July 10, 1923. 1,461,628

J. PATRICK

MAGNETIC SPEEDOMETER

Filed Dec. 1, 1921

Fig 1

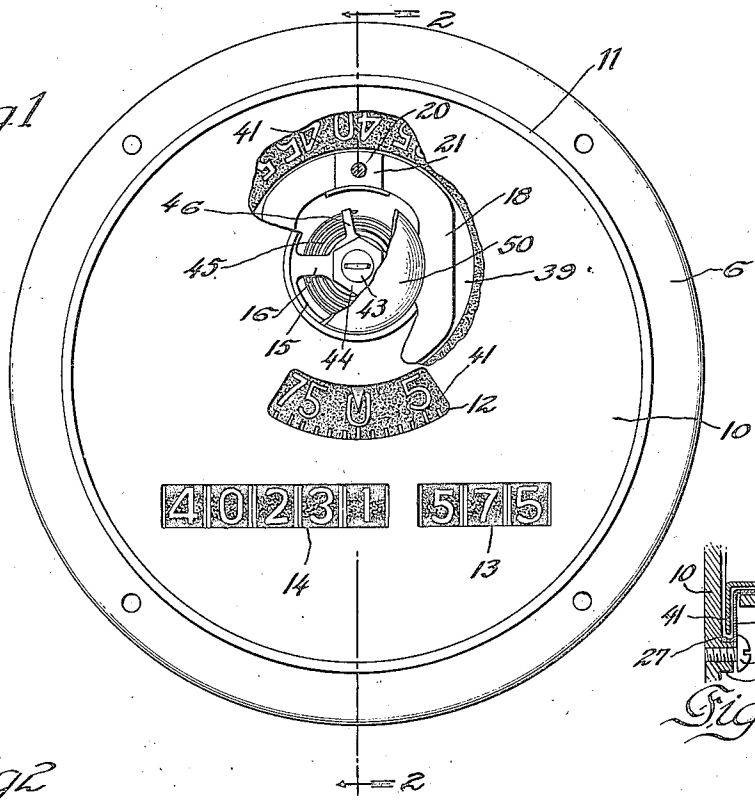


Fig 4

Fig 2

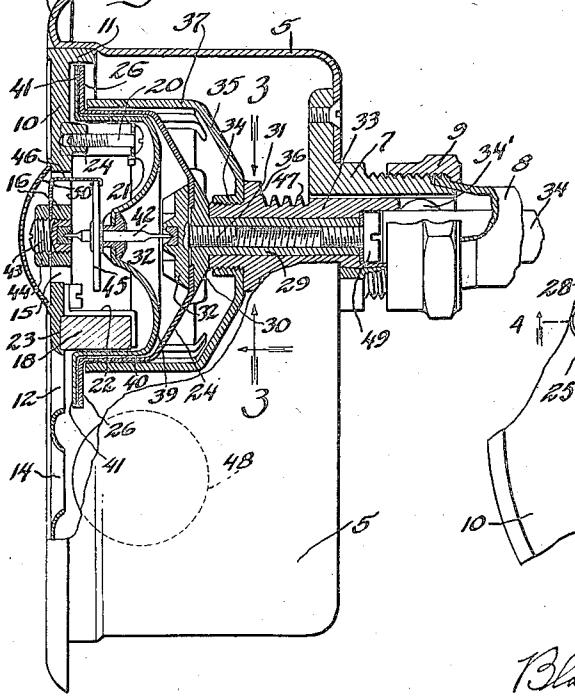
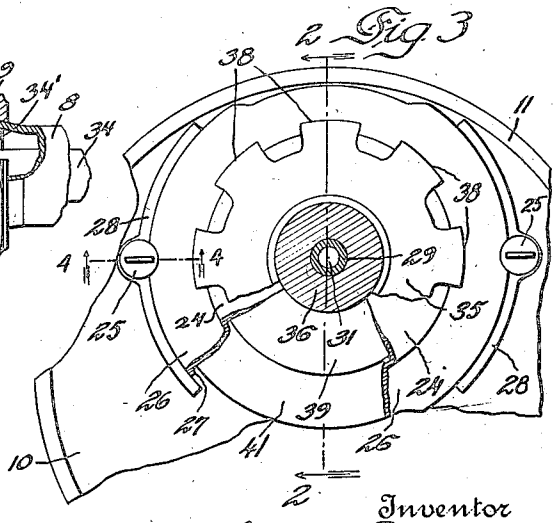


Fig 3



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Patented July 10, 1923. 1,461,628

UNITED STATES PATENT OFFICE.

