

Feb. 19, 1935.

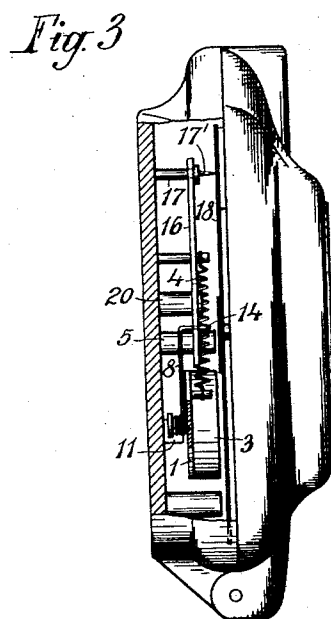
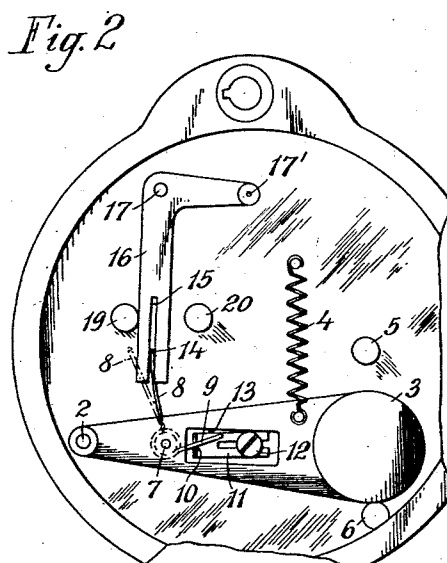
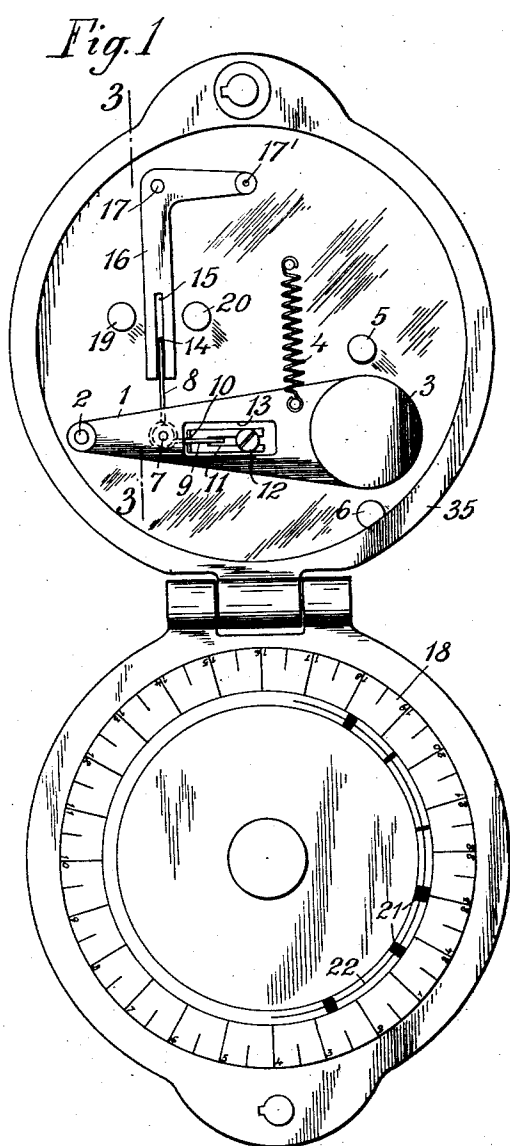
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1,992,134

