(No Model.) 2 Sheets—Sheet 1.

W. A. PHILLIPS.

ELECTRIC ODOMETER AND SPEED INDICATOR.

No. 473,341. Patented Apr. 19, 1892.

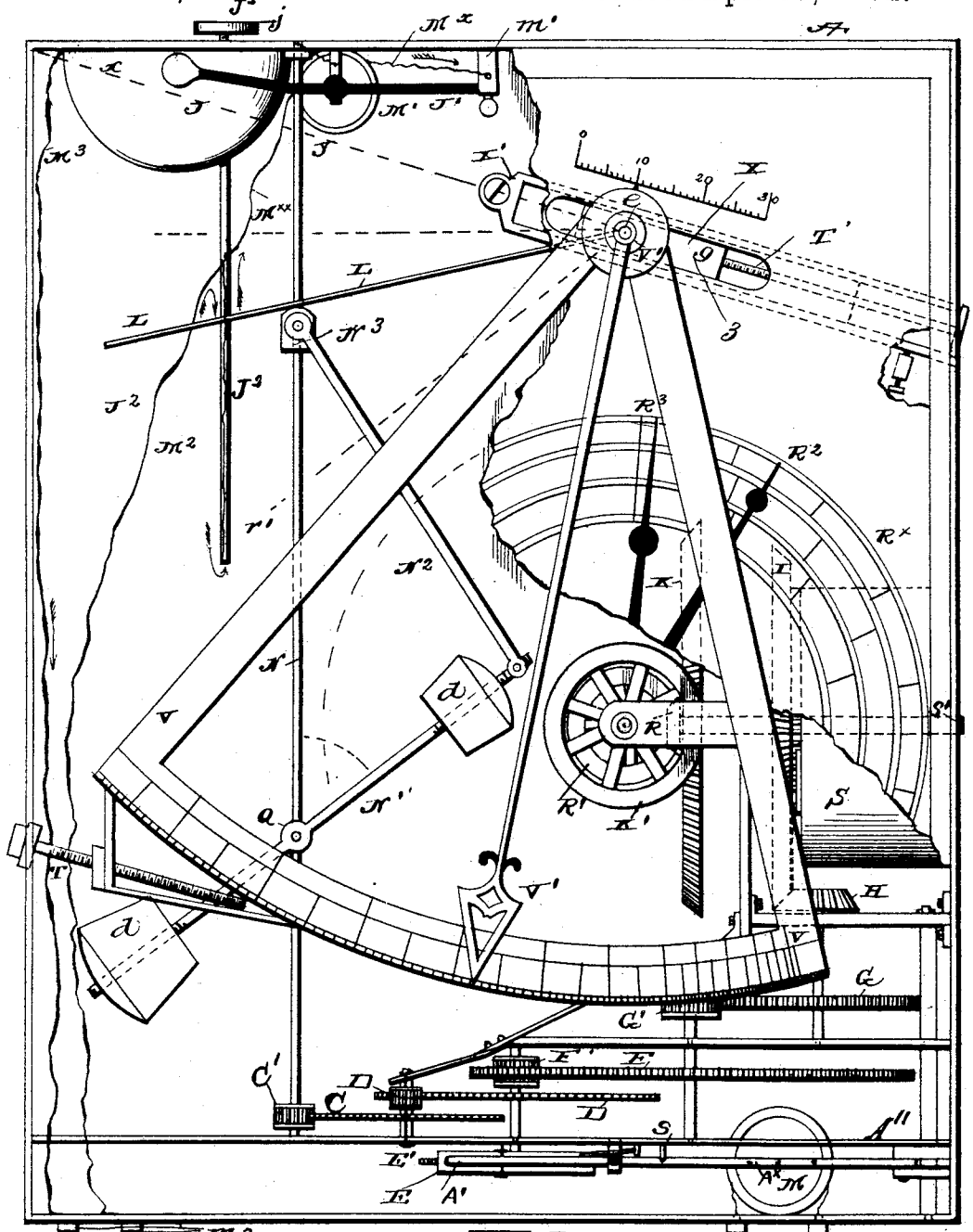

Fig 1

Witnesses
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(No Model.) 2 Sheets—Sheet 2.

