(No Model.) 2 Sheets—Sheet 1.

H. C. BLISS.

Electrical Indicator for Elevators.

No. 234,945. Patented Nov. 30, 1880.

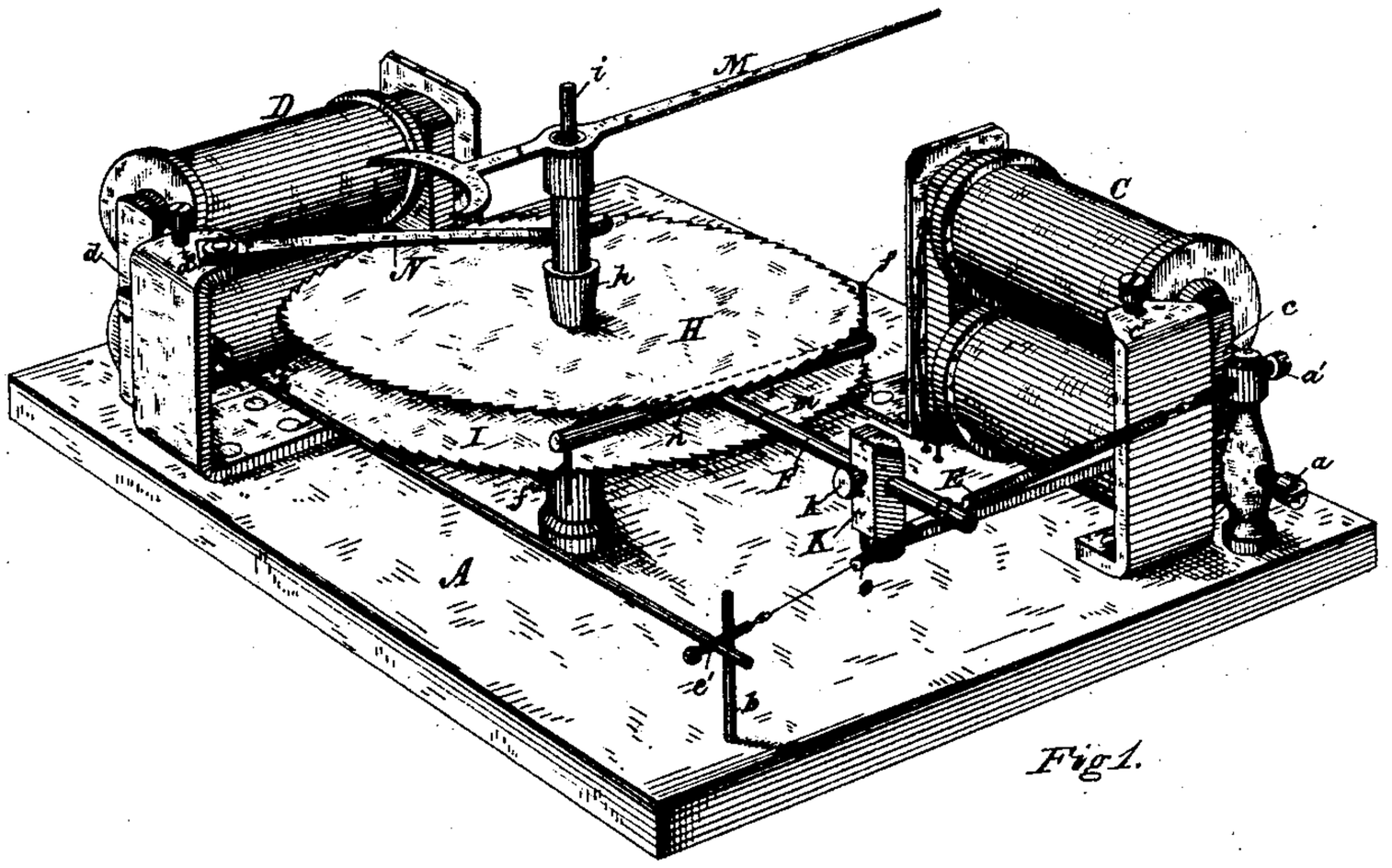


Fig 1.

Fig 3.

