(No Model.)

W. S. SCALES.

SPEED INDICATOR.

No. 588,931. Patented Aug. 24, 1897.

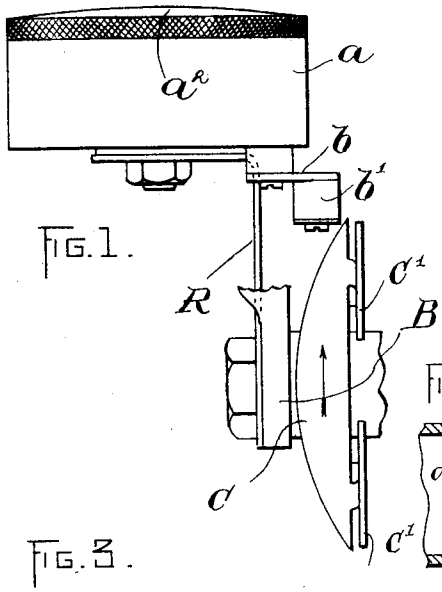


FIG. 1.

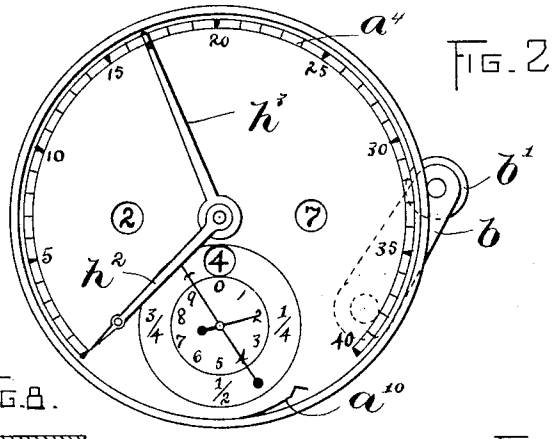


FIG. 2.

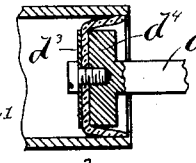


FIG. 3.

FIG. 8.

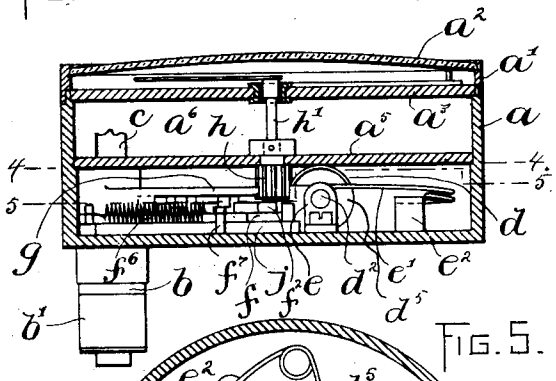


FIG. 4.

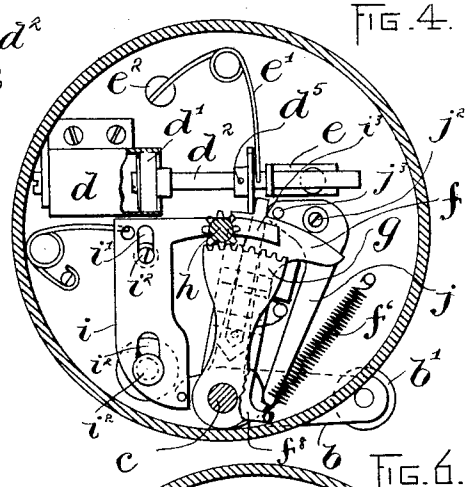


FIG. 5.