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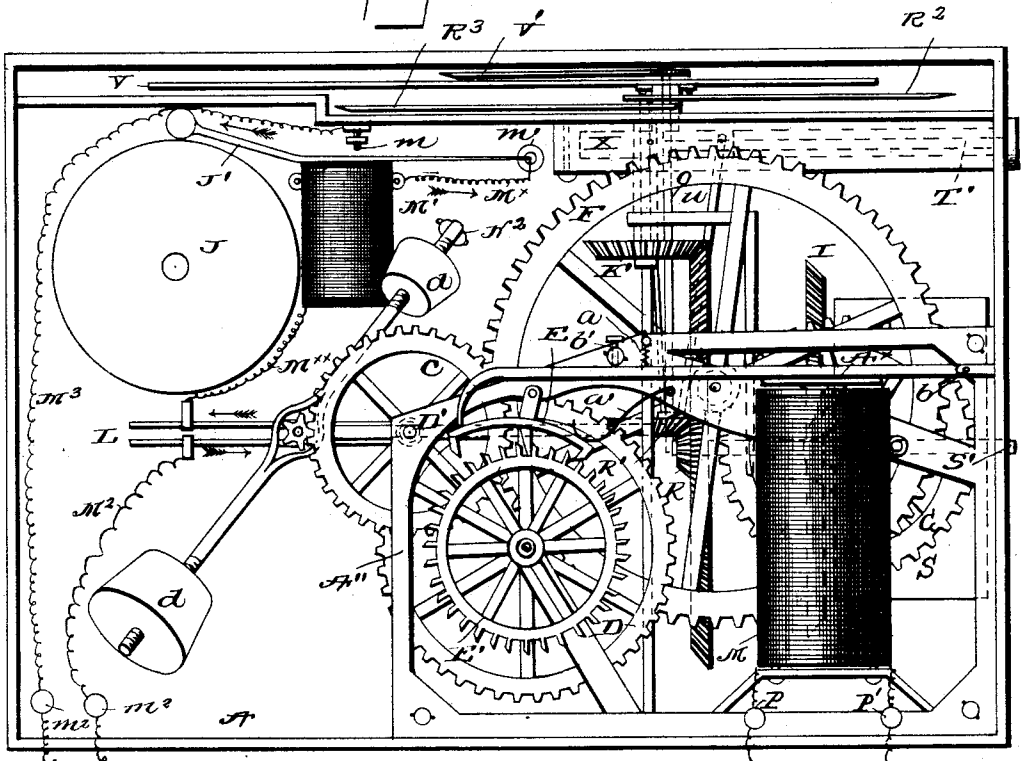
Fig 2



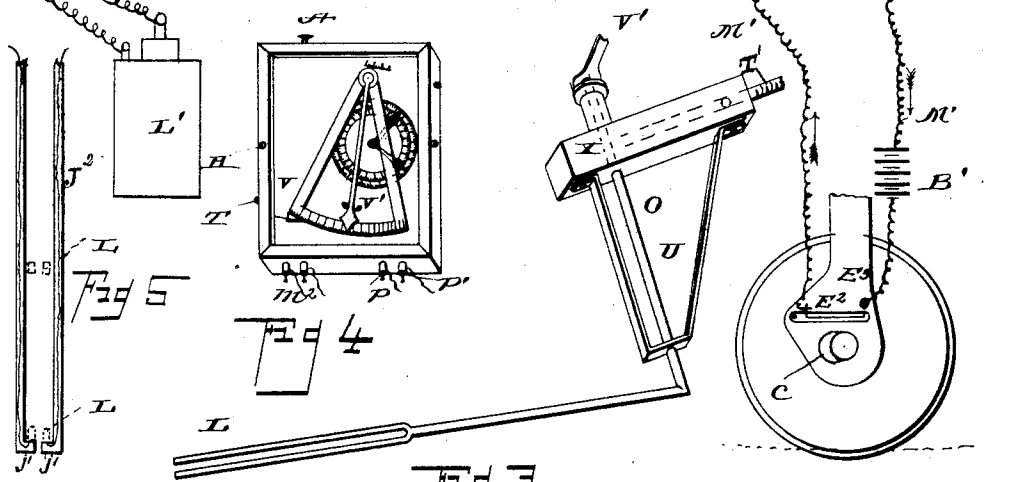


Fig 5

Fig 4

Fig 3

Witnesses

John Dennie

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Atto.

