Jan. 3, 1939. A. W. LE FEVRE ET AL 2,142,248

MAGNETIC SPEEDOMETER

Filed Jan. 31, 1936

Fig. 1.

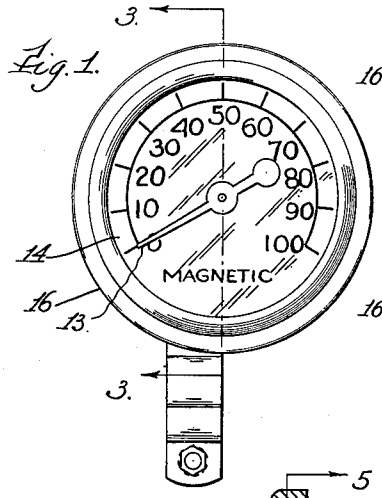


Fig. 2.

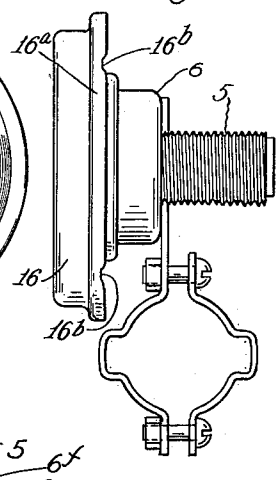


Fig. 5.

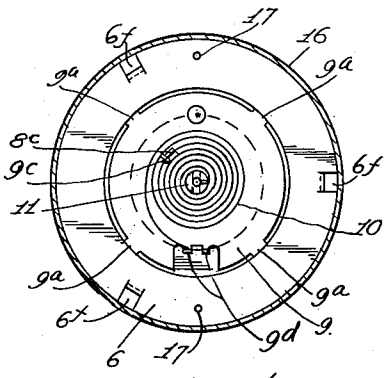


Fig. 4.

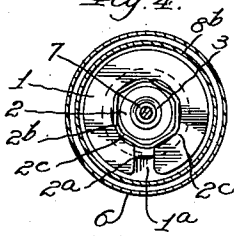
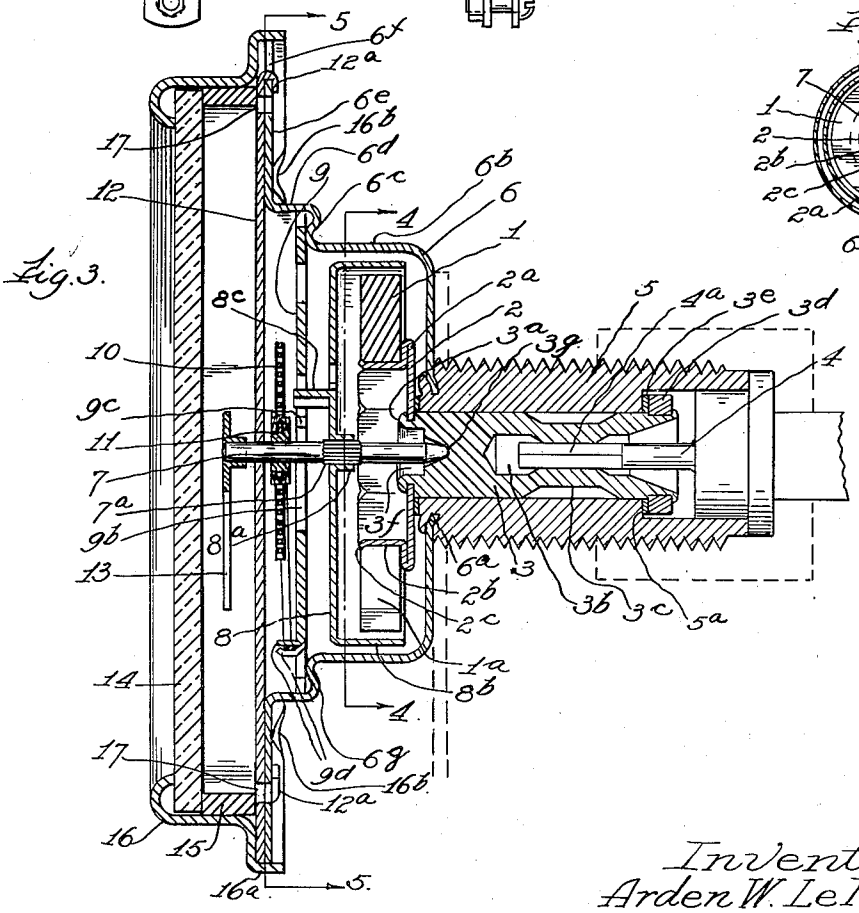


Fig. 3.



