Nov. 6, 1934. C. T. WALLIS ET AL 1,980,019

MAGNETIC SPEEDOMETER

Filed Sept. 14, 1931

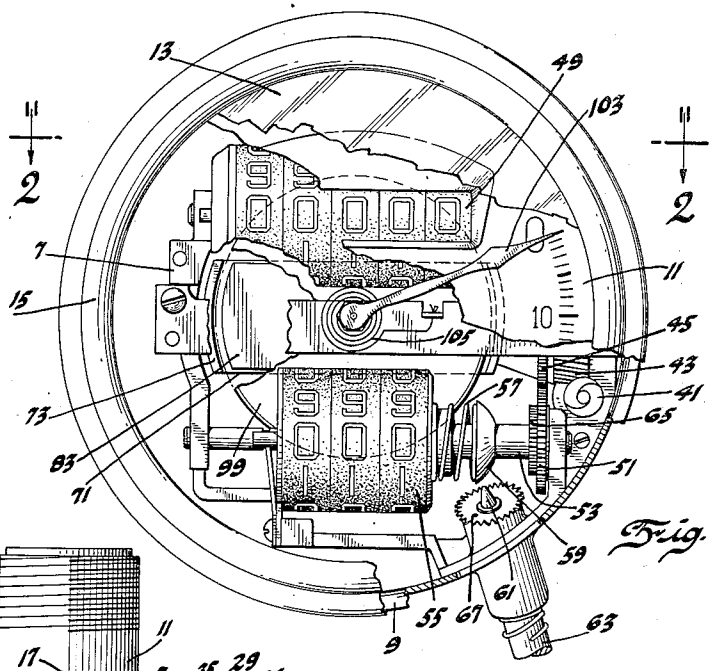


Fig. 1

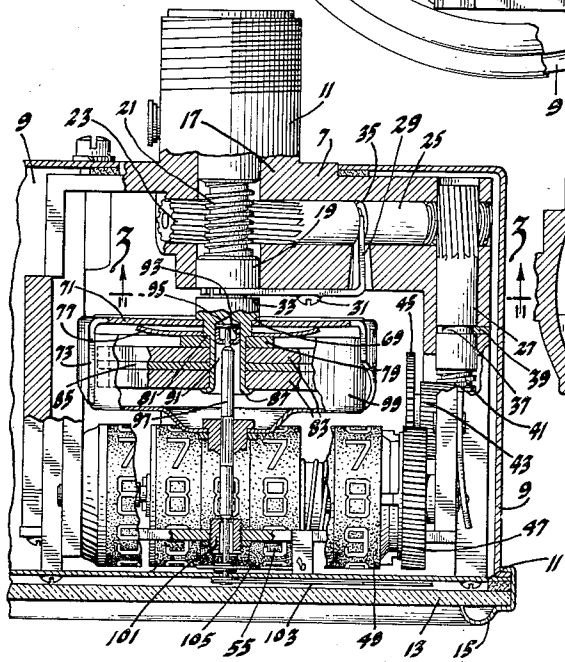


Fig. 2

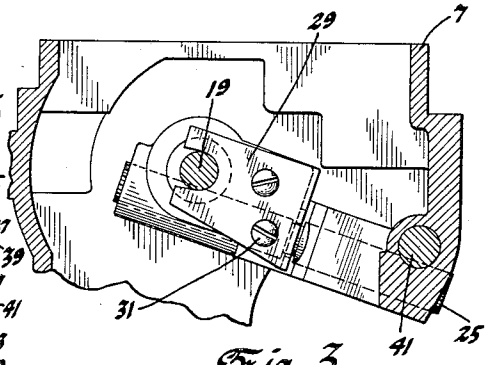


Fig. 3

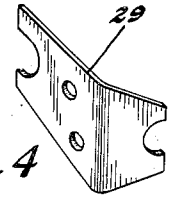


Fig. 4

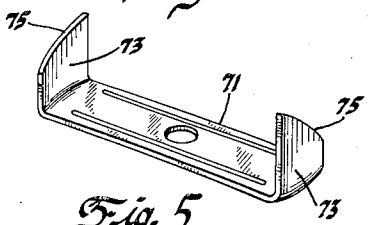


Fig. 5

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MAGNETIC SPEEDOMETER

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1 Claim. (Cl. 264—13)

This invention relates to magnetic measuring instruments and has been designed more particularly as an improved speedometer for use with vehicles.

An object of the invention is to provide an improvement in the calibrating means whereby the speed indications may be rendered accurate.

A further object consists in the provision of a laminated magnet having a temperature compensator located between the laminæ in order to insure accurate readings at all temperatures.

Other objects and advantages will be understood from the following description. Referring to the accompanying drawing—

Fig. 1 is a view in front elevation, partly broken away.

Fig. 2 is a transverse section.

Fig. 3 is a view from line 3—3 of Fig. 2 showing the means of retaining two shafts.

Fig. 4 is a perspective of the shaft retainer.

Fig. 5 is a view in perspective of the calibrating plate.

