(No Model.) 2 Sheets—Sheet 1.

L. BOCK, Jr.

ELECTRICAL INDICATOR.

No. 421,851. Patented Feb. 18, 1890.

Fig. 1.

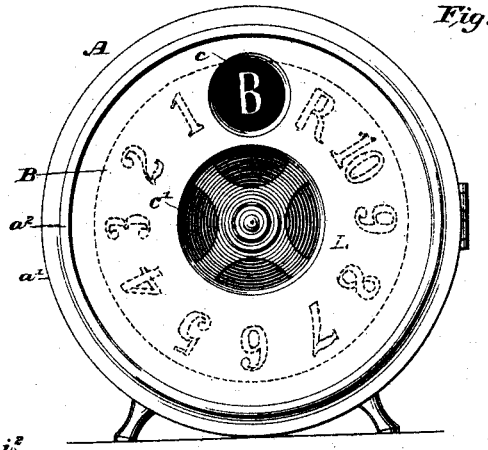


Fig. 2ª.

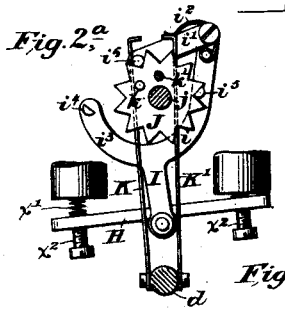


Fig. 2ᵇ.

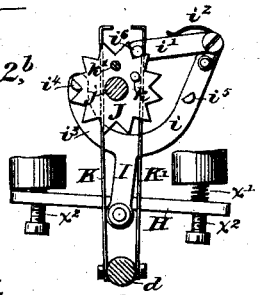


Fig. 2.

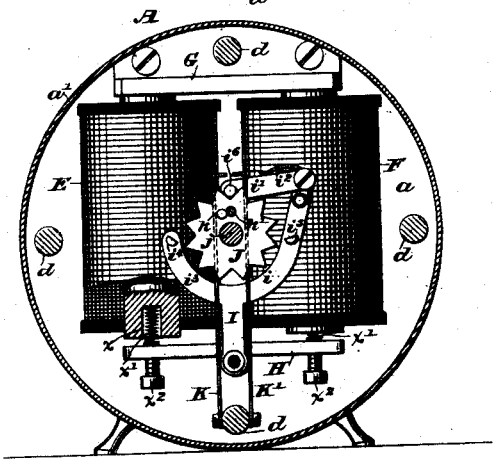
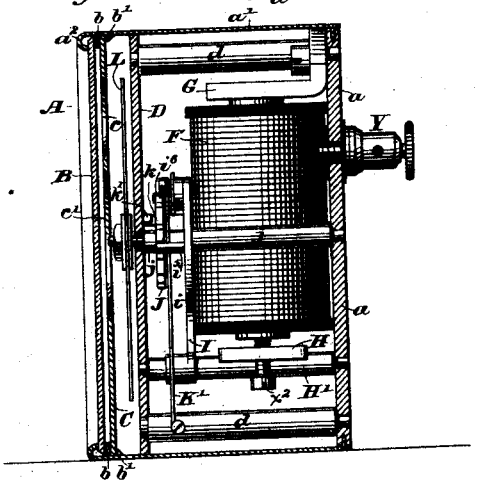


Fig. 3.



Witnesses
Geo. W. Breck.
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(No Model.) 2 Sheets—Sheet 2.

L. BOCK, Jr.

ELECTRICAL INDICATOR.

No. 421,851. Patented Feb. 18, 1890.

Fig. 4.