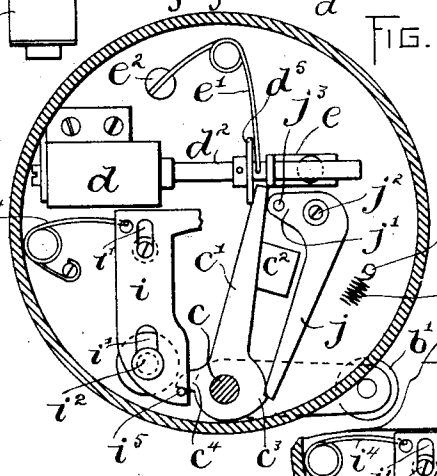


FIG. 6.

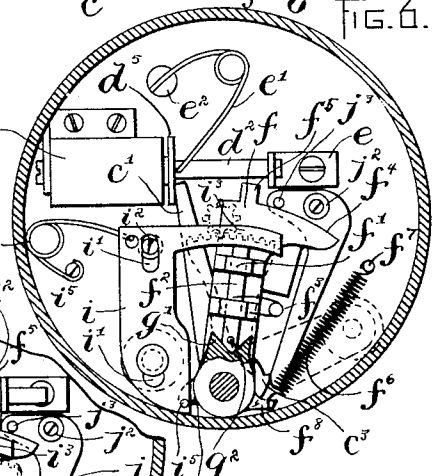
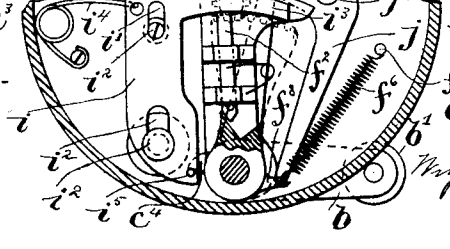


FIG. 7.



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UNITED STATES PATENT OFFICE.

WILLIAM S. SCALES, OF EVERETT, MASSACHUSETTS, ASSIGNOR TO E. T. FURNESS, O. E. MICHELL, AND JOSEPH SELIGMAN, OF BOSTON, MASSACHUSETTS.

SPEED-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 588,931, dated August 24, 1897.

Application filed January 22, 1897. Serial No. 620,253. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. SCALES, of Everett, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Speed-Indicators, of which the following is a specification.

This invention has relation to mechanisms for indicating the rate of speed at which a moving part, such as a vehicle-wheel or a shaft, is rotated, and has for its object to provide such improvements in the same that the movement of the moving part will be transmitted to the indicating devices without the employment of a rotating governor and its consequent disadvantages, and through the medium of an intermittently-acting device such as is ordinarily employed in cyclometers.

The invention consists of a speed-indicator equipped with those features of construction and arrangement which are illustrated on the drawings, and now to be described in detail, and set forth in the claims hereto annexed.

Of the drawings, Figure 1 shows in front elevation that particular embodiment of my invention which I have chosen to illustrate and describe as the best form now known by me, together with the actuating device which is secured to the vehicle-wheel. Fig. 2 is a plan view of the same, somewhat enlarged. Fig. 3 represents a vertical central section through the same. Fig. 4 represents a longitudinal section on the line 4 4 of Fig. 3. Fig. 5 represents a similar section on the line 5 5 of Fig. 3. Figs. 6 and 7 are plan views of the speed-indicating mechanism with the rack-arm removed for the purpose of illustrating how the latter is moved. Fig. 8 represents an enlarged longitudinal section through the cylinder and piston.

In carrying out my invention I may embody it in forms of various kinds, and hence it will be understood that while I have, as above stated, illustrated the best form of my invention now known to me, I am not limited to the details of construction thereof and may vary them as occasion or necessity requires.

Referring to the drawings, the casing, in which is mounted the mechanism which is more particularly adapted for use on a bicycle, is indicated by a, and is covered by a cap a', having a glass face a^2, through which the indicator-hands may be seen. A dial-plate a^3 is secured in the casing a and may be suitably marked with a graduated scale a^4, indicating the speed at which the bicycle is traveling, or covered with a printed dial suitably marked, as desired. Within the casing I mount not only the speed-indicating mechanism, but also cyclometer or distance-registering mechanism, so that the dial is also arranged to reveal the numerals on the disks of and marked with a scale for the pointers of the cyclometer mechanism. As the last-named mechanism forms no part of this invention and may be of any approved pattern or kind, I have not illustrated it, though I provide for mounting it in the chamber a^6 between the plate a^3 and a partition-plate a^5, located centrally in the casing.

