

F. W. ROLLER.
POLARITY INDICATOR.
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1,130,633.

Patented Mar. 2, 1915.

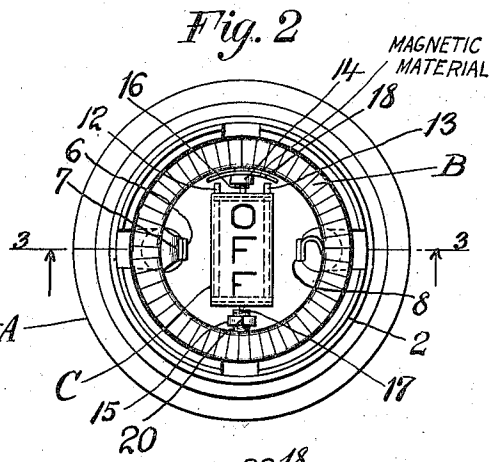
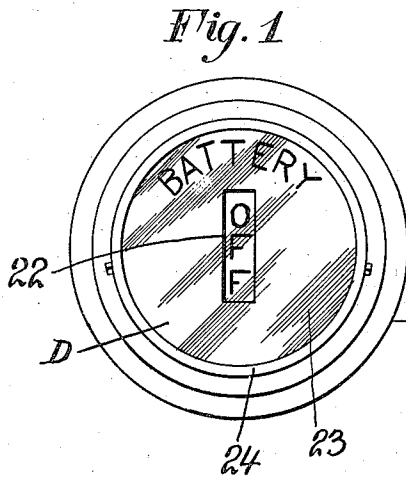
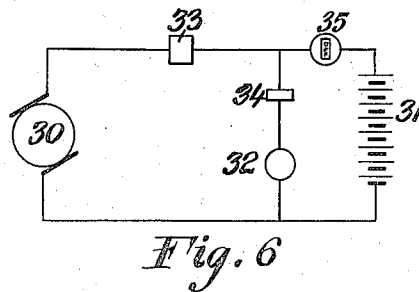
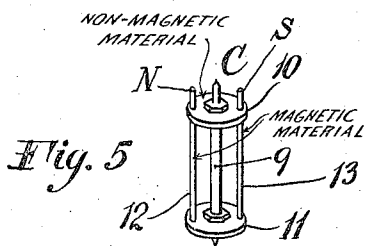
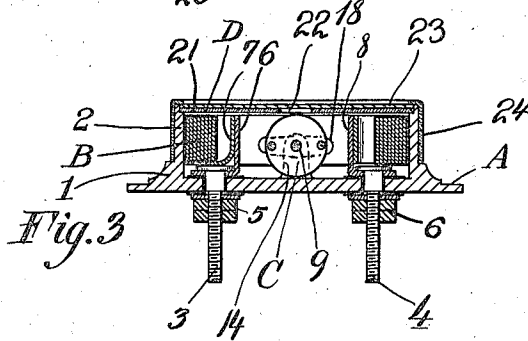
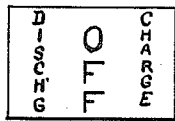


Fig. 4



Witnesses:
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By his Attorney,
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UNITED STATES PATENT OFFICE.

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POLARITY-INDICATOR.

1,130,633.

Specification of Letters Patent.

Patented Mar. 2, 1915.

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To all whom it may concern:

Be it known that I, FRANK W. ROLLER, a citizen of the United States of America, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Polarity-Indicators, of which the following is a full, clear, and exact specification.

This invention relates particularly to means for indicating the direction of current flow in electric circuits as well as the absence of current.

The particular object of the invention is to provide an indicator which shall have separate and definite positions of indication according to the direction of the current flow in the circuit, as well as absence of current, so that the indications will not merge into each other and there shall be no confusion of indications, but, on the contrary, such indications shall be positive and distinct.

Another object of the invention is to provide an indicating instrument having an improved construction of movable element.

A further object of the invention is to provide an improved construction of indicators in other respects, and other improved features and objects of the invention will appear hereinafter.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a top plan view of the indicator; Fig. 2 is a similar view with the face removed; Fig. 3 is a sectional view on the line 3, 3 of Fig. 2 looking in the direction of the arrows; Fig. 4 is a view of the card carrying the legends upon the movable member, such card being developed in a plane surface; Fig. 5 is a view more in detail of the movable member with the legend bearing card removed; and Fig. 6 is a diagram showing circuit connections including the indicator, and especially suitable for automobile lighting.

