N. A. PALMGREN.

SHOCK INDICATOR.

APPLICATION FILED APR. 17, 1919.

1,438,462.

Patented Dec. 12, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

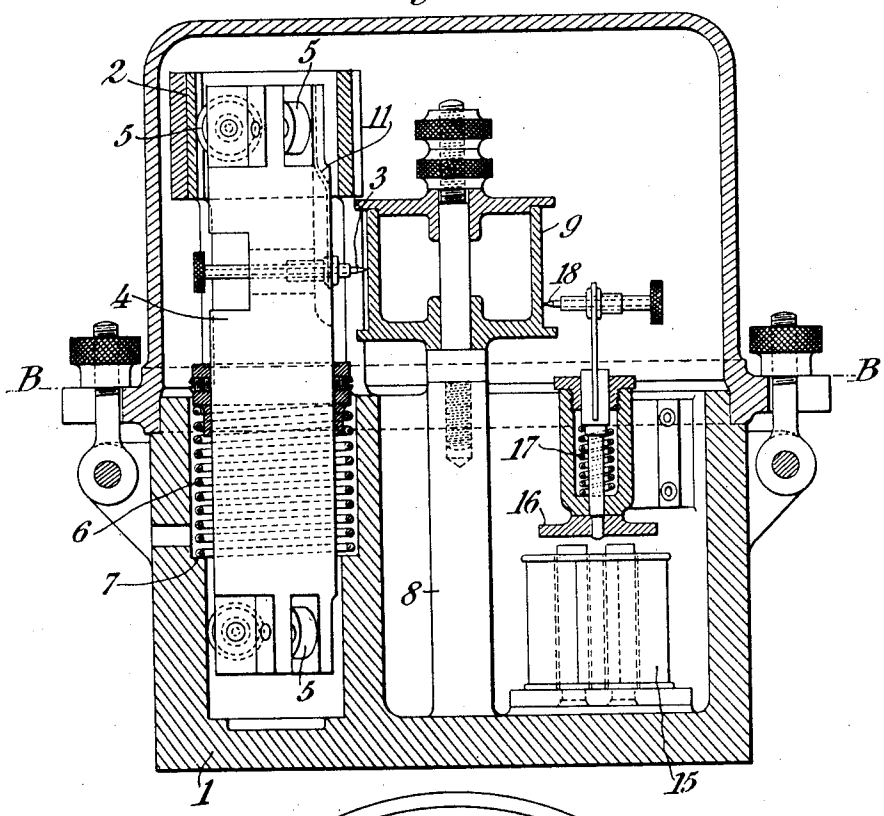
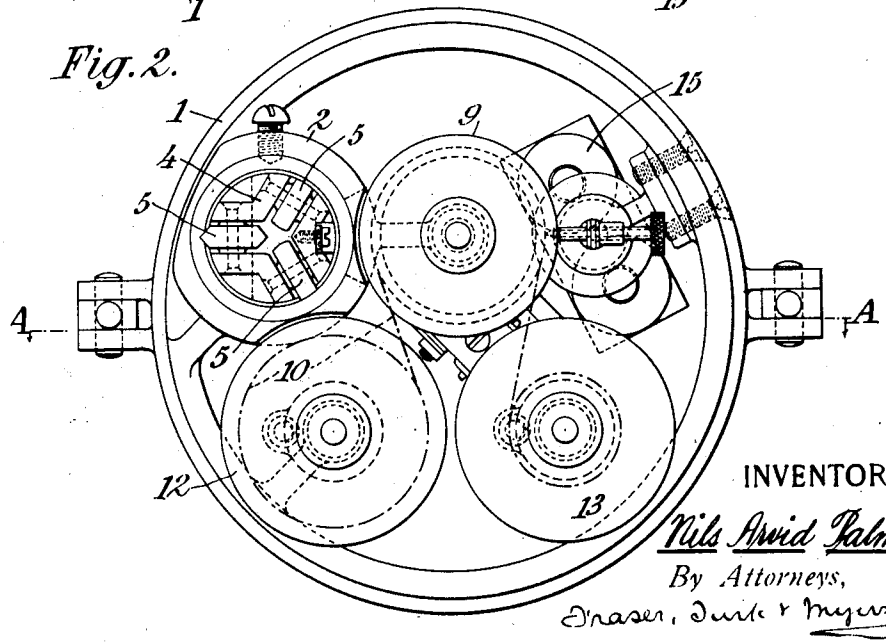