The casing is supported on the usual angular arm R, mounted upon the axle of the bicycle outside the front fork B, and power is imparted to the mechanism therein by means of an actuating device consisting of a segmental cam C, attached to the bicycle-wheel by clamps C'. A lever b, having a roller b' on the free end thereof, is secured upon the projecting end of a shaft c, extended through a boss b^2 on the bottom of the casing and through the partition-plate a^5 into the compartment a^6. The roller b' is engaged once during each revolution of the wheel by the cam, and the lever is oscillated about the axis, so as to rock the shaft c, from which shaft motion is transmitted to the distance-registering mechanism in the compartment a^6 and to the speed-indicating mechanism now to be described.

Secured upon the bottom plate of the casing is a cylinder d, having one end closed and in which a piston d' is reciprocated by a piston-rod d^2. The piston is provided with suitable packing, so that it may be forced rapidly toward the closed end of the cylinder and be forced to return slowly to its original position, or, if desired, the cylinder may be suitably valved to produce this result. As shown in Fig. 8, the piston consists of two disks d^3 d^4, between which is clamped a disk of kid or other suitable flexible material, which extends out, as shown, to act as a valve in allowing the air to escape when the piston is

moved inward and retains it when the said piston begins its outward movement.

The end of the piston-rod passes through a fixed guide *e*, secured upon the bottom plate, and there is a wire spring *e'*, one end secured to a screw e^2 on the said plate and the other end inserted in an aperture in the said rod for returning the piston to its normal position when it has been forced inward.

Upon the rod is secured a flanged collar d^5, which is engaged by the end of an arm *c'*, secured upon the shaft *c* and normally abutting against a fixed stop c^2. The hub of the arm is formed with a cam-shoulder c^3 on one side of the shaft *c* and a cam c^4 on the other side thereof, which coact with certain parts to be hereinafter referred to.

An arm *f* is mounted loosely upon the shaft *c* and is provided on its upper face with guides *f' f'*, in which is placed a sliding bar f^2, having a V-shaped end and normally held upward by a spring f^3.

The outer end of the arm *f* is extended laterally, and the edge f^4 is curved in the arc of a circle whose center is in the axis of the shaft *c*. It is provided with a lug or finger f^5, which projects behind the flange of the collar d^5 on the piston-rod d^2. The finger is held against the flange of the said collar by a spring f^6, one end of which is attached to a post f^7, extending up from the bottom plate of the casing, and the other end is attached to a lug f^8, projecting out from the hub of the said arm *f*. The spring *e'* is much stronger than the spring f^6, so that under ordinary conditions, when the mechanism is not in use, the first-mentioned spring will hold the piston d^2 in its inoperative outward position against tension of the spring f^6. Also loosely mounted on the shaft *c* is a segment-arm *g*, provided with rack-teeth on its outer edge, which engage a pinion *h* on an arbor *h'*, mounted in the plates a^3 and a^5 of the casing and projecting above the said plate a^3 to receive a pointer or indicator h^2, which is adapted to travel around the graduated scale a^4.

The segment-arm *g* (see Fig. 6) is formed with a cam *g'*, having a V-shaped notch or recess g^2 in the planes of the bar f^2 and in which the lower end of the said bar is adapted to enter to register the segment-arm with the arm *f*—that is to say, if the segment-arm *g* were at an angle to the arm *f* and the bar f^2 were thrust downward its V-shaped end would engage one of the sides of the notch and force the segment-arm to one side until it lay parallel to the said arm *f*.

