

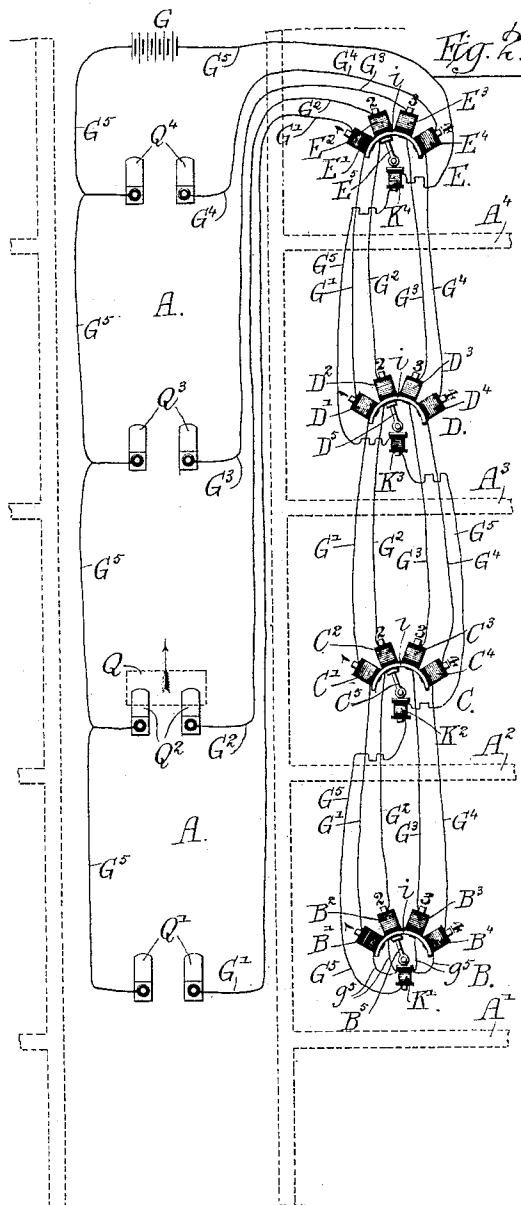
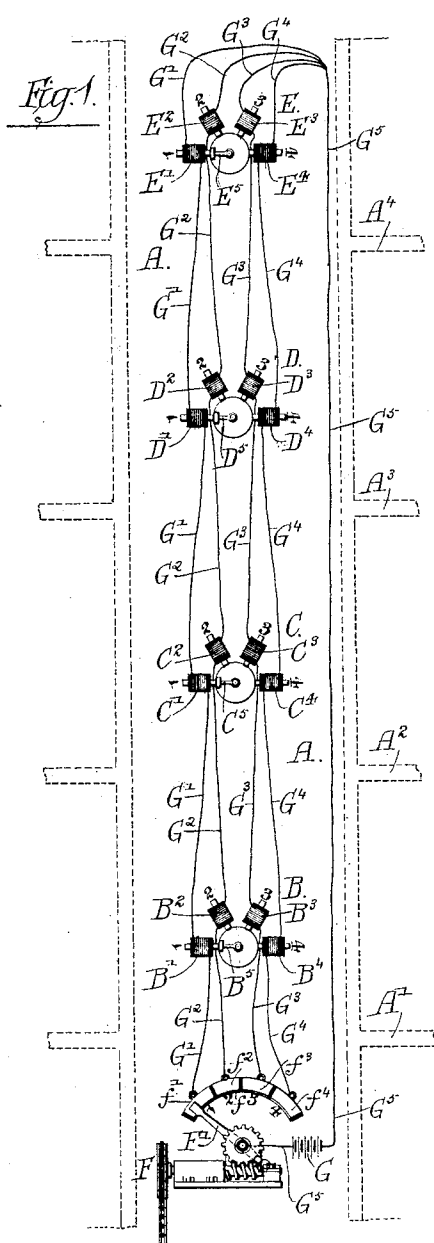
(No Model.)

3 Sheets—Sheet 1.

C. G. ARMSTRONG.
ELECTRICAL INDICATOR FOR ELEVATORS.

No. 462,835.

Patented Nov. 10, 1891.



Witnesses:

Louis M. F. Whithead.

Samuel Miller

Inventor:

Charles G. Armstrong.

By: Clayton, Poole & Brown.

