(No Model.)

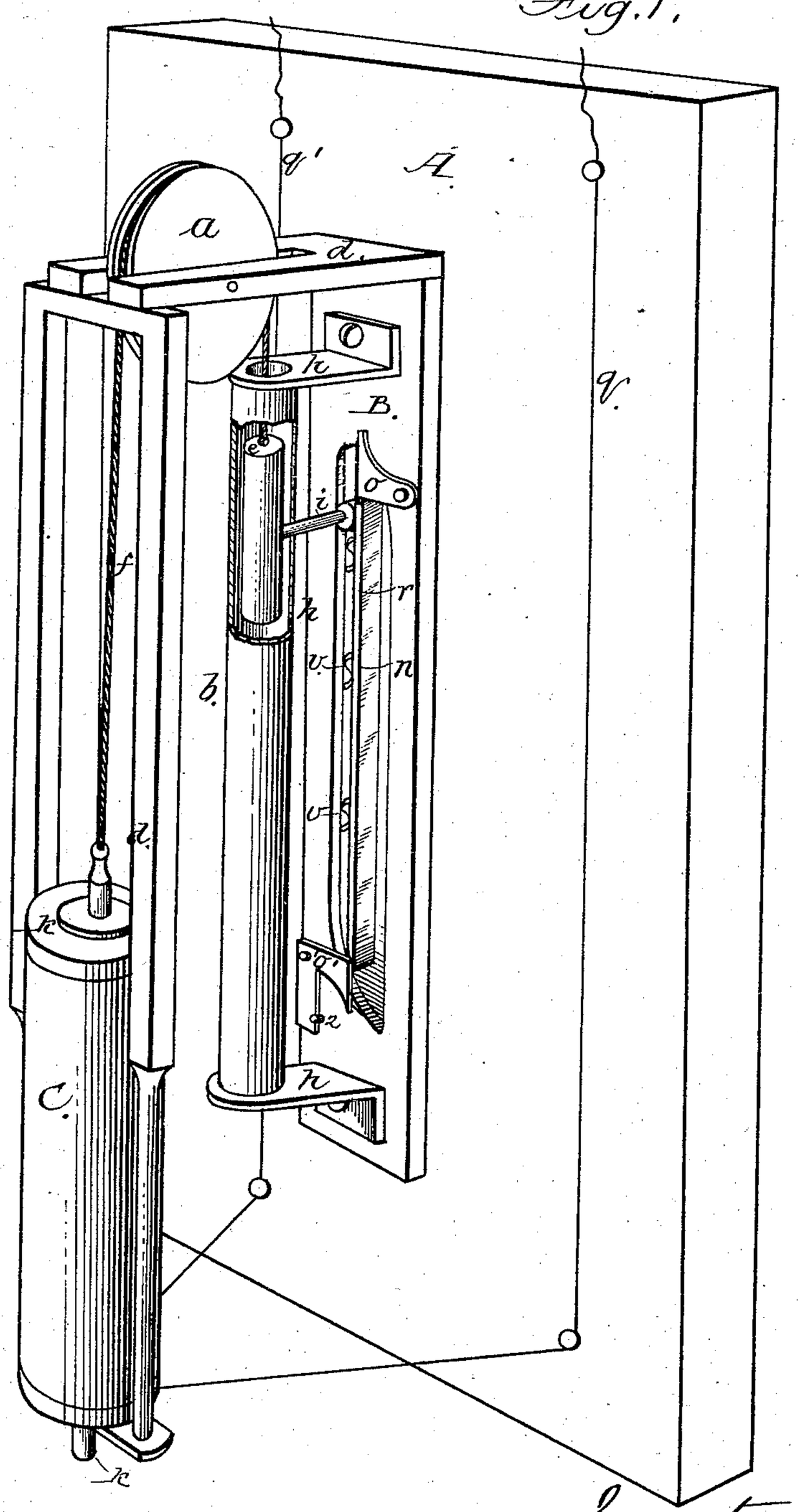
2 Sheets—Sheet 1.

