(No Model.)

# E. C. ELDREDGE.

## ELECTRIC INDICATOR.

No. 455,855. Patented July 14, 1891.

Fig. 1.

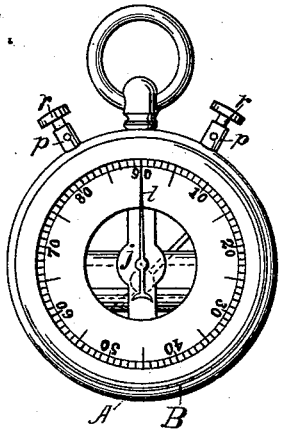



Fig 2

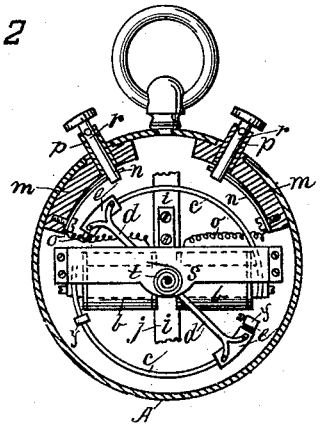



Fig. 3.

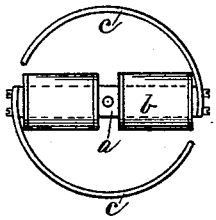


Fig. 4.

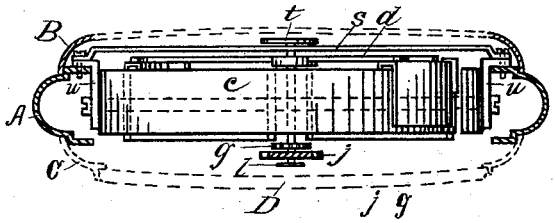


Fig 5

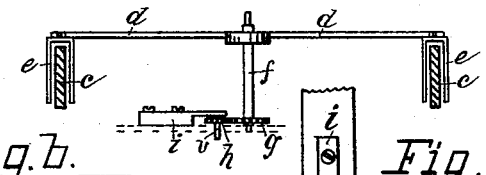


Fig. 8.

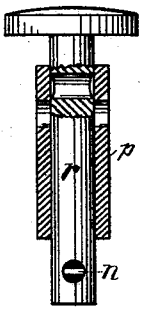


Fig. 6.

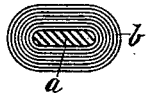
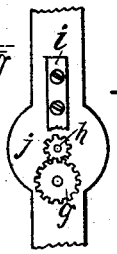


Fig. 7.



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# UNITED STATES PATENT OFFICE.

EARL C. ELDREDGE, OF SPRINGFIELD, MASSACHUSETTS.

## ELECTRIC INDICATOR.

SPECIFICATION forming part of Letters Patent No. 455,855, dated July 14, 1891.

Application filed February 9, 1891. Serial No. 380,717. (No model.)

*To all whom it may concern:*

Be it known that I, EARL C. ELDREDGE, a citizen of the United States of America, residing in Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Electric Indicators, of which the following is a specification, reference being had to the accompanying drawings and letters of reference marked thereon, in which drawings like letters of reference indicate like parts.

Figure 1 is a front view of my complete device. Fig. 2 is a view of the device as seen from the opposite or back side with the case cut in section. Fig. 3 is a view of the magnet and extended pole-pieces. Fig. 4 is an edge view of the device on an enlarged scale, the case and bridges being in section. Fig. 5 is an enlarged view of the armature, showing the extended pole-pieces in section, and showing, also, the staff and speeding-gear arrangement. Fig. 6 is a sectional end view of one of the magnet-coils, showing the core in section. Fig. 7 is a view of the front bridge with speeding-gears in position, and Fig. 8 is a view on an enlarged scale of the binding or contact post.

In detail, A indicates the rim of the case; B, the back case; C, the bezel; D, the glass; *a*, the magnet-core; *b*, the magnet-wire; *c*, extended pole-pieces; *d*, the armature-bar; *e*, armature extension-pieces; *f*, post or staff upon which the armature-bar is mounted; *g*, speeding-gear on post *f*; *h*, pointer gear or pinion; *i*, pointer-pinion bridge; *j*, front bridge; *l*, pointer; *m*, insulating material; *n*, post-springs; *o*, conducting-wires; *p*, connecting or contact post-shell; *r*, connecting or contact post-stem; *s*, back bridge; *t*, hair-spring, and *u* supporting-pieces.

My invention relates to that class of devices by which the strength of a current of electricity may be measured and indicated upon a properly-divided scale.

The object of my invention is to provide a convenient, simple, and effective indicator which may be used in any position to indicate instantly the strength of an electric current.

The construction and operation of the device will be readily understood on reference to the drawings.

A case A is provided, which is preferably made of the size and shape of an ordinary watch-case having a glass or crystal D to protect the pointer and dial, and having a back case B, which may be opened or removed for convenience in getting at the operative parts of the device.

Within the case is suitably mounted a bar-magnet *a b*, with extended pole-pieces *c*, as shown in Fig. 3. I prefer to mount this device upon front and back bridges *j* and *s*, which bridges extend preferably at right angles to each other across the case.

The armature-bar *d* is mounted upon a post *f*, which post has bearings in both the front and back bridges, and mounted upon said post on the lower face of the front bridge *j* is a pinion-wheel *g*, which meshes with a pinion *h*, also mounted upon said bridge, a smaller bridge *i* being secured to the front bridge *j* and projected over the pinion *h*, as shown in Fig. 5, to maintain the same in desired position.

