2 Sheets--Sheet 1.

S. H. BECKWITH.

Electric Annunciator.

No. 168,364. Patented Oct. 5, 1875.

Fig. 1.

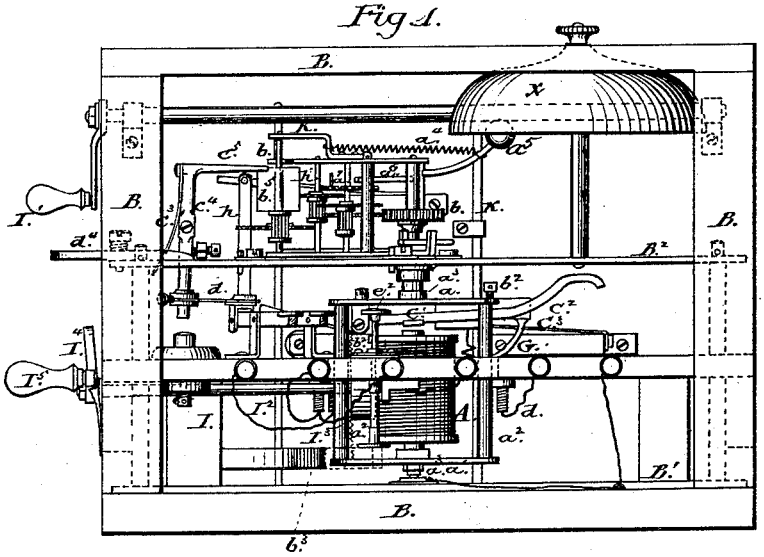

Fig. 2.

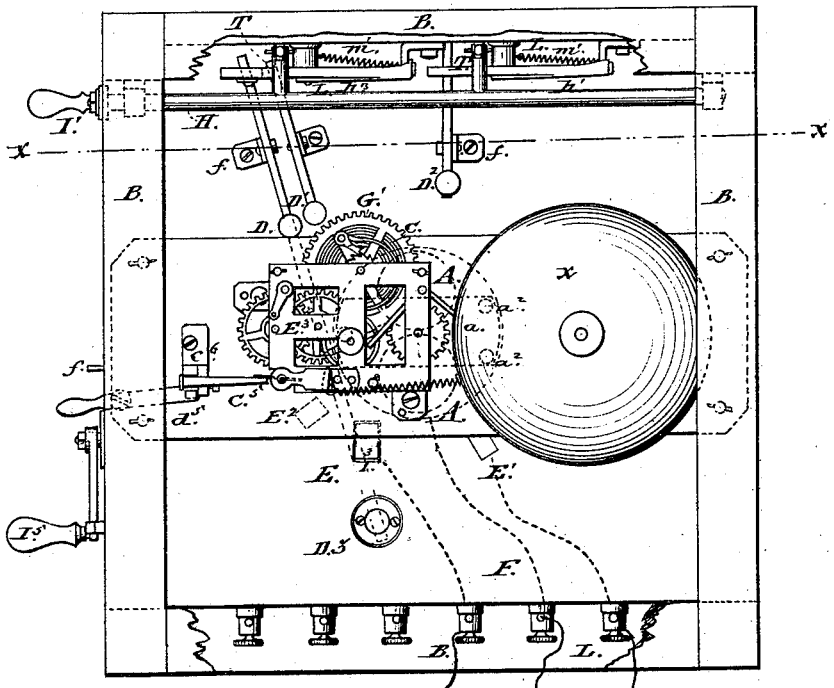

Fig. 5.

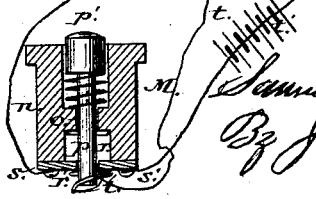

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Fig. 3.

