A. WETZEL.

TACHOMETER WITH SPRING LOOP AND PAWL MECHANISM.

APPLICATION FILED AUG. 15, 1910.

1,009,947.

Patented Nov. 28, 1911.

Fig. 1.

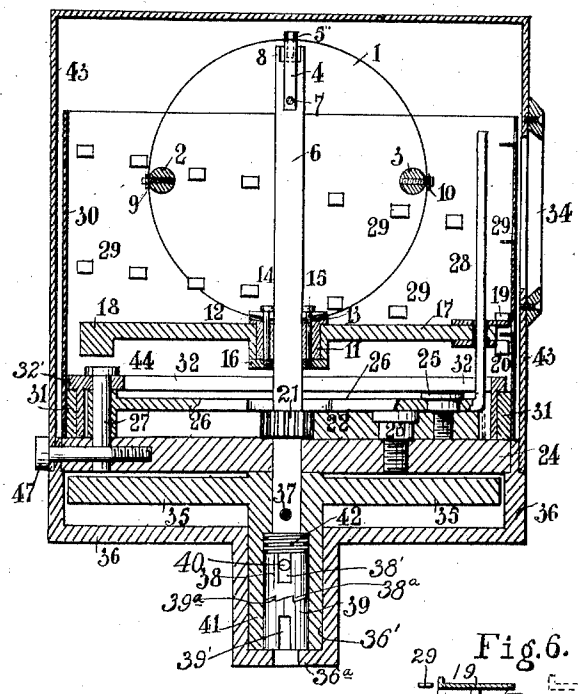


Fig. 2.

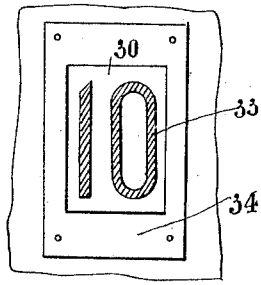


Fig. 3.

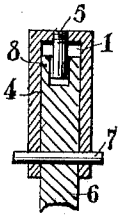


Fig. 6.

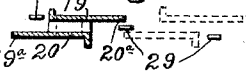


Fig. 5.

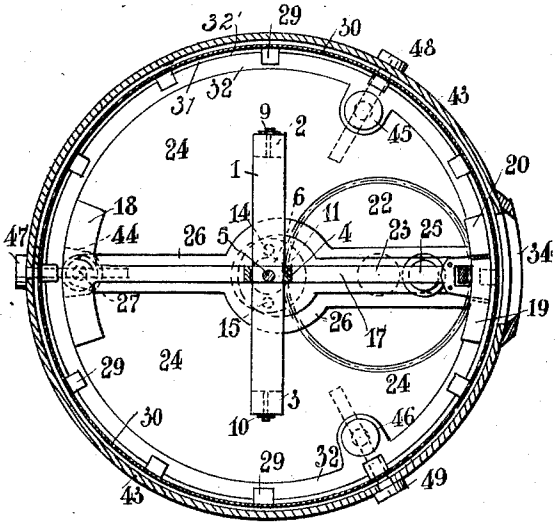
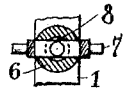


Fig. 4



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UNITED STATES PATENT OFFICE.

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TACHOMETER WITH SPRING LOOP AND PAWL MECHANISM.

1,009,947. Specification of Letters Patent. Patented Nov. 28, 1911.

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To all whom it may concern:

Be it known that I, ALBERT WETZEL, a subject of the Emperor of Germany, and resident of Stuttgart, in the Empire of Germany, have invented certain new and useful Improvements in Tachometers with Spring Loop and Pawl Mechanism.

This invention relates to tachometers and is more especially intended for use on motor cars.

It has for an object to indicate the speeds so clearly that the numbers may be seen by the occupants of the car and the apparatus is so constructed that the range of speeds indicated is quite large and provides for indicating low speeds as well as very high ones.

A further object of this invention is to provide a machine in which pawl mechanism is forcibly actuated in order that the sensibility of the apparatus may be maintained uniformly.