APPARATUS FOR RECORDING VIBRATIONS

Filed June 1, 1932

2 Sheets-Sheet 1



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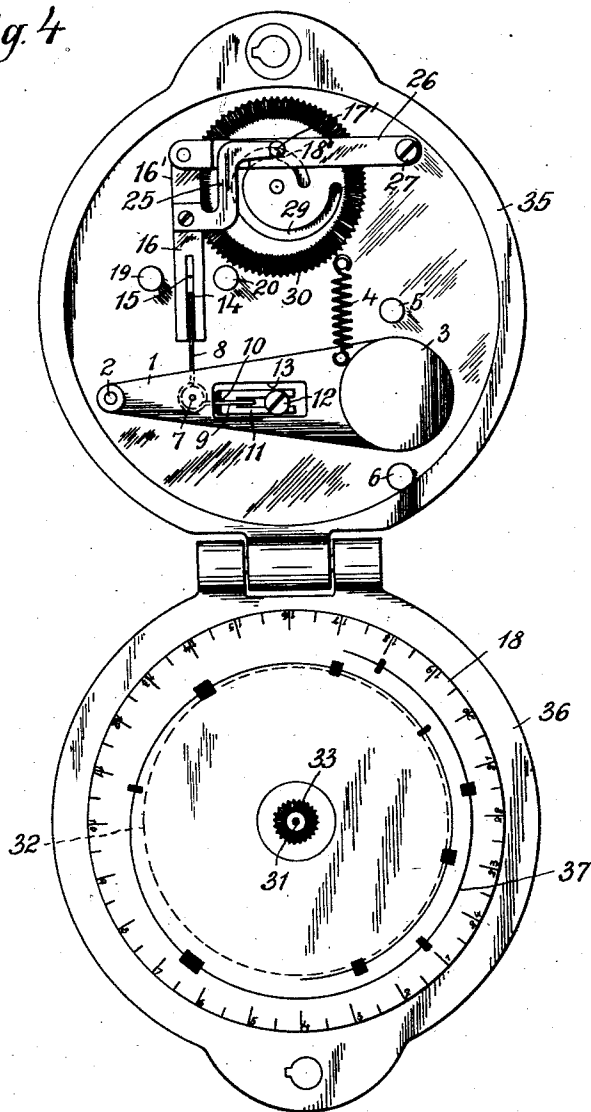
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Fig. 4



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APPARATUS FOR RECORDING VIBRATIONS

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3 Claims. (Cl. 234—5.6)

My invention relates to improvements in appa-
 ratus for recording vibrations, such as are used
 for example on motor vehicles for showing the
 periods of time during which the vehicle was in
 operation, and which comprise a rockingly
 5 mounted weighted body connected with a stylus
 recording the vibrations on a record disk. The
 object of the improvements is to provide an appa-
 ratus of this type by means of which exceed-
 10 ingly fine vibrations may be measured, such as
 are produced for example when the motor of the
 vehicle is in operation and disconnected from the
 driving mechanism. With this object in view my
 invention consists in providing mechanism inter-
 15 mediate the said weighted body and the stylus
 for enlarging the amplitude of the vibrations, so
 that even very fine vibrations are distinctly re-
 corded on the recording surface.

Other objects of the improvements will appear
 20 from the following description.

For the purpose of explaining the invention an
 example embodying the same has been shown
 in the accompanying drawings in which the same
 reference characters have been used in all the
 25 views to indicate corresponding parts. In said
 drawings,

Fig. 1 is an elevation of the apparatus show-
 ing the casing enclosing the operative parts open,

Fig. 2 is an elevation of the apparatus showing
 30 the operative parts in a different position,

Fig. 3 is an elevation partly in section taken on
 the line 3—3 of Fig. 1, and

Fig. 4 is an elevation similar to the one illus-
 trated in Fig. 1 and showing a modification.

In the example shown in the drawings the ap-
 35 paratus comprises a casing 35 having a hinged
 lid 36. On a pivot bolt 2 fixed to the rear wall
 of the casing 35 a lever 1 carrying a weighted
 body 3 is rockingly mounted, the said weighted
 40 body being suspended from a coiled spring 4 nor-
 mally holding the same in median position be-
 tween stops 5 and 6 secured to the rear wall of
 the casing. On the lever 1 a pin 7 is rotatably
 45 mounted which carries a bell crank lever 8, 9
 made from highly elastic spring steel. To the
 rear wall of the casing 35 a plate 11 is secured
 by means of a screw 12 passed through a longi-
 tudinal slot of the said plate, and the plate is
 50 formed with a forwardly directed slotted arm
 10 engaged by the short arm 9 of the bell crank
 lever 8, 9. The lever 1 is formed with a cut-
 out portion 13 through which the plate 11 is
 visible.

The upwardly directed long arm 8 of the bell
 55 crank lever is bent forwardly at its top end, as

is shown at 14, and the said forwardly directed
 end engages in a longitudinal slot 15 of a bell
 crank lever 16 mounted on a pivot bolt 17 secured
 to the rear wall of the casing 35. At its free
 end the bell crank lever 16 carries a stylus 17
 5 which is directed forwardly therefrom and into
 position for engaging a record disk 18 mounted
 on the inner face of the lid 36 and rotated by a
 clock work disposed on the lid 36. The vibrations
 imparted to the bell crank lever 16 are limited
 10 by stops 19 and 20. In the normal position the
 said bell crank lever is in median position be-
 tween the stops 19 and 20, as is shown in Fig. 1.

