

Oct. 23, 1923.

1,471,849

F. W. KAISLING, JR

AMMETER

Filed Oct. 25, 1919

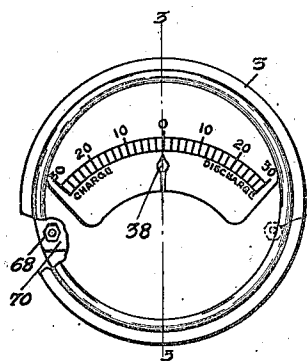


Fig. 1.

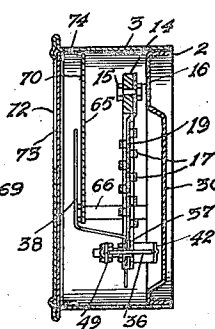


Fig. 3.

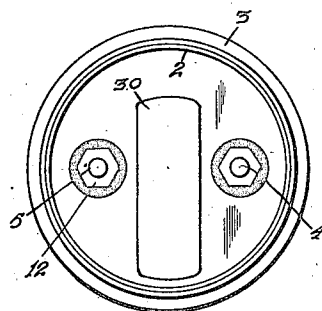


Fig. 2.

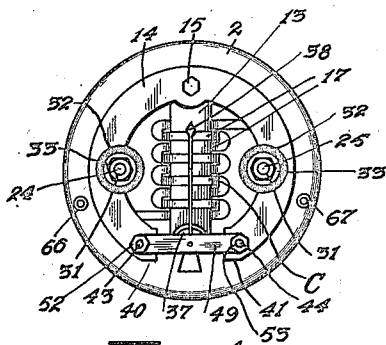


Fig. 4.

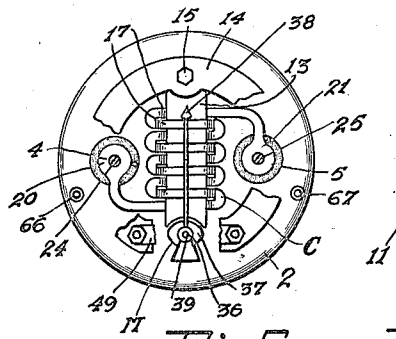


Fig. 5.

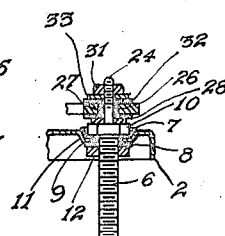


Fig. 7.

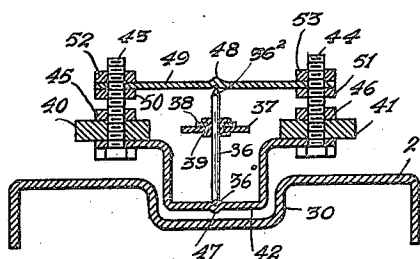


Fig. 6.

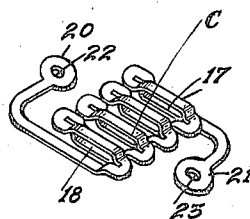


Fig. 8.

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UNITED STATES PATENT OFFICE.

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AMMETER.

Application filed October 25, 1919. Serial No. 333,352.

To all whom it may concern:

Be it known that I, FRANK WILLIAM KAISLING, Jr., a citizen of the United States of America, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Ammeters, of which the following is a specification.

My invention relates in general to devices for visualizing the direction flow of current in an electrical circuit, and for measuring the amount of current flowing in the circuit, such devices being commonly known as ammeters. The device of my invention is particularly adapted for use in connection with ignition and lighting circuits of an automobile or the like. I do not, however, wish to be limited to this particular use of my device, as it is at once apparent that my device may be connected in any circuit when it is desirable to know the direction flow of current, and also the amount of current flow.

It is the object of my invention to produce an improved device of this class which will embody desirable features and advantages in a simple, efficient and economical manner, and to the accomplishment of this object and such others as may hereinafter appear, the invention consists of the novel details of construction of parts, and combination of parts described and particularly pointed out in the appended claims.

Referring now more particularly to the device of my invention in the accompanying drawing which illustrates my device in the several views, and in which like reference characters in the several views denote like parts, and in which:

Fig. 1 is a front view of the device of my invention;

Fig. 2 is a rear view of Fig. 1, showing the terminals;

Fig. 3 is a sectional view along the line 3—3 of Fig. 1;

Fig. 4 is a front view of the device with the cover and indicating dial removed;

Fig. 5 is a front view of the device similar to that of Fig. 4, but with parts broken away to more clearly illustrate the structure;

Fig. 6 is an enlarged sectional view showing the supporting means for the indicator;

Fig. 7 is a sectional view of one of the terminal posts showing its construction;

