Dec. 18, 1956 W. W. HASTINGS 2,774,939

ELECTRIC TACHOMETER

Filed May 18, 1955

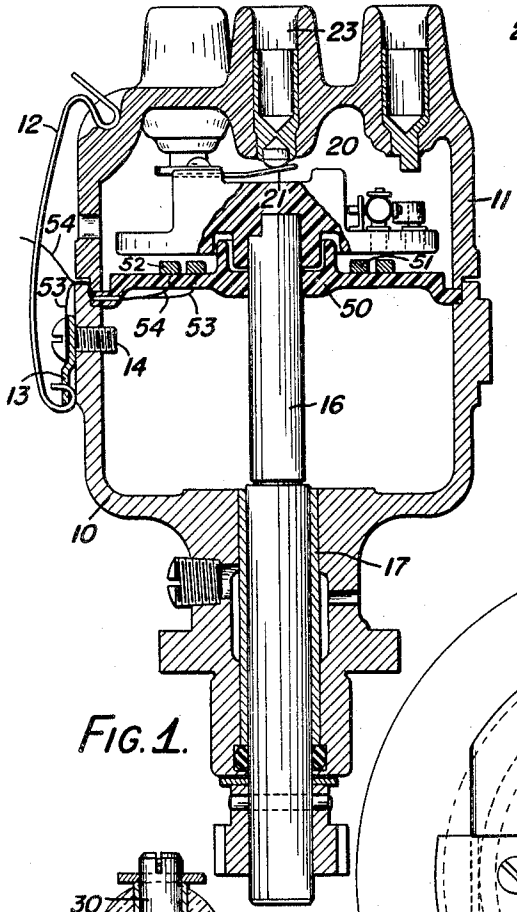



FIG. 1.

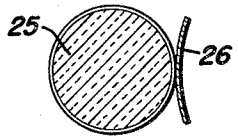



FIG. 3.

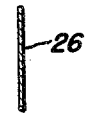



FIG. 4.

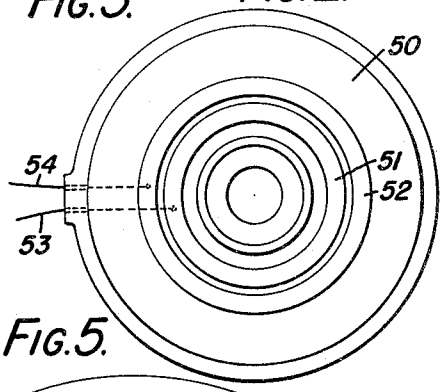



FIG. 5.

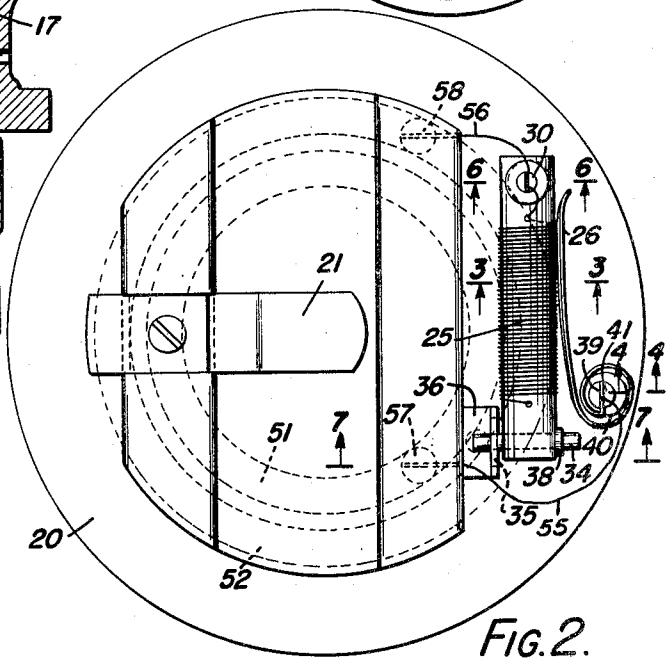



FIG. 2.

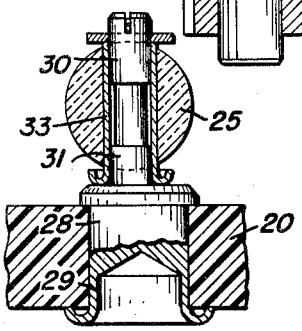



FIG. 6.

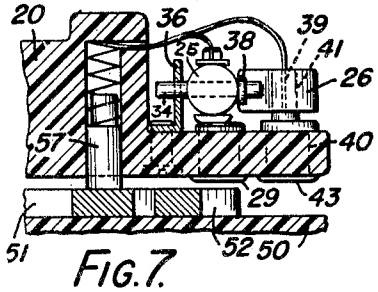



FIG. 7.