The instrument comprises a frame 7 carrying both speedometer and odometer mechanism. The frame is enclosed in a casing 9, there being a dial plate 11 having suitable openings to expose to view the odometer wheels, a cover glass 13 and a bezel 15. Journaled in a boss 17 forming a part of frame 7 is a rotor shaft 19 having a driving worm 21. This worm is in mesh with a worm 23 on shaft 25 rotatably journaled in the frame 7. Shaft 25 is similarly geared to shaft 27, shaft 27 being also journaled in the frame. For retaining shafts 19 and 25 in position there is provided a clamp 29 shown in detail in Fig. 4. This clamp comprises an angular stamping, one face engaging a face of the frame 7 and the other extending through an opening provided therefor in said frame. The ends of the two faces are provided with grooves, one to engage an annular recess 33 in shaft 19 and the other to enter a similar recess 35 in shaft 25. The stamping is secured in position by fastening means 31. By this simple retainer both shafts 19 and 25 are retained from movement in the direction of their longitudinal axes. Shaft 27 is also provided with an annular groove 37 to receive a suitable retainer 39. Gear 41 of shaft 27 drives a gear 43, and a gear 45 rigid with gear 43 is in engagement with the driving gear 47 of the season set of wheels, wheel 49 being the unit wheel of this series. Although not shown, since it is not a part of this invention, the wheels of the series are operably connected one to the other by any preferred transfer mechanism. Gear 45 also rotates a gear member 51 for rotating the wheels of the trip set. Gear 51 is rigid with a sleeve 53 which is slidable on the axis of the trip set of wheels but which is always in driving engagement with the first wheel 55 of this series. A spring 57 holds the sleeve in a position in which gears 51 and 45 engage. The sleeve 53 has a conical cam member 59 which may be engaged by the conical end 61 of a more or less conventional reset stem 63 whereby the sleeve may be moved to separate gear 51 from gear 45.

Rigid with gear 51 and sleeve 53 is a gear member 65 which engages a gear element 67 on the reset stem when the latter is moved to disconnect 51 from 45. By this means rotation of the reset stem may turn the wheels of the trip set.

Shaft 19 is reduced to form a shoulder 69 upon which is seated a rotatably adjustable armature 71 shown in detail in Fig. 5. This armature has axial arms 73 terminating in beveled or angular edges 75. A flat spring 77 terminally engages the armature plate 71 and holds this plate frictionally against the shoulder 69, the midportion of spring 77 engaging a spacer 79 which itself engages a second shoulder 81 on the shaft 19. The magnet is preferably composed of laminations 83 and between the laminations is a plate 85 of an alloy, such for example as nickel and steel, the magnetic permeability of which decreases with rising temperature. The end of shaft 19 is turned over as at 87 to grip the magnet together with the compensator and the spacer 79 between the end of the shaft and the shoulder 81.

The end of the shaft 19 is recessed as at 91 to receive a side bearing 93 and an end thrust bearing 95 for the spindle 97. To the spindle is clamped an inductor cup 99. This may be and preferably is of aluminum and its walls extend between the end of the magnet and the arms 73 of the armature 71. Owing to the chamfered or angular ends 75 of the walls 73 of the armature, the armature may be turned to variably influence the magnetic drag upon the rotating cup. The spindle has at 101 another bearing and frictionally secured to the spindle is a pointer 103 which moves with reference to figures on the plate 11 as will be readily understood. To bias the pointer to its zero position a spring 105 is used as usual.

The characteristics of the instrument will be briefly described. In the drum type of speedometer the pivots for the rotating drum are usually located in vertical alignment. In the pointer type as herein shown the pivots are in horizontal alignment. With this latter arrangement there

is a tendency to stick owing to friction at the pivots and for this reason the pointer type of instrument requires more torque. To get the greater torque with the rotating magnet I employ a magnet having at least two laminæ of an alloy having high coercivity. Between these laminæ I place at least one lamina of a metal having temperature compensating characteristics as explained above. This provision of plate 85 constitutes a shunt. Since the magnetic permeability of the shunt decreases as the temperature rises, a greater portion of the flux passes through the active field through the inductor cup. This is as it should be because at higher temperatures the active flux needs to be increased to offset the effects of the increasing electrical resistance of the inductor cup. It will be noted that the armature rotates with the magnet but may be circumferentially adjusted relative to the magnet, being held in positions of adjustment by friction influenced by the flat spring 77. The inductor cup located so that its circular wall lies between the ends of the magnet and the arms of the armature plate cuts the lines of force. Its rotation is effected by magnetic drag in the usual way. The angular or chamfered ends of the armature make it possible to control the influence of the magnet and vary, by gradual gradations, the drag on the inductor cup.

All parts are easily accessible after assembly and before being enclosed in the casing 9. It is unnecessary to provide for adjustment of the hair spring. The inductor cup may be held by the fingers and the pointer may then be turned to any desired position. Thus when the hair spring is free from tension the pointer may be set to zero.

The odometer, per se, is not a part of this invention. The mechanism of the odometer is operated by the worm shafts as described and two of these shafts are conveniently maintained in position by the single retaining clamp 29.

We claim:

In a magnetic measuring instrument, a laminated bar magnet and associated therewith a temperature compensator and an adjustable member to effect calibration, said magnet, together with the compensator and calibration member constituting a unitary rotatable assembly, said temperature compensator comprising a plate of alloy metal, said plate having as a characteristic magnetic permeability which decreases as its temperature rises, said alloy plate being positioned between the laminæ of the magnet and said calibrating member comprising a bar parallel with the magnet laminæ and having beveled ends overlying the ends of the magnet together with an inductor element the electrical resistance of which increases with rising temperature.

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