(No Model.)

W. C. WESTAWAY & G. I. LEONARD.

SPEED INDICATOR.

No. 456,919. Patented July 28, 1891.

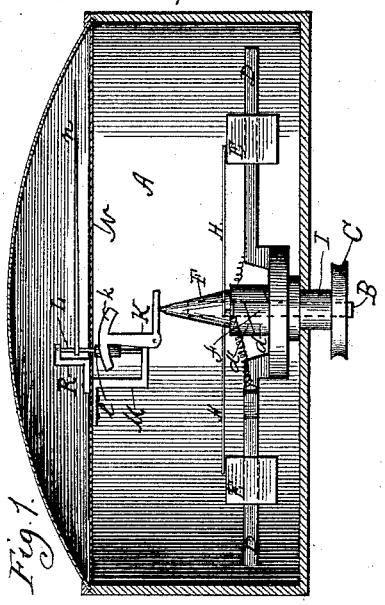

Fig. 1.

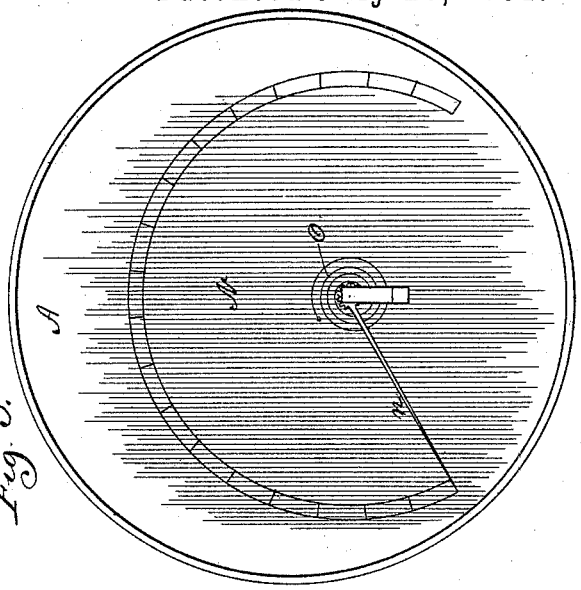

Fig. 3.

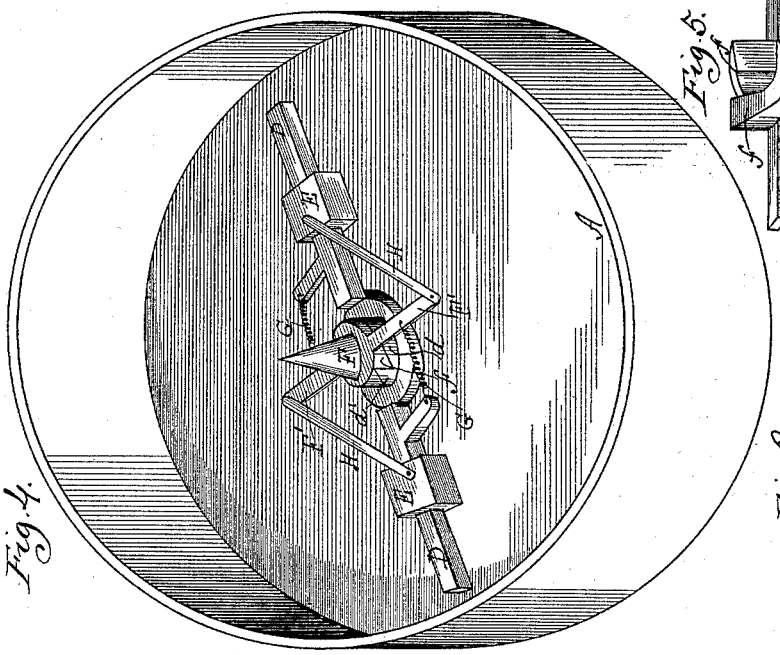

Fig. 4.

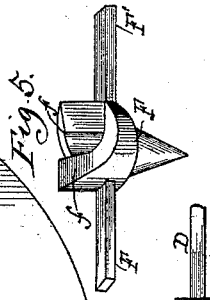

Fig. 5.