H. W. SOUTHWORTH.

Electrical Signaling Apparatus.

No. 241,517. Patented May 17, 1881.

Fig. 1.



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(No Model.)

2 Sheets—Sheet 2.

H. W. SOUTHWORTH.

Electrical Signaling Apparatus.

No. 241,517. Patented May 17, 1881.

Fig. 3

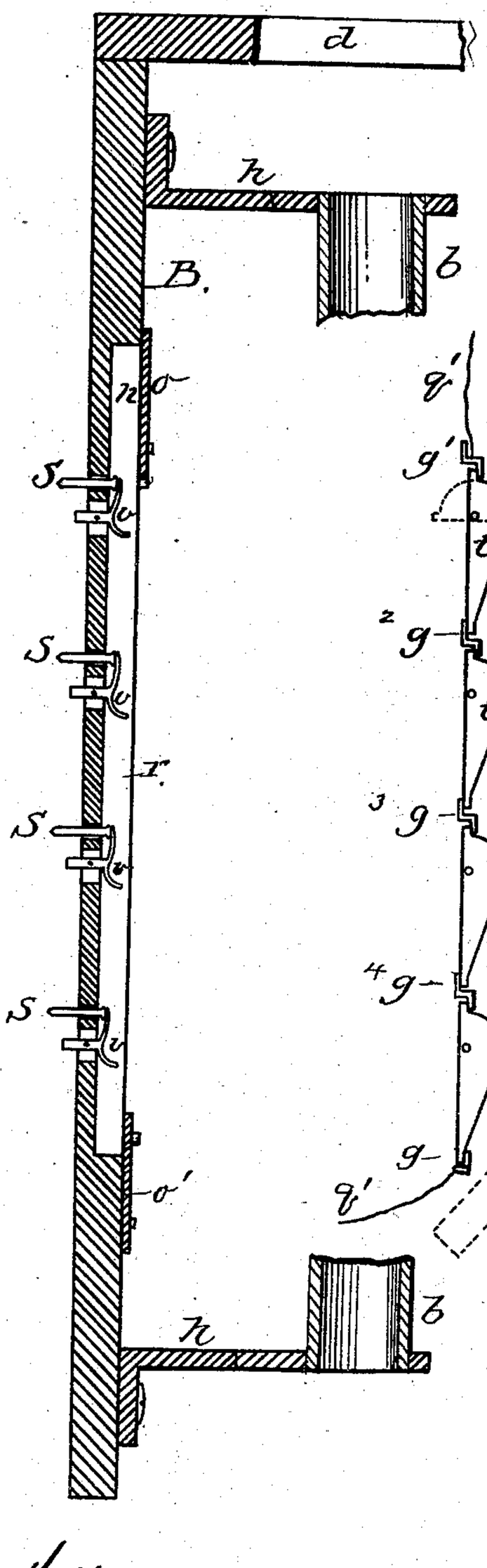


Fig. 2.