Referring to the drawings, the apparatus therein indicated comprises a casing A within which is mounted a coil B adapted to receive the current, the direction of which is to be indicated, a movable member C acted upon by the current in the coil B to effect the indications which are exhibited through a slot in the face D of the device.

The casing A comprises a base portion 1

from which extends the circular side wall 2. The coil B is circular and is preferably wound of ribbon conductor, the ribbon being of a width equal to the height of the coil and the overlying turns of the ribbon being suitably insulated from each other. The coil B is supplied with current, the direction of which is to be indicated, through the studs 3 and 4 which extend through the base 1 of the casing and are insulated therefrom. Where those studs pass through the casing they may be made square in cross-section so that they cannot turn and are secured in position by nuts 5 and 6. Secured by and electrically connected with the stud 3 is a conducting clip 6 which is secured by soldering to another conducting clip 7 which passes beneath the coil B and is secured to the end of its outer turn. Secured to and electrically connected with the stud 4 is a conducting clip 8 which is secured to and electrically connected with, as by soldering, the end of the inner turn of the coil B. The movable member C comprises a central spindle or shaft 9, the ends of which are adapted to act as pivots. Secured upon this shaft are two disks 10 and 11 and between these disks extend two rods 12 and 13 which rods extend somewhat beyond the disk 10 as shown. The rods 12 and 13 and the disk 11 are made of iron or steel, while the disk 10 is made of nonmagnetic material, such as aluminum, which is light in weight. This system of rods and the disk 11 are permanently magnetized so as to produce magnetic poles, one north and the other south at the ends of the rods 12 and 13. The spindle 9 being centrally located the magnetic potential will be such that no magnetism will tend to pass through the spindle 9, but if it is desired, this spindle may be made of brass or other nonmagnetic material so as to exclude any possibility of magnetism passing through it and insure the magnetic circuit being through the rods 12 and 13 and the disk 11. This construction, as described, of the movable member provides an easily constructed and efficient polarized member which is extremely retentive of its magnetism. The member C is pivoted at the ends of the spindle 9 in the lugs 14 and 15 extending from the casing A, by means of screws 16 and 17. The screw 16 takes into threads in the lug 14 and secured beneath its head is an iron piece 18 which is thus fixed in posi-

tion. This iron piece is adapted to serve as an armature for the magnet having its poles at the ends of the rods 12 and 13 of the movable member under circumstances as will hereinafter appear. The screw 16 being screwed down tightly is firmly secured in position by its head coming against the iron piece 18 and its lower end is adapted to serve as a pivotal bearing for the end of spindle 9 of the movable member. The screw 17 which carries the bearing for the other end of the spindle is screwed into the lug 15 and may be moved up or down to secure proper adjustment of the bearings. The screw is secured in such adjustment by reason of the fact that the lug which is split at 20 is pinched together before the screw is entered within it so that it tightly grips the screw. Placed upon the movable member are suitable characters or marks to provide indications of the operation of the instrument. In this case a card of pasteboard or other suitable material, marked "Dischg", "Off" and "Charge", as shown, is wrapped about and secured to the movable member C so that as this member moves the different legends will be brought into indicating position.

At the top of the side wall 2 of the casing the wall is rabbeted upon its inner side. Within this rabbet is placed a disk 21 having a slot 22 through which the indications upon the movable member may be observed. Over this may be placed a glass plate 23 and then the plate and disk are secured in position by a collar 24 which has an internal flange at its upper end. This collar is slipped over the side wall 2 of the casing and secured to the side wall by means of screws.

In the operation of this apparatus, when no current is passing through the coil B, the keeper or armature 18 will hold the member C in a certain position because the poles at the ends of the rods 12 and 13 will tend to set themselves in such a position that the magnetic circuit of the bars 12 and 13 through the air will be as short as possible and therefore these bars will set themselves directly beneath the armature 18. The characters carried by the movable member are so arranged that at this time the word "Off" will appear at the slot 22 indicating that the current is off. If now current passes in one direction through the coil B, for instance in charging a storage battery, a magnetic pole will be produced on one side of the coil, say next the base, and the opposite magnetic pole will be produced at the other side of the coil. The north pole of the movable member C will then be attracted toward the south pole created at one side of the coil B and the south pole of the movable member C will be attracted toward the opposite side of the coil, this attraction