JOSHUA PATRICK, OF DETROIT, MICHIGAN.

MAGNETIC SPEEDOMETER.

Application filed December 1, 1921. Serial No. 519,211.

To all whom it may concern:

Be it known that I, JOSHUA PATRICK, a citizen of the United States, and a resident of Detroit, county of Wayne, and State of Michigan, have invented certain new and useful Improvements in Magnetic Speedometers, of which the following is a full, clear, concise, and exact description, such as will enable others skilled in the art to which the invention relates to make and use the same, reference being made therein to the accompanying drawings, which form a part of this specification.

My invention relates to speed indicating devices of speedometers used in connection with motor driven vehicles to indicate the speed at which the same are driven, and particularly to speedometers of the magnetic type wherein an angularly rotatable speed cup is moved throughout various angles by the action of eddy current induced therein by a rotating armature, the poles of which move adjacent a magnet within the field of which the speed cup or a portion thereof lies.

The principal object of my invention is to provide a speedometer of the class or type above referred to wherein all the parts thereof may be assembled upon a foundation or supporting plate which closes an opening in the case of the instrument; and then introduced into or removed from the case as a single unitary structure, all the elements of the instrument being supported solely and entirely by and from said front plate, and independently of the casing of the instrument.

A further object of my invention is to provide an improved speedometer of the type in question in which the shaft whereby the same is driven from the vehicle is connected with the rear wall of the instrument casing and extends substantially at right angles therefrom; said driving shaft being operatively connected with the armature of the instrument, through a sliding joint; and the armature and all the other operating parts of the instrument being supported from a front plate which is removable from the casing, so that said plate and the parts carried thereby may be removed from the casing without disconnecting the driving shaft therefrom.

With the above and other objects of invention in view, as will hereinafter and at length more fully appear, my invention consists in the improved magnetic speedometer illustrated in the accompanying drawing and hereinafter described and claimed; and in such variations and modifications thereof, within the scope of the concluding claims, as will be obvious to those skilled in the art to which my invention relates.

In the drawing accompanying and forming a part of this specification, and wherein the preferred embodiment of my invention is illustrated:

Figure 1 is a view showing my improved speedometer in elevation and as seen from the front thereof, portions of the plate which supports the various operating parts of the instrument being broken away in order to better illustrate parts otherwise hidden by the supporting plate.

Figure 2 is a view showing a section upon a vertical plane indicated approximately by the line 2—2, Figures 1 and 3, of the principal operating parts of the instrument.

Figure 3 is a view showing the front supporting plate and various elements of the instrument carried thereby, the casing of the instrument being omitted and the view showing a section upon a plane indicated approximately by the line 3—3, Figure 2, looking toward the left.

Figure 4 is a fragmentary sectional view taken upon a plane indicated approximately by the line 4—4, Figure 3, showing the manner in which the support for the rear bearing member for supporting the armature is secured to the front plate of the instrument.

Referring now to the drawing, the reference numeral 5 designates the main casing of the instrument which may be made from pressed metal, as a die-casting, or otherwise and which casing is hollow and cup-shaped in form, and open along one side or end thereof; said opening being surrounded by an outwardly extending flange 6 which is provided with holes through which the screws pass whereby the instrument as a whole is secured in place in an opening provided in the dash or instrument board. The casing shown is made from comparatively thin metal and is provided with a hollow bushing 7 secured upon the inner surface of the rear wall thereof and extending through an opening therein, and to which bushing the non-rotating external casing 8 of the flexible driving shaft through which the instrument is driven is secured as by means of a suitable gland nut 9 to thereby

connect the driving shaft and housing to the casing.

The plane of the opening of the casing is substantially parallel with the bottom or rear wall thereof and is closed by a main foundation plate or cover 10 which serves as a support for all the operating parts of the instrument, the same being shown as provided with a peripherally extending flange 11 which fits closely within the open side or end of the casing as best shown in Figure 2 of the drawing. This supporting plate is commonly made from die-cast metal, altho the method of its formation is immaterial; and the same is provided with an opening 12 through which the speed indicating member or speed cup of the instrument may be seen and read, and with other openings 13 and 14 through which the readings of the trip and total odometer wheels usually present in speedometers may be read; and also with an opening 15 opposite the axis of rotation of the rotating parts of the instrument and across which a bearing supporting bar 16 extends, to thereby provide a support for the outer jewel bearing of the speed cup shaft of the instrument.