A pointer *l* is mounted upon a staff *v*, which is fixed to pinion *h* and revolves with it, the pointer being arranged to swing from the center of the device and cover in its sweep the graduated face. A hair-spring *t* is arranged to continually operate to return the pointer to its normal position.

The armature-bar *d* is preferably provided with U-shaped extension-pieces *e*, which project at each side of the extended pole-pieces *c*, and the arrangement of pinions or speeding-gears is such that the pointer *l* will traverse the whole face of the index while the armature is traveling over a portion of the extended pole-pieces *c*, and the size of the parts and construction are such that the armature will rotate to its limit of space near the poles of the magnet only when the strongest current is flowing through its coils that may be used in the circuit. Therefore all strengths from said strongest current to zero will be indicated by the position of the armature and index-pointer.

Within the case at convenient locations are arranged insulators *m*, within which is mounted a shell or socket-piece *p*, and within the latter a push pin or stem *r* is arranged, the inner end of which is secured to a spring *n*, mounted upon said insulating material and

having connected with it the conducting-wires *o*, which extend to the magnet-coils. The stem *r* is provided with an opening of sufficient size to receive the conducting-wire of any battery or appliance whose current the device has capacity to measure, and the shell or socket *p* is also provided with openings of like size, and as the tendency of the spring *n* is operating to force the shaft *r* outwardly at all times it simply becomes necessary whenever connection is to be made to place the finger upon the button mounted upon stem *r*, force the same inward until the opening in the shaft registers with the openings in the socket, and then insert the conducting-wire and release the pressure. The spring *n* immediately forces the stem outwardly and binds or holds the conducting-wire with sufficient firmness to give the requisite contact. It will be seen that the spring in this instance performs a double function—that is, it serves to operate the stem, as before explained, and serves also as a conductor of the electric current, and the spring being fastened to or so connected with the shaft *r* as to prevent the rotation of the shaft in its socket will avoid all danger of the openings for the reception of the conducting-wire being thrown out of register by reason of such rotation.

One or more stops may be arranged in any convenient manner to limit the movement of the armature-bar in either direction, or a stop may be provided against which the pointer will strike.

I have shown in the drawings two stops *y y* mounted upon one of the extended pole-pieces *c* to thus limit the movement of the armature-bar *d*.

Although I deem it best that the extended armature-pieces *c* should be U-shaped and extended at both sides or faces of the extended pole-pieces *c*, yet it will readily be seen that the device will be operative if the extended armature-pieces *c* project at one side or face only of the extended pole-pieces.

The device illustrated in the drawings is more especially designed for indicating or measuring the strength of electric currents of primary batteries or other light currents. It will, however, be seen that the device may be made upon a larger scale or so adjusted as to measure currents of any degree of intensity, and that the device will be operative when held in any position whatever.

It will be seen that the construction of the electro-magnet having the curved pole-pieces *c* may be employed in very many other devices.

It will be seen that if the index be arranged upon the same side of the case with the armature-bar and an opening left whereby the position of the armature-bar may be disclosed, or if a pin be projected from the armature-bar or the part *e* thereof adjacent to the index-scale, the pointer may be omitted, in which case it will be seen the scale would be somewhat finer and would extend only for the same distance and the armature-bar would rotate upon its pivot. The better and most convenient construction, however, is the one illustrated in the drawings.

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

1. The combination of an electro-magnet having curved pole-pieces *c*, formed in the segment of a circle, with an armature-bar pivotally mounted between its ends, and with its ends arranged to traverse the lines of said pole-pieces, and means to move the bar backward to its normal position, substantially as set forth.

2. The combination of a magnet having extended curved pole-pieces *c* with an armature-bar *d*, having armature-pieces mounted thereon, said bar being pivotally mounted to cause said pieces to move parallel with and adjacent to said extended pole-pieces, a pointer, an index, and connecting mechanism between the armature-bar and pointer, substantially as and for the purposes stated.

3. The combination, in an electric indicator, of a magnet having extended pole-pieces *c*, which are segments of a circle, and a pivotally-mounted armature arranged with its ends to move parallel with and adjacent to said extended pole-pieces, a pointer, an index, and connecting mechanism between the armature-bar and pointer, substantially as and for the purposes stated.

4. In an electric indicator, a binding-post provided with a spring *n*, fixed thereto and extending from the post to the inner conductors, which spring serves to normally force the post in one direction and serves also as a conductor, substantially as and for the purposes stated.

5. The combination of a magnet, the segment pole-pieces attached to and extending from the poles thereof in a curved line, said pole-pieces being of equal width and thickness at all points, an armature-bar provided with U-shaped ends, said armature-bar being mounted upon a staff, a spring or other means for holding said armature away from the maximum field of force, an index-pointer arranged to rotate over the face of the index, and connecting mechanism arranged to communicate motion from the armature-bar to the pointer, substantially as and for the purposes stated.

6. The combination of a suitable case, an electro-magnet mounted therein and provided with extended pole-pieces *c*, formed in the segment of a circle, an armature-bar pivotally mounted and having extended pieces *e*, arranged adjacent to the pole-pieces *c*, contact-posts arranged in said case, a spring *n*, arranged as shown, and conducting-wires, substantially as and for the purposes stated.

7. The combination of a suitable case provided with contact-posts mounted thereon,

front and back bridges *j s*, electro-magnet *b*, having curved pole-pieces *c*, armature-bar *d*, having U-shaped pieces *e*, a pointer arranged to traverse the face of the index, and connecting mechanism between the armature-bar and pointer, whereby the motion of the pointer communicated to it from the motion of the armature-bar is multiplied, all in combination, substantially as and for the purposes stated.

EARL C. ELDREDGE.

Witnesses:
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