Fig. 8 is a perspective view showing the current receiving coil unit,

Referring now more in detail to my invention as illustrated, it comprises a shallow-cup shaped mounting plate 2, upon which the operating mechanism of the device is mounted, and a cover or cap 3 for enclosing and protecting the mechanism. A pair of terminals 4 and 5 are provided, both being similarly constructed and by describing terminal 4, the construction of terminal 5 will be readily apparent. The terminal 4 is provided with a threaded shank 6 which passes through the plate 2 and is insulated therefrom by means of a pair of insulation washers 7 and 8, and an insulating bushing 9. To prevent the terminal from rotating, the terminal 4 is provided with a hexagonal-shaped portion 10 which rests in a hexagonal-shaped depression 11, and the insulation washer 7 is in the form of a hexagonal cup-shaped member and rests in the hexagonal-shaped depression 11 between the portion 10 of the terminal 4 and the plate 2. A clamping nut 12 is provided and has screw-threaded engagement with the threaded portion 6 of the terminal, which nut 12 securely clamps the terminal 4 to the plate 2.

A thin strip of soft iron forms the core 13 and is secured to the circularly-shaped permanent magnet 14 by means of the bolt 15, which passes through a suitable opening in the circularly-shaped permanent magnet 14, and a nut 16, which has screw-threaded engagement with the said bolt 15 secures the core 13 to the magnet 14. A coil C, which is adapted to receive current, the direction of flow of which is to be indicated by the rotating member M, is shaped as illustrated in Figure 8 by means of a shearing and forming operation in which the parallel ribbon conductor strips 17 are alternately formed in opposite directions from their centers to form a central opening 18 through which the core 13 is slipped, the said core 13 being suitably insulated by means of a thin rectangular tube of insulation 19. The ends 20 and 21 of the coil C are provided with suitable openings 22 and 23, which permit the ends 20 and 21 of the coil C to be slipped over the threaded portions 24 and 25 of the terminals 4 and 5, the said ends 20 and 21 resting against the hexagonal-shaped portions 10 of the terminals 4 and 5. The permanent magnet 14 is provided with suitable openings 26 of a size to receive the insulation bushings 27, the said bushings 27 being provided with

openings of a size to receive the threaded portions 24 and 25 of the terminals 4 and 5. Insulation washers 28 are placed between the terminal ends 20 and 21 and the permanent magnet 14, said bushings 27 and washers 28 suitably insulating the magnet 14 from the terminals 4 and 5. Nuts 31 are provided, which have screw-threaded engagement with the threaded portions 24 and 25 of the terminals 4 and 5, and insulation washers 32 and metal washers 33 are placed between the magnet 14 and the nuts 31, the said nuts 31 securing the coil C to the terminals 4 and 5; also permanently supporting the permanent magnet 14.

A rotatable shaft 36 for pivotally supporting the armature 37 and an indicator needle 38 are provided, and to secure the armature 37 and needle 38 to the shaft 36, I provide a shouldered sleeve 39. The sleeve 39 is provided with an opening slightly smaller than the shaft 36 so that it can be forced upon the shaft 36 to hold the armature 37 and needle 38 in position upon the shaft 36. The armature 37 and needle 38 are each provided with openings of a size to receive the sleeve 39, the said needle 38 resting between the upper shouldered portion of the sleeve 39 and the armature 37. The sleeve 39 protrudes slightly beyond the armature 37 and this protruding portion is staked or turned over to hold the armature 37 and needle 38 upon the sleeve 39. To pivotally support the shaft 36, armature 37 and indicator needle 38, as a whole, in place between the legs or pole pieces 40 and 41 of the permanent magnet 14, I provide a U-shaped member 42 which is secured to the bottom surfaces of the pole pieces 40 and 41 by means of the bolts 43 and 44, which bolts pass through suitably aligned openings in the legs 40 and 41 of magnet 14 and in the U-shaped member 42. Lock nuts 45 and 46 having screw-threaded engagement with the bolts 43 and 44 clamp the U-shaped member 42 in position. To permit the mounting of the U-shaped supporting member 42, I provide a rectangular shaped depression 30 in the mounting plate 2 of a depth slightly greater than the height of member 42.

A suitable depression or bearing point 47 centrally located with reference to the pole pieces 40 and 41 is formed in the member 42 into which the pointed end 36' of the shaft 36 rests, thus forming a bearing for one end of the shaft 36. The other end 36² of the shaft 36 is provided with a pointed end and rests in a depression 48 in an adjustable bridge plate 49, thus forming the other bearing for the shaft 36. The bolts 43 and 44 receive nuts 50 and 51, which nuts have screw-threaded engagement with the bolts 43 and 44. The plate 49 may be adjusted up and down by means of the nuts

50 and 51 to properly adjust the shaft 36 in the bearings 47 and 48, and when this adjustment is secured, the nuts 52 and 53 which have screw-threaded engagement with the bolts 43 and 44 are tightened to clamp the bridge plate 49 in position. A dial plate 65 is provided and is secured to studs 66 and 67 by means of nuts 68 and 69, which nuts have screw-threaded engagement with the threaded ends of the studs 66 and 67, the said studs being suitably secured to the mounting plate 2. A card 70 is suitably fastened to the dial plate 65 by means of the nuts 68 and 69 and is graduated to show the discharge or charge in amperes, depending in which direction the current is flowing that is passing through the instrument. The indicator needle or pointer 38 is carried above this dial and oscillates back and forth as the current is increased and decreased. The cover 3 is provided with an opening 72 below which a transparent covering 73, such as glass, is placed, the said glass covering 73 being held in place by means of a spring ring 74. When the cover is in place, the dial may be readily read through the transparent member 73.