His Attorneys.

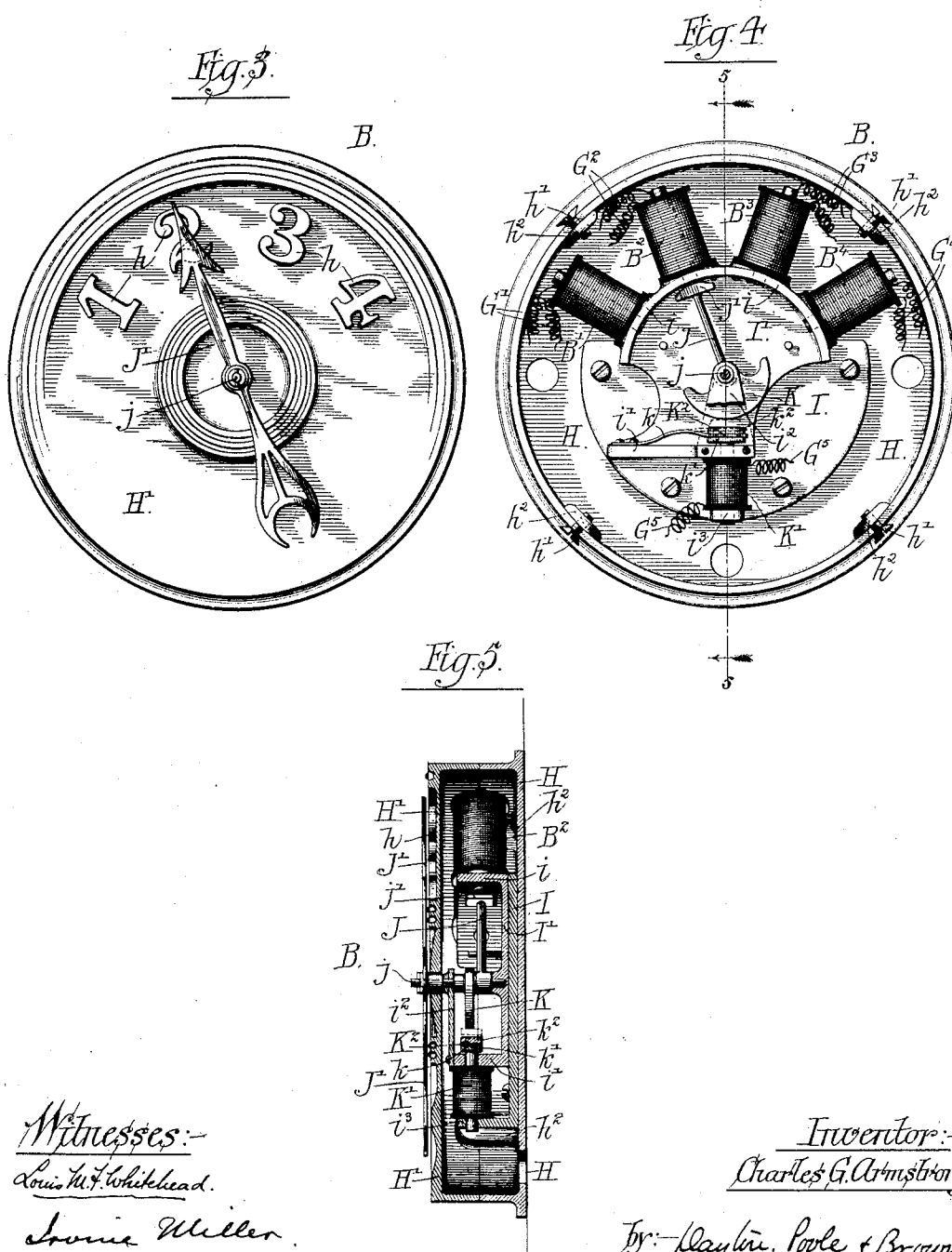
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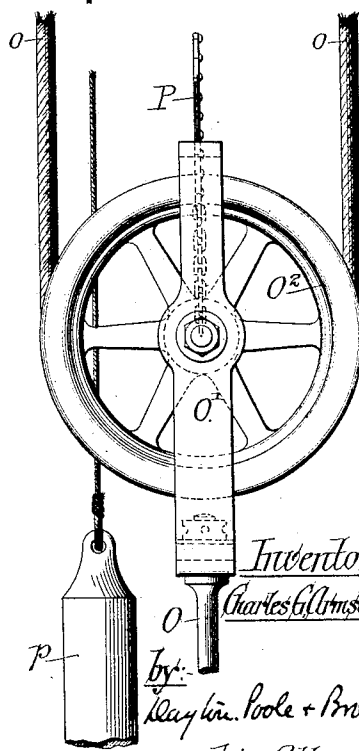
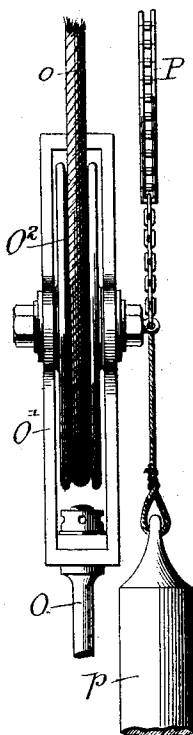
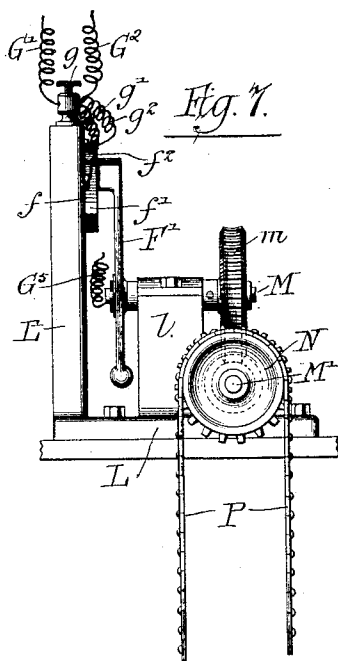
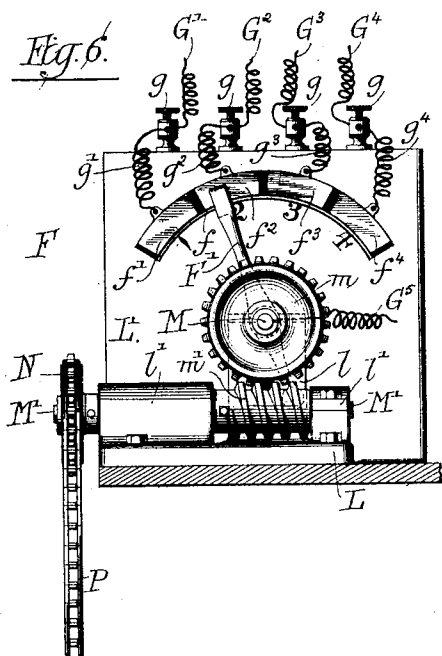
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Inventor:
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His Attorneys

