No. 670,432.

Patented Mar. 26, 1901.

R. N. POWERS.

SPEED INDICATOR.

(Application filed July 20, 1899.

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

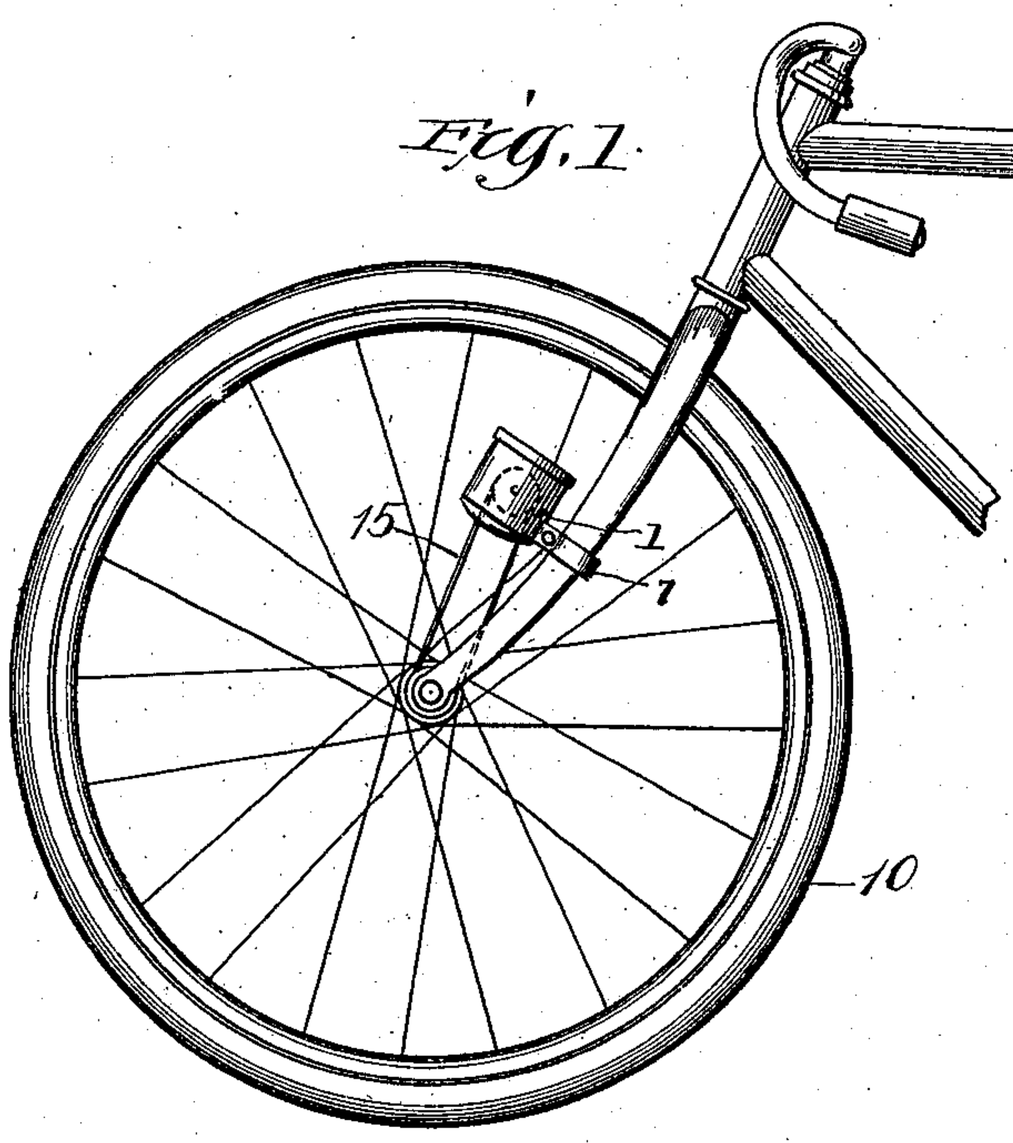


Fig. 2.