For the purpose of operating the bar f^2 I employ a slide *i*, having slots *i' i'*, through which screws i^2 pass to secure it to the bottom of the casing. It is located to one side of the shaft *c* and out of the path of the segment-arm, being provided with a lateral extension i^3, which projects over the arm *f* and has an edge nearest the shaft *c* concentric therewith and just escaping the end of the bar f^2. Thus it will be seen that the arm *f* and the bar f^2 may be swung to the side without being affected by the slide, although the extension i^3 will be in engagement with the end of the said bar f^2, provided the slide be in its normal inoperative position, as shown in Fig. 4, to which it is moved and held by a spring i^4, having one end attached to a screw i^5 and the other end projecting into an aperture in the slide *i*. The said slide is adapted to be reciprocated to effect the operation of the slide-bar f^2 by means of the cam c^4 on the hub of the lever *c'*, which engages a pin i^5, projecting downward from the slide.

A locking-lever having a long arm *j* and a short arm *j'* and pivoted by a screw j^2 to the bottom of the casing is employed to intermittingly lock the arm *f* against movement during certain times for the purpose to be hereinafter described. The short end, which is at an angle to the long end, is provided with a pin j^3, which projects up just beyond the curved edge of the arm *f*, while the long end of the lever rests against the hub of the lever *c'* and just against the cam or shoulder c^3.

When the parts are in the position shown in Figs. 4 and 5, the pin j^3 rests loosely against the curved edge of the arm *f*, so as to allow the arm to be freely moved about the shaft *c*, but when the lever *c'* has been thrown to the left, as in Fig. 6, the shoulder c^3 (or cam) throws the outer end *j* of the lever to the right and forces the pin j^3 against the edge of the arm *f*, so as to bind the latter against movement until the arm *c'* has resumed its normal position.

The operation of the device is as follows: Assuming that the bicycle-wheel, which is twenty-eight inches in diameter, is revolving at the rate of one revolution per second, which would be a speed of five miles an hour, and that as the said wheel revolves the cam C engages the roller *b'* and through the lever *b*, the shaft *c*, and the arm *c'* forces the piston to the closed end of the cylinder, the packing or the valves in the cylinder are so arranged that during the remainder of the second the piston will be moving to its normal position, or, in other words, it will take, for instance, exactly one second to force the piston inward and allow it to return to its normal position under the impulse of the spring *c'*. But suppose that the speed of the wheel is doubled, so that the wheel is traveling at the rate of ten miles per hour. Then before the piston reaches the outer limit of its movement the arm *c'* strikes the flanged collar and, checking its movement, drives it forward again. The piston travels through a predetermined space or at a predetermined rate of speed, while the movement of the bicycle-wheel and the arm *c'* is variable, so that the indicator will not be affected by the wheel until the latter travels fast enough to cause the checking of the piston at a point between the extremes of its movement. Hence it will be seen that by moving the indicator-pointer to indicate the relative point at which the piston is checked or the relative

distance through which it has traveled the rate of speed at which the wheel is traveling will be indicated. Assuming that when the wheel is traveling at the rate of ten miles an hour the piston is checked when it has retraversed four-fifths of the distance between the extremes of its movement, then the mechanism previously described causes the arm h^2 to be moved along the graduated scale (which is arbitrarily arranged) to the numeral "10." When the lever b is thrust to one side by the cam C to cause the arm c' to thrust the piston to the forward extreme of its movement, the very first movement of the said arm c' causes the cam c^3 on its hub to thrust the lower end of the lever j outward, so as to lock the segment-lever against movement; but as soon as the arm c' returns to its normal position (which occupies a very small fraction of a second) the lever j also returns to its normal position and, releasing the segment-lever, allows the spring f^6 to force the latter forward until the lug f^5 meets the flanged collar on the piston-rod, the rack-arm g remaining stationary. The piston forces the segment-lever backward until its movement is checked by the arm c' striking the flanged collar and forcing it forward again, and as the said arm begins its movement the segment-lever is locked and the slide i is moved by the cam c^4 to force the bar f^2 into engagement with the walls of the recess or V-shaped notch g^2 in the cam g' and moves the segment-arm into parallelism with the said bar. This movement of the cam g' (and the rack-bar g) causes the partial rotation of the pinion h and the consequent movement of the pointer h^2. Then, so long as the bicycle travels at this same rate of speed, the rack-lever and the pinion will both remain in the positions just described; but if the rate of speed of the bicycle is increased the travel of the piston will be shorter and the rack-lever will be forced, through the medium of the parts just mentioned, farther to the left to cause the pointer to indicate on the graduated scale the said rate of speed.