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MAGNETIC SPEEDOMETER

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Application January 31, 1936, Serial No. 61,734

4 Claims. (Cl. 264—13)

This invention relates to magnetic speedometers, and its purpose is to provide an instrument of this type which shall be extremely inexpensive to manufacture so as to be available for use on inexpensive vehicles, such as bicycles or children's toy automobiles and velocipedes. It consists of various features and elements of construction in combination as herein shown and described and as indicated by the claims.

In the drawing:

Figure 1 is a face view of an instrument embodying this invention.

Figure 2 is a side elevation of the same.

Figure 3 is a transverse section on an enlarged scale, taken as indicated at line 3—3 on Figure 1.

Figure 4 is a detail section taken as indicated at line 4—4 on Figure 3, but on the same scale as Figure 2.

Figure 5 is a detail section taken as indicated at line 5—5 on Figure 3.

In an instrument of this character the essential elements are a rotating magnet driven by the wheel or shaft whose speed is to be measured, and a spring-biased drag element, usually in the form of a disk or cup of non-magnetic metal, such as aluminum, adapted to be drawn from a zero position to a speed-registering position corresponding to the speed of revolution of the magnetic element. Associated with the drag element, of course, is a suitable dial and an index member, such as a pointer.

In the drawing the magnet, 1, is shown as annular in form, with the usual gap at 1^a between its poles, and it is carried by a stamped metal core or mounting, 2, which is in the form of a disk, doubled back upon itself at 2^a in the vicinity of its periphery, and then bent at right angles to form an annular flange, 2^b, fitting snugly into the annular magnet, 1, and peened over at 2^c for permanently securing the magnet against the base flange formed by the doubling of the material at 2^a. This core member, 2, is fixed to a drive shaft, 3, whose inner end is reduced to form a shoulder against which the member, 2, is seated, and upon which it is secured by peening over the extreme end portion of the shaft at 3^a. The other end of the shaft is axially bored at 3^b, and a portion of it is then constructed at 3^c to form a squared socket into which the squared end, 4^a, of any suitable flexible drive shaft, 4, is disengageably fitted. The shaft, 3, is journaled in a hollow stem or bushing, 5, projecting axially from the rear of the case, 6, and permanently secured in a central opening in the case by the peening method, as seen at 6^a. The outer end of the shaft, 3, carries a collar, 3^d, permanently held thereon and serving as a stop shoulder with a thrust washer, 3^e, interposed for running engagement with the shoulder, 3^a, in the bearing stem, 5.

The inner end of the shaft, 3, is counter-bored at 3^f, and formed with a central bearing recess, 3^g, for the inner end of the spindle, 7, which carries the drag element in the form of an aluminum cup, 8. Intermediate its ends the spindle, 7, is knurled or fluted at 7^a for interlocking engagement with a hub flange, 8^a, formed at the center of the cup, 8. The annular flange, 8^b, of the cup encompasses the magnet, 1, with clearance and fits rotatively within the annular wall, 6^b, which immediately joins the back wall of the case, 6, and which is preferably made of magnetic metal, such as steel, so as to serve as a field member for the magnet, 1, tending to concentrate the flux in the annular gap between said magnet and the wall, 6^b, thus drawing it through the skirt or flange, 8^b, of the drag element, 8.

The chamber formed within the annular wall, 6^b, of the case and serving to house the magnet, 1, and the drag element, 8, is further defined by a transverse partition, 9, preferably of magnetic material, so that it shall also serve as a field plate tending to draw a portion of the magnetic flux through the flat circular portion of the member, 8. This partition, 9, is seated against a transverse shoulder, 6^c, of the case, which is disposed between the annular wall, 6^b, and a slightly larger annular portion, 6^d, into which the projecting peripheral lugs, 9^a, of the plate, 9, fit tightly when the plate is forced into position for frictional securement. Just beyond the shoulder, 6^c, the material is crimped into bead, 6^e, to avoid a fillet in the angle between the transverse portion, 6^c, and the annular portion, 6^d, and thus ensure firm seating of the plate, 9, against the shoulder, 6^c. The central portion of the partition plate, 9, is cut away at 9^b, but so as to leave a projecting stop finger, 9^c, to engage the upstanding lug, 8^c, of the drag element, 8, at its normal zero position, or in the event that it should be turned through a nearly complete revolution. The biasing hair-spring, 10, is anchored at its inner end between a pair of collars, 11, forced on the spindle, 7, while the outer end of the spring is gripped between three upstanding fingers, 9^d, extending from the plane of the plate, 9, and formed integrally therewith. It is a comparatively simple matter in assembling the instrument, to draw the end of the spring into the space formed between one pair of these fingers, 9^d, and the third finger offset therefrom, and then to pinch the fingers together to grip this

end of the spring when it has been tensioned just sufficiently to bring the lug, 8c, against the stop, 9c.

