and will be disconnected by the next movement of the circuit-breaker; or a vibrating bell may be connected to the central-office battery by the action of the circuit-breaker, and rung while the central-office key remains depressed—that is to say, before said key is released after the depression which caused the circuit-breaker to operate. In the adjustment of the signaling apparatus to sound a call at any sub-station on the line, in case vibrating battery-bells are used, the vibrating armatures of the bells can be so adjusted that the circuit-breaker may be caused to pass each sub-station which is not desired to call in such rapid succession that the circuit at said sub-station will not remain open for sufficient length of time to cause the ringing of said bell so passed; but upon the detention of the circuit-breaker at any desired point for a sufficient length of time the desired bell will be rung. If by detaining the key a moment too long a stroke or two of the bells should be struck, it would readily be distinguishable from the continuous peal intended for a call.

In Fig. 4 I have shown a local battery, L, having its poles connected to terminals under the contact-piece *n*, said terminals being so arranged that when the piece *n* is depressed it will connect said terminals and close the circuit through the battery L and through a vibrating bell connected therewith. The springs *i j*, bearing with a yielding pressure against the shaft *e*, act as brakes to prevent the lever *c* from backwardly rotating the said shaft when the lever is moving forward over the ratchet *f* to engage with another tooth of said ratchet.

I claim—

1. In an electric signaling apparatus, a shaft carrying a circuit-breaker and a ratchet, an electro-magnet having a neutral armature provided with a device for rotating said shaft through its ratchet step by step, a detent adapted to engage with the ratchet and prevent forward rotation of the shaft, and automatic devices whereby the detent is intermittently operated and each forward step or rotation of the shaft is limited, as set forth.

2. The combination of the shaft having the circuit-breaker, the oppositely-toothed ratchets *f l*, the reciprocating lever *c*, actuated by the armature of the electro-magnet, and provided with a cam-surface, and the pivoted lever *h*, operated by said cam-surface, and serving as an automatic detent to limit the step-by-step rotations of the shaft, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 31st day of January, 1882.

JAMES H. CARY.

Witnesses:
GEO. H. CARY,
C. F. BROWN.