In addition to the above-described features the indicator has a pointer h^3 mounted loosely in an aperture in the dial-plate and below the pointer h^2. It has a pin h^4 projecting upwardly, with which the pointer h^2 may engage, so as to move the said pointer h^3 to the farthest extreme of its movement, at which point it remains by its frictional engagement with the dial-plate, thus indicating the highest degree of speed attained by the bicycle.

To return it to its original position, the cap or cover a' has a spring a^{10}, (see Fig. 2,) which when the cap is revolved engages the pin h^4 and carries the pointer h^3 with it.

It will be understood that I do not limit myself to the precise details which I have described, as I may embody my invention in other forms of indicator and may vary the various parts thereof to suit my convenience, and when in the following claims I refer to the device being employed in connection with a bicycle-wheel it will be remembered that it may be used with any other moving part, such as a carriage-wheel, a rotating shaft, or the like.

I have found that, if desired, I may dispense with the lock which prevents the segment lever or arm from moving, and may in such case depend upon the engagement of the slide with the sliding bar to lock the said segment-lever in position while the said bar is being actuated. Other parts may be omitted or varied, as above stated, the essential feature of the invention consisting in means for indicating the variations in the length of the movements of a device operating through a predetermined space in a predetermined time, and the length of whose movements is varied in accordance with the speed of rotation of the bicycle-wheel or other part, and the speed of which it is desired to indicate.

What I claim is—

1. A speed-indicator, comprising a device moving through a predetermined space at a predetermined rate of speed, and whose movements are affected by the rotating part the rate of speed of which is to be indicated, and mechanism for indicating the variations in the movements of the said device.

2. A speed-indicator comprising a device having a predetermined range of movement in a predetermined period of time, and the lengths of whose movements are varied according to the speed of the bicycle-wheel, and mechanism for indicating the length of each movement of the said device.

3. A speed-indicator comprising a device having a predetermined range of movement in a predetermined period of time, and the lengths of whose movements are varied according to the speed of the bicycle-wheel, and mechanism for indicating the variations in the range of movement of the said device.

4. A speed-indicator comprising a device having a predetermined range of movement in a predetermined period of time, and the lengths of whose movements are varied according to the speed of the bicycle-wheel, and mechanism for indicating the position of the said device at the end of each movement.

5. A speed-indicator comprising a device reciprocating at an arbitrary rate of speed, and the lengths of whose reciprocations are varied in accordance with the rate of speed at which the bicycle-wheel is traveling, and mechanism for indicating the variations in the length of the reciprocations of the said device.

6. A speed-indicator, comprising a device moving through a predetermined space at a determined rate of speed, and whose movements are affected by the rotating part, the rate of speed of which is to be indicated, and intermittingly-acting mechanism for indicating the variations in the movements of said device.

7. A speed-indicator comprising a device

reciprocating at an arbitrary rate of speed, and the lengths of whose reciprocations are varied in accordance with the rate of speed at which the bicycle-wheel is traveling, and intermittingly-acting mechanism for indicating the variations in the length of the reciprocations of said device.

8. A speed-indicator comprising a device moving through a predetermined space at a determined rate of speed, and whose movements are affected by the rotating part, the rate of speed of which is to be indicated, and mechanism actuated by the said moving part, for indicating the variations in the movements of said device.