In the operation of the apparatus the weighted
 body 1, 3 vibrates between the stops 5 and 6, and
 15 the said vibrations are transmitted to the bell
 crank lever 8, 9, the arm 9 of the said bell crank
 lever sliding in the slotted arm 10 of the plate
 11. The slotted arm 10 is fixed in position, while
 the pivot bolt 7 takes part in the oscillating move-
 20 ment of the weighted body 1, 3, and therefore
 the bell crank lever 8, 9 is vibrated so that the
 longer arm 8 is rocked to and fro. By reason of
 the difference of the lengths of the arms 8 and
 25 9, the amplitude of the vibrations of the top end
 of the arm 8 is considerably increased as com-
 pared to the amplitude of the weighted body 1,
 3. The said rocking movement of the arm 8 is
 transmitted to the lever 16 by the arm 14 engag-
 30 ing in the slot 15. By reason of the elasticity
 of the bell crank lever 8, 9 the lever 16 smoothly
 engages the stops 19 and 20 which limit the vi-
 brations thereof. The oscillating movement of
 the lever 16 imparts corresponding oscillating
 35 movements to the stylus 17 by means of which
 the said oscillations are recorded on the disk 18.

While the vehicle or other device on which the
 apparatus is mounted is at rest the record takes
 the form of a line 22, and when vibrations are
 40 recorded the record takes the form of a sur-
 face 21.

By constructing the bell crank lever 8, 9 from
 highly elastic steel the energy of the oscillation
 transmitted from the weighted body to the spring
 8, 9 is not annihilated, but it is stored in the bell
 45 crank lever. This is one of the reasons of the
 high sensitiveness of the apparatus.

In my improved apparatus even very small
 oscillations of the weighted body are surely and
 distinctly recorded and an exact contour of the
 record is produced. Thus the apparatus records
 also weak vibrations such as are produced in a
 vehicle which is at rest while its motor is in op-
 50 eration and disconnected from the driving mech-
 anism. The lever 16 on which the stylus is
 55

mounted is pressed on its stops 19 or 20 only with the small force exerted by the spring lever 8, 9, while heavy blows are taken up by the stops 5 and 6 acting on the weighted body.

- 5 By shifting the plate 11 and the slotted arm 10 thereof longitudinally of the arm 9 of the elastic bell crank lever 8, 9 the gear ration of the mechanism transmitting the vibrations from the weighted body to the stylus may be varied within
10 broad limits and in a very simple way.

My improved vibration meter may be used wherever it is desired to record very fine oscillations, and it may be used in connection with stationary or moving objects.

- 15 In the construction of the apparatus illustrated in Figs. 1 to 3 the record is produced on the record disk 18 along a concentric line, and therefore the record disk can be used only during a single rotary movement. As shown in Fig. 1 the record
20 disk contains twenty-four scale marks, according to the twenty-four hours of the day.

- In Fig. 4 I have shown a modification in which the record disk can be used for a longer time, by constructing the operating mechanism of the
25 stylus so that the stylus moves through a spiral line.

- As shown in the said figure, the stylus 17' is secured to an arm 25 fixed to the lever 16, and an extension 16' of the lever 16 is jointed to the
30 free end of a lever 26 rockingly mounted on a pivot bolt 27 fixed to the rear wall of the casing 35. A pin 18' extending rearwardly from the lever 26 engages in a spiral cam slot 29 made in the body of a gear wheel 30 rotatably mounted on
35 the rear wall of the casing 35. The clock work mounted on the lid 36 is provided with a pinion 33 secured to an arbor 31, and the pinion is adapted for engagement with the gear wheel 30.

When the lid 36 is rocked upwardly for closing

the casing 35 the pinion 33 and gear wheel 30 get into engagement with each other, so that the gear wheel 30 and the cam slot 29 thereof are slowly rotated, the gear ratio being such that
5 after a complete rotation of the record disk 18 the levers 26 and 16 have been moved inwardly so far that the next record is drawn on the disk 18 internally of the record first made, the record taking the form of a spiral line 37. The displacement of the lever 16 is possible by reason of the
10 engagement of the arm 14 in the longitudinal slot 15.

I claim:

1. An apparatus for recording vibrations, comprising a movably mounted weighted body, a
15 rockingly mounted lever carrying a stylus, stops limiting the movements of said lever, a bell crank lever having elastic arms rockingly mounted on said weighted body and engaging with one arm
20 said lever, and a relatively fixed member engaging the other arm of said bell crank lever.

2. An apparatus for recording vibrations, comprising a movably mounted weighted body, a
25 slotted lever carrying a stylus, stops for limiting the movements of said lever, a bell crank lever having elastic arms and rockingly mounted on said weighted body, one of the arms of said bell crank lever engaging the slot of said slotted lever, and a relatively fixed member loosely engaging
30 the other arm of said bell crank lever.

3. An apparatus for recording vibrations, comprising a rockingly mounted weighted body, a
35 lever carrying a stylus, a bell crank lever mounted on said weighted body and engaging said lever carrying the stylus with one arm, and a relatively fixed member engaging the other arm of the said bell crank lever and adjustable longitudinally of said arm.

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