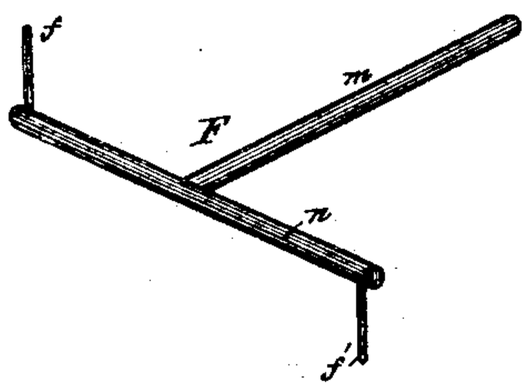
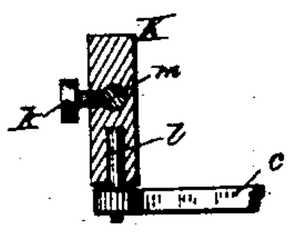


Fig 5.



Witnesses.

Harry King.

Theo C. Davis

Inventor.

Henry C. Bliss

(No Model.)

2 Sheets—Sheet 2.

H. C. BLISS.

Electrical Indicator for Elevators.

No. 234,945. **Patented Nov. 30, 1880.**

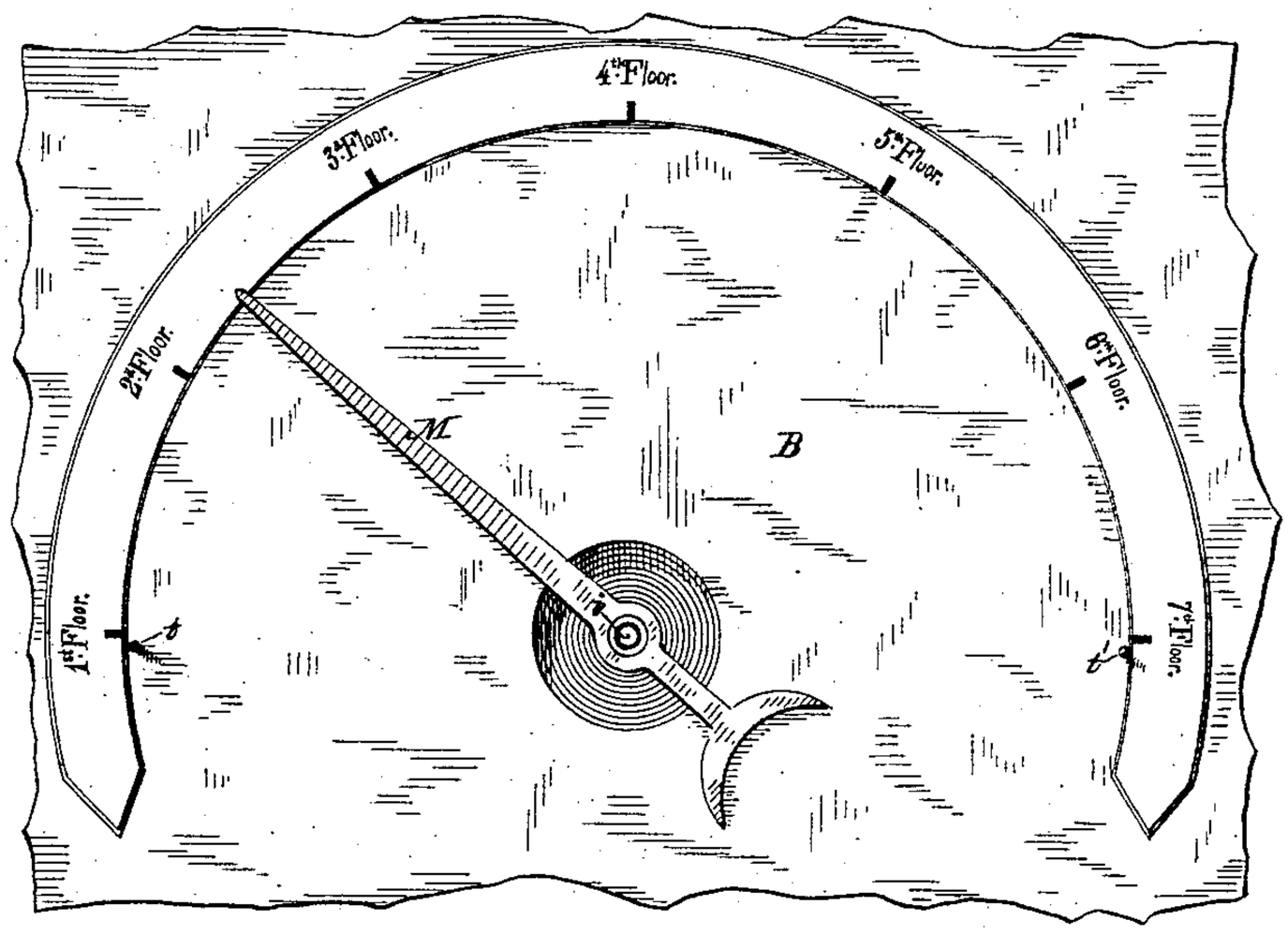
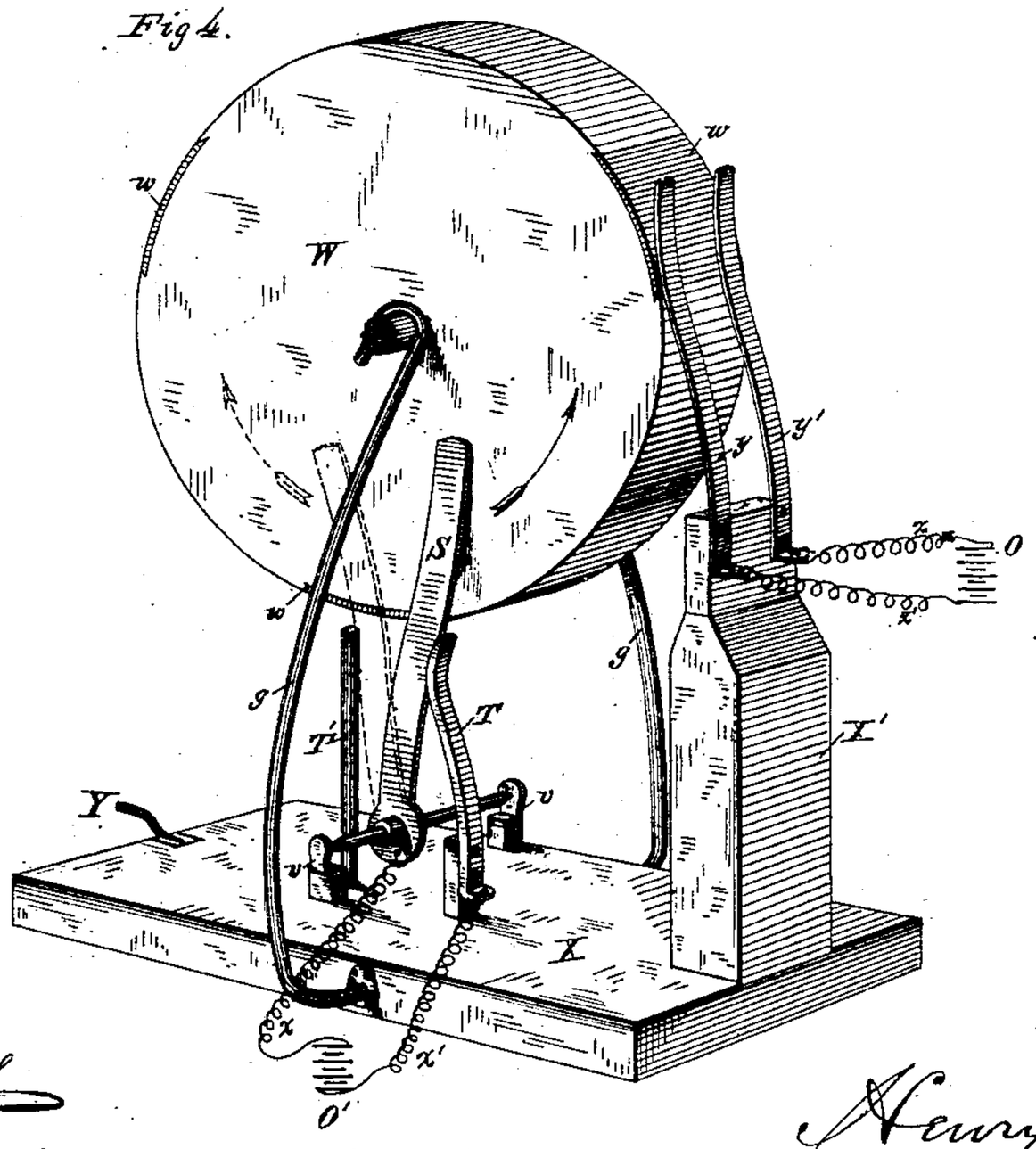


Fig 2.