UNITED STATES PATENT OFFICE.

CHARLES G. ARMSTRONG, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF
TO DANKMAR ADLER, OF SAME PLACE.

ELECTRICAL INDICATOR FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 462,835, dated November 10, 1891.

Application filed March 10, 1891. Serial No. 384,396. (No model.)

To all whom it may concern:

Be it known that I, CHARLES G. ARMSTRONG, of Chicago, in the county of Cook and State of Illinois, have invented certain
5 new and useful Improvements in Electric Indicators for Elevators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the
10 letters of reference marked thereon, which form a part of this specification.

This invention relates to indicators for elevators, and has for its object to provide an electrically-operated mechanism by means of
15 which the position of the elevator will be simultaneously indicated at a suitable point on each floor of the building, so that the location and direction of movement of the elevator-car may be known by a simple inspection of the indicator.

Referring to the accompanying drawings, Figure 1 is a diagrammatic view of a structure embodying one form of my invention. Fig. 2 is a similar view of a modification thereof. Fig. 3 is an elevation or face view of the indicator proper. Fig. 4 is a view of the same with the face-plate or dial removed. Fig. 5 is a vertical section taken on the line
5 5 of Fig. 4. Fig. 6 is an enlarged elevation of a portion of the mechanism shown in Fig. 1. Fig. 7 is a side view of the same.