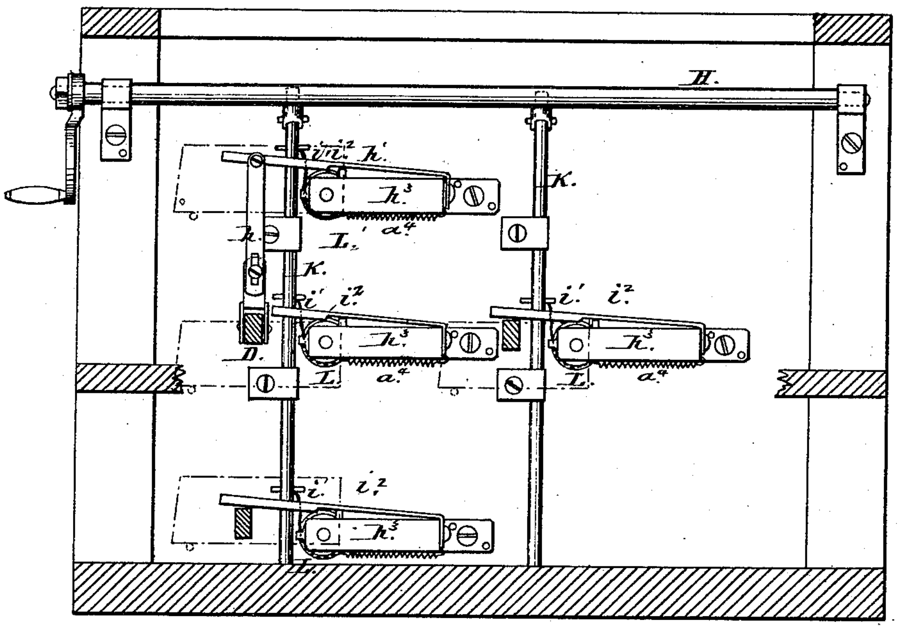
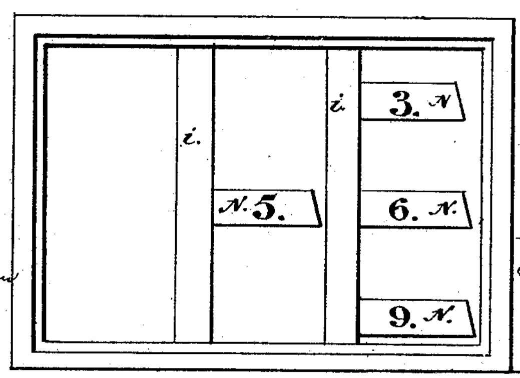


Fig. 4.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN ELECTRIC ANNUNCIATORS.

Specification forming part of Letters Patent No. **168,364**, dated October 5, 1875; application filed April 1, 1875.

To all whom it may concern:

Be it known that I, SAMUEL H. BECKWITH, of Utica, in the county of Oneida and State of New York, have invented a new and useful Improvement in Electro-Magnetic Alarms and Indicators; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings forming a part of this specification.

My invention relates to certain improvement in electro-magnetic alarms and annunciators for use in hotels, public buildings, &c.

It consists principally of a revolving electro-magnet located in the center of a table or key-board, having an armature, attached to a curved lever, the fulcrum of which is placed on the frame of the electro-magnet, so that the latter and the lever revolve together about a common axis. When influenced by an electric current the curved lever bears upon keys, arranged in a circle concentric to the lever's rotation, which are placed within reach of the lever, and by this action certain mechanism is set in motion, which causes numbers or letters to appear to view through the window of the apparatus, and thus indicate the point from where the alarm or call was made.

Connected with the frame of the electro-magnet, and revolving with it, is a drag-spring that passes over a series of conducting-plates arranged in a circle in the key-board, and corresponding in number with the places from which an alarm or call is desired, with which places they are connected by wires. When the alarm or call is sounded from any of the places in connection with the apparatus, the passage of the drag-spring over the corresponding conducting-plate establishes a half-circuit, which is completed through a wire connecting the drag-spring with the magnet, and by attracting the armature to the magnet causes the curved armature-lever to bear upon a key corresponding to this plate, and this sets the mechanism in motion, which causes an annunciating-card to appear behind the window, and at the same time an alarm is sounded on the bell.

To revolve the electro-magnet and bring the curved armature-lever in reach of the proper key, I make use of a system of clock-work, which is set in motion automatically through the medium of the armature-lever, the drag-spring, and a cut-off, by means of which the circuit is closed and broken, in a manner more fully described hereafter.

For communicating the alarm I make use of an automatic switch fixed at the place from where an alarm or call is designed to be made, which is connected with the battery and annunciator by wires, so that by the breaking and closing of the circuit the apparatus is set in motion to announce the place from where the alarm or call proceeds, and sounds the alarm on the bell.

In the drawings accompanying this specification, Figure 1 is a side elevation of the annunciator. Fig. 2 is a plan of the same. Fig. 3 is a vertical section on line *x x*. Fig. 4 is a front elevation, showing the annunciating-cards and windows. Fig. 5 is a sectional view of the automatic switch.