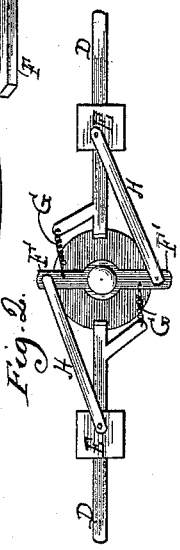

Fig. 2.

Witnesses
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By Hill & Dixon, Their Attys.

UNITED STATES PATENT OFFICE.

WALTER C. WESTAWAY AND GEORGE I. LEONARD, OF DECORAH, IOWA.

SPEED-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 456,919, dated July 28, 1891.

Application filed November 3, 1890. Serial No. 370,238. (No model.)

To all whom it may concern:

Be it known that we, WALTER C. WESTAWAY and GEORGE I. LEONARD, both of Decorah, in the county of Winneshiek and State of Iowa, have jointly invented certain new and useful Improvements in Speed-Indicators, of which the following is a specification.

Referring to the accompanying drawings, wherein similar reference-letters indicate the same parts, Figure 1 is a side elevation; Fig. 2, a top plan; Fig. 3, a diagram of the needle and its dial; Fig. 4, a perspective view of the apparatus in the box or case, the dial-plate and cover having been removed; and Fig. 5 a perspective view of the cam-cone, shown bottom up.

The invention relates to that class of devices which are attached to or used in connection with shafting or machinery having a rotary motion to indicate the speed of revolution, or in connection with the wheel or axle of a car, locomotive, or vehicle of any description to indicate the rate of speed at which the carriage is traveling. As heretofore constructed, such devices when employed in positions where they are subject to sudden jars or shocks—for example, on sulkies, buggies, bicycles, locomotives, and other forms of land conveyance—are liable to have their normal operation so disturbed by the rough jolting of the carriage that the result is either temporarily or permanently a false indication of the speed. As an illustration, assume a speed-indicator whose index-hand is controlled by a Watt governor connected to the running machinery. So long as there is no jar the indication will be correct; but a rough jolt is liable to throw both of the governor-arms down or up simultaneously, thus causing a false indication. The object of our invention is to correct this evil by so constructing the machine that, while sensitive to all changes of speed, no aberration will be caused by any sudden shocks or jars to which it may be subjected. In accomplishing this object we employ the centrifugal principle of the Watt governor, but with improvements which so change the mode of operation as to effect the result desired.

The principle of the main improvement is as follows, to wit: first, so connecting the two centrifugal weights that if either move both are obliged to move simultaneously to the same extent and in opposite directions; secondly, guiding both weights, so that if they move at all they are obliged to move on a substantially horizontal line—that is to say, on a line so nearly horizontal that vertical jars will not displace them; thirdly, using centrifugal force to move the weights outward and spring force or its equivalent to draw them inward when the centrifugal force decreases, and, fourthly, employing the movement of the weights thus connected and guided to control the position of an indicating-needle or its equivalent.

Subordinate improvements will be sufficiently indicated by the description and claims.

For convenience of handling and application, we arrange the mechanism in a suitable box or case A, having a cover or glass to protect the dial-plate N and indicating-needle *n* from injury. Through a boss I at the bottom of the case extends a shaft B, carrying the pulley or gear C, to which the power is applied from the running wheel or other part whose speed is to be indicated. A substantially-horizontal arm D rests on the upper end of the boss I within the case, and is caused to rotate in a horizontal plane by the revolutions of the vertical shaft B. Weights E E are arranged to slide on the opposite ends of the arm D and be guided thereby. Around the shaft B the arm D is provided with a hub *d*, formed with cam-inclines *d'*, such as are commonly employed on gate-hinges, shutter-hinges, &c., to raise the gate or shutter when opened and cause it to close by gravity, and upon this hub is mounted a cone-shaped block F, centered by the shaft B, and provided at its lower end with cam-inclines *f* to fit the inclines *d'*. An arm F' extends outward from each side of the block F, and is connected by an articulated rod H or its equivalent to one of the weights E, one arm being connected to one of the weights and the other to the other. A coiled spring G extends from each arm F' to a suitable projection of the arm D, and tends to draw

the connected weights inward toward the center of motion, and to hold the cam block or cone F at its lowest or normal position.