In Figs. 1, 3, 4, 5, 6, and 7 I have shown an apparatus in which my invention is practically carried out in one way. The diagram shown in Fig. 1 illustrates the general arrangement of the apparatus, while the remaining figures show the operative parts thereof in detail. In said diagram, A indicates the elevator well or shaft, and A' A² A³
40 A⁴ the stories or floors of the building, these parts being indicated in dotted lines. At each floor is located an indicator at some suitable point where it may be readily consulted—as, for instance, over or at the side
45 of the elevator-door. Each indicator is composed, essentially, of an armatured index or pointer and a plurality of electro-magnets corresponding in number with the number of floors of the building served by the elevator.
50 For instance, in the present case, in which

four stories are shown, there are four indicators B, C, D, and E, located, respectively, on the floors A', A², A³, and A⁴. The indicator B comprises the electro-magnets B', B², B³, and B⁴ and the armatured index or pointer
55 B⁵. The indicator C comprises the electro-magnets C', C², C³, and C⁴ and the armatured index or pointer C⁵. The indicator D comprises the electro-magnets D', D², D³, and D⁴ and the armatured index or pointer D⁵. The
60 indicator E comprises the electro-magnets E', E², E³, and E⁴ and the armatured index or pointer E⁵. At some suitable point—as, for instance, at the bottom of the elevator-shaft, as shown in Fig. 1—is arranged a circuit-
65 closer, which is in the present instance a commutator F, operated by the hoisting mechanism or car in any suitable manner. As shown, it consists, essentially, of a pivoted contact-arm F' and a fixed arc f, having
70 insulated segments f', f², f³, and f⁴, corresponding in number to the floors or stories of the building.

The magnets B', C', D', and E' and the commutator-segment f' are connected in a series
75 by means of a wire G', and are therefore located in a separate circuit. The magnets B², C², D², and E² and the commutator-segment f² are similarly connected by means of a wire G². The magnets B³, C³, D³, and E³ and
80 the commutator-segment f³ are connected in a series by a wire G³, while the magnets B⁴, C⁴, D⁴, and E⁴ and the commutator-segment f⁴ are similarly connected by a wire G⁴. These several wires are united at one end—
85 for instance, the upper end, as shown in Fig. 1—to a common return-wire G⁵, which connects with the contact-arm F' and thus completes the circuit, which latter is provided with a battery G, located therein at some suit-
90 able point.

The operation is as follows: The elevator-car being in its lowest position at the first floor, the contact-arm F' bears upon the segment f' and the current passes through the
95 circuit G' G⁵, the electro-magnets of the first series B', C', D', and E' being in said circuit and being energized, so that they attract the corresponding armatured indexes or pointers B⁵, C⁵, D⁵, and E⁵ and hold them in posi-
100

tion to indicate upon a suitable dial the position of the elevator. As the car moves upward the contact-arm F' moves to a corresponding or proportional extent, so that when the car reaches the second floor the contact-arm will bear upon the second segment f^2 of the commutator. The circuit is now established through G^2 G^5 , and the second series of magnets B^2 , C^2 , D^2 , and E^2 , being in said circuit, will be energized and will in their turn attract and hold the indexes or pointers B^5 , C^5 , D^5 , and E^5 . Similarly when the car reaches the third story the contact-arm F' will bear on the third segment f^3 of the commutator and the circuit G^3 G^5 and the third series of magnets B^3 , C^3 , D^3 , and E^3 therein will be energized and will attract and hold the indexes or pointers. When the elevator reaches the fourth story, the contact-arm will bear on the fourth segment f^4 , and the circuit G^4 G^5 , with the fourth series of electro-magnets B^4 , C^4 , D^4 , and E^4 , will be energized and the indexes or pointers of the several indicators moved and held accordingly. Whatever the position of the car may be, the position of the contact-arm will be a corresponding one, and the corresponding series of magnets will be energized to indicate such position through the medium of the pointers.

It is obvious that relative arrangements of the magnets of the indicator other than that shown may be made, and the movement of the index or pointer may be in a straight line, instead of in the arc of a circle. In other words, the pointer may slide and the magnets may be arranged in a corresponding straight line. Moreover, any approved form of commutator or circuit-closer may be substituted for that shown.

I will now describe in detail the operative parts of the apparatus, it being of course understood from what precedes that while the forms shown and described are those which I prefer I do not in any way limit myself to them.

