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J. E. ESHBAUGH

1,742,697

AMMETER SINGLE UNIT TYPE

Filed July 15, 1927

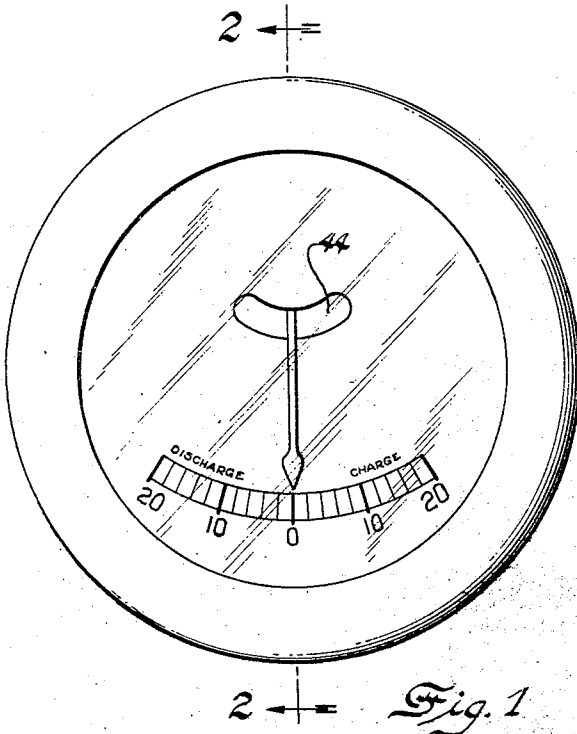


Fig. 1

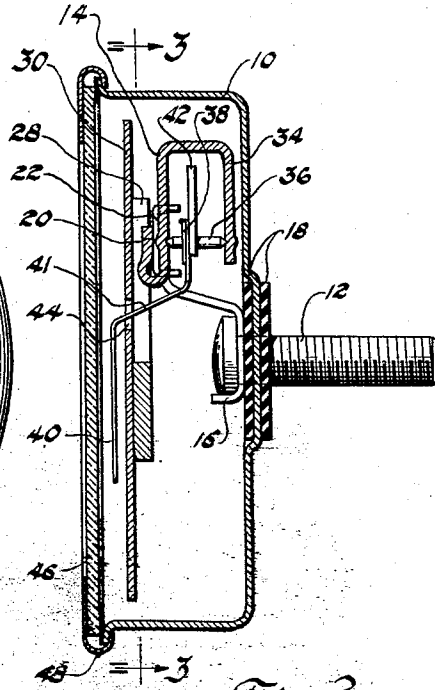


Fig. 2

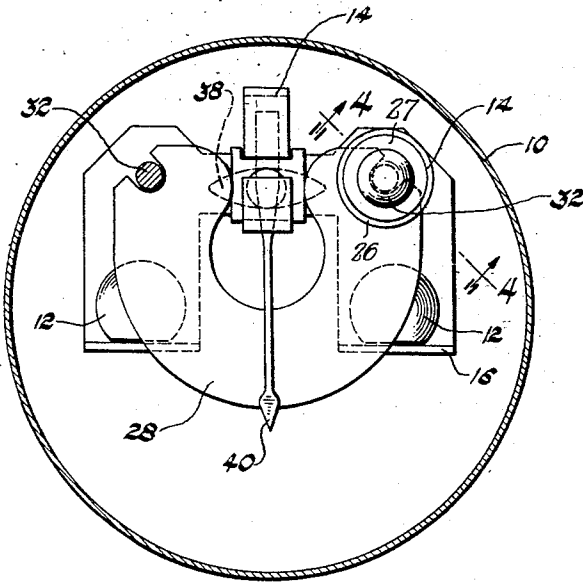


Fig. 3.

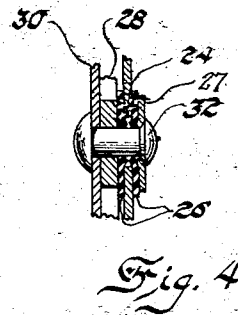


Fig. 4

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AMMETER SINGLE-UNIT TYPE

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This invention relates to an ammeter and more particularly to an ammeter of the type which is ordinarily mounted on the dash board of an automobile to indicate the direction and magnitude of the flow of current through the electrical system.

The prime consideration in an ammeter of this type is simplicity. This is a necessary feature from the standpoint of economy, both in manufacture and assembly, and from the standpoint of long life and uniform good service. The use of both bar and horseshoe magnets in ammeters in the past has been common. The bar magnet has the advantage over the horseshoe magnet in that the bar magnet can be readily compactly mounted with the rest of the structure. The horseshoe magnet gives a more concentrated field of force adjacent the armature as the ends are closer together but has the disadvantage that it is not so readily and compactly mounted.

In the prior construction, the horseshoe magnet has ordinarily been placed in the bottom of the case and the unit assembly, comprising the conductor carrying a pivoted shaft on which are mounted the armature and indicating needle, fixed in place adjacent the magnet. This requires several operations. I avoid the necessity of mounting the magnet separately by fixing it in place with the unit assembly so that the conductor, armature, needle and magnet as a unit may be readily placed in a case. This construction is of distinct advantage in instances where the ammeter is installed in a panel and an instrument case is unnecessary.

It is an object of this invention to provide an ammeter which is simpler in construction than those hitherto in use and more efficient, and which affords substantial advantages over known constructions in economy of manufacture and assembly.

