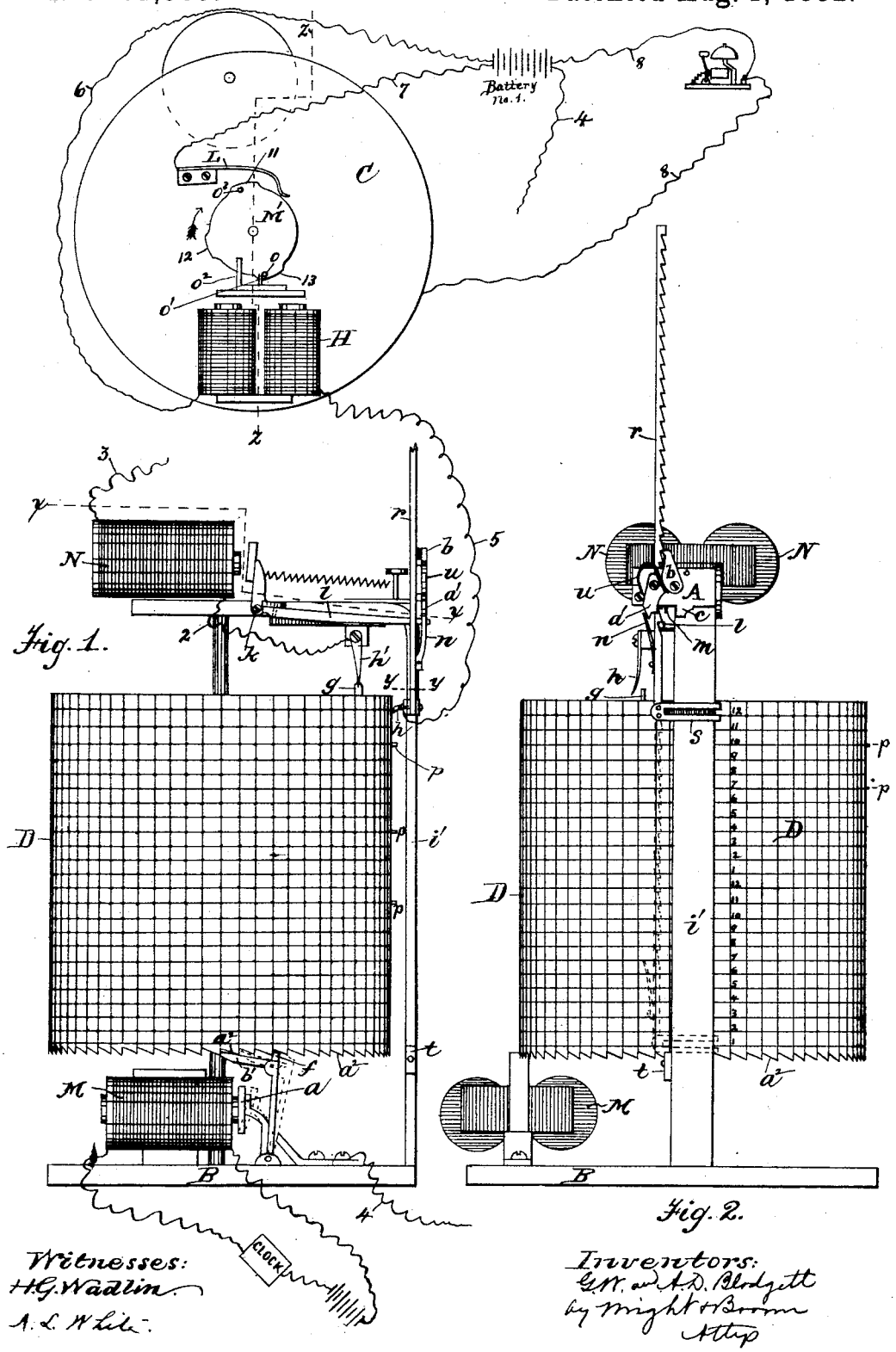
(No Model.) 2 Sheets—Sheet 1.

