

(Model.)

2 Sheets—Sheet 1.

J. D. RICHARDSON, Jr.

Signaling Apparatus for Telephone Lines.
No. 238,715.

Patented March 8, 1881.

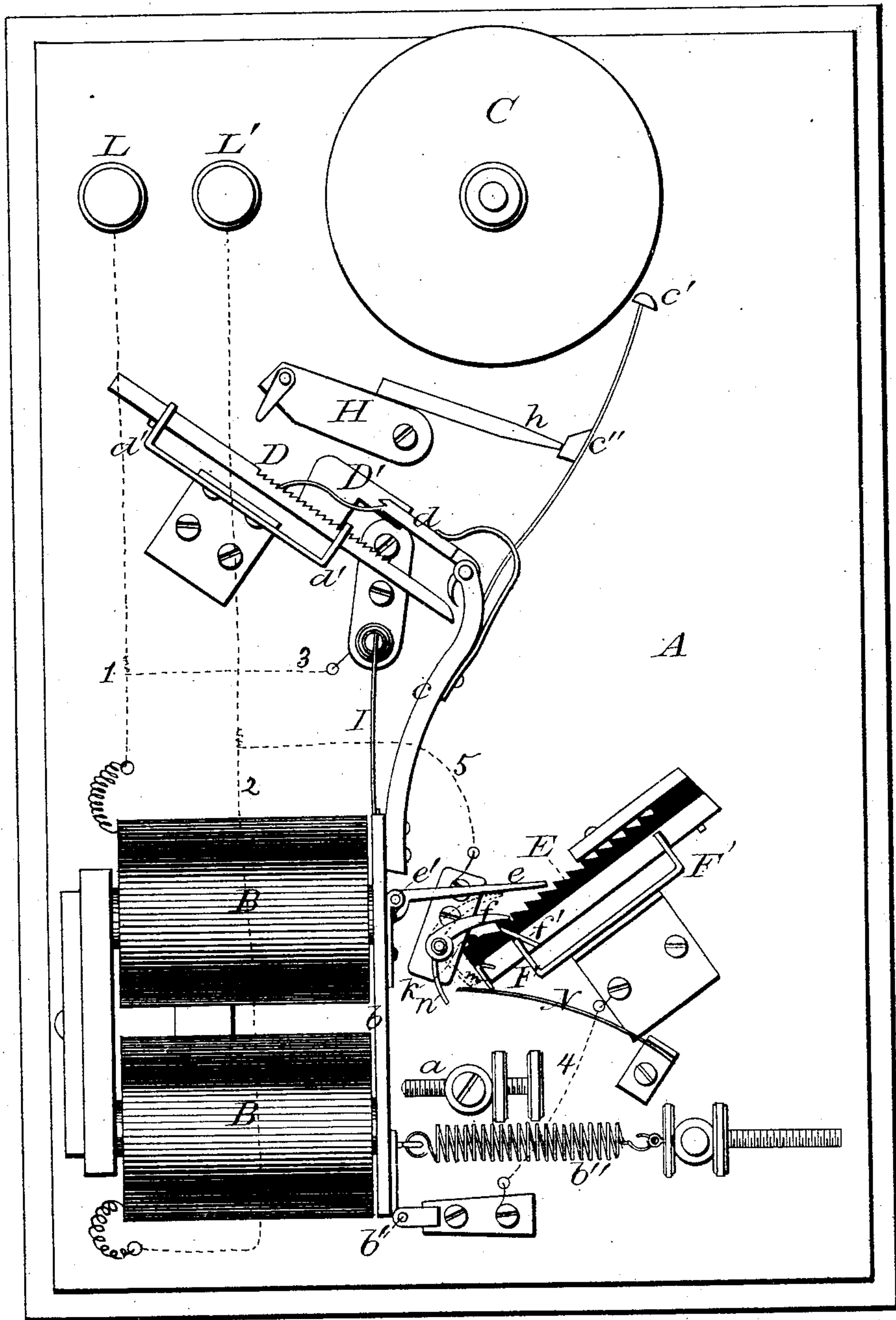


Fig: 1.

Witnesses;
Miller Earl
Mrs J. Lockwood French;

Inventor.
John Dean Richardson Jr.
by his Attorney,
Frank L. Pope

(Model.)