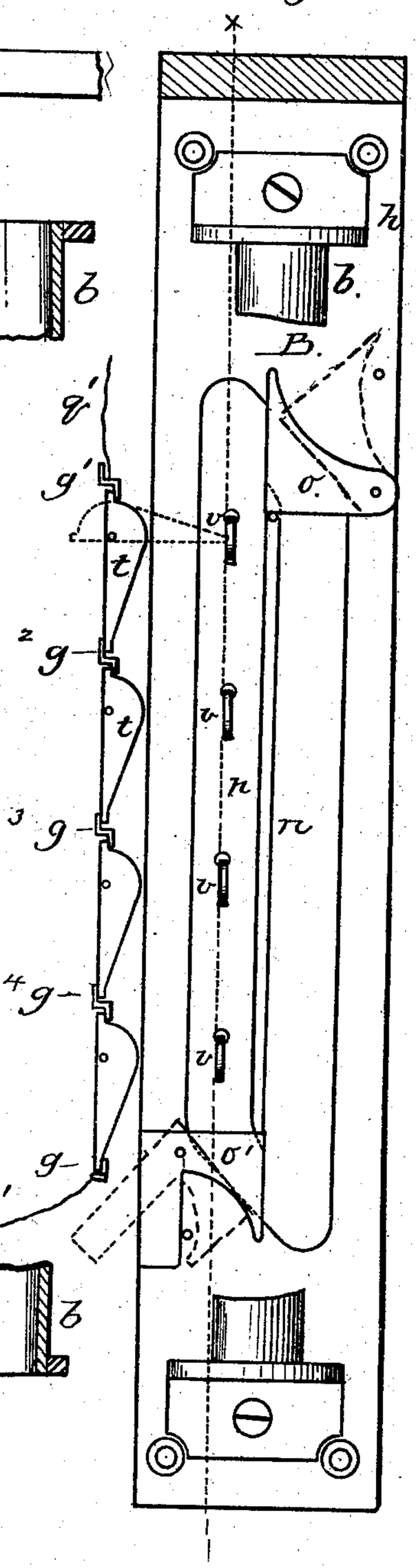
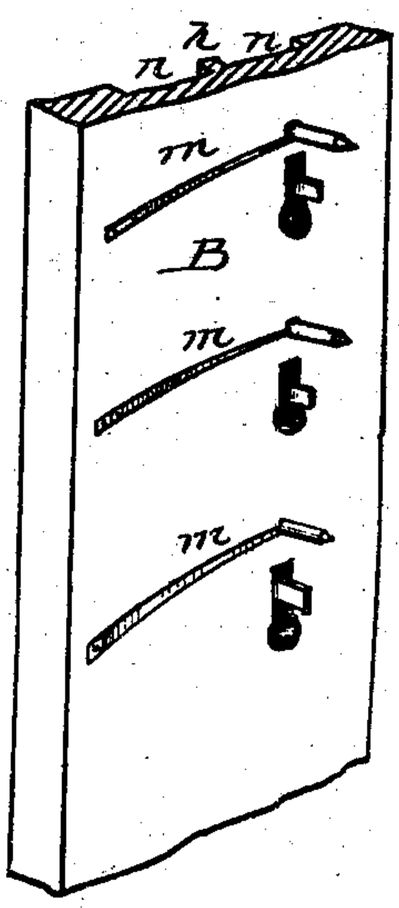


Fig. 4



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UNITED STATES PATENT OFFICE.

HORATIO W. SOUTHWORTH, OF SPRINGFIELD, MASSACHUSETTS.

ELECTRICAL SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 241,517, dated May 17, 1881.

Application filed September 13, 1880. (No model.)

To all whom it may concern:

Be it known that I, HORATIO W. SOUTHWORTH, a citizen of the United States, residing at Springfield, county of Hampden, and State of Massachusetts, have invented new and useful Improvements in Electric Signaling Apparatus, of which the following is a specification.

My invention relates to devices employed on electric signaling-lines for sending signals over such lines and for causing alarm-bells to be rung only at the called station, or for causing other electric signals to be given at such stations only as the sender intends them for; and the object thereof is to provide an apparatus for the above purpose which dispenses entirely with the employment of successive electric impulses and the usual provision of magnets, armature, ratchet-wheels, &c., in the operation of which much of the strength of the current is expended, and to provide a machine which operates under a current of moderate strength, and which is more simple in construction than such machines usually are, and one which can be manipulated easily by unskilled persons.

I attain the above-named objects by the construction and devices illustrated in the accompanying drawings, in which—

Figure 1 is a perspective elevation of my machine. Fig. 2 is a plan view of the bed-plate of the machine, with the operative parts thereof shown in Fig. 1 removed. Fig. 3 is a vertical section through line *x x*, Fig. 2; and Fig. 4 is a rear view of the central portion of the bed-plate.