G. W. & A. D. BLODGETT.

ELECTRIC SIGNAL.

No. 261,989. Patented Aug. 1, 1882.



Witnesses:
H. G. Wadlin
A. L. Wilkie

Inventors:
G. W. and A. D. Blodgett
by Wright & Brown
Attys

(No Model.) 2 Sheets—Sheet 2.

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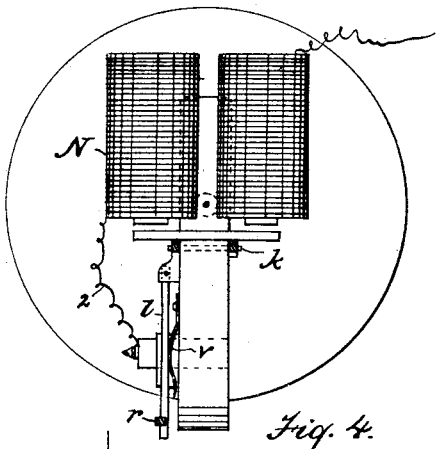

Fig. 4.

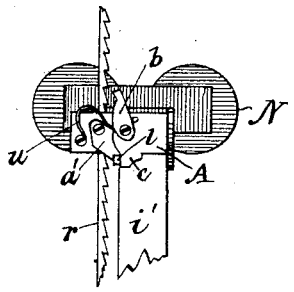

Fig. 3.

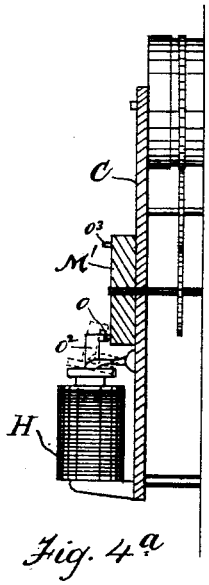

Fig. 4a

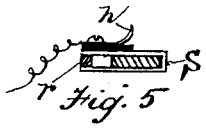

Fig. 5

Witnesses:
H. G. Madden.
A. L. White.

Inventors:
G. W. and A. D. Blodgett
by Wright Brown
Attys.

UNITED STATES PATENT OFFICE.

GEORGE W. BLODGETT, OF BOSTON, AND AARON D. BLODGETT, OF NEWTON, ASSIGNORS TO THEMSELVES, JAMES F. EMERSON, OF WAKEFIELD, AND GEORGE H. WOODRUFF, OF BOSTON, MASSACHUSETTS.

ELECTRIC SIGNAL.

SPECIFICATION forming part of Letters Patent No. 261,989, dated August 1, 1882.

Application filed December 17, 1881. (No model.)

To all whom it may concern:

Be it known that we, GEORGE W. BLODGETT, of Boston, in the county of Suffolk and State of Massachusetts, and AARON D. BLODGETT, of Newton, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Electric Signals, of which the following is a specification.

This invention has for its object to provide an electric signal adapted to automatically operate a gong or other signaling device at any predetermined time or times, varying as desired during each successive hour of the day; and it consists in combining and arranging a series of electrodes adapted to be changed as desired, each representing a minute or unit of time, with a rotating cylinder or drum that will bring them successively into contact with a single vertically-moving electrode located in the same circuit with the series above mentioned, thereby completing the circuit and operating the signal. It also includes a circuit-breaking device by means of which preliminary or warning signals may be given; and, further, in certain other details and combinations of parts hereinafter more particularly described, and pointed out in the claims.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation and diagram, illustrating our invention. Fig. 2 represents a front elevation of the mechanism shown in Fig. 1, a portion of said mechanism being in a different position. Fig. 3 represents a front elevation of a portion of the mechanism shown in Fig. 2. Fig. 4 represents a plan view of the mechanism below the line $x\ x$ of Fig. 1. Fig. 4^a represents a section on line $z\ z$, Fig. 1. Fig. 5 represents a section on line $y\ y$, Fig. 1.