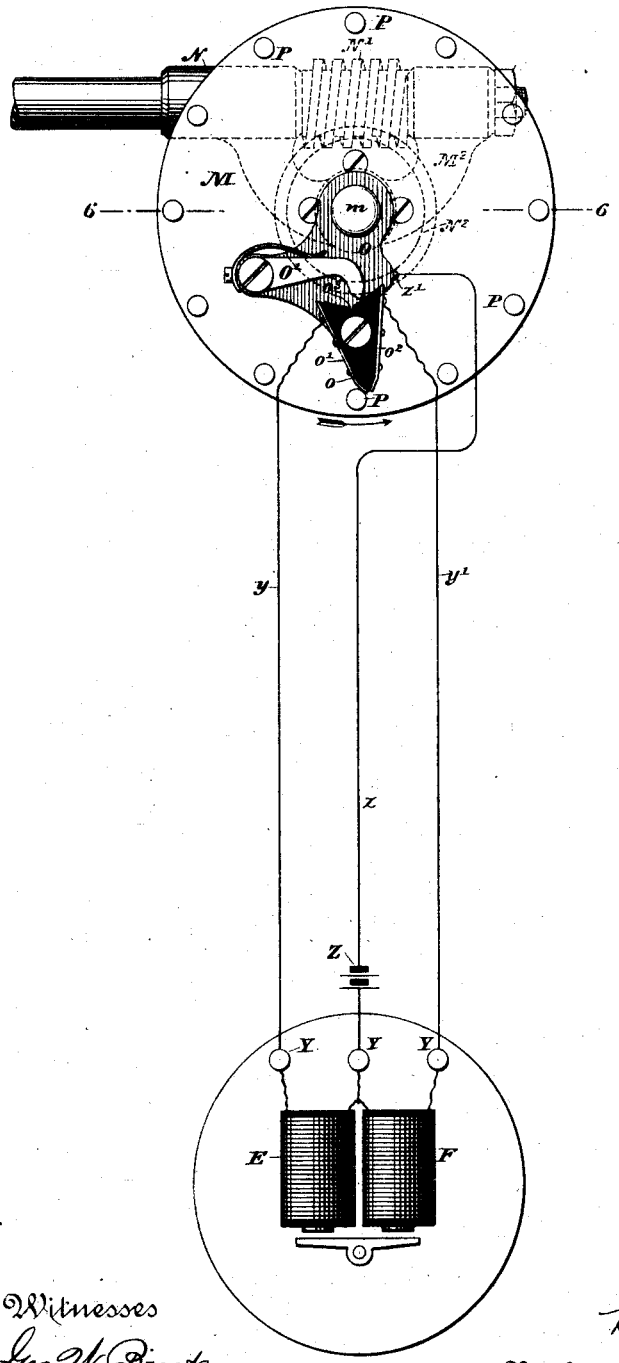


Fig. 5.

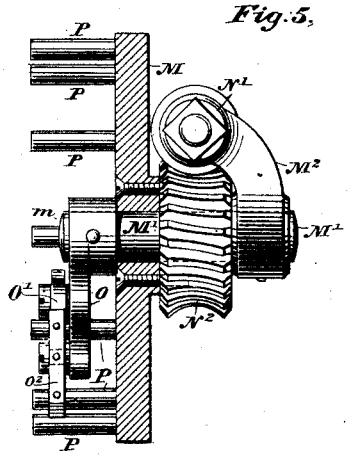
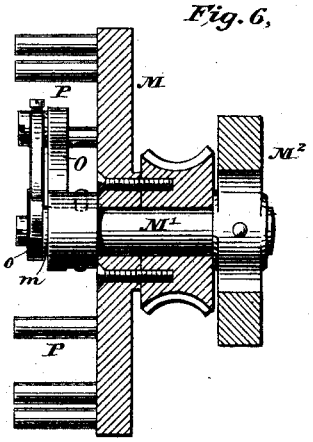


Fig. 6.



Witnesses
Geo. W. Breck.
Edward Thorpe.

Inventor
Leo Bock Jr.
By his Attorneys
Baldwin, Davidson & Wright.

UNITED STATES PATENT OFFICE.

LEO BOCK, JR., OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO CHARLES L. WRIGHT, OF SAME PLACE.

ELECTRICAL INDICATOR.

SPECIFICATION forming part of Letters Patent No. 421,851, dated February 18, 1890.

Application filed July 18, 1889. Serial No. 317,873. (No model.)

To all whom it may concern:

Be it known that I, LEO BOCK, JR., a citizen of the United States, residing in New York city, county and State of New York, have invented certain new and useful Improvements in Electrical Indicators, of which the following is a specification.

My invention is especially designed to indicate in the office of the superintendent of a building the running and position of an elevator in its shaft.

My invention consists, primarily, in providing improved circuit making and breaking devices operated correspondingly with the movement of the elevator and opening and closing electric circuits, including electro-magnetic devices, actuating a disk, wheel, or plate bearing indicating numbers, letters, or other characters.