A A are helices, formed in the usual manner, to form an electro-magnet. This magnet is set vertically in a metal frame with top and bottom plates *a a*, connected together by a double set of short rods, a^2 a^2. From the plates *a a* short shafts a^3 a^3 project, forming the axis on which the magnet revolves. B is the wooden frame-work of the apparatus, having floor, uprights, and cross-pieces. On the floor is fixed the metal plate B^1, and just above this is another metal plate, B^2. The plates are connected together by metal rods secured by keys or other suitable devices. Between the plates B^1 B^2 the frame of the electro-magnet is secured vertically in suitable journal-bearings, so that it rotates freely therein. On the plate B^2 is secured the clock-work moved by the coiled spring C, by which the electro-magnet is rotated, the driving-wheel G′ gearing with a toothed wheel on the axis of the frame in which the magnet is fixed. The armature C^1 is secured to the curved lever C^2, which is pivoted or fulcrumed in suitable bearings attached to the plate *a*, and, by means of the opposing spring b^3, it keeps the armature from contact with the poles of the magnet. The curved end of the lever projects outside the frame of the magnet, and when rotated it passes over the ends of the keys D D^1 D^2 D^3, but does not touch them unless the

electric current attracts the armature to the magnet, when it is drawn down and strikes in its circuit one or more of the keys. When the circuit is broken the opposing spring raises the armature from the magnet and the lever is lifted from contact with the keys. The upward movement of the lever is limited by the adjusting-screw b^2. G is the drag-spring, attached by screws to the metal plate C^3 projecting from the magnet's frame, but insulated therefrom by a plate of rubber or other material, and washers surrounding the screws. The drag-spring is connected with the electro-magnet by a wire, and thus a complete circuit can be established through it. E E^1 E^2, &c., are plates of metal inserted in the key-board F in a circle concentric to the axis of the magnet, and in the path traversed by the drag-spring G, which, in revolving with the magnet, comes in contact with each of them successively. Binding-screws *d* project below the key-board from the conducting-plates E E^1 E^2, and are connected by wires with the battery through the automatic switch hereafter described. Keys D D^1 D^2 D^3 are pivoted in angle-plates *f f* attached to the key-board. Key D connects with the rod *h*, which is pivoted to the horizontal spring h^1, but the other keys bear directly against the springs without intervening connecting-rods. The rod *h* is merely used to show how the levers are to be connected with the higher springs. L are cams fixed upon axis supported in the front plate of the apparatus and in the metal frame h^3. The ends of the axes which project through the front plate have fixed to them the annunciating-cards N N, &c., having numbers or letters printed on them.

By turning these cams in one direction the cards are rotated up and behind the shields *i* and are concealed from view, but on turning them in the opposite direction they are lowered from behind the shields and can be read through the windows.

The cams are operated mechanically in a way I shall now proceed to describe.

A cord or chain, i^1, is passed through each of the cams, a hole being made for that purpose, and one end is connected with one of the spiral springs a^4, while the other is fastened to the uprights or movable rods K. These rods are connected with short shafts projecting from the horizontal rod H hung in bearings secured to the frame, and provided with the crank I^1. By turning this crank, which raises the rods K, the cords or chains i^1 rotate the cams on their axes, and in doing so turn the cards upward and behind the shields *i i*. When in this position the notches i^2 in the horizontal springs h^1 engage the lugs on the cams, and these are held securely and prevented from yielding to the strain of the spiral springs attached to the ends of the cords. This arrangement holds all the cards behind the shields. When, however, an alarm is sounded the armature-lever C^2, actuated by the electric current through the conducting-plate E E^1, &c., corresponding to the place from where the alarm or call is made, presses upon one of the keys corresponding to the same. The key lifts the horizontal spring and releases the cam, which is thereupon turned by the pressure of the spiral spring, and one of the cards is thrown down from behind the shield. Any number of the cards can be exposed by the armature-lever striking the proper keys, and one or all may be reset behind the shield by the crank I^1 and rod H, as the several cams and their attachments have no connection with each other directly, but only through the rod H. Therefore, in resetting the cards only those exposed or thrown down are acted upon. The keys D D^1 D^2 D^3, &c., by which the annunciating-cards are made to fall, are arranged in a circle on the key-board within reach of the armature-lever C^2, so that when it is drawn down by the electric current it touches each one of them. Any number of keys may be used, it being necessary that there should be one for each point from which an alarm or call is desired. There must be an annunciating-card for each key, and likewise a conducting-plate in the key-board.