The reference numeral 18 designates the magnet of the instrument which is secured to the supporting plate 10 by a screw 20 extending between the poles thereof and through a clip 21, and a second clip 22 which engages the magnet near the middle portion thereof, the magnet as a whole preferably lying within a recess 23 provided for it in the foundation plate in order that it may be more fixedly held in position; and said foundation plate is preferably provided with a projecting lug 24 which lies between the poles of the magnet and maintains them the proper distance apart. While I have illustrated the magnet as of horse-shoe form it will be appreciated that a magnetic element of other form may be used such, for example, as two or more magnets arranged with their poles adjacent one another.

Located within the casing 5 and secured to the supporting plate 10 is a supporting member 24 which is substantially cup-shaped in form and made preferably from thin non-magnetic sheet metal having high electrical resistance to prevent the formation of eddy currents, the outer end of said member being secured to the said plate as by means of screws 25 the heads of which overlie the peripheral edge of an outwardly extending flange 26 of said member and said flange being preferably turned toward the plate at its free edge, as indicated at 27, in order that the flange may be properly spaced away from the adjacent inner wall of the plate. The supporting plate is preferably provided with arc-shaped ledges 28 with which the outwardly turned portion 27 of the flange 26 engages, as best shown in Figures 3 and 4, to thereby properly position the supporting member as a whole within the casing and relative to the plate 10 of the instrument.

The supporting member 24 which it will be appreciated is thus supported solely and entirely by and from the front supporting plate 10 is provided with a long bearing 29 extending from the inner unsupported end thereof toward and preferably into the hollow sleeve 7, said bearing having an inner annular projecting flange 30 which surrounds a central opening provided in the supporting member. The bearing is provided with an internally threaded passage into which a threaded stud 31 of a jewel supporting member 32 extends, as best shown in Figure 2, the bearing being thus supported from the supporting member by the clamping action of the member 32 the periphery of which lies opposite the flange 30, and serves to clamp the edge of the supporting member 24 surrounding the opening therein between the said jewel bearing supporting member and said collar. The supporting member 24 and the bearing 29 are functionally a single structure, and may obviously be made integral if desired.

It will therefore be appreciated that the bearing 29 is supported entirely from the main supporting plate or cover 10 of the instrument through and by means of the supporting member 24 and extends substantially at right angles to the said plate; the said bearing and supporting member being secured to the plate by the screws 25, as above explained, and the bearing being properly positioned relative to the plate as the supporting member is attached to the plate during the assembling of the instrument.

Rotatable upon the bearing 29 is an armature driving sleeve 33 which is itself driven from the rotating core 34 of the flexible driving shaft through a suitable connection which acts to drive the sleeve, but which is not permanently connected therewith; such, for example, as is provided by the key and key-way shown at 34'. The driving may however be accomplished by extending a squared or otherwise shaped end of the driving shaft into a similar recess in the sleeve, or in accordance with other schemes suitable for providing a driving connection which will be positive as regards rotary motion, but non-positive as regards relative longitudinal movement of the parts, so that the driving shaft may be removed from the casing without injury to the interior mechanism of the instrument as is usual in speedometer drives.

The sleeve 33 is threaded at its inner end as shown at 34 and the reference numeral 35 designates the rotating armature of the instrument which is screwed onto the

threaded portion 34 and against a collar 36 provided upon the sleeve. The armature is therefore driven from the core 34 of the driving shaft; and the same is substantially cup-shaped in form and has a cylindrical portion 37 which surrounds the magnet 18. This cylindrical portion of the armature 35 is slotted to provide a plurality of separate and distinct poles 38. The armature is made of iron or other magnetic metal; and the poles thereof which move close to the magnet and speed cup serve to vary the magnetic flux flowing between the poles of the magnet and induce eddy currents in the speed cup of the instrument, in accordance with the general mode of operation of magnetic speedometers of the class to which my invention relates.