2 Sheets—Sheet 2.

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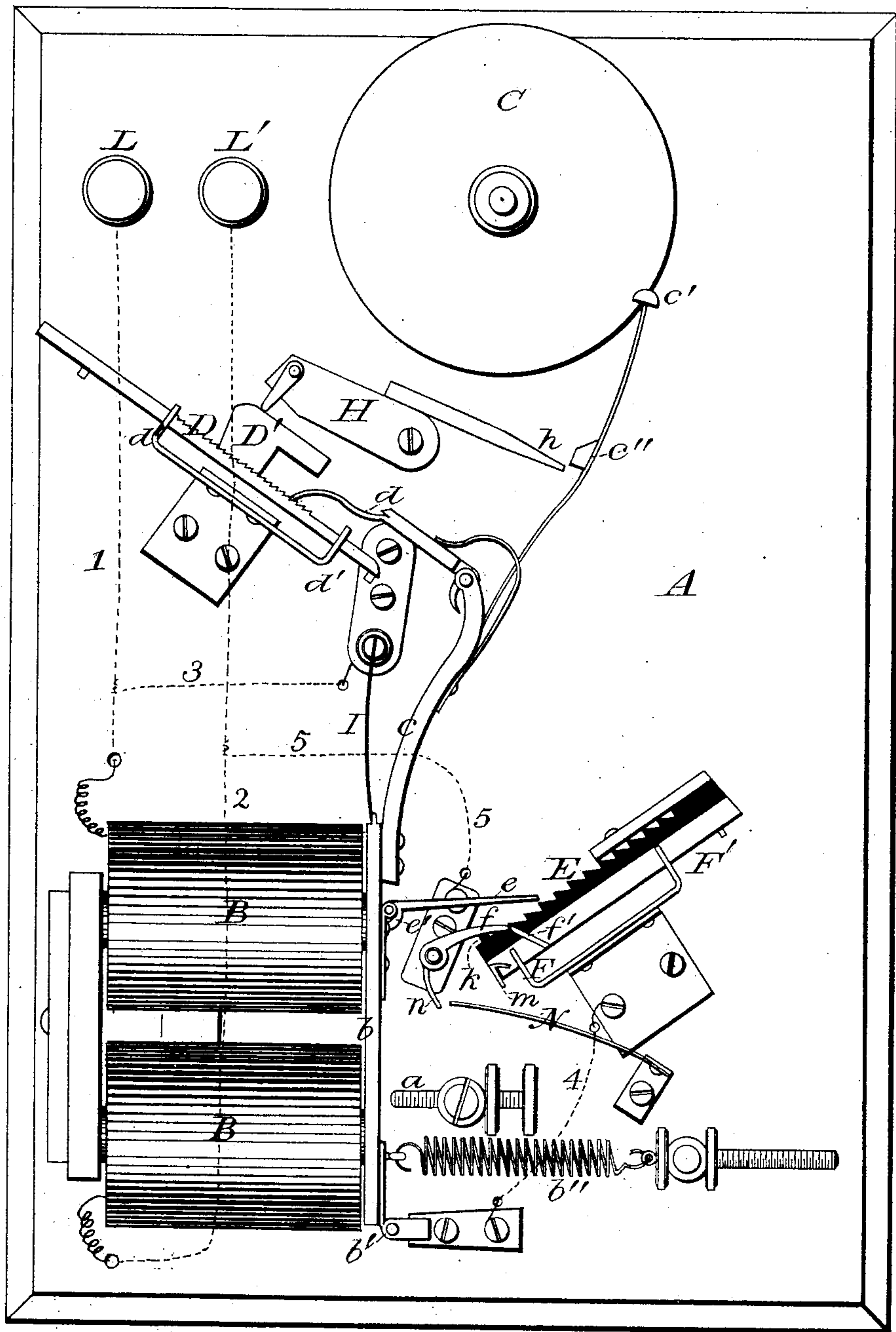


Fig: 2.

Witnesses;
Miller & Co.
Mrs. J. Lockwood French.

Inventor;
John Dean Richardson, Jr.
by his Attorney,
Frank L. Poff

UNITED STATES PATENT OFFICE.

JOHN D. RICHARDSON, JR., OF NEWPORT, RHODE ISLAND.

SIGNALING APPARATUS FOR TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 238,715, dated March 8, 1881.

Application filed November 10, 1880. (Model.)

To all whom it may concern:

Be it known that I, JOHN D. RICHARDSON, Jr., a citizen of the United States, residing at Newport, in the county of Newport and State of Rhode Island, have invented certain new and useful Improvements in Signaling Apparatus for Telephone-Lines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings.

My invention relates to an improved method of and apparatus for signaling upon telephone or telegraph lines in cases where it is necessary to place a number of stations upon the same line or circuit.