Having described the various parts of my device, I will now describe its function and use. Assuming that the instrument is used in connection with an ignition and lighting circuit of an automobile, it is so connected in circuit that current will flow through the coil C in one direction if the generator is charging the storage battery, and in the opposite direction if the storage battery is supplying current to the operating circuits. The legs or pole pieces 40 and 41 of permanent magnet 14 are in the same plane as the flat elliptical-shaped armature 37, as is also the free end of the core 13. The armature 37 being elliptical its greatest width lies in the magnetic field created by the pole pieces 40 and 41 of the permanent magnet 14, thus when no current is flowing through the coil C, the indicator needle 38 points to zero. Should current now pass through the coil C in one direction, if the generator is charging the storage battery, the core 13 will be magnetized. The field created by the energization of the core or magnet 13 will cause the armature 37 to rotate, as is well understood, and this movement of the armature 37 causes the indicator 38 to be moved to the left to indicate that the storage battery is being charged, and the graduations on the dial 70 indicate to what extent it is being charged. The stronger the field set up by the magnet 13, the greater the deflection for the indicator needle 38.

Now, should a current pass through the coil in a direction opposite to that just described, the armature 37 will rotate in the opposite direction, as is well understood,

causing the indicator needle 38 to move to the right and the graduations on the dial face 70 will indicate that the storage battery is supplying current to the operating circuits and the amount being supplied thereto.

From the foregoing description, it is believed that the application and functions of the device of my invention will be readily understood without illustrating or describing circuit arrangements in detail.

In illustrating my invention I have chosen a preferred form, but it is to be understood that many changes and modifications thereof may be made and I, therefore, do not wish to be limited to the exact structure as shown, but aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

Having described my invention, what I claim as new and desire to secure by United States Letters Patent, is:

1. A device of the character described including a mounting plate, a non-continuous ring-shaped permanent magnet secured thereto, a coil comprising integrally formed parallel strips alternately displaced to form a central opening supported by said mounting plate, a pair of terminals for said coil secured to said plate, a flat core extending through said central opening and having its one end secured to said permanent magnet and its other end resting between the free ends of said permanent magnet, a pair of bridging members secured to the free ends of said permanent magnet, an armature pivotally secured between said bridging members and adapted to be acted upon by said core when current is passing through said coil, adjusting means for adjusting one of said members relative to said pivotally supported armature, and a cover cap for engaging said mounting plate to enclose the various parts of said device.

2. A device of the character described including a mounting plate, a non-continuous cylindrically shaped permanent magnet secured to said mounting plate, a coil comprising a plurality of flat strips integrally formed out of a piece of flat material, said strips being alternately displaced relative to the main portion of said flat plate, thereby forming a central opening, a flat core for engaging said central opening to form an

electromagnet, one end of said core being secured to said permanent magnet and its other end extending between the free ends of said permanent magnet, a pair of terminals for said coil, said terminals securing said coil in its operative position, a pair of members secured to the free ends of said permanent magnet, each of said members having a depression, a pivot pin having an armature secured thereto for engaging said depression in said members, said pivot pin retaining said armature in position whereby the same is acted upon by said permanent magnet and by said flat core when current is passing through said coil, adjusting means for adjusting one of said members relative to said pivot pin, and a cover cap for enclosing the different parts of said device.

3. In a device of the character described including a mounting plate, a non-continuous ring-shaped permanent magnet secured to said plate, a flat current-carrying conductor having parallel ribbon conductor strips alternately formed in opposite directions to form a flat conductor provided with a central opening, said conductor being secured to said mounting plate, a flat core for engaging said central opening and secured to said plate by means of a screw, a pair of terminals secured to said mounting plate and insulated therefrom in a manner to prevent rotation of said terminals, said conductor being electrically connected to said terminals, an angularly shaped bridging member for engaging said angularly shaped plate and secured to the free ends of said permanent magnet by means of bolts, another bridging member associated with said first bridging member and secured in place by said bolts, a pivot pin having an armature secured thereto and pivotally supported between said bridging members and also between the free extremities of said permanent magnet and in close proximity of the free end of said flat core controlling the actuation of said armature, adjustable means for adjusting one of said bridging members relative to said pivot pin, and a cover cap for enclosing said device secured to said mounting plate.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 22nd day of October, 1919.

FRANK WILLIAM KAISLING, Jr.