UNITED STATES PATENT OFFICE.

WILLIAM A. PHILLIPS, OF THE UNITED STATES ARMY.

ELECTRIC ODOMETER AND SPEED-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 473,341, dated April 19, 1892.

Application filed March 19, 1891. Serial No. 385,713. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. PHILLIPS, a citizen of the United States, and a second lieutenant in the Twenty-second United States Infantry, now stationed at Fort Keogh, in the county of Custer and State of Montana, have invented a new and useful Electric Odometer and Speed-Indicator, of which the following is a specification.

My invention relates to an improved electric odometer and speed-indicator specially designed for railway-cars, steam, street, electric, or elevated; and it consists of the novel combination and arrangement of parts, substantially as hereinafter fully disclosed, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a front view of my improved odometer and speed-indicator. Fig. 2 is a bottom view of the same. Fig. 3 is an enlarged detailed perspective view showing more especially the fork of the circuit-closer and its carrying slide or support, parts being broken away. Fig. 4 is a perspective view, on a greatly-reduced scale, of the odometer and speed-indicator, viewing the same from the exterior of its inclosing case. Fig. 5 is a broken detailed front view of the circuit-closer with the speed-indicator hand-fork shown in end view in dotted lines in two different positions.

In carrying out my invention I employ a train or system of wheels C C′, D D′, F F′, G G′, H, I, K K′, and R R′, arranged after the fashion of the ordinary clock mechanism or gearing and driven by the action of a spring S, all properly mounted in a suitable frame A, adapted to be secured at any convenient place upon the car. The shaft of the wheel R′ carries the rapid-moving hand R^2, and the shaft of the wheel K′ carries the slow-moving hand R^3, which move over a scale $R^\times$, the hand R^3 recording long distances and high or whole number of revolutions and the hand R^2 recording fractional parts of the whole upon the principle of the hour and minute hands of a clock.

M is an electro-magnet suitably secured upon the frame A and adapted to attract and release the armature-lever $A^\times$ in the making and breaking of the circuit from the wheel-axle, as presently more fully disclosed.

The armature-lever $A^\times$ is suitably fulcrumed, as at *b*, upon a frame A″ within the frame A and is adapted to engage the normally-elevated end of the escapement-lever E and is itself normally held elevated from the electro-magnet M by a spring *a* and limited in its upward movement by set-screw *b*′.

The escapement-lever E is suitably hung from the frame A″ and held at its lower end by a spring *a*′ in engagement with an escapement-wheel E′, secured to the shaft of the wheel D of the aforesaid system or train of wheels.

The electro-magnet M has electric connection, by means of wires M′, passing through posts P P′ and the battery B′, with a key E^2, supported upon the axle-hanger and adapted to be engaged at each revolution of the wheel or axle by a projection *c* upon the axle, thus providing for the making and breaking of the circuit accordingly.

N is a vertical shaft suitably journaled in the frame A and geared to the aforesaid train or system of wheels or gearing and carrying a normally obliquely-disposed lever N′, upon which are screwed two different-sized weights or balls *d d*, the heavier one being near the lower end of said lever and the lighter one near its upper end.

By adjusting the weights at various distances from the fulcrum of the lever any desired difference of momentum of revolution is obtainable. Thus the centrifugal force can be graduated to cause the weights to diverge or converge with relation to the shaft N to a greater or less extent, as desired, without affecting the momentum of inertia of the combined weight of the balls *d d*. This is very important, as the weights or balls *d d* are not caused to diverge or converge by reason of the jolting or jarring action of the car in ascending or descending grades or rounding curves. The weights or balls are permitted to change their positions only by a variation in the revolution of the shaft N, consequently showing the variation in the velocity of the moving car. The lever N′ is connected at its extreme upper end to the lower end of a rod or arm N^2, connected at its upper end to a slide N^3, carried by the shaft N.

L is a fork placed astride the shaft N and having its tines or branches resting or riding upon the slide N^3 and whose upper end ter-

minates in a shaft or axis *o*, bearing in a slide or block X at its inner end and having its outer end supported in a bracket U, secured to said slide or block.