With the foregoing and other objects in view, the invention consists in the details of construction and in the arrangement and combination of parts to be hereinafter more fully set forth and claimed.

In describing the invention in detail, reference will be had to the accompanying drawings forming part of this specification wherein like characters indicate corresponding parts in the several views, and in which—

Figure 1 illustrates a vertical sectional view of a tachometer embodying the invention; Fig. 2 illustrates a fragment of the indicating mechanism; Fig. 3 illustrates a detail sectional view of an automatic centering arrangement for the centrifugal controlling mechanism; Fig. 4 illustrates a detail view, partly in section, of the top of the element shown in Fig. 3; Fig. 5 illustrates a plan view of the apparatus shown in Fig. 1, partly in section; and Fig. 6 illustrates a detail view, partly in section of an actuating pusher ear.

In order to render the instrument as suitable as possible for speed indicating, a steel ribbon 1 is arranged as shown in Figs. 1, 3, 4 and 5 in such a manner that it carries weights 2 and 3 secured in position by bolts. The centering of the ribbon 1 is accomplished by a stirrup 4 which is secured on a shaft 6, the said stirrup having an aperture for the reception of a screw and the shaft 6 having a recess 8 for the reception of the lower end of the screw by which the stirrup is centered with relation to the shaft, Fig. 3 showing the ribbon 1 held by the screw 5 passing through it and entering a recess 8. The steel ribbon is preferably bowed into circular formation as shown in Fig. 1, and carries horizontally opposed weights 2 and 3 at its lateral extremities. Washers 9 and 10 are interposed between the bolt heads and the steel ribbon for the purpose of protecting the said steel band against fracture. The scope of speed indications may be increased by bringing the steel ribbon nearer the shaft in order to increase its free lever action, or by the use of a harder or thicker steel ribbon.

A sleeve 11 (Figs. 1 and 5) is provided with two slots 12 and 13 into which the ends of the steel ribbon are inserted to clamp them into operative relation with the shaft 6. The connection is accomplished by means of two screw bolts 14 and 15 which pass through apertures in the sleeve 11 and have screw-threaded engagement with a disk 16 which projects laterally beyond the periphery of the sleeve and constitutes a bottom bearing for the hub of the pusher 17, which is adapted to oscillate on the sleeve 11. This sleeve is vertically movable on the shaft 6, and is held in suspension by means of the spring 1, the sleeve and spring being secured against rotation, relative to the shaft, by means of the stirrup 4, which is secured to the shaft by means of the pin 7. The pusher 17 is counterbalanced by a weight 18, thereby avoiding unnecessary friction of the bearings. This objectionable feature is also avoided by constructing the arm 17 of relatively light material, such as aluminum, wood or the like. The pusher arm has ears 19 and 20 thereon which are stamped out of steel plates and bent at right angles at their working edges. These ears constitute parts of the pusher, being rigidly fixed thereon. The shaft 6 is provided with a toothed pinion 21 meshing with and adapted to actuate the toothed wheel 22 (Figs. 1 and 5). The toothed wheel 22 rotates on a pin 23 which is screwed into the base 24. The toothed wheel 22 carries a crank pin 25 having its head inserted in the slotted arm 26 for causing said slotted arm to oscillate when the wheel 22 rotates. In order to render the oscillatory motion of the fork uniform, its pivot 27 is positioned on the opposite side of the base plate 24

and beyond the shaft 6 from its free end. In producing the fork, I find it advantageous to punch the same out of sheet steel as thereby the same can be made at comparatively small cost and at the same time, its end remote from its pivot can be bent at an angle as shown at 28. The said part 28 constitutes a vertically disposed arm passing through apertures of the pusher 17 and of the plates of the ears 19 and 20, whereby the oscillatory movement of the fork is transmitted to the pusher. The pusher arm is free to move longitudinally of the shaft 6 under the influence of the steel ribbon 1 according to the speed of the shaft 6 in order to indicate the speed at a given moment, the said pusher being carried on the sleeve 11, as heretofore stated.