overcoming any tendency the movable member C has to set itself so that its poles are beneath the iron armature 18. A turning couple will thus be produced on the member C which will tend to set the plane of the bars 12 and 13 in alinement with the axis of the coil B. The member C will then turn on its axis and this movement will continue until the bar 13 comes against the lug 14. In this position the legend "Charge" will be exhibited through the slot in the face plate. If current passes in the opposite direction through the coil B, as when the storage battery is discharging, the polarities produced at the sides of the coil will be reversed and the movable member will turn in the opposite direction until the bar 12 comes against the lug 14. In this position of the movable member the legend "Dischg" will be exhibited through the slot 22.

It will be observed that as the movable member is moved from its off position in either direction, the means which tends to hold it in the off position, namely, the attraction of the armature 18 for the poles at the ends of the rods 12 and 13, will decrease.

It will be further observed that each direction of the current which is indicated and the off indication corresponds with a certain definite separated position, so that there is a distinct, unmistakably separated indication for each direction of the current as well as for the off indication, without the merging of the indications into each other so that the line of division is distinct.

Referring now particularly to Fig. 6, 30 is a direct current generator which, on an automobile, may be driven from the propelling engine, 31 is a storage battery adapted to supply current when necessary to the lights of an automobile, which may be a head light as indicated at 32. 33 indicates an automatic switching device for establishing connections of the generator, when its voltage is sufficiently high, to light the light 32 or charge the storage battery 31, and to disconnect the generator to prevent the storage battery discharging through it when the voltage of the generator is low. Automatic switches of this character are well known in the art. 34 represents a switch for making and breaking the circuit of the light 32 to energize and extinguish the same. 35 represents the current indicator, as hereinbefore described in detail. It will be apparent that when current is flowing into the battery to charge the same the indicator will disclose the legend "Charge" which will unmistakably indicate to the operator the quality of current in the circuit. The legend "Dischg" will be displayed when the operator is discharging current to light the lights, and when there is no current flowing in the battery circuit the legend "Off" will be exhibited. This indicator

may, in the case of an automobile, be mounted upon the dashboard where it is easily viewed by the driver and will oftentimes afford a means of showing that something is wrong with the circuit if the conditions therein, as indicated by the indicator, do not correspond with what they ought to be in view of the condition of the apparatus. For instance, if the indicator should show "Dischg" when the engine was shut down and the light switched off, it would indicate that there was an improper circuit for the battery somewhere and that quite likely the automatic switches for cutting out the generator had stuck and that the battery was discharging through the generator. This is only one of the improper conditions which might be indicated by my improved indicator.

While I have illustrated my invention in what is considered its best application, it may have other applications without departing from its spirit and is not, therefore, limited to the structure shown in the drawings.

Having thus described my invention, I declare that what I claim as new and desire to secure by Letters Patent, is:—

1. An electric current indicator comprising a movable member, means carried by the indicator tending to hold said member in a certain position, and means for causing the movement of said member to a single definite position when the current flows in one direction, and to another different single definite position when the current flows in the opposite direction.

2. A three position current indicator comprising a movable member, means carried by the indicator tending to hold said member in a position to indicate no current, and means for causing the movement of said member to a definite position on each side of said no-current position according to the direction of current to be indicated.

3. A three position electric current indicator comprising a movable member having definite separated positions corresponding to the two directions of current and to no current respectively, means carried by the indicator tending to normally hold said member in the no-current position, and means for causing the movement of said member into the two other definite positions according to the respective direction of the current.

4. A three position current indicator comprising a movable member having three definite separated positions corresponding to the two directions of current and to the no-current conditions respectively, the position of no current being located between the other two, means carried by the indicator tending to hold said member in the mid position when no current is flowing, and means for causing the movement of said

member into the other two positions according to the respective direction of the current.

5. A polarized movable member for an electrical instrument comprising a spindle, rods of magnetic material extending along the same and separated member supporting said rods on said spindle, one of said separated members being of magnetic material and the other being of non-magnetic material.

6. A movable member for an electrical instrument comprising a spindle, rods of magnetic material extending along the same and separated disks secured to said spindle and supporting said rods thereon, one of said disks being of magnetic material and the other being of non-magnetic material.