Fig 4.



Witnesses.

Harry King

Fred E Davis.

Inventor

Henry C. Bliss

UNITED STATES PATENT OFFICE.

HENRY C. BLISS, OF WEST SPRINGFIELD, MASSACHUSETTS.

ELECTRICAL INDICATOR FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 234,945, dated November 30, 1880.

Application filed March 25, 1880. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. BLISS, of West Springfield, county of Hampden, State of Massachusetts, have invented a new and useful Improvement in Indexes for Elevators, of which the following is a full and exact description, reference being had to the accompanying drawings.

The object of my invention is to indicate at convenient places for observation, more or less remote from an elevator, the position and direction of motion of the elevator car or platform, or any body subject to an upward and downward, forward and retrograde motion.

To accomplish this object I cause, by the contrivance herein described, the hands on dials or arcs, located, for instance on the different floors of a building, to revolve or move upward or downward as the elevator-car ascends or descends, said mechanism being operated by electric impulses controlled and regulated by an automatic circuit-closing device attached to the hoisting machinery of the elevator.

My invention is fully shown in the accompanying drawings, in which—

Figure 1 is a general perspective view of machine with dial removed. Fig. 2 is plan of dial with index; Fig. 3, a detail of pawl with attachments; Fig. 4, general perspective of circuit-closing apparatus attached to hoisting machinery of elevator; Fig. 5, detail of attachment of pawl with armature.

In Fig. 1 A is the base of the instrument, which also answers for the bottom or back of the box inclosing the machinery. The box has for its front a piece of sheet metal, that, being painted and suitably graduated, forms the dial or arc B in Fig. 2.

C and D are two electro-magnets provided with vibrating armatures *c* and *d*. The armatures are pivoted at *c'* and *d'* in the usual manner.

The length of vibration of armature C is regulated by set-screw *a*, and the swing of armature *d* is regulated by pin *b*, or preferably a set-screw in place thereof. Armature C carries at its end the double-elbow pawl F.

E and *e* are adjustable springs of different tension. The spring E is adjustable by screw at *a'*, and spring *e* is adjustable by screw through armature-rod *d* at *e'*. Normally, the spring E is at a slight tension, sufficient to swing the pawl F to the right, so that foot *f* will engage ratchet-wheel H. Spring *e* is of stiffer tension, and normally is lax; but when it is tightened by motion of armature *d* it overcomes the spring E, and draws to the left the pawl F, thereby causing foot *f'* to engage ratchet-wheel I when said pawl is worked by force of magnet C.

H and I are ratchet-wheels, firmly fixed upon sleeve *h*, which sleeve turns freely on post *i*. The teeth of these ratchet-wheels are set in opposite directions, so that a reversal of direction of motion is caused by shifting engagement of pawl from foot *f* with wheel H to foot *f'* to wheel I, and vice versa.

The hand or index M clasps the end of sleeve *h* with an attachment similar to that of the minute-hand of a clock.

The pawl F, Fig. 3, has the shape of an inverted T, with the tips turned out in opposite directions. The rod *m* of the pawl passes through block K, and has a longitudinal adjustment by means of set-screw *k*. The block K is connected to armature *c* by means of pin *l*, which projects from said armature and into a corresponding hole in the block. Upon this pin the pawl swings freely to the right or left according to tension of springs, as shown.

The length of rod *n* is less than the diameter of the ratchet-wheels, and when the pawl is in normal position it rests down upon the two ratchets, the foot *f* engaging a tooth on the left periphery of ratchet-wheel H, and foot *f'* engaging a tooth on the right of ratchet I, and in that position the rod *m* forms a line in reference to the two, representing the chord of an arc of the two circles. The feet *f* and *f'* are formed by inserting pins horizontally and at right angles within the opposite sides and extreme ends of rod *n*.

An equivalent device may, of course, be employed in the place of pawl F, constructed as described—as, for instance, two narrow strips of metal may be attached to block K and extended downward therefrom in the form of an inverted V to the point of contact on periphery of H and I. In the device described, if the pawl is raised by operation of magnet C, the feet *f* and *f'* will both be raised from the teeth engaged on the periphery of H and I,

and, as the chord of the arc of the circles becomes shorter as it recedes from the center, space will be gained thereby for a lateral motion or swing of the pawl F.