Beyond the annular portion, 6d, of the casing the material extends outwardly in a flat annular portion, 6e, to which the dial plate, 12, is affixed by lugs, 12a, extending through radial slots, 6f, and clinched over against the back of the part, 6e. The dial plate has a central aperture which serves as a second bearing for the spindle, 7, and the projecting end of the spindle carries an indicating hand or needle, 13, frictionally held thereto by its hub. A cover glass, 14, spaced from the dial plate, 12, by a ring, 15, of paper, fiber or other suitable cushioning material is secured by a bezel ring, 16, whose marginal flange, 16a, is crimped inwardly at several points, as indicated at 16b, just back of the flat annular portion, 6e, of the casing. To prevent clouding of the under surface of the cover glass by condensation of moisture the dial plate, 12, and the portion, 6e, of the casing are formed with registering breather holes, 17.

Thus it will be seen that the assembly of the instrument is accomplished entirely without screws or rivets, but by simple upsetting or deforming operations by which the various parts are permanently and firmly secured together. This keeps the cost of manufacture down to a figure commensurate with the use for which the instrument is intended without, in any wise, endangering the certainty of its satisfactory operation.

While there is shown and described herein certain specific structure embodying the invention, it will be manifest to those skilled in the art that various modifications and re-arrangements of the parts may be made without departing from the spirit and the scope of the invention, and that the same is not limited to the particular form herein shown and described, except in so far as indicated by the appended claims.

We claim:

1. In a magnetic speedometer of the type which includes a shaft, an annular magnet carried thereby, speed-responsive means associated therewith including a nonmagnetic drag cup whose annular wall encompasses the magnet, a dial plate and a cover glass; a case of magnetic metal having a central annular portion disposed adjacent the magnet and closely encompassing said annular wall of the drag cup to serve as a field member for the magnet, a bearing sleeve for the shaft fixed axially to said central portion of the case, the speedometer including also a spindle for said drag cup having a bearing for its inner end in the end of the shaft, said case including an outwardly flaring flange extending from its said central portion, the dial plate being seated on said flange and providing a second bearing at its center for said spindle, said flange of the case having peripheral notches, and said dial plate being secured to the case by means of lugs clinched over the flange through said notches to retain it.

2. In a magnetic speedometer of the type which includes a shaft, an annular magnet carried thereby, speed-responsive means associated therewith including a non-magnetic drag cup whose annular wall encompasses the magnet, a field plate extending over the drag cup, a dial plate, a spindle for the drag cup journaled in the dial plate and carrying a pointer positioned to swing over the dial plate, and a cover glass over the pointer with a spacer interposed between the dial plate and the cover glass; a case for said elements comprising a shell of magnetic metal having a central, annular portion extending adjacent the magnet and closely encompassing the annular wall of the drag cup to serve as a field member for the magnet, with a central web at one end of said annular portion of the case, and a bearing for the shaft secured to said web, the case being of stepped formation including a first step extending radially outward from the other end of said annular portion for seating the field plate, and a second step extending farther outward for seating the dial plate, together with a bezel ring embracing the cover glass and said second step, with the spacer interposed.

3. In a magnetic speedometer of the type which includes a shaft, an annular magnet carried thereby, speed-responsive means associated therewith including a non-magnetic drag cup whose annular wall encompasses the magnet, a dial plate and a cover glass; a case having a central annular portion, a bearing sleeve for the shaft fixed axially to said central portion of the case, the speedometer including also a spindle for said drag cup having a bearing for its inner end in the end of the shaft, said case including an outwardly flaring flange extending from its central portion, the dial plate being seated on said flange and providing a second bearing at its center for said spindle, and said flange and dial plate having interlocking lugs and notches held in tight frictional engagement for securing the dial plate to the case.

4. In a magnetic speedometer of the type which includes a shaft, an annular magnet carried thereby, speed-responsive means associated therewith including a non-magnetic drag cup whose annular wall encompasses the magnet, a field plate extending over the drag cup, a dial plate, a spindle for the drag cup journaled in the dial plate, and a cover glass over the dial plate with a spacer interposed between them; a case for said elements comprising a shell having a central annular portion extending adjacent the magnet with a central web at one end of said annular portion of the case, and a bearing for the shaft secured to said web, the case being of stepped formation including a first step extending radially outward from the other end of said annular portion for seating the field plate, and a second step extending farther outward for seating the dial plate, together with a bezel ring embracing the cover glass and said second step with the spacer interposed.

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