In the drawings, A is the usual supporting-back, to which the machine is secured. B is the bed-plate. *c* is a hollow coil of wire, or a coreless electro-magnet. *e* is a weight, provided with an arm, *i*. *d d* is a frame supporting a pulley, *a*, and the coil *c*. *b* is a weight-tube, held in position by two supports, *h h*, which are secured to the bed-plate B. *o o'* are two latches pivoted to bed B. *n* is a guide-groove cut in bed B, through which passes vertically the projecting rib *r*. *v* are levers pivoted to bed B in groove *n*. *s* are connection-pins in bed B, back of one end of levers *v*. *t* are pivoted switch-levers, hung on back A near the edge of bed B. *g* are connection-points on back A, between levers *t*. *m* are springs actuating pins *s*, and *q q'* are line-wires. *k* is a metallic bar, and *f* is a cord passing over pulley *a*, one end of which is secured to weight *e* and its other end to bar *k*.

The bed-plate B, frame *d d*, supports *h h*, and tube *b* may be made of metal or other suitable material.

Weight *e* is made heavier than bar *k*, so that when bar *k* is uninfluenced by any magnetic action weight *e* will drop down in tube *b*, causing said bar to rise up nearly out of coil *c*. The arm *i* on weight *e* reaches into groove *n* in bed B, as seen in Fig. 1, and is adapted to move down one side of rib *r* and up the other side, following the course of said groove. When said arm, in its downward course, reaches latch *o'* it strikes the end thereof which extends across said groove, bears it down, and passes by it, and as the lower end of said latch is heavier than its horizontal part, it immediately swings back to the position seen in Fig. 1, striking against a stop-pin, 2, and effectually preventing said arm from moving upward in that part of groove *n* through which it has just descended after having passed said latch; but it may move up when properly actuated in the part of groove *n* on the opposite side of rib *r*, into which it swings, following the curve at the lower end of said groove. (Shown in Fig. 1.) When arm *i* rises in the latter-named portion of said groove it lifts the latch *o*, which acts in like manner to latch *o'*, and, guided by the curved edge of the groove at that point, it swings over the upper end of rib *r*, into the upper end of the groove, to the position seen in Fig. 1, and latch *o* drops down, compelling said arm to there remain. Tube *b*, in which weight *e* moves up and down, is slotted vertically, and as said weight so moves the arm follows said slot, which is of sufficient width to allow the arm to swing sufficiently in it to operate at the bottom and top of said groove, as just described.

A series of levers, *v*, is pivoted in openings made through bed B, as seen in Fig. 3, the horizontal arms of which extend through said openings, and their curved vertical portions stand one above the other in slot *n*, their lower ends curving outward, and their upper ends bearing against the ends of pins *s*, which ex-

tend through bed B, as shown. Said levers *v* are so hung that when arm *i* on weight *e* passes over them going down they slightly tip as it hits their lower ends, letting it pass on unobstructedly; but when said arm moves upward in that part of groove *n* it encounters the under side of one of the curved lower ends of said levers, lifts it up, and, causing its upper end to move against one of pins *s*, pushes the latter in a direction through the back of bed B.

The wires *q* and *q'* represent portions of a line-wire in which the instrument may be connected, and are connected to the ends of the wire forming the coil *c*. The portion *q* runs unbroken to said coil; but in that part of the end *q'* between the top of the back A and the lower part of the machine, as seen in Fig. 2, is placed a series of circuit-breakers, *t*, arranged to operate automatically to close the circuit. The wire *q'*, as it descends, is connected with a metallic stop-block, *g*, and other similar blocks, *g*, are interposed between the ends of said circuit-breakers, as shown, and the lower end of wire *q'* is connected to the lower one of said blocks, and runs from thence to coil *c*. When all of the circuit-breakers *t* stand in a vertical position, as in Fig. 2, the line is connected; but when one of them is turned to a horizontal position, as shown by dotted lines at the upper one, the circuit is broken. The circuit-breakers *t* are so balanced on their pivots that when they are turned up to said horizontal position they will rest there; but when arm *i*, in moving down in groove *n*, carries the end of one slightly downward, it will swing quite over to a vertical position and against blocks *g*, and again complete the circuit-connection.

