(No Model.) 2 Sheets—Sheet 1.

# A. B. HERRICK.

## ELECTRIC CURRENT INDICATOR.

No. 435,695. Patented Sept. 2, 1890.

Fig. 2.

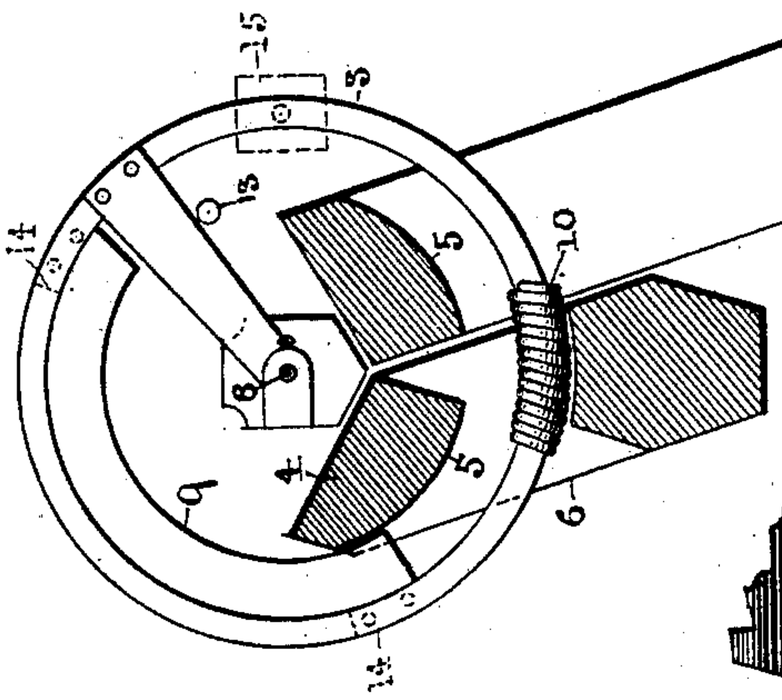
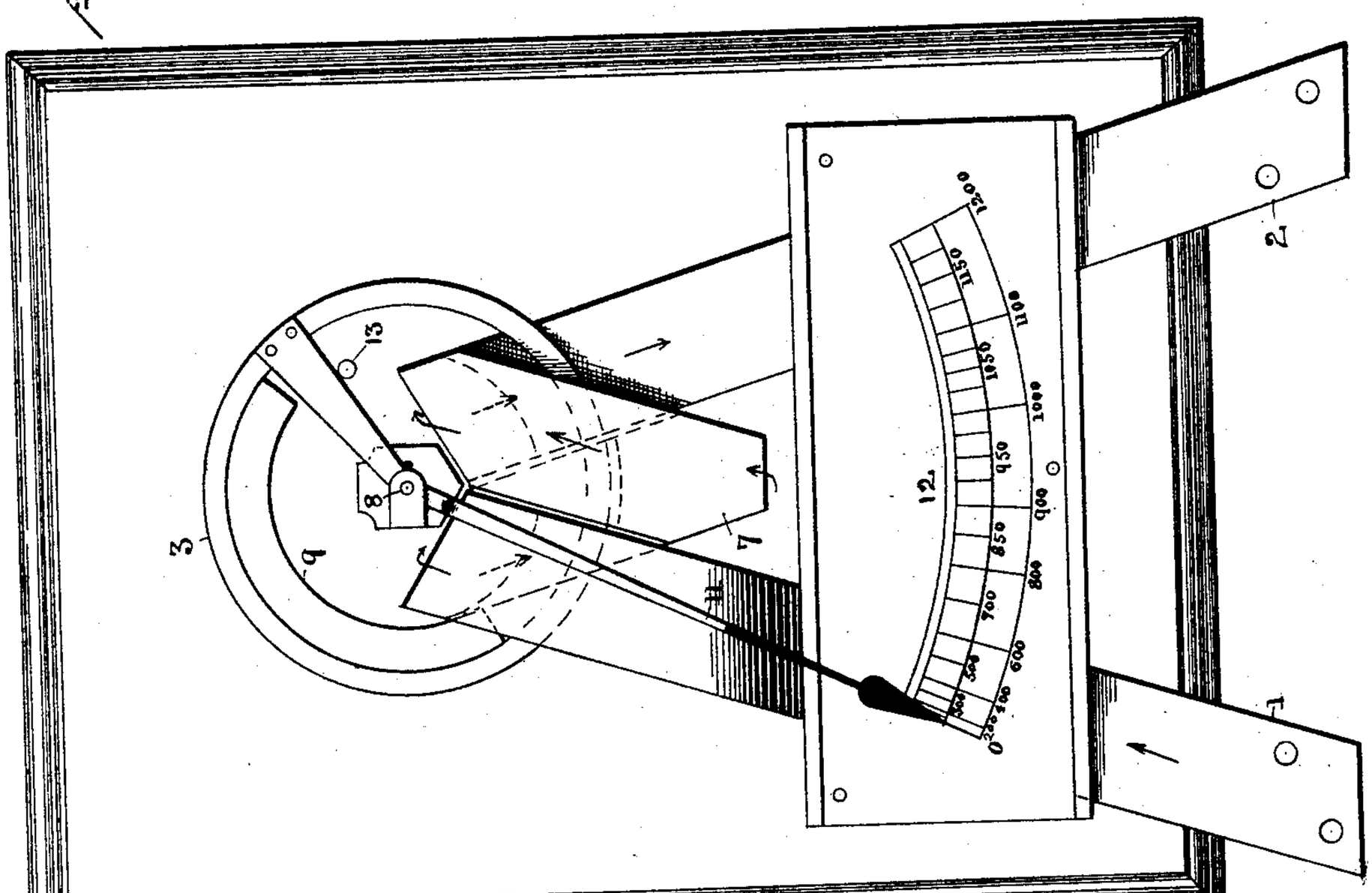