The block or slide X is held adjustably in an inclined slotted support X′, suitably secured in the frame by means of an adjusting-screw T′, and to the block or slide X is secured the quadrant or scale V, over which moves the velocity or speed indicating hand V′, secured to the axis or shaft *o* of the fork L. Therefore as the weighted lever N′ changes its position, causing its weights to converge or diverge with relation to the shaft N, as the latter is revolved through the action of the aforesaid train or system of wheels the fork L is accordingly raised or lowered, carrying with it the velocity-indicating hand V′, causing it to indicate on the scale or quadrant V the velocity of travel of the car.

The block X is adapted to slide parallel to the face of the containing closure or frame A and in the direction of the dotted line *x y z*, intersecting the shaft N at *y*, the point at which the slide N^3 stands when the car is not in motion, which is consequently the highest point said slide ever reaches.

The scale or quadrant V has an adjusting-screw connection T with the frame or closure A at its lower left-hand corner, which, together with the screw T′, provides for the adjusting of said quadrant or scale and the block X in a plane parallel with the line *x y z* without changing the point of intersection *y*, consequently not requiring the changing of the zero-point of the said scale.

By varying the position of the block or slide X and the quadrant or scale V by means of the screws T T′ the scale can within limits be made to correspond to any-sized car-wheel. The scale V is produced by actual experiment, and if no other wheel of the car is available for the application of the instrument then an additional or extra wheel should be used for that purpose.

J is an ordinary gong-bell, whose hammer J′ is arranged in an electric circuit produced by an electro-magnet M′, wires M^2 M^3 $M^\times$ $M^{\times\times}$, contact-point *m*, binding-posts *m′* m^2, a circuit-closer J^2, the fork L, and the battery L′. The circuit-closer J^2 consists of a bifurcated rod arranged astride of the fork L, but normally out of contact therewith, and having its upper screw-threaded portion adapted to work in a corresponding aperture in the frame A and capable of manipulation by a disk-terminal *j* to permit of its adjustment, as may be desired, for a purpose which will be disclosed further on. The lower ends of the tines or prongs of the circuit-closer J^2 are turned or project inward, as at *j′ j′*, to permit of the engagement or contact therewith of the fork L under a certain condition, as presently seen.

It is obvious that each time the projection *c* on the car-wheel axle makes contact with the key E^2, occurring during each revolution of the car-wheel, the electric circuit, including said key, will be closed and broken, thus energizing the electro-magnet M at each such interval, attracting the armature-lever $A^\times$ thereto. This accordingly causes the armature-lever $A^\times$ to press the free or elevated end of the escapement-lever E downward, disengaging the opposite end of the latter lever from the escapement-wheel E′ and permitting it, the latter wheel, to revolve to the extent of one tooth. The distance traveled by the car and the revolution of the car-wheel are thus indicated by the slow and rapid moving hands R^2 R^3, which move over a space on their respective scales corresponding to the revolution and circumference of the car-wheel, this revolution of the latter also being transmitted through the system or train of gear-wheels, as above described, to the governor-shaft N. By this system or train of wheels, increasing the motion and decreasing the power from the escapement-wheel E′ to the shaft N, this shaft can be made to spin or revolve fast or slow, corresponding to the velocity of the moving car, and thus with its lever carrying different-sized weights at the ends serving as a kind of differential governor, as above made plain. It will therefore appear that when the speed of the shaft N, representing that of the car, is such that the centrifugal action of the weights or balls *d* of the governor N′ N^2 N^3 shall permit the fork L, riding or resting upon the slide N^3, to descend and engage the projections *j′ j′* of the circuit-closer j^2, which determine the dangerous-speed point, then the circuit will be closed and the gong J consequently be sounded, notifying the engineer of that fact, the gong continuing to sound or ring until the fork L has been raised or the speed of the engine has been lessened.

The instrument can be placed at any part of the car or engine that may be convenient or desirable, as the electric connection with the car-axle can be effected without regard to the relative motion of the axle or its distance from the instrument. It serves to reduce the mental strain upon the engineer or driver, which would otherwise be required to run his train or car on time, thus preventing accidents from that cause.

The instrument will indicate the station passed or the one being approached, the distance between stations, and the time of arrival and departure of the train. On street-cars (electric or elevated) it will disclose to the conductor or driver, as well as to the passengers, whether the speed required by law is being exceeded and the name of the street being crossed, &c., in addition to being of great assistance to both conductor and passengers in permitting the latter to alight at the proper station.