Normally the parts occupy the position shown in Fig. 1, with the cam-cone at its lowest and the weights at their innermost position. When the device rotates, the weights tend to move outward on the guide-arms D under centrifugal action, but are obliged to move simultaneously and equally, by reason of the connections H F′. When the speed decreases, the springs G′ draw the weights inward again, this movement being for the same reason simultaneous and equal. Any jar tending to slide one of the weights outward or inward on the supporting-arm D will tend to slide the other weight equally in the opposite direction, and the effect on the mechanism will therefore be completely neutralized or canceled. Any jar tending to throw either weight in a horizontal direction transverse to the arm D will tend to throw the other weight equally in the same direction, and both movements will therefore be resisted by the vertical shaft at the center. Any jar tending to throw either weight in a vertical direction will tend equally to throw the other weight in the same direction, but, being guided by the arm D, they cannot move vertically without moving the supporting-arm also, and the latter may be held at the center from vertical movement by its attachment to the shaft B, or by any suitable collar or other device well known to mechanics for such purpose. Hence no jar in any direction can disturb the normal and perfectly accurate operation of the governing-weights and their springs.

When the weights move outward under the increasing speed of the running machinery, the connections H F′ draw the cam-cone F around, causing it to ride up on the cam-surfaces d', and when the speed of the machinery decreases the springs G draw the arms F′ and weights back toward or to their normal positions, causing the cam-cone F to ride down again toward or to its normal position. The vertical movements of the cam-cone thus effected are employed to control the indicating-needle n. Any suitable intermediate mechanism may be employed to communicate this motion of the cam-cone to the needle, or other device employed as an indicator; but we prefer the following simple and effective means:

K is a right-angled lever pivoted at its angle to a bracket M and having its horizontal arm resting upon the upper end of the cam-cone and its vertical arm provided with a cog-rack k.

L is a small vertical shaft supported by brackets M R and provided with a pinion l, which gears with the rack k. The needle n extends from the side of the shaft L over the dial-plate and is provided with a light hair-spring O, acting on the shaft L, to resist the movement of the needle from zero and to return it thereto when permitted by the cam-cone to do so. The rising of the cam-cone under the increased speed of the machinery moves the lever K, and consequently the needle n, in exact proportion to the speed, and when the speed decreases and the cam-cone descends the spring O causes the needle to return as far as the position of the cone will permit.

Our invention is not limited to matters of form or details of construction. In practical manufacture, for example, it may be deemed best to use a single spring G, or to make the horizontal member D D integral with the shaft B, or possibly to change the form of said member and its connections, the principle of the invention being involved wherever two counterbalancing-weights are so connected to a rotary supporting member that they are incapable of vertical or lateral displacement thereon, and are capable only of sliding simultaneously toward or from the center of rotation, substantially as herein-above set forth.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a speed-indicator, the combination of the following elements, viz: a rotary member to support and rotate the centrifugal weights, counterbalancing-weights supported by said member and so guided as to be capable of movement thereon only in lines radial to the vertical axis of rotation, connections between said weights adapted to compel them when moved on said radial lines to move equally and in opposite directions, a returning spring or springs tending to draw the weights toward the center of rotation, and a central device supported by and revolving with said rotary member and so connected to said weights as to be moved vertically by any change of their position radially, substantially as described.

2. In a speed-indicator, the combination of the rotary member D, the weights E E, supported and guided thereby, the central cam-block F, the retracting spring or springs G, and the connections F′ H, when combined and operating substantially as described.

3. In a speed-indicator, the combination of the cam-block F with a rotating support having a corresponding cam, and provided with radially-movable weights connected to and adapted to operate the cam-block, substantially as described.

4. In a speed-indicator, the combination of the rotating bar D and weights E E with a central block F, mounted on and rotating with the bar and having its opposite sides connected to said weights, respectively, and to a retracting spring or springs, whereby the radial movement of the weights will ro-

tate the central block on its rotating support, substantially as described.

5. In a speed-indicator, in combination with a horizontal rotary member D, weights E E, supported and guided thereon and connected to opposite sides of a loose block mounted centrally on said rotary member, whereby any radial movement of either weight will be accompanied by a similar movement of the other weight in an opposite direction, substantially as described.

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