My invention also consists in certain novel organizations of apparatus and details of construction, hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a front elevation of my improved indicator. Fig. 2 is a front view, partly in section, of the electro-magnetic step-by-step actuating devices for the indicator-disk. Fig. 2^a is a detail view, showing some of the parts in a different position from that shown in Fig. 2; and Fig. 2^b shows those parts in still another position. Fig. 3 is a vertical central section through the indicating apparatus, some of the parts being shown in side elevation. Fig. 4 shows in diagram the circuit making and breaking devices and the circuit-connections with the electro-magnets of the indicator. Fig. 5 is a vertical central section, with some of the parts in side elevation, of the circuit-breaker; and Fig. 6 is a central section of the same on the line 6 6 of Fig. 4.

The indicating apparatus is inclosed by a casing A, preferably cylindrical. A sheet-metal body portion a' is secured to the back plate a, and at the front ends is beaded or bent at a^2, where it bears against the edge of the transparent front plate B. A bearing-ring b is secured to the inner side of the casing, near its front end, and the plate B is held firmly between the front edge of the ring b and the beaded end a^2 of the casing. The non-transparent disk or shield C is secured at its edge between the rear face of the ring b and the ring b'. The shield C is formed with an opening c near the top, through which the indicating-characters on the indicator disk or wheel are exhibited. As shown, the shield C is also formed with a central opening c'; but this is not essential. A circular frame-plate D, located near the front end of the casing, is secured to rods or posts d, the rear ends of which are secured to the back-plate a. Electro-magnets E and F, secured within the casing to a bracket G, attached to the back-plate a, have their armature H secured to a shaft H', pivoted on the back-plate a and frame-plate D. The cores of the magnets are recessed at x, as shown in Fig. 2, to receive the coiled springs x', which bear against the armature or against adjusting-screws x^2, as shown, to normally hold the armature from the magnets, but which readily yield when the armature is attracted, to allow the armature to swing on its pivot toward the magnet. The adjustment is such that the springs tend normally to hold the armature in a horizontal position, as shown in the drawings. When one end of the armature is, by one of its springs, forced away from the core of the magnet which has just been demagnetized, it assumes a horizontal position, as in Fig. 2. A bifurcated pawl-carrying lever I is secured to the armature-shaft H', and the upwardly-extending arm i carries a push-and-pull pawl i', which is held by a spring i^2 in engagement with a star-wheel J on the indicator-shaft j. On the arms i and i^3 of the lever are secured pins or studs i^4 i^5 at equal distances from the pivot H' of the lever I. The pins i^4 i^5 limit the movement of the wheel J, and also aid in turning it. When the pawl is moved forward or to the left, as shown in Fig. 2^a, the pin i^5 enters between the teeth on the right-hand side of the wheel. By bearing against the upper edge of the tooth immediately below it the movement of the wheel to the left or in a direction contrary to that of the hands of a watch is prevented. At the same time by sliding along the inclined edge of the tooth the wheel is turned slowly to the right to meet the pawl as it moves to the left to take hold upon another tooth. On the backward movement of the pawl the pin recedes from the star-wheel and the wheel is moved to the right a distance of one tooth.

When the apparatus is worked in an opposite direction, the pin i^5 works in a similar way.

The spring i^2, which holds the pawl i' in engagement with the star-wheel J, is secured to the upper end of the arm i, and that part of the pawl which engages with the star-wheel is shown as formed by a pin i^6 projecting laterally from the pawl i'. The throw of the pawl is limited by rods or wires K, against which the pin i^6 abuts, and which are secured to one of the posts d and hooked at their upper ends to hold the pin i^6 in engagement with the star-wheel should the force of the spring i^2 be insufficient. A stop-pin k is secured to the star-wheel J, and a corresponding stop-pin k' is secured to the frame-plate D in the line of revolution of the pin k. The wheel may be turned nearly a complete revolution—*i. e.*, assuming the wheel is in the position shown in Fig. 2, with the pin k lying against one side of the pin k', it may be turned till the pin k abuts against the opposite side of the pin k'.

The indicator-disk L is secured to the shaft J in front of the frame-plate D and in rear of the shield C. As shown in Fig. 1, indicating characters—such as numbers and letters—are arranged on the face of the disk around its edge at equal distance apart. As the disk is revolved the characters are brought to view in rear of the opening c in the shield C.

The operation of the indicating apparatus will be described after a description of the circuit making and breaking devices with which it is electrically connected.