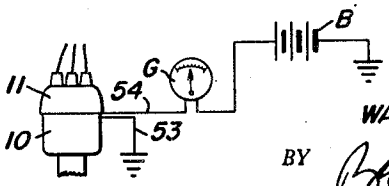



FIG. 8.

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# ELECTRIC TACHOMETER

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5 Claims. (Cl. 324—70)

The present invention relates to tachometers, and more particularly to tachometers for use on automotive vehicles.

One object of the invention is to provide a tachometer, the actuating mechanism of which, at least, can be made part of already-existing equipment of an automotive vehicle.

Another object of the invention is to provide a tachometer having actuating mechanism that can be incorporated in the distributor of an automotive vehicle so that it will be compact, and will not require any additional drive or mounting in the vehicle.

Another object of the invention is to provide a tachometer that will be simple in construction, yet accurate.

Other objects of the invention will be apparent hereinafter from the specification and from the recital of the appended claims.

In the drawing:

Fig. 1 is an axial section through a conventional automotive distributor showing the actuating mechanism of my tachometer mounted therein, the breaker points, cam, condenser, terminals, spring, and other conventional parts of the distributor being omitted for the purpose of clearness in illustration of the invention;

Fig. 2 is a plan view of the rotor of the distributor, showing the mounting for the resistor and rocker spring which actuate my tachometer;

Fig. 3 is a section on the line 3—3 of Fig. 2, looking in the direction of the arrows and particularly showing the shape of the contact portion of the rocker spring;

Fig. 4 is a section on the line 4—4 of Fig. 2 looking in the direction of the arrows;

Fig. 5 is a plan section of the modified breaker cover used in the distributor;

Fig. 6 is a section on the line 6—6 of Fig. 2 looking in the direction of the arrows, and on a somewhat enlarged scale;

Fig. 7 is a section on the line 7—7 of Fig. 2, looking in the direction of the arrows, and also on an enlarged scale; and

Fig. 8 is a wiring diagram, showing how the tachometer is wired.

Referring now to the drawings by numerals of reference, 10 denotes the housing and 11 the cap of a conventional automotive distributor. The cap is removably secured to the distributor housing in conventional manner by a plurality of spring clips 12 which snap over the cap and which are pivotally secured at their lower ends to straps 13 that are secured by screws or rivets 14 to the housing.

The distributor shaft is denoted at 16. It is journaled in the housing in conventional manner on a bushing 17. The rotor 20 is fixedly secured to the upper end of the distributor shaft. It carries the conventional current spring 21 which conducts in conventional manner the high voltage current from the secondary of the ignition coil to the sockets 23 which receive the jack-connections for the spark plugs of the vehicle.



All this is conventional construction. The new feature is the use of the rotor for operating a tachometer.

This tachometer-actuating mechanism includes a wire wound, or carbon, resistor 25 and a rocker spring 26 which cooperates therewith. The resistor is pivotally mounted on a shaft 28 (Figs. 6 and 7) which is hollowed at its lower end, as denoted at 29, and which has its lower end spun over to secure it in the rotor. The resistor is pivotally mounted on the bearing portions 30 and 31 of the shaft by means of a bushing 33. The bearing portions 30 and 31 are eccentric of the axis of the shaft. The pivotal mounting of the resistor permits the resistor to swing about its pivotal axis under centrifugal force as the rotor revolves in the operation of the automotive vehicle.

The resistor is constrained to remain in a horizontal plane during its swinging movement by a guide shaft 34 which has a pressed fit in a hole in the core of the resistor, and which engages in an elongate slot 35 in a bracket 36 which is riveted or otherwise secured to the rotor body. The guide shaft 34 has a shoulder portion 38 which seats against the resistor core.

The rocker spring 26 is a single piece of flexible strip material secured at one end in a kerf 39 in a retainer 40. The kerf 39 is formed in a cylindrical portion 41 of the retainer that is eccentric of the axis of the retainer so that by rotation of the retainer the tension of the spring can be adjusted. The retainer may be fastened in the rotor by making it hollow at its lower end, and spinning its lower end over, as denoted at 43. The spring 26 is positioned so that it has oscillating contact at only one point along its length, at a time, with the resistor; and as the resistor pivots on shaft 28, this point of lengthwise contact changes. The resistor, in effect, has rolling engagement with the spring. The spring is made flat in transverse section for the major portion of its length, as shown in Fig. 4, but is made convex in transverse section, as denoted in Fig. 3, for that portion of its length which is in contact with the resistor, so that the contact between the spring and the resistor will be limited to point contact, thereby giving the greatest accuracy in reading of the tachometer.