As before mentioned, the rotation of the magnet is produced by clock-work, which is stopped or set in motion by an apparatus which will now be described.

The pinion-post *b* is pivoted in the frame of the clock work, and the pinion thereon is geared with the motive power. A fly, b^5, is fixed to the post, and rotates with it. Through the fly the movement of the clock mechanism is controlled by the stop-lever c^5 projecting at right-angles from the rod c^4, which is pivoted to the angle-plate c^6, and projects through an opening in the metal plate B^2, so as to be partly below the plate. A flat spring, c^3, fixed to the rod c^4, bears against the plate, and keeps the stop-lever c^5 from contact with the fly. When no other influence is brought to bear this arrangement permits the clock-work to move without interruption when the spring is wound up. To the lower end of the rod below the metal plate is fixed the lever *d*, which projects within the circle of the revolving armature-lever C^2.

By a switch arrangement presently described for breaking and closing the circuit the armature-lever, by closing the circuit, is made to press on the lever *d*, and keep the stop-lever in contact with the fly, and thus prevent the clock mechanism from moving, and to release it on breaking the circuit. The curved armature-lever presses on the lever *d*, and holds the stop-lever against the fly while the armature is down under the influence of the closed circuit; but as soon as the circuit is broken by the switch where the alarm or call is sounded the armature-lever is drawn up, releases the lever *d*, and the stop-lever c^5 is withdrawn from the fly, permitting the clock-work to move, revolving the magnet, and sounding an alarm on the bell *x* by means of the hammer a^5, actuated by the cam a^7 and spring a^4. The move-

ment of the clock-work may be continuous, or it may endure only during one revolution of the magnet and armature-lever; and this is effected by the following arrangement, constituting the cut-off: I is a rod supported in bearings under the key-board F. At one end is fixed the crank I^5, by which the rod is turned, and, under the key-board it carries the cut-off I^3, which enters a mortise in the key-board in the path of the drag-spring G, so that the latter passes over it in revolving with the magnet. The cut-off I^3 has three flat faces, the middle one being of a non-conducting substance, and it is connected with the battery-wire, and when the drag-spring presses on one of its conducting-faces the circuit is closed through the wire connecting the drag-spring with the magnet, but the circuit is broken so soon as the drag-spring leaves the conducting-face.

By means of the crank I^5 the rod I can be half rotated—that is, from the stop *f* to the notched spring I^4, which holds it in a horizontal position on one side, as shown in Fig. 1, and back again.

When the crank is in a horizontal position the conducting-faces of the cut-off are above the key-board; but when it is in a pendent position the non-conducting face is in the same situation. When the circuit is closed by placing the crank in a horizontal position the drag-spring G is held on the conducting-face of the cut-off, while the adjustment of the curved armature-lever is such that the instant the drag-spring is held it presses on the lever *d*, and stops the clock mechanism; but, when the circuit is broken, the drag-spring is released, and at the same instant the armature is relieved from the magnet, and, the armature-lever being drawn up, the fly is released, and the clock-work moves.

If the crank is held by the spring I^4 the movement of the clock-work will continue until the drag-spring again reaches the cut-off—that is, for one revolution—when it will again be held, and the clock-work stopped.

The instrument thus rests itself after every alarm. If, however, a continuous alarm is desired, the crank is carried to the other side, against the stop *f*, and held there until the drag-spring is again held over the cut-off, when its pressure will keep the crank in position. Now, when the current is broken and the armature released, the armature-lever relieves the stop-lever from contact with the fly, and the clock-work moves. The spring is carried from the cut-off, and the crank I^5 falls to a pendent position, turning the insulated face of the cut-off above the key-board. The drag-spring now passes over the cut-off without interruption, causing a continuous alarm, which only ends with the running down of the clock-work. So far as producing a continuous alarm, the action of the apparatus is automatic, requiring no attention after the crank is secured.

From this description it will be perceived that the closed circuit through the cut-off causes the armature-lever c^2 to hold the stop-lever against the fly, and thus control the clock-work, while the broken circuit, by releasing the armature, and, through that, the armature-lever, allows the clock-work to move; and that this movement may only continue for one revolution; or it may be continuous, or so long as the coiled spring C exerts any power.

When it is desirable to stop the clock-work independently of the magnet and electric current, I make use of the notched stop-lever d^5, pivoted to the plate B^2, and so arranged that when it is pressed against the rod c^4 the notch will clasp it and force it forward, so that the stop-lever will strike between the wings of the fly and be held there, preventing the fly from revolving.