Fig. 1.

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ATTORNEYS.

(No Model.)

2 Sheets—Sheet 2.

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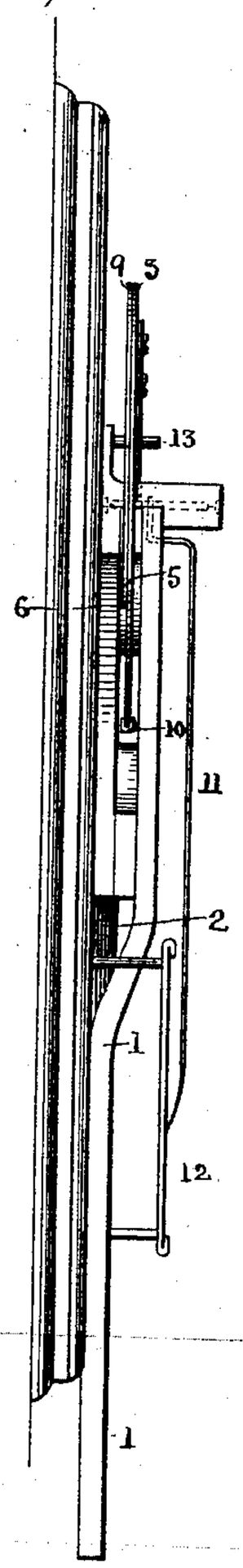
## ELECTRIC CURRENT INDICATOR.

No. 435,695. Patented Sept. 2, 1890.

Fig. 3.

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# UNITED STATES PATENT OFFICE.

ALBERT B. HERRICK, OF NEW YORK, N. Y., ASSIGNOR TO THE BERGMANN & COMPANY, OF SAME PLACE.

## ELECTRIC-CURRENT INDICATOR.

SPECIFICATION forming part of Letters Patent No. 435,695, dated September 2, 1890.

Application filed March 13, 1890. Serial No. 343,689. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT B. HERRICK, a citizen of the United States, residing at New York, in the county and State of New York, have invented an Improved Electric-Current Indicator or Amperometer, of which the following is a full and exact description.

My invention relates to devices for measuring electric currents which are especially adapted for use in connection with the heaviest currents used in the electrical arts, and which are constructed substantially as hereinafter set forth. This indicator is operated entirely by variations in the current measured, and is not dependent on the operation of permanent or other magnets.

The indicator consists of the following parts: thick conducting bars or strips, preferably rectangular in cross-section and having two ends joined by means of conductors of substantially the same cross-section or conductivity as said bars in such manner as to form a curved rectangular passage, and a ring carrying a plate armature and controlling an indicating-hand movable over a graduated scale, all as will be hereinafter described.

In the accompanying drawings, which illustrate my invention, Figure 1 is a front elevation. Fig. 2 is a front elevation with a part of the conductor and the indicating apparatus removed. Fig. 3 is a side view of Fig. 1, looking toward the right.