The instrument, as has been explained, by reason of the aforesaid construction of circuit-closer is adapted to provide for producing an alarm at any given rate of speed beyond which it is not desired to run the engine

or train, and it will accurately indicate the speed and the distance passed over at any instant.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The odometer combining a speed-indicator whose hand is controlled by a centrifugal governor actuated by the gearing or wheels of the odometer, substantially as set forth.

2. The odometer combining a speed-indicator whose hand is controlled by a centrifugal governor carried by a shaft geared to the wheel or gear mechanism of the odometer, substantially as set forth.

3. In an electric odometer and speed-indicator, the combination, with the anchor or detent of the escapement-wheel, of the register-hand-actuating-gear mechanism, the armature-lever having one end normally resting upon said anchor or detent at its elevated end, and an electro-magnet having electrical connection with the car-wheel axle, substantially as specified.

4. In an electric odometer and speed-indicator, the combination, with the anchor or detent of the escapement-wheel, of the register-hand-actuating-gear mechanism, the armature-lever having one end resting upon the normally-elevated end of said anchor or detent, a spring normally holding the opposite end of said detent in engagement with said escapement, and an electro-magnet having electric connection with the car-wheel axle, substantially as described.

5. In an electric odometer and speed-indicator, the combination, with the register-hand gear mechanism, including the escapement-wheel and detent or anchor, and the spring adapted to hold one end of said anchor or detent normally in engagement with said escapement-wheel, of the armature-lever having one end normally in contact with the elevated end of said escapement or anchor, an electro-magnet, the key held upon the wheel-axle support, the circuit wires, and battery, said wires connecting with said key and said axle having a projection adapted to engage said key, substantially as set forth.

6. In an electric odometer, the combination, with the register-hand gear mechanism, of the speed-indicator hand and its scale or quadrant, and means for controlling the movement of said hand from said gear mechanism, substantially as described.

7. In an electric odometer, the combination, with the hand-register gear mechanism, of the speed-indicator hand and its scale or quadrant, and the centrifugal governor actuated by a shaft geared to said gear mechanism, substantially as specified.

8. In an electric odometer, the combination, with the register-hand gear mechanism, of the speed-indicator hand and its scale or quadrant, the shaft geared to said gear mechanism and carrying a centrifugal governor, and the fork adapted to move or ride upon and with the governor and its shaft, substantially as and for the purposes set forth.

9. In an electric odometer, the combination, with the fork, the speed-hand indicator, and its scale-quadrant, of the slide carrying said speed-indicator hand, fork, and quadrant-scale, and means for adjusting said slide and quadrant, substantially as specified.

10. In an electric odometer, the combination, with the fork, the speed-indicator hand, and the scale-quadrant, of the slide carrying said quadrant-scale and speed-indicator hand, and the adjusting-screws adapted to engage said slide and quadrant, substantially as set forth.

11. In an electric odometer and speed-indicator, the combination, with the speed-indicator hand, of the centrifugal governor and its shaft geared to actuating mechanism, the fork riding upon said governor, said governor comprising a lever carrying a heavier and a lighter weight, and an arm connected to one end of said lever and to a slide arranged on said shaft, substantially as and for the purpose set forth.

12. In an electric odometer and speed-indicator, the combination, with the fork and the speed-indicator hand, of the centrifugal governor and its shaft driven by suitable gear mechanism, and means adapted to secure alarm at a given rate of speed of the moving vehicle or car by moving said fork into an electric circuit adapted to sound said gong or bell, substantially as specified.

13. In an electric odometer and speed-indicator, the combination, with the fork and the speed-indicator hand, of the centrifugal governor and its shaft actuated by suitable gear mechanismm, and the electrically-circuited gong or bell and circuit-closer adapted to be engaged by said fork at a given point, substantially as set forth.

14. In an electric odometer and speed-indicator, the combination, with the fork and the speed-indicator, of the centrifugal governor and its shaft actuated by suitable gear mechanism, and the electrically-circuited gong or bell, and the adjustable bifurcated circuit-closer having its arms provided with projections adapted to be engaged by the tines of said fork to produce the alarm, substantially as set forth.

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M. C. MURTIN.