Pins *s*, actuated, as aforesaid, by levers *v*, are given sufficient movement to cause them to connect an alarm-bell circuit of ordinary description, springs *m* being applied to retract said pins after having been so operated upon.

In providing a number of machines for a signaling-circuit, I construct them with at least as many of levers *v* and pins *s*, together with the circuit-breakers *t* and their connections, as there will be signaling-stations on said circuit, and when said instruments are set up a number is given to each one of the circuit-breakers and to the lever hung opposite to it, and at each station an alarm-bell circuit is arranged to be operated by the action of the lever *v* and pin *s*, which bear the number of said station.

The operation of my machine in signaling is as follows: It is understood that when the instruments are set they are operated on a closed circuit and their movements are isochronous. The positions of the bar *k*, weight *e*, and arm *i* shown in Fig. 1 are those which will be occupied by those parts of the machines on a circuit when all of the machines are at rest, the action of the electric current on the coils *c* causing all of the bars *k* to be held down within said coils and overcoming the gravity force of weight *e*. If, now, station 1 would signal station 4, the circuit-breaker No. 4 is turned to the position shown by No. 1 in dotted lines on Fig. 2. This causes the magnetic action between the coils *c* and bars *k* to cease, leaving weight *e* free to descend and carry the end of arm *i* down groove *n* by the levers *v* until it encounters the end of said circuit-breaker 4, which projects over groove *n*, when said arm carries the end of said "breaker" down, causing it to swing into connection and re-establish magnetic action through the line. This causes bar *k* to be quickly drawn downward again, carrying arm *i* up against the lower end of lever *v*, No. 4, and causing the latter to throw out pin *s* and ring the call-bell at station 4. After the object of the call has been fulfilled No. 4 circuit-breaker may be slightly turned to let weight *e* drop quite down to the bottom of groove *n*, and then by putting said circuit-breaker into connection again bar *k* will quickly descend and draw weight *e* and arm *i* back to the position from whence they started, which was that shown in Fig. 1. Thus, as the movements of the weights *e* in all of the machines are isochronous and the alarm-bell circuit at each station is connected only to a connecting-lever bearing the number of that station, no bell is rung at any uncalled station, but only the bell of the station called.

What I claim as my invention is—

1. In an electric signaling apparatus, the combination of the following elements, viz: a hollow coil or coreless electro-magnet, a metallic bar to be moved vertically within said hollow coil by magnetic action and by gravity-power, a weight to co-operate with said bar, signaling appliances to co-operate with said weight, and appliances for breaking and automatically connecting the electric circuit in which the machine is connected, substantially as set forth.

2. In an electric signaling apparatus, the combination, with the hollow coil *c*, bar *k*, and weight *e*, provided with arm *i*, of appliances to co-operate therewith to cause an alarm-bell to be rung, substantially as set forth.

3. In combination with the hollow coil *c*, bar *k*, and weight *e*, provided with arm *i*, the bed B, provided with groove *n*, lever *v*, and pin *s*, substantially as set forth.

4. The combination of the hollow coil *c*, bar *k*, weight *e*, provided with arm *i*, lever *v*, pin *s*, and of appliances for breaking and automatically connecting the electrical circuit in which the machine is connected, substantially as set forth.

5. In combination, bed B, provided with groove *n*, latches *o o'*, and arm *i* on weight *e*, substantially as and for the purpose set forth.

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Witnesses:

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