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P. RIEGGER
INSTRUMENTS FOR SUPERVISING THE RUNNING OF POWER DRIVEN VEHICLES
Filed Feb. 21, 1939

Serial No.
257,685
2 Sheets-Sheet 1

Fig. 1

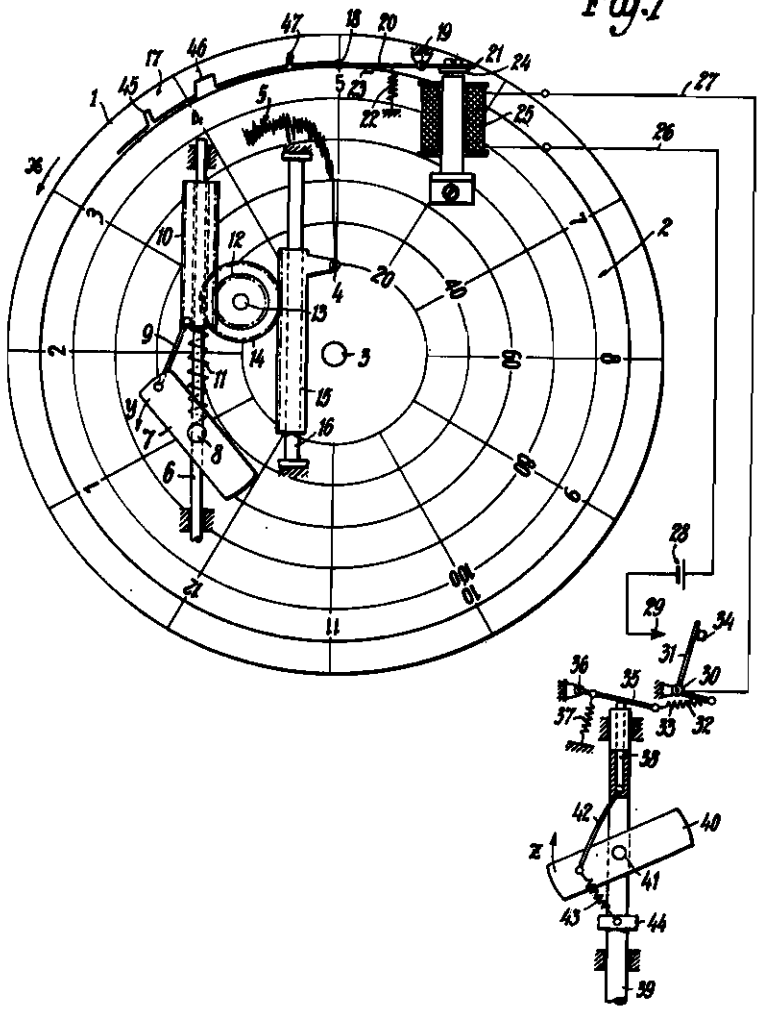

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Fig. 2

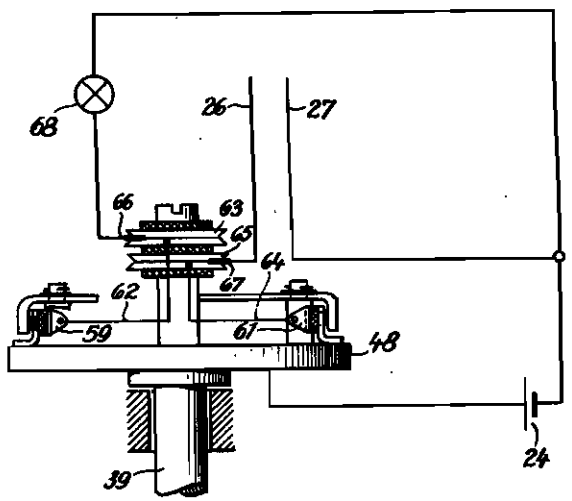
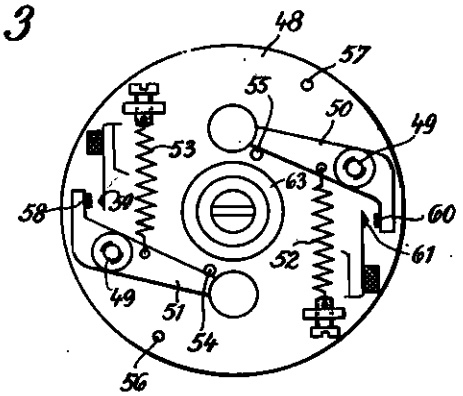


Fig. 3



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ALIEN PROPERTY CUSTODIAN

INSTRUMENTS FOR SUPERVISING THE RUNNING OF POWER DRIVEN VEHICLES

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Application filed February 21, 1939

The heavy stresses imposed on vehicle engines when running for long periods, for example when the vehicle is travelling along a motor road, easily lead to excessive strain on the engine and therefore to its becoming worn out prematurely. Therefore, in the interests of maintaining reliability of operation and also for keeping the engine in good running order, as long as possible, it is desirable that the speed of revolution of the engine and also the driving of the vehicle should be carefully supervised.