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

In carrying out our invention we provide a metallic cylinder, D, having on its outer surface a series of metallic pins or electrodes, p. We also provide a single electrode, h, and means, as hereinafter described, whereby said single electrode is caused to make contact successively with each of the electrodes of the cylinder D. The cylinder D and its electrodes and the single electrode h are included in a single electric circuit, which also includes a gong or other signaling device, said circuit being closed and caused to operate the gong whenever the single electrode touches either of the electrodes of the cylinder D. The electrodes p are so arranged that each is brought in contact with the single electrode h at a predetermined time of day or night, each electrode p representing or corresponding to a given minute or unit of time. Hence for convenience of description we will call them "minute-electrodes." The cylinder D is journaled to rotate on a vertical axis supported by a base, B, and provided with twenty-four parallel peripheral rows of holes, each row representing one of the twenty-four hours and consisting of sixty holes, one for each minute of the hour. The minute-electrodes p are inserted in these holes according to the order in which signals are to be given. Should there be more pins on one side of a cylinder than another as it rotates on a vertical axis, no irregularities will result from such uneven distribution of weight, as would ensue if the cylinder were horizontal. The longitudinal rows for holes are designated by suitable numbers on the body of the cylinder, so as to enable the operator to readily determine the position for the pins. On the lower end of the cylinder are formed sixty ratchet-teeth, a^2.

M represents an electro-magnet under the cylinder, the armature a of which is provided with a pawl, b', which at each attraction of the armature engages with one of the teeth a^2 of the cylinder and rotates the cylinder one-sixtieth of a complete rotation. The circuit is closed through the magnet M once each minute by the action of a suitable electrical clock. The cylinder is thus caused to make a complete rotation once each hour. The armature is provided with a stop, f, which, when the armature is attracted, abuts against the forward portion of a ratchet-tooth behind the one engaged by the pawl b and prevents the cylinder from rotating by its own momentum after the pawl stops.

It will be seen that as the step-by-step operating mechanism is below the cylinder, and as the frame supporting the vertical shaft is open at one side, there is no obstacle to the ready removal of the cylinder for the adjustment of the pins or to quickly substitute another having pins differently adjusted.

At the upper end of the cylinder D is a metal

projection, *g*, which comes in contact once each hour and on the hour with a spring, *h'*, which is attached to but insulated from a fixed support, and is in electrical connection with an electro magnet, N, by wire 2, the other pole of said magnet being connected by wire 3 with battery No. 1 and the other pole of said battery by wire 4 with the metal base B, on which the cylinder is journaled, as indicated in the diagram forming part of Fig. 1. When the projection *g* comes in contact with spring *h'*, therefore, the circuit (normally open) is closed through the magnet N, causing an attraction of its armature, (pivoted at *k*,) thus raising an arm, *l*, supported by the armature, and lifting a toothed rod, *r*, with which said arm is engaged, one notch. Said rod carries the single electrode *h*, and by its movement raises said electrode from a point opposite the row of holes containing the minute-electrodes representing one hour on the cylinder to a point opposite the next row. The electrode *h* and rod *r* are attached to a slide, *s*, which is adapted to move on a fixed vertical guide, *i'*. When the arm *l* is raised, as described, it is clamped between a fixed pin, *m*, and the side of the electrode-rod, and thus prevented from lifting said rod more than one notch at each attraction of the armature of the magnet N. At twelve o'clock at night the electrode-rod is brought to the position shown in full lines in Fig. 2, the arm *l* being engaged with the last or lowest notch on said rod. When the next full rotation of the cylinder is completed, or at one o'clock, the arm *l* is lifted, (as previously described,) and a spring, *n*, on the electrode-rod brought against the back side of a pivoted latch, *a'*, forcing said latch against the arm *l*, and thus removing said arm from its engagement with the electrode-rod and clamping it against a stop, *c*, on a fixed frame or support, A. At the same time the heel of the latch *a'* comes in contact with a dog, *b*, pivoted to the support A and disengages said dog from the notches on the electrode-rod, the position of the various parts being as shown in Fig. 3.