7. A movable member for an electrical instrument comprising a spindle, rods of magnetic material extending along the same and separated disks secured to said spindle and supporting said rods thereon, one of said disks being of iron and the other being of aluminum.

8. An electric current indicator having a face with a slot, an indicating member having two definite separated indications corresponding to the direction of current to be exhibited one at a time through said slot, means carried by the indicator tending to maintain a certain relative position between said face and said member for exhibiting an off indication through said slot, and means controlled by the current for causing relative movement between said member and said face to exhibit said first-named separated indications through said slot according to the direction of the current flowing.

9. An electric current indicator comprising a polarized movable member having that portion of the path of its magnetism within the member longer than that without the member, an element of magnetic material tending to hold said member in a given position, and means controlled by the current for causing movement of said member from said position.

10. An electric current indicator comprising a casing, a rotatable member having its axis substantially parallel with the base of said casing and having a cylindrically shaped marked indicating surface, a current coil about said movable member and substantially parallel to said base, and a covering portion substantially parallel to said base, said covering portion having a slot over said indicating surface.

11. An electrical instrument, comprising a movable member having a U-shaped part of magnetic material and having its arms extending parallel to the axis of said member, a stationary element of magnetic material tending to hold said member in fixed

position, and a coil having its axis in a plane substantially at right angles to the axis of said member.

12. A three position electric current indicator having a face with a slot, an indicating member adapted to exhibit its three indications one at a time through said slot, means carried by the indicator tending to maintain a certain relative position between said face and said indicating member for exhibiting one of said indications through said slot, and means controlled by the current for causing relative movement between said member and said face to exhibit each of the other two indications through said slot according to the respective direction of the current flowing.

13. An electric current indicator comprising a magnetic movable member, a stationary magnetic member cooperating therewith and tending to hold said member in a certain position, said movable member having the path of its magnetism within the member longer than that of said stationary member, and means controlled by the current for causing movement of said member into definite positions.

14. An electric current indicator comprising a casing, a rotatable cylindrical indicating member having separate definite indications on the side of the cylinder, said member carrying an element of magnetic material, a current coil about said member, and a face plate having a slot through which the said indications may be singly viewed.

15. An electric current indicator comprising a casing, a rotatable cylindrical indicating member having a plurality of definite separated indications marked on the side of the cylinder, said member having its axis substantially parallel with the face of said casing, a current coil about said movable member, said coil lying in a plane substantially parallel to said base, and a face substantially parallel to said base, said face having a slot over said movable member through which said indications may be singly viewed.

16. An electric current indicator comprising a movable member, means tending to hold said member in a certain position by a force which decreases when said member is displaced from said certain position, and means for causing the movement of said member to other positions than said first named position according to the direction of the current to be indicated.

17. An electric current indicator comprising a movable member, means tending to hold said member in a certain position by magnetic force which decreases when said

member is moved from said position, and means for causing the movement of said member to other positions according to the current to be indicated.

18. A three position current indicator comprising a movable member, means tending to hold said member in a mid-position with a force which decreases when said member is displaced from said position, and means for causing the movement of said member into positions on each side of said mid-position according to the direction of the current to be indicated.

19. An electric current indicator comprising a movable member of magnetic material, a stationary member of magnetic material cooperating therewith and in close proximity thereto tending to hold said movable member in a certain position with a force which decreases when said member is moved from said position, and means for causing the movement of said movable member to other positions according to the current to be indicated.

20. An electric current indicator comprising a casing, a rotatable member having its axis substantially parallel with the base of said casing and having a cylindrically shaped marked indicating face, and a current coil about said movable member and said cylindrically shaped marked indicating face.

21. An electric current indicator comprising a movable member of magnetic material, said member having a cylindrical indicating surface enveloping and carried by said member, a magnetic element cooperating with the magnetic material of said member tending to hold said member in a certain position, and a coil for causing movement of said member from said position, said coil being located about said member and cylindrical indicating surface.

22. An electric current indicator comprising a movable member of magnetic material, said member having a cylindrical indicating surface enveloping and carried by said member, a magnetic element tending to hold said member in mid position, and means controlled by the current for causing movement of said member to a single definite position each side of said mid position according to the respective direction of the current.

In testimony whereof I affix my signature, in presence of two witnesses.

FRANK W. ROLLER.

Witnesses:

THOMAS HOWE,
G. N. KERR.