The mechanism described is inclosed in an upper and lower casing 43 and 36 respectively, which are united with the base by means hereinafter described. An annular member 32 having a flange 32′ is secured to the base. A drum 30 incloses said flange, and a bearing ring 31 is secured to said drum and is rotatably seated on the base, being retained thereon by means of said flange, which overlaps said ring. The drum is provided at suitable localities with teeth 29, adapted for contact with the pusher ears, for intermittently rotating the said drum. The teeth of the drum are shown in Fig. 1 as being struck up from the sheet metal of which the drum is formed, and are arranged to project inwardly of the drum, as shown; but the invention is not limited to this form of construction. The teeth are spaced approximately equidistantly around the said drum in a helical series. The ears 19 and 20 are separated by a space at the end of the arm 17 to accommodate the teeth 29 as hereinafter described. The drum is provided, on its outer convex surface, with indicating numbers, properly spaced and arranged to correctly indicate the various speeds. The upper casing is provided with a window 34 through which the numerals may be read; and through this window may be read both high and low speed indications.

The fly wheel 35 is journaled between the base plate 24 and the bottom of the casing 36. The pin 37 connects the fly wheel with the shaft 6. Arranged in the cylindrical part 41, which may be termed the hub of the fly wheel, are two stop wheels 38 and 39 which are provided with slots 38′ and 39′ respectively. The slot 38′ engages the pin 40 which is rigidly connected with the sleeve or hub 41 of the fly wheel. These wheels are further provided with interlocking detents 38^a and 39^a, whereby they are adapted for relative rotary motion in one direction, but are prevented from relatively rotating in the opposite direction, and comprise a free wheel mechanism, whereby the fly wheel may not be checked too suddenly when a brake is applied suddenly to the motor car. The wheel 38 is adapted to move vertically in the hub of the wheel 35, and is normally held down by means of a spring 42. The wheel hub 41 is rotatable in a socket 36′ having a centrally apertured bottom 36^a, on which the hub and the wheel 39 are seated. The slot 39′ is adapted to receive a tenon or a similar connection of a flexible shaft, (which being no part of the present invention is not shown) which may be driven from any proper source of power.

In order to avoid screws inside of the apparatus, which may get loose and impair the operation of the machinery, pins 44, 45 and 46 are employed (Figs. 1 and 5) which connect the bearing ring with the base plate 24. The pins are pierced with holes at their lower parts and securely held in position by screws 47, 48 and 49 which are applied from the outside into the plate in such manner that they connect the latter with the bottom casing 36 and the upper casing 43 while holding the pins 44, 45 and 46.

The operation is as follows: Having first connected the device with a source of motive power, through the medium of the member 39; the wheels 38 and 35 and the shaft 6 are thereby rotated. The pinion 21 transmits rotary motion to the wheel 22, which carries the crank pin 25 back and forth through the slot in the arm 26 and causes it to oscillate. The vertical extension 28 of this arm, imparts oscillatory motion to the pusher 17 through its contact with the sides of the apertures through the plates 19 and 20. While thus oscillating, the pusher contacts one of the teeth and rotates the drum a distance equal to the oscillatory stroke of the pusher, thus carrying one number from view and replacing it with another number in front of the window. As the speed increases, the centrifugal force of the weights 2 and 3 causes the lower ends of the steel ribbon to rise, whereby the pusher is also raised, so that it contacts another of the teeth 29 and rotates the drum so as to bring a higher speed indicating number into view. Let the device be considered as shown in Fig. 1; one of the teeth 29 appearing in the space between the ears 19 and 20: It is readily seen that the oscillations of the arm, while in this position, would not actuate the drum, and so long as the speed remains constant the drum and the number being indicated would remain at rest, but, if the speed were increased the presser would be raised and the ear 20 would contact the tooth, which in the drawing appears in the aperture between the ears, and would move the drum, while, if the speed were decreased, the ear 19 would contact this tooth and move the drum in the opposite direction, thereby bringing a lower speed indicating member into view. Wings

19′ and 20′ operate to prevent a reversal of the functions of the ears 19 and 20, as will be clearly obvious by an inspection of Fig. 6.