It will be apparent that so long as the armature of the magnet N is in contact with said magnet the arm *l* will be held up against the stop *c*, and said arm, so long as thus held up, prevents the latch *a'* from falling, and so prevents the dog *b* from re-engaging with the notches on the electrode-rod. (See Fig. 3.) The electrode-rod is therefore free to fall until the electrode is brought opposite the lowest (or one o'clock) ring on the cylinder. The rod, or the slide *s* thereof, abuts against and is arrested by a yielding stop, *t*, which limits the downward movement of the rod. At the next partial rotation or step of the cylinder the contact between the projection *g* and spring *h'* is broken, thus opening the circuit and allowing the armature to fall away from magnet N and the arm *l* to drop and engage with a lower notch on the electrode-rod, and the latch *a'* to resume its normal position, and the dog *b* to also engage with and support the electrode-rod. The parts are now in position shown in Fig. 2, the position of electrode-rod being as shown in dotted lines. A spring, *u*, holds the latch *a'* away from the dog *b*, and a spring, *v*, (see Fig. 4,) holds the arm *l* with a yielding pressure against the electrode-rod. When the arm *l* is pushed up against stop *c*, as just described, and as shown in Fig. 3, it is of course against the pressure of the spring *v*. It will be seen, therefore, that the cylinder is rotated step by step every minute and effects a complete rotation every hour, and that the single electrode is adjusted after each complete rotation of the cylinder, so that during each hour it will coincide with a different row of holes in the cylinder from the preceding hour. The result is the contact of the single electrode with all of the minute-electrodes in succession and the closing of the circuit through a signal gong or series of gongs during each contact, which preferably lasts about seven seconds. We prefer to give one or more preliminary signals before the signal proper—that is to say, if it is desired to signal the departure of a train at five o'clock we prefer to give two signals as follows: two blows on the signal-gong at three minutes before five, and one blow at five. This is effected in this instance by the employment of a circuit-breaker composed of a rotary drum, M', having projections 11, 12, and 13 on its periphery, and a spring, L, adapted to make contact with said projections as the drum rotates. The drum M' is rotated by a train of gearing driven by a spring, (not shown in the drawings,) and is held and released by stops o' o^2 on the armature of a magnet, H, which is connected by wire 5 with the single electrode *h*, the other pole of said magnet being connected by wire 6 with battery No. 1, and said battery by wire 4 with the base B, as previously described. The spring L of the circuit-breaker is insulated from its support but connected by wire 7 with battery No. 1, the other pole of said battery being connected by wire 8 through a gong or series of gongs with the metal frame of the circuit-closer. When the drum rotates the surfaces 11, 12, and 13 are successively brought in contact with spring L, each surface momentarily closing the circuit through the gongs, and the intermediate depressions breaking the circuit.

The parts being in position shown in Fig. 1, the drum is prevented from rotating by a pin, *o*, on the drum, in contact with the stop o' on the armature of magnet H. When the single electrode comes in contact with a minute-electrode on the cylinder—say at three minutes before five in the case supposed—the circuit through magnet H is closed and the armature attracted, allowing pin *o* to slip by the stop o' and the drum to rotate until the pin *o* is brought against stop o^2. This carries the raised portion 11 nearly but not quite to contact with spring L. The stop o^2 is so formed that when the armature is released by the subsequent opening of the circuit the pin *o* is released and the drum allowed to rotate until the pin o^3 is brought against stop o', thus al-

lowing raised portions 11 12 to make contact with spring L, striking two successive blows on the gong. Three minutes later, or at five o'clock, the single electrode strikes another minute-electrode on the cylinder. Pin o^3 is released by the ensuing attraction of the armature and brought against stop o^2, nearly allowing the surface 13 to make contact with spring L. At the subsequent release of the armature pin o is released. The drum revolves until pin o is again brought against stop o', allowing spring L to make contact with surface 13, and striking the final blow on the gong.