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

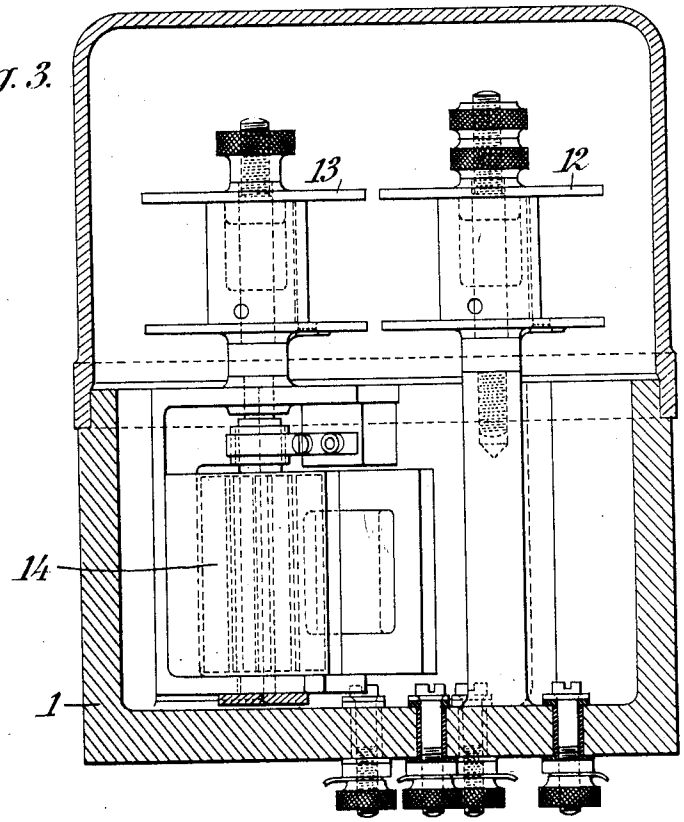
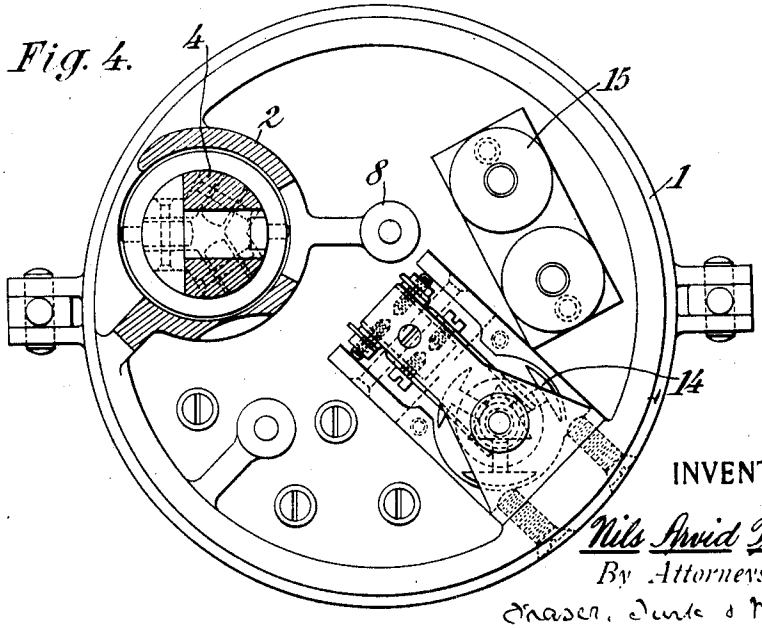


Fig. 4.



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UNITED STATES PATENT OFFICE.

NILS ARVID PALMGREN, OF GOTTENBORG, SWEDEN, ASSIGNOR TO AKTIEBOLAGET SVENSKA KULLAGERFABRIKEN, OF GOTTENBORG, SWEDEN, A CORPORATION OF SWEDEN.

SHOCK INDICATOR.

Application filed April 17, 1919. Serial No. 290,778.

To all whom it may concern:

Be it known that I, NILS ARVID PALMGREN, a subject of the King of Sweden, residing at Gottenborg, in the Kingdom of Sweden, have invented a new and useful Improvement in Shock Indicators, of which the following is a specification.

The present invention refers to a shock indicator which has for its purpose to produce a space-time diagram by the aid of which it is possible in a well-known manner to determine the acceleration at every moment of the motion and thus also the magnitude of the force producing the shock, provided that the mass put into motion is known.

The invention consists principally of a paper strip or the like movable with a constant or variable velocity, and a pen-point (or equivalent marker) cooperating with said strip and arranged on a heavy body movable in a certain direction and relatively to the paper strip, the said body being connected through the intermediary of an easily yielding member, such as a weak spring, to the part of the indicator supporting the paper strip or the like.

The accompanying drawings illustrate an embodiment of the indicator in which the paper strip is supposed to move with a variable speed.