The indicator proper B is shown in detail in Figs. 3, 4, and 5, and has an inclosing casing H , provided with a removable face plate or cover H' , forming a dial having figures or numerals h thereon to designate the several floors or stories. The cover H' is secured by screws h' , which pass through the marginal flange of said cover into apertured lugs h^2 on the body of the casing.

I represents a base-plate secured to the inner face of the back of the casing H and carrying a supporting-bracket I' , on which the various operative parts are mounted. The bracket I' has at its top a flange i , having the segmental form shown, and on this flange are mounted the electro-magnets B' , B^2 , B^3 , and B^4 , the cores of which extend through said flange and may project below the same to a slight extent, if desired. At its lower end the bracket I' is provided with a flange i' , from which rises an upright i^2 . This upright forms one bearing of a shaft j , the other bearing of

which is formed in the bracket I' , as clearly shown in Fig. 5.

J indicates a radial arm on said shaft provided with an armature j' to co-operate with the electro-magnets B' , B^2 , B^3 , and B^4 , and J' indicates an index or pointer mounted on the shaft j at its forward end, where it extends through a suitable aperture in the cover H' . The arm J' is parallel with the arm J and travels over the figures h on the dial of the cover. These parts—the arms J and J' , shaft j , and armature j' —form as a whole the armatured index or pointer B^5 , referred to in the description of Fig. 1.

For purposes hereinafter set forth, I contemplate providing the index or pointer with a brake or detent, and in Figs. 4 and 5 I have shown a construction which I have devised for this purpose. On the shaft j there is mounted a segment K , the periphery of which may be roughened, if desired. Below the segment K is located an electro-magnet K' , mounted between the flange i and an arm i^3 on the base-plate I , its core extending upward through the flange i , while its coil forms a portion of the return-wire G^5 . Between the segment K and electro-magnet K' is arranged a brake K^2 , consisting of a spring k , secured on the flange i' and tending normally to engage the segment K , said spring being provided on its under side with an armature k' , located in the field of the magnet K' , and on its upper side with a brake-shoe k^2 , preferably of brass or other comparatively soft metal, as is also the segment K . It will be seen that when the electro-magnet K' is energized it will attract the armature k' and thus draw the spring k downward, thereby disengaging the brake-shoe k^2 from the segment K . At all other times, however, the said shoe engages the segment and holds the shaft j and its connected parts stationary.

In Figs. 6 and 7 I have shown in detail the commutator F , referred to in describing Fig. 1, as well as one form of operating mechanism therefor. In this construction L represents a suitable base, and L' an upright thereon, on which latter the fixed arc f is mounted. The ends of the wires G' , G^2 , G^3 , and G^4 are secured to a corresponding series of binding-posts g on top of the upright L' , a separate series of wires g' , g^2 , g^3 , and g^4 being used to connect the several binding-posts and main wires with the respective segments f' , f^2 , f^3 , f^4 of the fixed arc f . In a suitable bearing l on the base L is mounted a shaft M , which carries the contact-arm F' , and is provided with a worm-wheel m , with which meshes a worm m' on a shaft M' , arranged at right angles to the shaft M in suitable bearings l' on the base L . The end of the shaft M' extends beyond the base L and receives a sprocket-wheel N , or other means for applying power to said shaft, to rotate the same. It will be observed that all the parts so far enumerated are mounted on the base L , so that the entire commutator forms a separate machine, which

may be moved from point to point and may be set up and removed as a whole with great convenience.

In the present instance I have shown the commutator as employed in connection with a hydraulic elevator of the vertical-cylinder type and actuated from the piston-rod thereof. O represents such a piston-rod, O' the yoke, and O² the pulley or wheel thereof, around which the cable *o* passes. P represents a sprocket-chain connected with the yoke O' at one end and passing over the sprocket-wheel N, its other end being provided with a counter-weight *p*, by which it is kept taut. It is obvious that the motion of the elevator-car resulting from the rise and fall of the piston-rod O will be communicated in a corresponding degree to the contact-arm F, the several parts being so proportioned that the movement of the arm over one segment of the arc *f* will correspond exactly with the movement of the car through one story of the building.