In the diagrammatic view, Fig. 6, the sectional portion is taken vertically through the pusher ears, at right angles to the length of the pusher, the dotted lines indicating the same, as having oscillated to another position. The members 29 are indicated in their respective relative positions. In this figure the full line position indicates one extremity of the oscillation of the pusher, and the dotted line position indicates the other extremity. In the positions here shown, none of the members 29 are being contacted by the pusher ears, one of the latter being just beyond the leftward stroke, another being just beyond the end of the rightward stroke, and another being in line with the recess between the pusher ears 19 and 20 respectively. Should the pusher ears now be raised or lowered, this last said member 29 would contact one of the pusher ears 20 or 19 respectively and cause the drum to rotate to the right or left respectively, a distance equal to one half of the full stroke of the pusher.

I claim—

1. A tachometer comprising a base, a rotatable drum having teeth, a bearing for said drum connected to the base, a rotatable shaft concentric with the drum, a pusher having means for contacting certain of the teeth for rotating the drum intermittently, means coacting with the shaft for oscillating said pusher, means for raising and lowering the pusher in proportion to the speed of the shaft, and means for connecting the shaft with an external source of motive power.

2. In a tachometer, a base, a rotatable drum having numerals thereon, a bearing for said drum on the base, a rotatable shaft concentric with the drum, a pusher concentric with the shaft, means connected with the shaft for oscillating the pusher, means on the pusher for engaging and rotating the drum, means for changing the points of engagement of the pusher and the drum according to the speed to be measured, and means for connecting the shaft with an external source of power.

3. In a tachometer, a base, a rotatable drum having numerals thereon, a bearing for said drum in fixed relation to the base, a shaft concentric with the drum, a pusher concentric with the shaft, means connected with the shaft for oscillating the pusher, means on the pusher for engaging and rotating the drum, means for changing the points of engagement of the pusher and drum according to the speed to be measured, and means for connecting the shaft with an external source of motive power.

4. In a tachometer, a base, a rotatable drum having numerals thereon, a bearing for said drum in fixed relation to the base, a shaft concentric with the drum, a pusher, means connected with the shaft for oscillating the pusher, means on the pusher for engaging and rotating the drum, means for changing the points of engagement of the pusher and the drum according to the speed to be measured, and means for connecting the shaft with an external source of motive power.

5. In a tachometer, a base, a drum having numerals thereon and being rotatably seated on the base, a shaft inclosed by the drum, a vertically movable and oscillatory pusher pivotally connected with the shaft, means connected with the shaft for oscillating the pusher, said drum having a helical series of teeth, means on the pusher for interchangeably engaging the teeth whereby the drum is rotated, and means engaging the shaft for operatively connecting it with an external source of motive power.

6. In a tachometer, a base, a drum having numerals thereon and rotatably seated on the base, a shaft inclosed by the drum, a pusher pivotally connected with the shaft, means connected with the shaft for oscillating the pusher, said drum having teeth, means on the pusher for interchangeably contacting the teeth, and means on the shaft for operatively connecting it with an external source of motive power.

7. In a tachometer, a base, a drum having numerals thereon rotatably mounted on the base, a shaft rotatable within the drum, a pusher mounted for oscillation concentric to the shaft, said pusher having means thereon for rotating the drum, means secured on the shaft for carrying weights, said means having connection with the pusher and adapted to coact with said weights for raising and lowering said pusher by means of centrifugal force exerted by said weights when the shaft is rotated, means for connecting the shaft with a source of motive power for rotating the shaft, and means operatively connected with the shaft for oscillating the pusher.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

ALBERT WETZEL.

Witnesses:

ERNEST ENTENMANN,

FRIDA KLASBA.