The reference numeral 39 designates the angularly movable speed-cup of my improved magnetic speedometer, the same having a substantially cylindrical portion 40 which lies between the magnet 18 and the poles of the armature so that eddy currents will be induced therein as the armature is rotated; said speed cup having an outwardly extending flange 41 which moves adjacent the inner wall of the supporting plate 10 and across the opening 12 therein, and has figures upon it to indicate the speed at which the vehicle with which the speedometer is used is travelling, as is usual in such devices. This speed cup is supported by a pivot 42 the inner end of which is supported in a jewel bearing carried by the jewel bearing supporting member 32, and the outer end of which is supported in a jewel carried by a screw 43 which is in threaded engagement with the cross-bar 16 so that the bearings for the speed cup may be properly adjusted, said screw being locked in position after the speed cup is properly adjusted by a lock nut 44. A hair spring 45 is operatively connected at its inner end with the pivot 42 and at its outer end with a finger 46 which is adjustably held between the lock nut 44 and the cross bar 16, the purpose of the spring being to oppose the rotation thereof and return the speed cup to a zero reading and hold it in that position when the armature is stationary, as is usual in magnetic speedometers.

The armature sleeve 33 is provided with a worm 47 from which the odometer mechanism, indicated conventionally at 48, with which such instruments are commonly provided is driven, no specific odometer mechanism however being illustrated as the invention to which this present application relates is not concerned with the odometer features of the instrument; and the said sleeve is held in place upon the bearing 29 by a screw 49 in threaded engagement with the passage above referred to in the said bearing member.

In view of the premises it will be appreciated that all the elements involved in the speed indicating function of the instrument are supported from the main foundation or supporting plate or cover 10 which closes the front open end of the casing 5; and that the speed indicating elements, as well also as the odometer elements, may be assembled outside the casing and then introduced into and removed therefrom as a single unitary structure.

My invention therefore provides a speedometer in which the parts may be more readily assembled than has heretofore commonly been the case; the magnet being first secured to the front plate, then the speed cup put in position and loosely supported in its bearings, after which the supporting member 24 is fastened to the foundation plate by the screws 25, thus providing a single rigid bearing for the sleeve 33 which carries the rotating armature of the instrument.

After the sleeve 33 has been assembled with the bearing 29 the same is held in place thereupon by the screw 49 thus providing, as above pointed out, an instrument in which a single unusually long and rigid bearing is provided for the main rotating element of the instrument, and in which all the parts involved in the speed indicating function are supported from the front supporting plate. The assembling is completed by placing the supporting plate within the open front end of the casing which, however, in no way provides a bearing for any rotating element of the instrument; and it will be appreciated that the entire speed indicating mechanism may be removed from the casing as a single unitary structure along with the said plate. The single long bearing for the armature of the instrument avoids binding at the bearings therefor and provides for long life thereof; and the general concentric arrangement of the several elements which comprise the instrument insure proper alignment of the several parts as the instrument is assembled upon the main supporting plate.

After the instrument has been assembled and properly adjusted a sealing plate 50 the peripheral edge of which engages an annular groove provided in the front plate is sprung into place, thereby closing the opening 15 and covering the front jewel bearing and hair spring; which cover plate, being preferably put in place while the edges thereof are sprung inward, provide a construction in which the user of the instrument cannot readily gain access to the hair spring and other internal parts and vary the adjustment of the instrument.

Having thus described and explained my invention, I claim and desire to secure by Letters Patent:

1. In a speedometer of the class described, a suitable hollow casing having an opening at its front side or end; a supporting plate secured to said casing and acting to close said opening; speed indicating mechanism located within said casing and supported solely and entirely by said supporting plate; and a driving shaft supported by said casing and operatively connected with an element of said speed indicating mechanism to drive the same.

2. In a speedometer of the class described, a suitable hollow casing having an opening at its front side or end, and a rear wall opposite said opening; a supporting plate secured to said casing and acting to close said opening; a supporting member located within said casing and supported solely and entirely by said supporting plate; a magnet and an armature concentrically arranged relative to one another and one of which is rotatably supported by said supporting member while the other is fixedly secured to said supporting plate; an angularly movable speed cup supported by said supporting plate and operatively associated with said magnet and armature; and a driving shaft supported by said rear wall and operatively connected with the rotating member aforesaid to drive the same.