As I have already stated, the commutator F may be of any approved form, and may, in fact, be dispensed with, other forms of circuit-closing devices being substituted therefor. As an illustration, I have shown in Fig. 2 a modified form of apparatus in which circuit-closing devices, partly on the elevator-car and partly on the wall of the elevator-shaft, are employed. In this construction there is attached to the car a contact-plate Q, (shown in dotted lines in Fig. 2,) and there are arranged in pairs on the wall of the shaft or some other suitable support contact-pieces Q', Q², Q³, and Q⁴ at each story of the building. One contact-piece of each pair is connected with the corresponding wire G', G², G³, or G⁴ and the remaining contact-pieces of the several pairs are all connected with the return-wire G⁵, which has a series of brake-controlling electro-magnets K' K² K³ K⁴, one in each indicator and all similar in the construction and operation of their associated parts to the electro-magnet K' and the brake mechanism controlled thereby, which has already been fully described. The wire G⁵, after it leaves the coil of the magnet K', is connected with the coils of each of the magnets B', B², B³, and B⁴ by means of branch wires *g*⁵, as indicated in Fig. 2.

In order to illustrate the operation of the apparatus thus modified, suppose the car to be moving forward. With the parts in the position shown, the contact-plate Q on the car being in contact with both of the contact-pieces Q² of the second story, the current passes from one of the contact-pieces Q², through the wire G⁵ and the battery G, and also through the coils of the series of brake-controlling magnets K⁴, K³, K², and K', thereby retracting the brake-springs and freeing the indexes or pointers. The current passes thence through the proper branch wire *g*⁵ to the coil of the magnet B² and thence through the wire G² and the coils of the other mag-

nets C², D², and E² of the second series to the other contact-piece Q², the contact-plate Q completing the circuit. The magnets of the second series being thus energized attract and hold their respective indexes or pointers until the time when the contact-plate Q passes clear of the contact-pieces Q², when the circuit is broken, and the springs *k* act to engage the several brake-shoes *k*² with their segments K and thus hold the pointers in position until the next floor is reached by the car, when the circuit is again established; but this time through the third series of electro-magnets. In each case the brakes are released during the operative period of the magnets of the several series and applied simultaneously with the cessation of such period to hold the pointers until the next series comes into play.

The brake mechanism shown may be employed in conjunction with the form of apparatus shown in Fig. 1, if desired, as a means for holding the pointers in position during the passage of the contact-arm from one segment of the commutator to the next segment, and will operate in an obvious manner to prevent the pointers from falling by gravity out of the field of the next series of magnets if the current be interrupted during such passage.

What I claim is—

1. The combination, with an elevator-shaft having a plurality of doorways, an elevator and its actuating mechanism, of an indicating device comprising a battery or other source of electricity, a plurality of indicators, one located at each doorway, and each consisting of a plurality of electro-magnets equal in number to the indicators, an index or pointer, a dial having characters indicating the several doorways, and a movable armature connected with and actuating said pointer, conductors forming a plurality of circuits, each of which includes one magnet of each indicator, and a commutator or circuit-closer actuated by a moving part of the elevator mechanism, and which operates to successively close the said several circuits during the movement of the elevator, substantially as described.

2. An indicator for elevators, comprising a battery or other source or generator of electricity, an index or pointer, a movable armature connected with and actuating said index or pointer, a brake for controlling said armature and pointer, an electro-magnet controlling the said brake, a plurality of electro-magnets for successively actuating said armature, and a commutator or other circuit-closer actuated by a moving part of the elevator to successively energize said electro-magnets.

3. In an indicator for elevators, the combination, with the index or pointer and its shaft, of a sector mounted on said shaft, a spring-actuated brake normally engaging said sector, and an electro-magnet arranged in the circuit and adapted when energized to with-

draw said brake from engagement with said sector.

4. In an indicator for elevators, the combination, with indicators embracing electro-
5 magnets and armatures constructed and arranged as set forth, of a commutator comprising a fixed are composed of insulated segments, each connected with a corresponding
10 series of electro-magnets, and a contact-arm connected with each of said series of electro-magnets and actuated from a moving part of the elevator to successively bear on each of
said segments.

5. In an indicator for elevators, the combination, with a segmental commutator are, of

a contact-arm and its shaft provided with a worm-wheel, a second shaft having a worm to mesh therewith and provided with a sprocket-wheel, and a sprocket-chain passing over said wheel and connected at one end with a
20 moving part of the elevator, its other end being provided with a counter-weight.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

CHARLES G. ARMSTRONG.

Witnesses:

TAYLOR E. BROWN,
GEORGE W. HIGGINS, Jr.