Other objects of the invention will appear in the course of the following description, taken in connection with the accompanying drawing and appended claims.

In the drawing:

Figure 1 is a plan view.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a view taken along the line 3—3 of Figure 2.

Figure 4 is a section on the line 4—4 of Figure 3.

Referring to the drawing, the numeral 10 indicates a cup-shaped metallic case, bent out or flanged at its rim. Spaced openings are formed in the back of the case for reception of the terminal bolts 12. The conductor 14 through which passes the current to be measured is somewhat the shape of an inverted U, as viewed in Figure 3. Each end of the conductor is provided with a flange 16 for fitting against the straight edge of the head of the terminal bolt 12. The conductor and terminal bolt are spaced from the back of the case by strips 18 of insulating material.

The center of the conductor is bent back in the form of a finger 20 to provide means for holding thereon a U-shaped clip or tufting plate 22 for a purpose described below. This plate is of magnetic material, as soft iron. Each side portion of the conductor is provided with an opening 24 and on each side surrounding the opening is placed a strip or washer 26 of insulating material. A washer 27, preferably of metal, is placed between the insulation 26 and the head of the rivet 32, the purpose of this washer being to provide a more secure gripping surface for the rivet head and thereby prevent damage to the insulation. Over this is placed the apertured end of the permanent horseshoe magnet 28 and over this the dial 30. The parts are held together by a rivet 32. The center of the conductor is bent back under the main portion to form a finger 34, and the parts are prick punched to provide bearings for the shaft 36 on which is non-rotatably mounted the armature 38, indicating needle 40 and counterbalance weight 42. The armature is of magnetic material, the needle and counterbalance weight being ordinarily of light non-magnetic metal, as aluminum. The needle 40 is provided with an offset portion 41 extending through an arcuate slot 44 in the dial so that the arrow on the end of the needle will be visible to the operator. Thus the conductor 14 has fixed thereto the horseshoe magnet, dial, needle and armature.

This unit is fixed to the back side of the case by terminal bolts 12 held thereon by suitable nuts (not shown).

Fitting over the face of the case is the transparent cover 46, ordinarily of glass and held in place by the bezel 48, suitably constructed for mounting on the dashboard or instrument panel (not shown).

The operation of my device is as follows:

When no current is passing through the conductor the magnet 28 will hold the armature in the position illustrated in Figure 3. When current passes through the conductor, magnetic lines of force extend about the central portion of the conductor and tend to turn the armature at right angles to its illustrated position. Thus, the position of the needle will be the resultant of two forces, the unvarying force of the permanent magnet and the varying field about the conductor, the variation being both in direction and magnitude. While the concentrating or tufting plate 22 is not absolutely necessary for the attainment of the advantages above enumerated, I find that placing this plate on the conductor as illustrated gives a stronger deflecting force for a given current than would otherwise be attained. This results from the fact that the plate 22 concentrates the lines of flux about the conductor 14 and cuts down the magnetic gap between the armature and clip as larger and larger angles of deflection are reached.

My improved ammeter may be mounted in a case as illustrated or it may be mounted in a separate instrument panel or directly on the dashboard.

I claim:

1. In an ammeter, a conductor comprising side terminal portions, and a connecting portion, said connecting portion supporting a shaft carrying an armature of magnetizable material, a curved permanent magnet having its ends on opposite sides of the axis of the armature, a clip of magnetic material supported on the conductor frame between the poles of the magnet and extending on either side of the axis of the armature, and a dial adjacent said magnet, and common means for rigidly fixing said dial, magnet and conductor together.

2. In an ammeter, a conductor comprising side terminal portions and a connecting portion, said connecting portion supporting a shaft carrying an armature of magnetizable material, a curved permanent magnet having its ends on opposite sides of the axis of the armature, a clip of magnetic material between the poles of the magnet and extending on either side of the axis of the armature, a finger on said connecting portion to hold said clip fixed in place, and a dial adjacent said structure, said dial, magnet and conductor being fixed rigidly together by a common means.

3. In an ammeter, a conductor frame provided with terminals, a shaft carrying an armature and indicating needle supported on said frame, a bent permanent magnet resting on said frame and insulated therefrom, the ends of said magnet being disposed adjacent the armature and on opposite sides of the axis thereof, a dial disposed over said magnet, and unitary connecting means between said frame, magnet and dial.

4. In an ammeter, a conductor frame provided with terminals, a shaft carrying an armature and indicating needle supported on said frame, a bent permanent magnet resting on said frame and insulated therefrom, the ends of said magnet being disposed adjacent the armature and on opposite sides of the axis thereof, a clip of magnetizable material supported on the frame between the poles of the magnet and extending on opposite sides of the axis of the armature, and means for fixing said magnet on said frame.

5. In an ammeter, a conductor having a U-shaped portion and feet serving as terminals, an integral arm on the base of the U and bent to underlap the U, a pointer swinging mechanism mounted between the base of the U and the arm, a magnet secured to the base of the U, a dial mounted on said magnet, and common means to secure said magnet, dial and conductor together.

6. In an ammeter, a conductor having a U-portion and feet forming terminals the base of the U being in a plane parallel to the plane of the feet, an integral finger on said U bent onto its base, a tufting plate held by said finger, a bent magnet resting at its ends on said base, a dial on said magnet, and common means passing through the dial, magnet ends, and base to rigidly hold the parts together.

In testimony whereof I affix my signature.
JESSE E. ESHBAUGH.