A disk or wheel M, (shown in Figs. 4, 5, and 6,) is mounted loosely on a shaft M', which extends rearwardly from the wheel and is supported in a bracket M^2, which also forms a bearing for the end of a shaft N connected with some moving part of the apparatus for raising and lowering the elevator. The end of the shaft N is provided with a worm N', which gears with a worm-wheel N^2, loosely mounted on the shaft M' and secured rigidly to the wheel M. A contact-carrying frame O, suspended loosely from the forwardly-projecting end m of the shaft M', carries a block o of insulating material, to opposite sides of which contact-plates o' o^2 are respectively secured. The block o is shown approximately triangular in shape, its outer end being abruptly tapered, and the contact-plates lie closely against its sides. The inner or larger end of the block is cut away or recessed and provided with a central notch o^3, from which the inclined faces of the inner end of the block diverge. A spring-dog O', pivoted on the frame O, engages with the recessed upper end of the block, and its tapered end enters the notch o^3 to hold the block steady, but yields when the block is shifted to change the circuit. Contact pins or teeth P, secured to the wheel M near its edge and arranged at equal distance apart, make contact successively with the contact-plate on one side of the block O as the wheel is rotated in one direction, and with the other plate as it is turned in the opposite direction. The contact-plates o' and o^2 are electrically connected, respectively, by wires y y', through binding-posts Y, with the coils of the electro-magnets E and F, and the return-wire z is connected with both magnets, with battery Z, and with the frame O at z'. The frame O, shaft M', wheel M, and pins P are preferably metallic, so that the pins are all electrically connected with the wire z. Any other suitable way of connecting the pins P with the wire z may be employed.

The apparatus thus constructed operates as follows: The elevator in moving up and down in its shaft through suitable connecting apparatus correspondingly moves the shaft N in opposite directions. Assuming that the elevator is at the top of the shaft and starts down, the shaft N revolving turns the wheel in the direction indicated by the arrow, and by means of the gear N' N^2 causes the pins to be alternately brought into engagement with the contact-plate o'. Each time that the pin P engages the plate o' the circuit is closed through the magnet E and the adjacent end of the armature is attracted, thus rocking the bifurcated lever I and causing the pawl i i^6 to move the star-wheel one tooth. The pin i^4 supplements the action of the pawl i i^6 in moving the wheel by sliding along the inclined edge of the adjacent tooth, and also limits the movement of the wheel by entering between the teeth and stopping its further movement. At each actuation of the wheel the indicator-disk L is correspondingly moved, bringing the characters in succession to view at the opening c. When the characters on the disk O have all been successively brought to view, the pin k on the wheel J abuts against the pin k' on the frame-plate D and the revolution of the disk is stopped. The elevator is now at the end of its travel and ready to reverse its movement. When the elevator moves in the opposite direction, the wheel M will be reversed in its movement and the contact-pins will be brought successively into engagement with the contact-plate o^2, thus closing successively the circuit through the circuit-wires y' z and the magnet F.

I have described in detail the construction and operation of an apparatus embodying my invention which is deemed practical and efficient; but obviously my improvements may be embodied in apparatus differing in details of construction from that herein described without departing from the novel features of my invention. The devices for actuating the star-wheel or similar parts, the stop devices, and other parts of the apparatus claimed may be used in apparatus differing in general design and in details of construction.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of the supporting-frame, the disk or plate, electro-magnetic devices for moving it alternately in opposite directions,

a stop connected with and moved around with the disk, and a stop fixed to the supporting-frame and against the opposite sides of which the other stop abuts.

2. The combination, substantially as hereinbefore set forth, of the supporting-frame, the disk or plate, electro-magnetic devices for moving it alternately in opposite directions, a stop connected with and moved around with the disk, a stop fixed to the supporting-frame and against the opposite sides of which the other stop abuts, the electric circuits, and devices, substantially such as described, for opening and closing the circuits.

3. The combination, substantially as hereinbefore set forth, of the indicator-disk, its shaft, the star-wheel on the shaft, the electro-magnets, the pivoted armature, a pawl connected with the armature and actuating the star-wheel in opposite directions, stops for limiting the opposite movements of the disk, electric circuits, including the magnets, and devices for opening and closing the circuits.

4. The combination, substantially as hereinbefore set forth, of the indicator-disk, its shaft, the star-wheel on the indicator-shaft moving in opposite directions, the electro-magnets, the armature pivoted in front of the magnets, a pawl for actuating the star-wheel, a bifurcated pawl-carrying lever secured to the armature, and the pins parallel with the axis of the star-wheel and projecting laterally from the arms of the bifurcated lever and engaging with the star-wheel.