It is obvious that instead of closing a circuit by the contact of the single electrode with the several minute-electrodes, the arrangement may be such as to break or open a circuit and call into action a secondary battery to operate the signal without departing from the spirit of our invention.

We are aware that electric signaling devices have been constructed to give signals automatically at predetermined moments, which effected their object by means of a wheel provided with adjustable pins forming electrodes, each representing a separate unit of time, by the rotation of which wheel these pins are brought into contact with other electrode-pins in the same circuit carried in a frame working in connection with said wheel, and also including derived circuits, through which extra or warning signals could be given. We therefore do not claim such construction broadly.

What we claim, and desire to secure by Letters Patent, is—

1. In an automatic time-signal, the combination of a cylinder mounted upon a vertical shaft, turning in a frame open at one side, and provided with pin-holes arranged upon the intersections of parallel horizontal and parallel vertical lines, and an electro-magnet and devices operated therefrom, arranged below the lower end of the cylinder to turn the latter step by step, substantially as set forth.

2. In an electric signal, the combination of a rotary metallic cylinder, means for rotating the same at a predetermined rate, a number of series or rows of holes on said cylinder, each series being arranged so that all the holes composing it shall successively occupy a given space once during each rotation of said cylinder, minute-electrodes or pins inserted as desired in said holes, a single movable electrode located in a circuit which is closed through a signaling device when contact is made between said single electrode and any one of the minute-electrodes of the cylinder D, a circuit closed through an electro-magnet by the rotating body once during each complete rotation thereof, and mechanism, substantially as described, operated by the armature of said electro-magnet to move the single electrode a distance equal to the space between each row or series of minute-electrodes and the next, as set forth.

3. In an electric signal, the combination of an electric circuit including a signaling device, a series of minute-electrodes, and a single electrode operated, substantially as described, to automatically close said circuit and operate the signal at predetermined times, a mechanically-rotated drum having projections 11 12 13 and pins o o^3, the contact-spring L, the electro-magnet H, and the armature having stops o' o^2, said parts being arranged and operated, as described, to give a definite number of signals in succession at one closing of the circuit and a different signal by the next closing, as set forth.

4. The combination of the rotary cylinder having ratchet-teeth formed on one of its ends, an electro-magnet, an armature for said magnet, a pawl operated by the armature to rotate the cylinder step by step, and a stop carried by the armature to limit the step-by-step rotations of the cylinder, as set forth.

5. The combination of the sliding toothed rod r, having a spring or arm, n, the arm l, oscillated vertically by the armature of an electro-magnet, pivoted so as to oscillate laterally, and held with a yielding pressure against the toothed side of the rod r, the pivoted dog b, and a pivoted latch, a, adapted to be moved by the spring n and disengage the arm l and dog b from the rod r, whereby said rod is released and allowed to fall, as set forth.

6. The combination of the cylindrical body D, having minute-electrodes p, means for rotating said cylinder step by step, the adjustable single electrode, mechanism, substantially as described, for adjusting the single electrode step by step, and an electric circuit closed through an electro-magnet by the cylinder once during each rotation thereof, and mechanism, substantially as described, operated by the armature of said electro-magnet to adjust the single electrode, as set forth.

7. In an electric signal, the combination in a single electric circuit, of a metallic rotary cylinder having holes arranged in parallel rows or series, pins or minute-electrodes inserted as desired in said holes, an electro-magnet having an armature adapted to rotate the cylinder step by step, a single electrode located on an adjustable slide, a secondary electro magnet through which a circuit is automatically closed at the completion of each rotation of the cylinder, and mechanism, substantially as described, operated by the armature of the secondary magnet to adjust the single electrode and cause it to coincide with a new row of holes after each complete rotation of the cylinder, as set forth.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 12th day of December, A. D. 1881.

GEO. W. BLODGETT.
AARON D. BLODGETT.

Witnesses:
C. F. BROWN,
A. L. WHITE.