Revolution counters for indicating the speed of the engine are well known. They have the disadvantage, however, that they only indicate the revolutions at a particular time and do not record them. On the other hand, the recording of the engine speeds in addition to recording the speed of the vehicle would complicate the recording apparatus very considerably and increase its cost.

Now the present invention provides an apparatus whereby the times when the speed of revolution of the engine becomes excessively high and the duration of the periods of excessive engine speed are recorded, in addition to the speed of travel of the vehicle. The invention is therefore concerned with improving the known instruments for supervising the operation of power vehicles of the kind in which the speed of the vehicle at any time is recorded on a chart which is moved by a clockwork mechanism. According to the present invention, the instrument is also provided with a stylus which records continuously on the chart and, as soon as a predetermined maximum engine speed is exceeded, is moved in a direction which differs from the direction of movement of the chart by means of a controlling device which is responsive to the speed of revolution of the engine. In this way the construction of the apparatus is considerably simplified.

In order that the invention may be readily understood and carried into effect two forms of instruments constructed in accordance with the invention are illustrated diagrammatically and by way of example in the accompanying drawings, in which

Figure 1 shows an instrument provided with a static centrifugal pendulum, whereas,

Figures 2 and 3 show in side elevation and plan respectively part of an instrument provided with an astatic pendulum.

Referring to Figure 1 of the drawings, a circular chart 1 is provided with a time scale 2 and is rotated in the sense indicated by the arrow x by the spindle 3 of a clockwork mechanism which is not illustrated in the drawing.

A stylus 4 which co-operates with a central recording zone of the chart records the speed of the vehicle provided with the apparatus relatively to the time indicated on the chart. A part of this record is indicated at 5. Instruments of this kind are well known.

For actuating the stylus 4 the following device is employed.

A shaft 6 which is coupled to the wheel axle of the vehicle carries a weight 7 which rotates together with the shaft 6 and is also capable of swinging about a pivot 8 at right angles to the shaft 6. The weight 7 is connected by a rod 9 to a rack 10 which is in the form of a body of revolution which rotates with the shaft 6 but can also be shifted longitudinally. A spring 11, which is arranged on the shaft 6 between the pivot 8 on which the weight 7 turns and the rack 10, tends to hold the rack 10 and the weight 7 in the upper end position which is illustrated in Figure 1 of the drawings.

A pinion 12, on the spindle 13 on which is mounted a pinion 14 of larger diameter meshes with the rack 10. The larger pinion 14 meshes with the teeth on a slidable member 15 which carries a stylus 14 and is longitudinally displaceable on a slide bar 16.

When the vehicle fitted with the instrument is moving the shaft 6 rotates. The centrifugal force acting on the weight 7 tends to swing the weight against the return force of the spring 11 about its pivot 8 in the direction of the arrow y. The rack 10 which is longitudinally displaceable on the shaft 6 follows this movement of the slide 15, with the result that the slide 15 and therefore the stylus make a corresponding movement in an upward direction. As the speed of travel increases, that is to say the speed of revolution of the shaft 6 becomes greater, the weight 7 is swung more and more into the horizontal position, the spring 11 being compressed, and the stylus 4 is moved upwardly more and more over the chart 1. Since the chart is simultaneously driven in proper time by a clockwork mechanism which is not illustrated, a time-speed curve 5 is recorded on the chart from which it is possible accurately to determine at what speed the vehicle was moving at any given time.

Instead of the centrifugal weight 7 which is illustrated in the drawing, any other controlling apparatus which responds to variations in the speed of the shaft 6, for example a differentiating revolution meter, can be employed in order

to move the stylus 4 over the chart 1 in accordance with the speed of travel of the vehicle.