5. The combination, substantially as hereinbefore set forth, of the indicator-disk, its shaft, the star-wheel on the indicator-shaft, the electro-magnets, the armature pivoted in front of the magnets, the pawl for actuating the star-wheel in opposite directions, a bifurcated pawl-carrying lever secured to the armature, pins on the armature of the bifurcated lever engaging with the star-wheel, and the stops for limiting the movement of the indicator-disk.

6. The combination, substantially as hereinbefore set forth, of the star-wheel, the bifurcated pawl-carrying lever, the push-and-pull pawl at one side of the star-wheel, and a lateral extension i^6 on the pawl, engaging with the star-wheel, and the pins on the arms of the bifurcated lever, also engaging with the star-wheel.

7. The combination, substantially as hereinbefore set forth, of the star-wheel, the rocking bifurcated lever, the push-and-pull pawl carried thereby and engaging the teeth of the star-wheel, the pins on the bifurcated lever, and lever-rocking devices for successively moving it on either side of a central or neutral position, whereby the wheel may be rotated in either direction.

8. The combination, substantially as hereinbefore set forth, of the oppositely-revoluble star-wheel, the rocking bifurcated lever, the push-and-pull pawl carried thereby and engaging with the teeth of the star-wheel, the pins i^4 i^5 on the bifurcated lever, devices for successively moving the lever in opposite directions, and springs for limiting the movement of the lever in the direction opposite to that in which it is positively moved or actuated.

9. The combination, substantially as hereinbefore set forth, of the electro-magnets, the armature pivoted between the magnets, the oppositely-revoluble star-wheel, the bifurcated pawl-carrying lever secured to the armature, the push-and-pull pawl at one side of the star-wheel, and a lateral extension i^6 on the pawl, engaging with the star-wheel, and the pins on the arms of the bifurcated lever, also engaging with the star-wheel.

10. The combination, substantially as hereinbefore set forth, of the electro-magnets, the armature pivoted between the magnets, the springs between the armature and the cores of the magnets, the oppositely-revoluble star-wheel, the bifurcated pawl-carrying lever secured to the armature, the push-and-pull pawl having a lateral extension engaging with the star-wheel, and the pins on the arms of the bifurcated lever, also engaging with the star-wheel.

11. The combination, substantially as hereinbefore set forth, of the electro-magnets, the armature, the star-wheel, the pawl having a lateral extension engaging with the star-wheel, the hooked rods for holding the pawl in engagement with the star-wheel, and the pawl-carrying lever secured to the armature.

12. The combination, substantially as hereinbefore set forth, of the rotating contact-carrying wheel, means for turning it in opposite directions, the contact-carrying frame, and the insulated contact-plates carried on opposite sides of the frame and engaging with the contacts on the wheel.

13. The combination, substantially as hereinbefore set forth, of the rotating wheel, the contact-pins thereon, the contact-carrying frame, the contact-plates engaging with the contact-pins, a triangular block of insulating material, to which the contact-plates are secured and which is secured to the frame.

14. The combination, substantially as hereinbefore set forth, of the rotating contact-carrying wheel, the shaft on which it is loosely mounted, the worm-wheel on the shaft secured to the wheel, a worm on the operating-shaft engaging with the worm-wheel on the wheel-shaft, the loosely-supported contact-carrying frame, and the contact-plates on opposite sides thereof engaging with the contacts on the wheel.

15. The combination, substantially as hereinbefore set forth, of the indicator-disk, the electro-magnets, the armature pivoted between the magnets, connections between the armature and the indicator-disk, the contact carrying wheel, an electric circuit connecting both magnets with the contact-carrying wheel, the contact-carrying frame, the insulated contact-plates thereon, and a separate

electric circuit connecting each magnet with a contact-plate.

16. The combination, substantially as hereinbefore set forth, of the contact-carrying wheel, means for turning it in opposite directions, the contact-carrying frame, the recessed block of insulating material secured to the frame, a spring-dog engaging with the recess in the block, and contact-plates on opposite sides of the insulating-block.

In testimony whereof I have hereunto subscribed my name.

LEO BOCK, JR.

Witnesses:
EDWARD C. DAVIDSON,
M. J. KELLEY.