The object of my invention is to enable the operator at the central or principal station of such a line to sound a call or alarm at any particular station required without putting in operation any of the others upon the line, and to effect this result by simply breaking and closing the circuit of the line upon which the several stations are situated.

To this end my invention consists in a novel method of transmitting the successive impulses which are designed to operate the alarm or signal bell at some particular station, and in certain novel combinations of apparatus at each station, whereby the said impulses are enabled to produce the required effect at any one of the stations as required without interfering with the others.

The subject-matter claimed as new will be specifically designated in the several claims at the end of this specification.

In the accompanying drawings, Figure 1 is a view in elevation of the apparatus at one of the sub-stations when in its normal position of rest, and Fig. 2 represents the same when in its position of action.

Referring now to Fig. 1, A is the base upon which the various parts of the apparatus are mounted. To this base is secured an electro-magnet, B, having a soft-iron armature, *b*, which is pivoted at *b'*, and provided with a retractile spring, *b''*, which, when the electro-magnet B is inactive, tends to draw the armature *b* away from the poles thereof and into contact with the stop *a*. The line enters at the binding-screw L, and passes by wire 1 to the electro-magnet B, and thence out by the

wire 2 to the binding-screw L'. The armature *b* and its extension *c* have attached to them two hinged pawls, *d* and *e*, and also a bell-hammer, which produces the alarm or signal by striking against the bell C, as will be hereinafter shown. The pawl *e* rests upon the ratchet-shaped teeth of a movable rack, E, sliding in guides F F', which is placed in an inclined position, as shown, so that when free to move it falls by the action of gravity into the position in which it is represented in Fig. 1. The pawl *e* is provided with a stop, *e'*, which holds it just out of the path of the ratchet-teeth when the circuit is closed and the armature *b* held against the magnet B. If, now, the circuit of the main line is interrupted, the armature *b* falls off by the action of the spring *b''*, and the pawl *e* enters one of the teeth of the rack E and pushes it forward and upward a distance equal to one tooth, when a dog, *f*, drops into a succeeding tooth and prevents the rack from falling back when the circuit is closed and the pawl *e* drawn back, so that each time the circuit of the main line is broken the rack E is advanced one tooth.

The teeth of the rack E are made of hard rubber or like insulating material; but one of the teeth is provided with an electrically-conducting connection, *f'*, so that when the dog *f* falls into that particular tooth a shunt-circuit is closed around the electro-magnet B, which effects the ringing of the bell C through the agency of mechanism hereinafter to be explained. The conducting-tooth *f'* occupies a different position in the rack at each station of the series, so that, for example, one interruption or break of the circuit would close the shunt through the first tooth at station 1, two breaks would close it through the second tooth at station 2, and so on. The successive to-and-fro movements of the armature, caused by the succession of breaks above referred to, would cause the bell-hammer *c'* to strike the bell, and thus give a signal, were it not for the stop-lever H, the projecting end of which at *h* is in the path of the projection *c''* upon the stem of the bell-hammer, and prevents the latter from coming in contact with the bell. The instant the shunt is closed between the dog *f* and the conducting-tooth *f'* of the rack E the electro-magnet is short-circuited by

the way of wire 3, spring I, (which is secured to the base at *i*, and has its free end resting against a contact-point on the armature *b*,) armature *b*, pivot *b'*, wire 4, guides F F', rack E, tooth *f'*, dog *f*, and wire 5, and the current being thus diverted from the electro-magnet B, its armature *b* falls off, breaks contact with spring I, and opens the shunt-circuit, when it is instantly attracted again, and it thus becomes an automatic vibrator or trembler, moving backward and forward a short distance with great rapidity. During this operation the pawl *d* engages with the teeth of a second inclined rack, D, which moves in guides *d'* *d'*, and carries a lifter, D', which is adapted to pass under one end of the stop-lever H, and in so doing to remove the other end of said lever out of the path of the bell-hammer *c'*. The effect of this arrangement is, that if the shunt-circuit remains closed between *f* and *f'* for a sufficient length of time the trembling motion of the armature will push the rack D, by means of the pawl *d*, upward a sufficient distance to trip the stop-lever H, as seen in Fig. 2, after which the hammer *c'* will strike the bell C and keep up a continuous and rapid ringing by reason of the automatic vibration of the armature *b*. This effect is produced for the reason that the teeth of the rack D are fine, and consequently the rack does not have time to fall back after each impulse if the vibrations of the armature and pawl are rapid. When, however, the main circuit is broken again, after a longer or shorter time, the armature falls back on the stop *a* and the pawl *d* is lifted clear from the rack D, which thereupon instantly drops back to its normal position. The rack D advances by the action of the pawl *d* at each forward movement of the armature; but when the successive vibrations succeed each other slowly the rack has time to drop back to its normal position after each forward movement.