Fig. 1 is a vertical section of the indicator. Fig. 2 is a plan view of the indicator with the protecting cap removed. Fig. 3 is a section on the line A—A in Fig. 2. Fig. 4 is a horizontal section on the line B—B in Fig. 1.

Referring to the drawings, 1 denotes the indicator casing which is intended to be mounted on the object, such as for instance a journal box for a railway carriage, on which the shocks are to be observed. In the casing 1 there is a tubular standard 2 serving as a guide for the heavy body 4 which supports the pen-point 3, and which is movable in its longitudnal direction and is guided in the standard 2 by means of rollers 5 journaled at both ends of the body, said body being supported by a weak coil spring 6 bearing against an annular abutment 7 in the standard 2. In the casing 1 there is further an upright 8 supporting a rotatable drum 9 over which the paper strip 10 moves, and by means of which drum said paper strip is guided past the pen-point 3 which is supported by a spring 11 secured to the body 4. The paper strip is wound off from a reel 12 and it is wound up on a reel 13 which latter is driven by means of a suitable source of power, such as for instance a small electric motor 14, Figs. 3 and 4. The speed of the motor being constant, the speed of the paper strip will become increased as it is wound up on the reel 13, hence it is necessary by means of a special device to register the time. In the embodiment of the shock indicator illustrated, the said device consists of an electromagnet 15 the armature 16 of which is movable in the direction towards the magnet against the action of a spring 17, and supports at its upper end a pen-point 18 cooperating with the paper strip 10. By allowing an impulse of current to flow at definite intervals through the electromagnet 15 which will then attract its armature 16, there will be produced by means of the pen-point 18 a diagram on the paper strip, which diagram marks the time-scale of the space diagram independently of the speed of the strip.

The shock indicator which is supposed to be mounted on an object, such as a journal box for a railway carriage, on which the shocks are to be observed, acts in the following manner:

If there are no shocks the pen-point 3 draws a line on the paper strip which line, owing to the long time of oscillation of the weak spring 6, may practically be considered rectilinear within a limited length. If now the object, i. e. the journal box, and thus also the indicator is subjected to a sudden shock, the said parts will be brought into motion relatively to the object causing the shock, for instance a rail-joint. The body 4 will not take part in the said rapid movement, however, since owing to the inertia of said body and to its yielding support it is practically independent of the other parts of the indicator. The paper strip 10 will thus perform a movement relatively to the pen-point 3 on the body 4 in a direction parallel to the direction of movement of the body 4 in the standard 2, so that the pen-point deviates from its normal path, said deviation indicating the magnitude of the relative movement or space between the paper strip and the pen-point in the said direction at

each moment of the movement. By the aid of the time-scale drawn simultaneously by the pen-point 18 it is possible in a well-known manner to determine the acceleration of the mass brought into motion and thus the force of the shock.

By driving the strip 10 with a definite constant speed which may be effected with a suitable clockwork, the device for drawing the time-diagram may be dispensed with.

I claim:

1. In a shock indicator, the combination of a frame, means for guiding a horizontally moving paper strip, a heavy body movable in said frame and guided to perform a rectilinear vertical movement, a spring supporting said body, said spring being of barely sufficient strength to uphold the weight of the body, a pen-point connected with said body adapted to mark said paper strip, and a second pen-point and means for moving it periodically to mark said strip for indicating time thereon independently of the speed of the strip.

2. In a shock indicator, the combination of a frame, means for guiding a moving paper strip, a heavy body mounted in said frame so that it may perform a rectilinear movement vertically and relatively to said paper strip, rollers guiding said body at its ends in such manner as to give it a frictionless movement, a spring supporting said body, said spring being long and supple and of barely sufficient strength to uphold the weight of the body, and a pen-point connected to said body to mark said paper strip.

3. In a shock indicator, the combination of a frame, means for guiding a moving paper strip, a heavy body mounted in said frame so that it may perform a rectilinear movement vertically and relatively to said paper strip, guides for said body having parallel inner guiding faces, rollers journaled in groups of three at the ends of said body and making contact with the inner faces of said guides so as to give said body a frictionless movement, a spring supporting said body, said spring being long and supple and of barely sufficient strength to uphold the weight of the body, and a pen-point connected to said body to mark said paper strip.

4. In a shock indicator, the combination of a frame, a heavy body mounted in said frame on anti-friction vertical guiding means adapted to permit it to move in vertical rectilinear direction with negligible friction, a spring supporting said body, said spring having great length and flexibility and barely sufficient stress to uphold the weight of said body so that the body is given a floating suspension which yields to the slightest movement, and recording means adapted to move a strip horizontally and mark thereon a sinuous line indicating the relative vertical movements between the frame and body, whereby to record up and down movements of said frame.

NILS ARVID PALMGREN.