9. A speed-indicator comprising a device reciprocating at an arbitrary rate of speed, and the lengths of whose reciprocations are varied in accordance with the rate of speed at which the bicycle-wheel is rotating, and mechanism, actuated by the bicycle-wheel, for indicating the variations in the length of the reciprocations of said device.

10. A speed-indicator, comprising an intermittingly-actuated device operated by the bicycle-wheel, and having a predetermined movement in a predetermined period of time, the lengths of whose movements are varied in accordance with the rate of speed of the bicycle-wheel, and mechanism for indicating the variations in the length of movement of the said device.

11. A speed-indicator, comprising a device reciprocating at an arbitrary rate of speed, and the length of whose reciprocations is varied in accordance with the speed of the bicycle-wheel, and mechanism for indicating the variations in the length of the reciprocations of said device, comprising a pointer, and means actuated by said bicycle-wheel and controlled by said device for moving said pointer.

12. A speed-indicator, comprising a device reciprocating at an arbitrary rate of speed, and the length of whose reciprocations is varied in accordance with the speed of the bicycle-wheel, and mechanism for indicating the variations in the length of the reciprocations of said device, comprising a pointer, means for moving said pointer, and means for operating the last said means at the end of each reciprocation of said device.

13. A speed-indicator, comprising a device reciprocating at an arbitrary rate of speed, and the length of whose reciprocations is varied in accordance with the speed of the bicycle-wheel, and mechanism for indicating the variations in the length of the reciprocations of said device, a pointer, means for moving said pointer, and means actuated by the bicycle-wheel for operating the last said means, at the end of each reciprocation of the device.

14. A speed-indicator consisting of a reciprocatory rod, means for checking the movement of said rod to cause it to move through a predetermined distance at a predetermined time, a lever operated by the bicycle-wheel for moving said rod once for every revolution of the bicycle-wheel, and mechanism for indicating the variations in the length of the movements of said rod.

15. A speed-indicator consisting of a reciprocatory rod, means for checking the movement of said rod to cause it to move through a predetermined distance at a predetermined time, a lever operated by the bicycle-wheel for moving said rod once for every revolution of the bicycle-wheel, and mechanism intermittingly operated by said lever for indicating the variations in the length of movements of said rod.

16. A speed-indicator consisting of a reciprocatory rod, means for checking the movement of said rod to cause it to move through a predetermined distance at a predetermined time, a lever operated by the bicycle-wheel for moving said rod once for every revolution of the bicycle-wheel, and mechanism, comprising a pointer, a rack, and pinion for moving the pointer and means operated by said lever for moving said rack to correspond with the variations in the length of movements of said rod.

17. A speed-indicator, consisting of a longitudinally-reciprocatory rod, a piston and cylinder for checking the movement of said rod to cause it to normally move a predetermined distance in a predetermined time, an arm actuated by the bicycle-wheel for varying the length of movement of said rod in accordance with the speed at which the bicycle-wheel revolves, and means operated once for each revolution of said wheel for indicating the length of movements of said rod.

18. A speed-indicator, consisting of a longitudinally-reciprocatory rod, a piston and cylinder for checking the movement of said rod to cause it to normally move a predetermined distance in a predetermined time, an arm actuated by the bicycle-wheel for varying the length of movement of said rod in accordance with the speed at which the bicycle-wheel revolves, and mechanism actuated by the said bicycle-wheel for indicating the variations in the length of movements of said rod, said mechanism comprising a pointer, having a pinion on its arbor, a slide, a rack-arm meshing with the pinion and having a cam, and a sliding bar moving laterally with said rod, and adapted to engage said cam, and means for actuating said slide at the end of each reciprocation of the said rod.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 16th day of January, A. D. 1897.

WILLIAM S. SCALES.

Witnesses:
MARCUS B. MAY,
PETER W. PEZZETTI.