3. In a speedometer of the class described, a suitable hollow casing having an opening at its front side or end, and a rear wall opposite and substantially parallel with the plane of said opening; a supporting plate fitting within said opening; a hollow supporting member substantially cup-shaped in form located within said casing and supported solely and entirely by said supporting plate; a magnet secured to said supporting plate and located within said supporting member; an angularly movable speed cup located within said supporting member and arranged adjacent said magnet and supported from bearings carried one by said supporting plate and the other by said supporting member; an armature rotatable upon a bearing carried by said supporting member and having poles which move adjacent said magnet and speed cup; and a driving shaft supported by said rear wall and operatively connected with the armature aforesaid to drive the same.

4. In a speedometer of the class described, a suitable hollow casing having an opening at its front side or end; a supporting plate carried by said casing and acting to close said opening; a hollow substantially cup-shaped supporting member located within said casing and secured to said supporting plate so as to be supported thereby, and which supporting member is provided with a bearing disposed substantially at right angles to said supporting plate; an angularly movable speed cup located within said supporting member and supported in bearings one carried by said member and the other by said plate; a magnet located within said speed cup and secured to said plate; a rotatable armature supported solely by said bearing and having poles moving adjacent said speed cup and magnet; and a driving shaft operatively connected with said armature to drive the same.

5. In a speedometer of the class described, a suitable hollow casing having an opening at its front side or end, and a rear wall opposite and substantially parallel with the plane of said opening; a supporting plate fitting within said opening; a hollow substantially cup-shaped supporting member located within said casing and secured to said supporting plate so as to be supported thereby, and which supporting member is provided with a bearing disposed substantially at right angles to said supporting plate; an angularly movable speed cup located within said supporting member and supported in bearings one carried by said member and the other by said plate; a magnet located within said speed cup and secured to said plate; a rotatable armature supported solely by said bearing and having poles moving adjacent said speed cup and magnet; and a driving shaft supported by said rear wall and operatively connected with said armature to drive the same.

6. In a speedometer of the class described, a suitable hollow casing having a supporting plate at its front side or end, and which plate is provided with an opening; a speed cup angularly rotatable about an axis disposed substantially at right angles to said supporting plate, and which speed cup is provided with a radially extending flange adjacent its open end and which flange moves across the opening aforesaid in said plate; means including relatively stationary and rotatable magnetic members whereby angular movement is communicated to said speed cup; and a driving shaft operatively connected with the rotatable one of said members to drive the same.

7. In a speedometer of the class described, a suitable hollow casing having a supporting plate at its front side or end, and which plate is provided with an opening; a speed cup angularly rotatable about an axis disposed substantially at right angles to said supporting plate, and having a radially extending flange at its open end which moves across the opening aforesaid in said plate; a substantially cup-shaped supporting member carried by said supporting plate and enclosing said speed cup and its flange aforesaid, and which members is provided with a bearing substantially co-axial with the axis of rotation of said speed cup; a magnet secured to said supporting plate and located within said supporting member; an arma-

ture rotatable upon and supported solely by the bearing aforesaid of said supporting member, and the poles of which armature move adjacent said speed cup and magnet; and a driving shaft operatively connected with said armature to drive the same.

8. In a speedometer of the class described, a suitable hollow casing having an opening in its front side or end, and a rear wall opposite said opening; a supporting plate secured to said casing and extending across said opening; speed indicating mechanism located within said casing and supported solely and entirely by said supporting plate; and a driving shaft having a non-rotatable external casing fixedly secured to said casing, and a rotatable inner core operatively connected with an element of said speed indicating mechanism to drive the same.

9. In a speedometer of the class described, a suitable hollow casing having an opening in its front side or end, and a rear wall opposite said opening; a supporting plate secured to said casing and extending across said opening; a supporting member located within said casing and secured to said supporting plate, and having a bearing at its free end; a magnet carried by said supporting plate; an angularly rotatable speed cup supported in bearings carried by said supporting plate and supporting member; an armature rotatable upon the bearing aforesaid and supported solely by said supporting member, and the poles of which move adjacent said speed cup and magnet; and a driving shaft having a non-rotating external casing fixedly secured to said speedometer casing, and a rotatable inner core operatively connected with said armature to drive the same.

In testimony whereof I affix my signature.

JOSHUA PATRICK.