The length of rod *n* and diameter of wheels are so proportioned, and the length of vibration of armature C is so adjusted by set-screw *a*, that when the pawl is drawn up by force of magnet C, and to the right by spring E, or to the left by spring *e* on armature *d*, but one tooth of either ratchet-wheel can be passed over at a single impulse of said magnet.

N is a friction-spring, one end of which is fixed at *d'*, and the other end of which drags upon the side of wheel H, thereby tending to keep the ratchets in position except when moved in response to magnets C.

In Fig. 4 W is a wheel, preferably of wood, though any non-conducting substance is suitable. This wheel is attached to and revolves with the shaft of the elevator machinery that carries the drum or wheel from or over which the cable is played out that suspends the elevator car or platform. The diameter of W will vary with the diameter of the cable-drum of the hoisting apparatus the height or distance that the car or platform has to traverse, and the number of teeth on the ratchet-wheels, as is more fully hereinafter described. The width of the wheel may conveniently be two inches. On the periphery of the same are fixed or embedded transversely the metal strips *w' w''*, preferably of brass.

X is a plane board of convenient size, which is suspended from shaft P by means of hooks *q q'*, which have such bearings upon said shaft that very little friction is produced when the shaft revolves. X is provided with arm X', which supports or carries springs *y* and *y'*.

Y is a rod that extends from board W to some portion of the building and holds said board steady. Springs *y* and *y'*, which are preferably of brass, are insulated upon their support X'. These springs impinge upon the periphery of W, and, whenever in the revolution of said wheel W metal strips *w* and *w* are brought in contact with them, an electric circuit is closed through wire *z*, which leads direct'y to one pole of battery O, and wire *z'*, which leads through electro-magnet C to the other pole of same.

It will readily be seen that the revolution of wheel W in either direction will cause a succession of impulses to be sent through magnet C, as strips *w w* pass under springs *y y'*.

S is a metal spring, preferably of brass, which bears against the side of wheel W. This spring is attached to rock-shaft *s*, and insulated upon its bearings *p* and *p'*.

T is another spring, also preferably of brass, insulated upon the projection or support X. This spring is set with its face at right angles with S, and only comes in contact with S when that spring is dragged to the right by motion or revolution of W.

T is a post, insulated upon its support and placed at such a distance from spring T that a slight play is allowed S on the bearings *s* between the two.

To spring S is attached insulated wire *x*, leading to one pole of battery O'. To spring T is attached wire *x'*, which leads through electro-magnet D to the other pole of said battery. The spring S follows the motion of wheel W to the right or left as far as the spring T or post *t* will allow. If the motion of the wheel is to the right the electric circuit is closed through springs S and T, and on the other hand, when the wheel revolves to the left, the circuit is broken.

As the car or platform of the elevator ascends when the wheel and cable-drum turns to the right, and descends when they revolve to the left, it will readily be seen that a change in the direction of motion of elevator will simultaneously cause a change in the condition of electro-magnet D.

In the place of supports X and X', springs *y y'* and S and T may be attached to any convenient portion of the building or elevator machinery.

On the dial or arc B, Fig. 2, are pins *t* and *t'*, which arrest the motion of the hand at the top and bottom of the arc. These points represent highest and lowest floors of the building reached by the car or platform. Should there be five floors in the building to be reached, then the arc B will be marked by five radial lines, as indicated, and upon each will be pointed the number of the story that it represents.

The practical operation of this mechanism above described is as follows: Let the elevator car or platform be at the lowest point of its course, which we will call the first floor of a building, and commence to ascend by the winding up of the cable, and let the hand M on dial or arc B be set so as to point directly down. The wheel W, Fig. 4, now revolves to the right, and the electric circuit, through battery O' and magnet D, is closed through the medium of spring S, now in contact with spring T. Magnet D being actuated, armature *d* is drawn toward it and spring E tightened. This causes pawl F to be swung to the left so that foot *f'* engages a tooth of ratchet I. At the same time a succession of impulses are sent through magnet C by the closing of the circuit through springs *y* and *y'* and battery O. This causes the pawl F to rise and fall, the ratchet to revolve, and the hand M to rise on the arc. As the machine is set in a vertical position, the weight of the pawl is sufficient to turn the ratchet-wheels. If, now, the direction of the car is changed from ascending to descending, the direction of motion of wheel W is also changed, the drag-spring S is carried away from spring T, the electric circuit through magnet D is thereby broken, the armature *d* at once recedes from its magnet, the spring *e* is loosened, and, as a consequence, the pawl F swings to the right and engages foot *f* with