1 2 are conducting-bars for the current to be measured. In practice I have made these about one by two inches, in order to provide a conducting-path of very low resistance. These bars are preferably placed at an angle to each other, and their approaching ends are joined as follows: Conductor 1, which is bent upwardly so as to pass above the ring 3, is connected at its end with an angle extension 4, which extension is provided with a curved inner face 5. This extension in turn connects with a conducting-piece 6, which extends in a line substantially parallel with the conductor 2 and which passes beneath said ring 3. At the lower end of conductor 6 is also an angle extension connecting with a conducting-piece 7, which extends substantially parallel with the conductor 1. The upper end of conductor 7 is in turn connected with conductor 2 by an angle extension, also having a curved surface 5. It is obviously immaterial whether the parts joining conductors 1, 6, 7, and 8 are formed integral with said conductors or are separate pieces suitably secured in place. The piece joining conductors 6 and 7 at their lower ends is also provided with a curved inner face. By this construction I provide a solenoid having a single turn or coil. The passage through this coil will be substantially rectangular in cross-section and will be preferably much narrower in the direction at right angles to conductors 1 and 2 than in the other direction.

In connection with certain features of my invention a continuous conductor bent into the form of a coil could be used; but in that case the coil should be flattened, so as to give a cross-section substantially like that above described. The conductors are preferably painted or enameled, but are not otherwise insulated, although a slight space is left between the parts forming the coil, as shown. Pivoted at 8, generally on jeweled bearings, is the ring 3, before referred to. This ring is preferably of non-magnetic material—such as brass—and carries a segment-plate armature 9, which extends partially around the ring and is normally held with one end in proximity to the conductor or coil by the weight 10. The segment may consist of a single sheet of iron, or may consist of several sheets placed side by side, forming a laminated armature.

On the same axis as wheel 3 is an indicating hand or pointer 11, which is normally held at the zero-point on scale 12 by the weight on the ring. The scale 12 is preferably graduated to indicate ampères, so that at any moment the strength of current on the line may be read on the scale by observing the position of the index-pointer. I have shown the scale below the axis; but it would evidently be an equivalent arrangement to place it above the ring and reverse the direction of the pointer.

13 is a stop against which the radial arm carrying ring 3 strikes to limit its motion in one direction.

Instead of making the ring continuous it

may be broken away at 14 14, as indicated by the dotted lines in Fig. 1, and the armature-plate 9 may complete the ring between those points.

The weight which I have shown consists of a coil of wire—such as lead wire—wound directly upon the ring; but I do not confine myself to this form. I may have an adjustable weight, as indicated in dotted lines at 15, which weight may be placed below the radial arm, or, if space be left between said arm and the armature-plate, may be placed above the arm.

In using this indicator current enters conductor 1 and passes through the apparatus, as indicated by the arrows. This current creates a magnetic field the strength of which is directly dependent upon the current. Armature 9, being delicately suspended, is attracted by the field, and moves the pointer 11 over the scale 12, which, when the apparatus was made, was subdivided and marked to indicate ampères, as before stated. An increase in the current moves the pointer farther on the scale. A decrease in the current allows the weight to move the pointer in a reverse direction, and as soon as current ceases to flow the weight carries the armature and pointer back to their original positions. By employing thick conductors with a single turn and the plate armature mounted, as described, I am enabled to measure very heavy currents as readily as weaker currents have been heretofore measured, and such measurement does not involve complicated and expensive apparatus.

Having thus described my invention, what I claim is—

1. The combination, in an electric-current indicator, of a coil, a pivoted ring movable therein, and a plate-armature carried by the ring, substantially as described.

2. The combination, in an electric-current indicator, of a coil, a pivoted ring passing through the coil, a plate-armature carried by said ring, and a pointer connected to the ring and moving therewith, substantially as described.

3. The combination, in an electric-current indicator, of a coil constituting a portion of the circuit, a pivoted ring passing through said coil and having an index-pointer, and a magnetic plate on said ring constituting the core or armature, substantially as described.

4. The combination, in an electric-current indicator, of a coil consisting of a heavy conducting-bar, an angle extension, a second bar having an opposite extension, and two bars at an angle with each other and with said first bars but joining the same, thereby forming a single turn or coil, and a plate-armature passing through the same and controlling the index-pointer, substantially as described.

5. The combination, in an electric-current indicator, of two conducting-bars at an angle with each other, their approaching ends connected to form a turn or coil, a plate-armature movable in said coil, and an indicating device connected with and moved thereby, substantially as described.

6. The combination, in an electric-current indicator, of two conducting-bars at an angle with each other, their projecting ends connected to form a coil, a pivoted segment-plate armature controlling a pointer, and a graduated scale over which the pointer moves, substantially as described.

This specification signed and witnessed this 8th day of March, 1890.

ALBERT B. HERRICK.

Witnesses:
W. E. MOORE,
CHAS. E. ESTABROOK.