In order to restore the rack E to its normal or zero position at each station after any one station has been signaled, the breaking of the circuit at short intervals is continued until the pin *k* lifts the dog *f* from the tooth of the rack, when the latter falls backward by the action of gravity. The dog *f* has a finger, *n*, which bears against the end of a flat spring, N, the pressure of which normally tends to keep the dog engaged with the rack-teeth; but when the dog is lifted by the pin *k* the finger *n* slips past the end of spring N, and the latter then bears against it in the opposite direction and holds it clear of the teeth while the rack E is falling back to its normal position. Just before the rack E reaches its normal position, Fig. 1, the pin *m* on its lower end strikes spring N and pushes it past the finger *n*, so as to throw the dog *f* into gear with the rack again, in readiness for another advance movement.

The operation of the apparatus will be readily understood with little additional explanation. Suppose, for example, the operator at

the central station wishes to signal-station No. 3, which is the apparatus represented in the figures. He breaks circuit three times in succession at short and regular intervals, which, by means of the mechanism hereinbefore described, advances the rack E in each apparatus a distance of three teeth from the zero or starting point. As the conducting-connection *f'* is on the third tooth at station No. 3, the armature at that station will be thrown into vibration, as hereinbefore explained, upon the closing of the circuit after the third break. The circuit is held closed as long as it is desired to keep the bell ringing at station 3, during which time the apparatus will occupy the position illustrated in Fig. 2. When it is desired to stop ringing the circuit is broken again, and so on successively until the dog *f* is tripped by the pin *k*, when the racks at all the stations simultaneously fall back to zero. In case the fourth station, for example, should be signaled the pause would be so short that the vibrations of the armature would not have time to work the rack D at the first, second, and third stations up to the point where the stop-lever H is tripped in order to allow the bell to ring.

It is obvious that the rack D can be made of any required length, so as not to trip the stop-lever until after the circuit has been held closed for a sufficient length of time.

I do not desire to confine myself to the particular construction and arrangement of parts herein shown and described, as these may be greatly varied without departing from the principle of my invention. For instance, it might be preferable to place the ratchet-teeth upon segments of a circle instead of straight racks moving in guides, and many other similar mechanical modifications will readily suggest themselves to persons skilled in the art.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of an electro-magnet and armature, a shunt-circuit passing around said electro-magnet, a spring-contact in said shunt-circuit adapted to be opened and closed by the vibration of the armature, and an independent circuit-closer in said shunt-circuit, which is brought into action to close the shunt by means of a determinate number of pulsations traversing said electro-magnet.

2. The combination, substantially as hereinbefore set forth, of a call or alarm bell, an electro-magnet and its armature, whereby the same is actuated, a pawl, a series of ratchet-teeth, a shunt passing around said electro-magnet, and a circuit-closer which is brought into action by the contact of the pawl with one particular tooth of the series of ratchet-teeth.

3. The combination, substantially as hereinbefore set forth, of an electro-magnet and its armature, a pawl, a series of ratchet-teeth, a dog or stop-pawl, and a pin for tripping said dog at a determinate point in the movement of the ratchet.

4. The combination, substantially as here-

inbefore set forth, of an electro-magnet and its armature, a pawl, a series of ratchet-teeth, a dog or stop-pawl, a pin for tripping said dog, and a spring for holding said dog out of the path of the teeth after having been tripped by said pin.

5 5. The combination, substantially as here-
inbefore set forth, of a series of ratchet-teeth,
a dog, a spring for holding said dog out of the
10 path of the ratchet-teeth, and a pin moving
with the ratchet-teeth, which acts to trip the
spring and engage the dog with the said teeth
when the mechanism is restored to its normal
or zero position.

6. The combination, substantially as herein- 15
before set forth, of an electro-magnet and its
armature, a bell-hammer attached to said ar-
mature, and a bell with a stop-lever, a lifter,
a series of ratchet-teeth, and a pawl actuated
by the said armature. 20

In testimony whereof I have hereunto sub-
scribed my name this 25th day of October, A.
D. 1880.

JOHN DEAN RICHARDSON, JR.

Witnesses:

JOHN DEAN RICHARDSON,
JOHN BURDICK TILLEY.