Mounted on the breaker cover 50 of the distributor are two concentric, electrically-conducting, contact rings 51 and 52. The spring retainer 40 is connected by a wire 55 to a brush 57 which rides on the inner ring 51. One end of the resistor is connected to shaft 28 which in turn is connected by wire 56 to a brush 58 which rides on outer contact ring 52. The inner contact ring 51 is grounded to the distributor housing by an electrical wire or conductor 53 which is secured in conducting engagement with strap 13 by the head of screw 14. The outer contact ring 52 is connected by a line 54 in series with an indicating meter, and the battery of the vehicle. The indicating meter which may be a conventional galvanometer, is denoted at G in Fig. 8. The battery is denoted at B in this figure. One pole of the battery is grounded to complete the indicator circuit.

The resistor may be of standard construction. It may be a carbon resistor or it may comprise a multiplicity of turns of fine wire wound very close together. In the latter case, the coil has the insulation removed from one side as by means of a coarse emery cloth, and is coated with an insulating varnish except where the insulation is removed. In either case, as the resistor pivots under action of centrifugal force, the contact spring engages and rocks along the resistor. In the case of the wire wound resistor, of course, the contact spring rocks over the portion of the resistor coil from which the insulation has been removed. The spring contact arm has an osculating, rolling, contact with the resistor. It is held spring pressed into engagement with the resistor by its own inherent resiliency.

The rotor is driven in time with the motor of the automotive vehicle. The faster the rotor rotates, the more the resistor is thrown outwardly about its pivot by centrifugal force, thereby rolling along the spring contact member. The speed of rotation of the rotor determines the movement of the resistor about its pivot, thereby determining the point of contact of the spring contactor with the resistor. This determines the amount of resistance in the circuit to the galvanometer. The needle of the galvanometer thereby registers the speed of rotation of the rotor of the distributor, namely, the speed of the engine.

The spring contact member has almost frictionless action resulting in very little lag; and it permits using great pressure between the resistor and the contactor. Because there is no intermediate linkage the action is very smooth and trouble free. In addition, the transmitter or sender is simple, rugged, and inexpensive to build since it contains so few parts. It is suitable for truck-tractor installations. It can be calibrated by rotation of the shaft **28** about its axis. After calibration, shaft **28** is fixed in the factory against rotation.

While the invention has been described in connection with a specific embodiment thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains, and as fall within the scope of the invention or the limits of the appended claims.

Having thus described my invention, what I claim is:

1. A tachometer comprising a rotary member, a wire-wound resistor comprising a core and a coil of wire wound about the axis of said core, a shaft mounted in said rotary member and having an eccentric bearing portion offset from its axis, and perpendicular to the axis of said core and on which said core is mounted to pivot about an axis parallel to the axis of said rotary member under centrifugal force as said rotary member rotates, and an electrically-conducting leaf spring having rolling contact with said resistor as said resistor pivots, and means connecting said spring and one end of said coil electrically in circuit to actuate an indicator, said shaft being rotatably adjustable to calibrate the tachometer.

2. A tachometer comprising a rotary member, a resistor pivotally mounted on said rotary member to swing about an axis parallel to the axis of said rotary member and perpendicular to the axis of resistor under centrifugal force as said rotary member rotates, and an electrically-conducting leaf spring having rolling contact with said resistor as said resistor pivots, said leaf spring having a contacting portion which is of convex profile to have point contact with said resistor.



3. A tachometer comprising a rotary member, a resistor pivotally mounted on said rotary member to swing about an axis parallel to the axis of said rotary member and perpendicular to the axis of resistor under centrifugal force as said rotary member rotates, and an electrically-conducting leaf spring having rolling contact with said resistor as said resistor pivots, said leaf spring having a contacting portion which is of convex profile to have point contact with said resistor, and means for adjusting the pressure of contact of said spring with the resistor.

4. A tachometer comprising a rotary member, a resistor pivotally mounted on said rotary member to swing about an axis parallel to the axis of said rotary member and perpendicular to the axis of said resistor under centrifugal force as said rotary member rotates, a post secured in said rotary member to extend parallel to the axis of said rotary member, and an electrically-conducting leaf spring secured at one end to said post and having rolling contact along its free portion with said resistor as said resistor pivots, said post being rotatably adjustable to vary the pressure of contact of said spring with said resistor, and means for connecting said spring and one end of said resistor electrically in circuit to actuate an indicator.

5. The combination with the distributor of an automotive vehicle, having a housing, a rotor rotatably mounted in said housing and driven in time with the engine of the vehicle, and a pair of conductor rings secured in said housing coaxial with said rotor, of a tachometer, said tachometer comprising a resistor pivotally mounted on said rotor for pivotal movement under centrifugal force about an axis parallel to the axis of said rotor as said rotor rotates, a spring contact member also mounted on said rotor and having resilient rolling contact with said resistor as said resistor pivots, a brush engaging one conductor ring and electrically connected with said spring contact member, and a second brush engaging the other conductor ring and electrically connected with one end of said resistor, and means for connecting the two conductor rings in series circuit with an electrically operated indicating meter and with a source of electrical power.

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