This arrangement is not designed to be used at any other time than when it is not desired to operate the apparatus by the electric current.

The automatic switch M, which is placed at the point from where an alarm or call is desired, consists of the sheath *n*, which is fixed in the jamb of the door or window when the apparatus is used as an alarm, and secured in a mortise or socket therein. Through the bore *o* is passed the plunger *p*, made of a non-conducting material, having the knob *p'*, which presses against the spiral spring *q*, within the sheath. By pressing on this knob a slight reciprocating movement can be communicated to the plunger. Through the plunger, within the sheath, is inserted the metal pin *r*, and a similar pin, *r'*, is passed through the end, projecting out through the sheath. On the end of the sheath are secured the metal plates *s* *s'*. The indicating-wire t^1, communicating with the annunciating mechanism, is secured to the metal pin *r*, the battery-wire t^1 is attached to the metal plate *s'*, and the wire to the electro-magnet is attached to the metal plate *s*.

By pressing on the knob *p'* the pin *r* comes in contact with the metal plates, and thereby a complete circuit is established, the armature is attracted to the magnet, and thus the mechanism for stopping the clock-work is operated, as hereinbefore described; but when the plunger is released, the circuit is first broken and then reclosed by the pin *r'* coming in contact with the plates *s* *s'*, and at the same instant the indicator-wire *t* is switched on, and a half-circuit to one of the conducting-plates E E^1, &c., connected with the switch, is established, which is completed through the drag-spring, and thus the armature-lever is made to press on the key corresponding to this plate, and the annunciating-card shows the point from whence the alarm or call proceeded.

The switch here described is peculiarly adapted to doors, but when it is to be applied to a window a slight change in construction is necessary, for here the indicator-wire must be switched on by pressing the knob or plunger in. In this construction the indicator-wire is attached to the upper pin *r*, and the

first circuit—*i. e.*, the one which keeps the apparatus prepared to give an alarm—is closed by the lower pin r'.

The switch is inserted in the jamb of the window, with the knob resting in an inclined groove in the window-sash. Now, on raising the window the knob is pressed in, breaking the circuit, and then reclosing it through the pin r, and switching on the indicator-wire t.

When the apparatus is used as a call either one of these constructions may be adopted.

In the construction of the apparatus and its arrangement in the building the battery is placed in any convenient place; one of the battery-wires t^2 is run to the binding-screw 1, and thence to the electro-magnet, while the other is run to one of the automatic switches, and thence to all the others designed to be worked in connection with the same battery and annunciator, and the circuit is completed through the cut-off I^3.

Thus it will be seen that the instrument, when set in readiness for operation, is on a closed circuit, but the instant the drag-spring passes from the cut-off it continues to operate on a combination or series of open circuits until reset.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in an annunciator, of a series of indicating or numbered cards or signs and a single electro-magnet controlling the same, with intermediate mechanism, for the purpose of causing the proper sign or number to appear on sounding an alarm or call, substantially as set forth and described.

2. The combination of a revolving electro-magnet, an armature-lever, a drag-spring, and a system of keys for the purpose of announcing an alarm or call by the appearance of annunciating-cards indicating the place from whence the alarm or call proceeds, substantially as set forth and described.

3. The revolving electro-magnet provided with the armature-lever C^2 and drag-spring G, in combination with the cut-off I^3, the automatic switch M, and the clock-work, whereby the breaking of the circuit at the switch causes the clock-work to move and revolve the magnet, and the circuit is automatically closed to stop the same, substantially as set forth and described.

4. The keys D D^1, &c., in combination with the armature-lever C^2, the conducting-plates E E^1, &c., and the horizontal notched springs h^1, substantially as set forth and described.

5. The cams L carrying the annunciating-cards N, in combination with the horizontal springs h^1, rods I and K, chains or cords m', and keys D D^1, &c., substantially as set forth and described.

6. The conducting-plates E E^1, &c., in combination with the drag-spring G, the armature-lever C^2, and the automatic switch M, substantially as set forth and described.

7. The cut-off I^3, constructed as described, in combination with the automatic switch M, the revolving electro-magnet, the drag-spring G, and the armature-lever C^2, substantially as set forth and described.

8. The cut-off I^3, in combination with the crank I^5, substantially as set forth and described.

9. The automatic switch M, composed of the sheath n and plunger p, provided with the metal pins r r and the metal plates s s', in combination with two circuits to the annunciating apparatus, substantially as set forth and described.

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