a tooth of ratchet H, and releases, at the same time, foot *f'* from ratchet I. This causes a change in the direction of motion of hand M, which will now swing downward as the car descends. Should there be one hundred teeth on the ratchet-wheels, or fifty on the semi-periphery of the same, and the height to be attained by the elevator-car be fifty feet, the current through magnet C should be closed and broken once as the car passes over each foot of its course. Now, if the cable-drum be nine feet in circumference, and the wheel W be of the same size, then there should be nine strips, *w w'*, &c., on the periphery of W, which would cause a make and break in the electric circuit through magnet C as the cable is played out or the car is hoisted one foot. It will be more convenient to make the wheel of less diameter than that of the cable-drum, in which case the strips *w w'* will, of course, be nearer together.

Should the hand M by any means become turned out of proper position, or if it should be set at random when the elevator-car is started, the same will, when the car reaches the highest or lowest point in its course, be properly adjusted in the following manner: Suppose the hand be set on the point on the arc representing the second floor when the car is at the first or lowest floor; or, in other words, suppose the hand be out of position by the space representing one floor; if in this variation the hand be set ahead of the car, it will reach the upper pin, *t'*, before the car reaches the upper floor of the building, and will there be arrested and held until the car reaches the top of its course. Any further motion of car and index must be downward, and in that direction both will start properly at the same instant. It will readily be seen that a similar correction will be effected by means of pin *t* at bottom of arc, and that index M will constantly be kept in proper relative position.

Instead of the two ratchet-wheels H and I, one alone—as ratchet H—may be employed, in which case the feet of the double-elbow pawl should be turned in the same direction and engage the opposite sides of the single ratchet; or, if an inverted V-shaped pawl be employed, the right branch should be hooked, so as to engage the teeth on the right periphery of the ratchet when the pawl is raised. A motion of the ratchet and index in one direction will then be effected, when the pawl being operated is swung to the left, and a reverse motion will be imparted when the pawl is swung to the right. I prefer, however, the employment of the two ratchets, as I thereby avoid that sudden jerking motion on the index which an electro-magnet imparts when its power is directly applied; and in the employment of two ratchets the double-elbow or bifurcated pawl, adapted as shown, answers both for a propelling and retaining device.

Having now fully explained my invention, what I claim, and desire to secure by Letters Patent, is—

1. The mechanism herein described for producing and controlling the motion of an index, consisting of wheel W, provided with strips *w w'*, springs *y* and *y'*, springs S and T, batteries O and O', electro-magnets C and D, armatures *c* and *d*, ratchets H and I, pawl F, springs E and *e*, dial B, and hand M, substantially as described.

2. In an instrument operated by electric impulses for indicating the position and direction of motion of an elevator or similarly-moving body, the electro-magnets C and D, the one for producing motion in an index and the other for controlling the direction of motion.

3. The ratchet-wheels H and I, provided with the bifurcated pawl F, substantially as described.

4. The pawl F and armature *d*, provided with springs E and *e*, substantially as described.

5. The armature *c*, provided with swinging bifurcated pawl F, for producing and changing direction of motion in ratchet wheel or wheels, substantially as described.

6. The wheel W, provided with drag-spring S and set-spring T, strips *w w' w''* and springs *y* and *y'*, having electric connection with batteries O and O' and electro-magnets C and D, substantially as described.

7. In combination with a revolving or moving body, subject to a change of direction of motion, the insulated drag-spring S and set-spring T, whereby an electric circuit is closed by the motion of said body in one direction, and broken by its motion in another or opposite direction.

8. The combination, with hand M, moving correspondently to another body having an upward-and-downward or alternate motion, of pins *k* and *k'*, situated at such points on the arc over which the hand swings as represent thereon the termini of the course traversed by the correspondently-moving body, and operating, by arresting the motion of said hand at said points, to correct certain disarrangements in the index, substantially as described.

HENRY C. BLISS.

Witnesses:
THEO. E. DAVIS,
H. A. HALL.