A second stylus 18 which is carried by a lever 20, 21 which is fulcrumed about an axis 19 coacts with the outer strip 17 of the chart 1. The arm 20 of the lever 20, 21 is acted upon by a spring 22 which normally presses it against a stop 23. The other arm 21 of the stylus lever carries the armature 24 of an electromagnet 25, the ends of the coils of which are connected respectively by the conductors 26 and 27 through a source of current 28 to a contact 29 and to a double-armed contact lever 31, 32 which can turn about a pivot 30. The contact lever 31, 32 is normally held by a spring 33 which acts on the arm 32 in the open position in which it bears against a stop 34, which position is illustrated in the drawing. The spring 33 also engages the free end of the lever 35 which can turn about a pivot 36 and is held by means of a spring 37 against a controlling pin 38. This controlling pin 38 is disposed in a longitudinal bore in a shaft 39 which is connected to a rotating part of the vehicle engine, for example its crankshaft or camshaft.

A centrifugal weight 40 which can swing about a pivot 41 at right angles to the shaft 39 is provided on the shaft 39 in the manner usual in speedometers. The weight 40 is connected by a rod 42 with the controlling pin 38 which can be moved in the bore of the shaft 39 and is held in the position illustrated in the drawing by means of a spring 43 as long as the centrifugal force acting on the weight 40 does not overcome the power of the spring 43. The other end of the spring 43 is fixed to an adjusting ring 44 which is adjustable on the shaft 39 so that the tension of the spring can be regulated.

If the speed of revolution of the shaft 39 exceeds a predetermined value which corresponds to the highest permissible speed of revolution of the engine, the centrifugal force acting on the weight 40 overcomes the tension of the spring 43 and turns the weight 40 about the pivot 41 in the direction of the arrow *z* into the position which is illustrated in the drawing by dotted lines. The result of this is that the controlling pin 38 is raised by the connecting rod 42 and therefore the lever 35 is transferred into the position illustrated in dotted lines in the drawing. Then the direction in which the force of the spring 33 acts lies above the pivot 30 of the lever 31, 32, so that this lever snaps into its other end position illustrated in dotted lines in the drawing in which it makes contact with the contact 29. The circuit of the electromagnet 25 is thereby closed so that the armature 24 is attracted and the stylus 18 is moved upwardly a corresponding distance on the chart. The line which has hitherto been drawn on the rotating chart by the stylus 18 is therefore broken and there are peaks provided in the curve drawn, as illustrated by way of example at the points 45, 46 and 47. The length of these peaks, measured in the direction of rotation *x* of the chart, and their position relatively to the time scale on the chart give accurate information as to when the permissible maximum speed of revolution was exceeded and for how long. It is also possible to determine from the diagram the vehicle speed at which the engine developed the unpermissible speed of revolution.

When the speed of revolution of the engine again falls below the maximum permissible speed, the centrifugal weight 40 is returned into the starting position illustrated by the action of the spring 43, the consequence of which is that the contact lever 31, 32 again opens the circuit 28, 27 of the electromagnet 25. The stylus 18 together with its lever 20 is then likewise returned into the starting position by the action of the spring 22.

Instead of the centrifugal weight 40, another device of any suitable construction which responds to variations in speed of revolution may be employed for controlling the contact lever 31, 32 which is connected in the circuit of the electromagnet. Thus, for example, an astatic centrifugal pendulum of the construction shown in Figures 2 and 3 can be employed. An astatic centrifugal pendulum of this kind has the property that, when a predetermined speed is reached, it is deflected suddenly out of its normal position into an operative position. The contact device 28—34, shown in Figure 1, which operates with a snapping action is then not necessary, but instead of this the following construction may be adopted.

On the shaft 39, which is connected to the part of the machine to be watched, is mounted a disc 48 which carries the pendulum masses 50 and 51 which can turn about the pivots 49. The two pendulum masses are ordinarily drawn by return springs 52 and 53 against stops 54 and 55 respectively. When a definite predetermined speed of revolution is reached, the pendulum masses 50 and 51 move suddenly out of their normal position illustrated in Figure 3 into their operative position, their movement being limited by the stops 56 and 57. The contacts 58, 59 on the one hand and the contacts 60 and 61 on the other hand are thereby closed. A conductor 62 leads from the contact 59 to a slip ring 63 and a conductor 64 leads from the contact 61 to a slip ring 65. The two slip rings 63 and 65 are carried by the shaft 39 and rotate with it. Brushes 66 and 67 make contact with the slip rings 63 and 65.

In the circuit which is controlled by the pendulum mass 51 is connected a lamp 68 which is illustrated as a preliminary signal. When the pendulum masses are deflected the circuit in which the magnet 25 of Figure 1 is connected is closed.

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