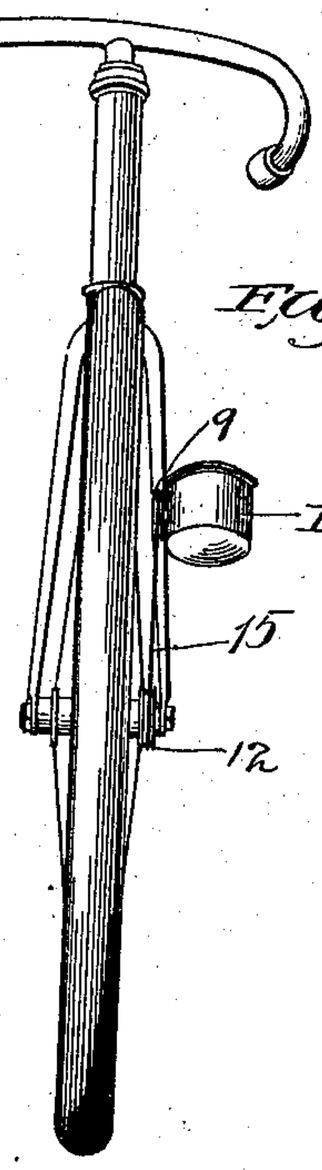
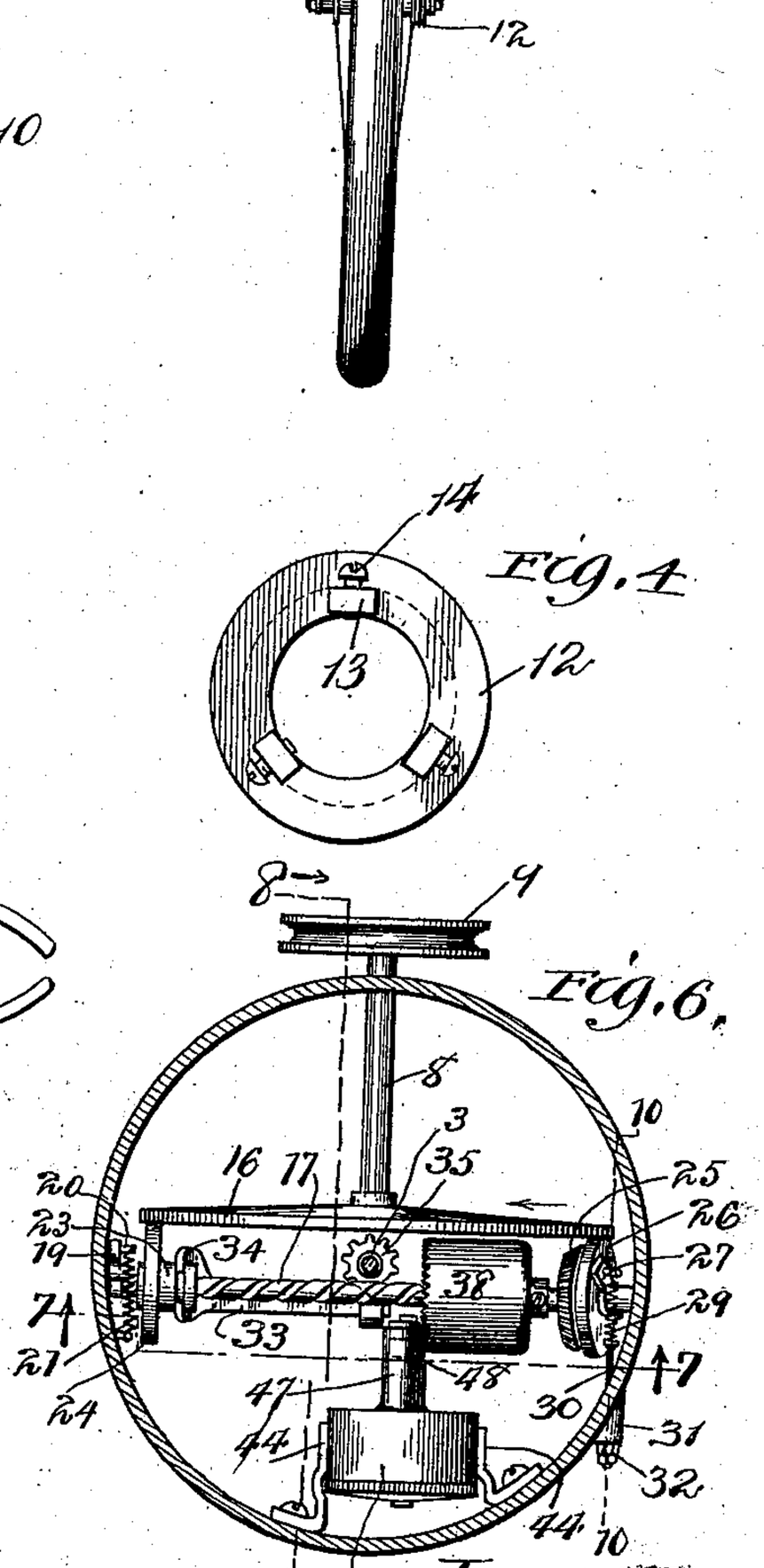


Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.



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No. 670,432. Patented Mar. 26, 1901.

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2 Sheets—Sheet 2.

Fig. 7

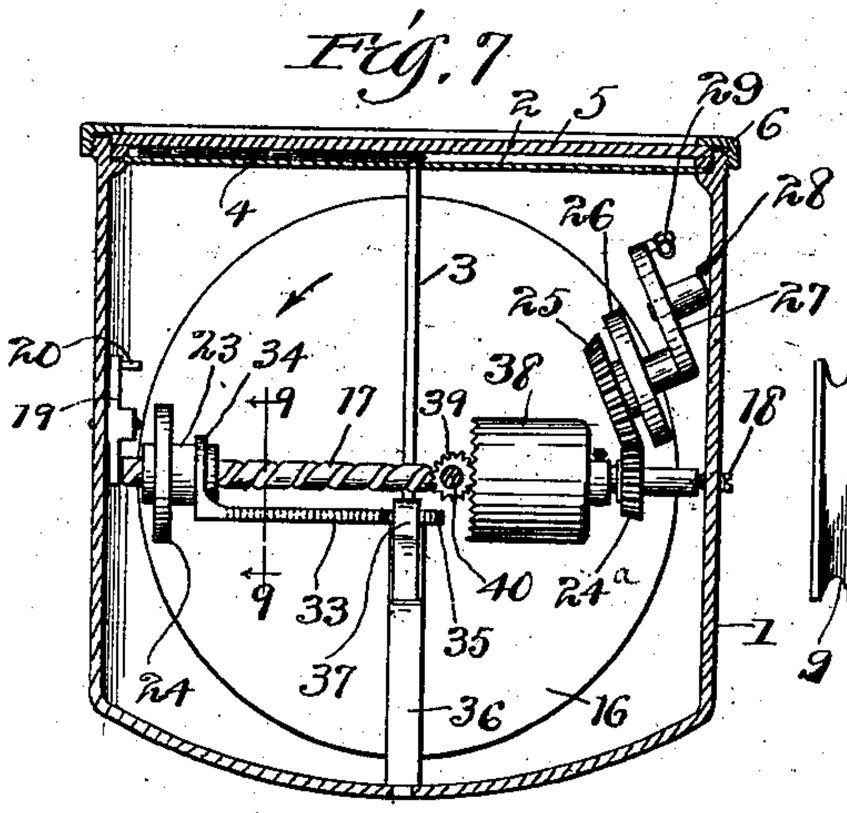


Fig. 8

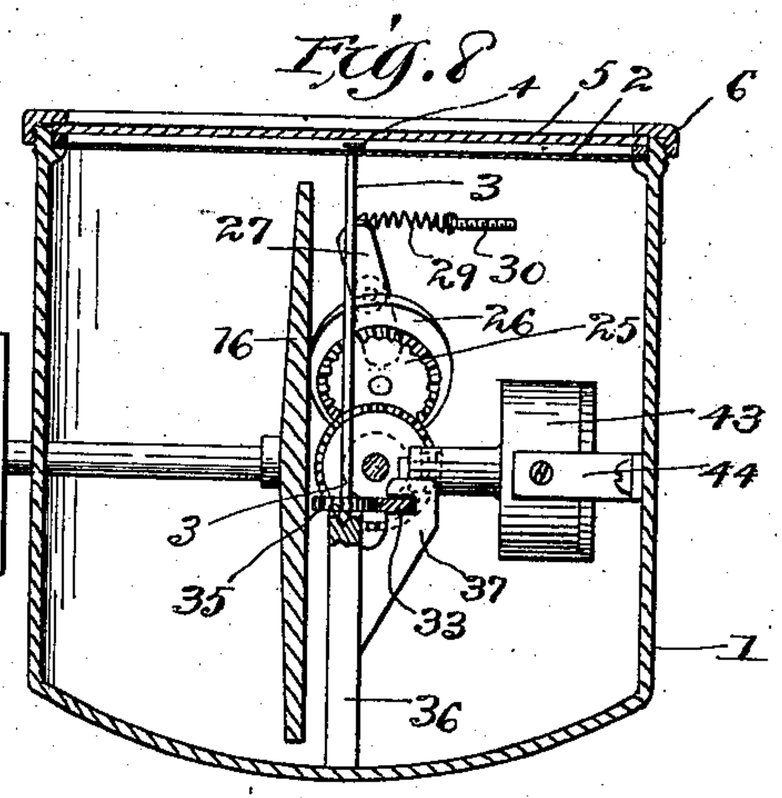


Fig. 9

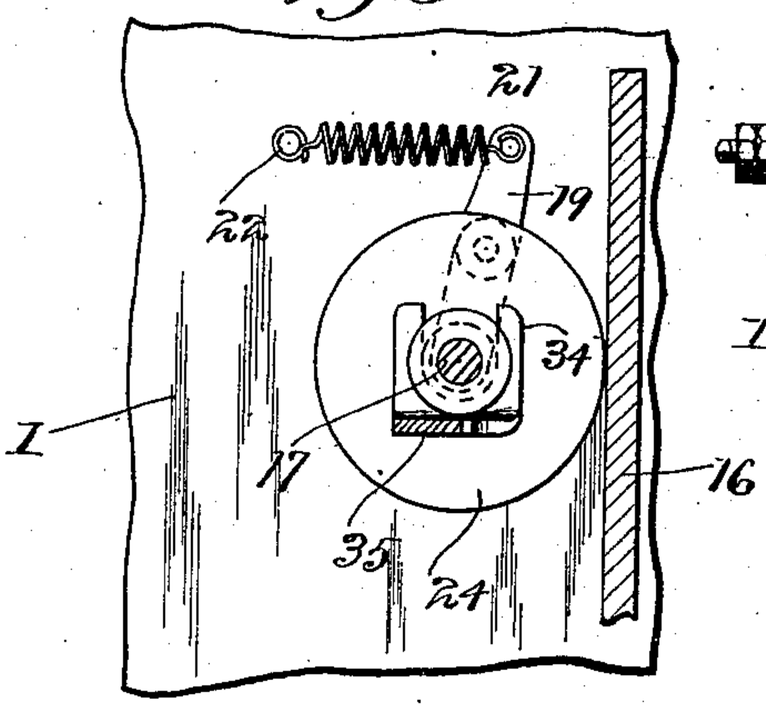


Fig. 10

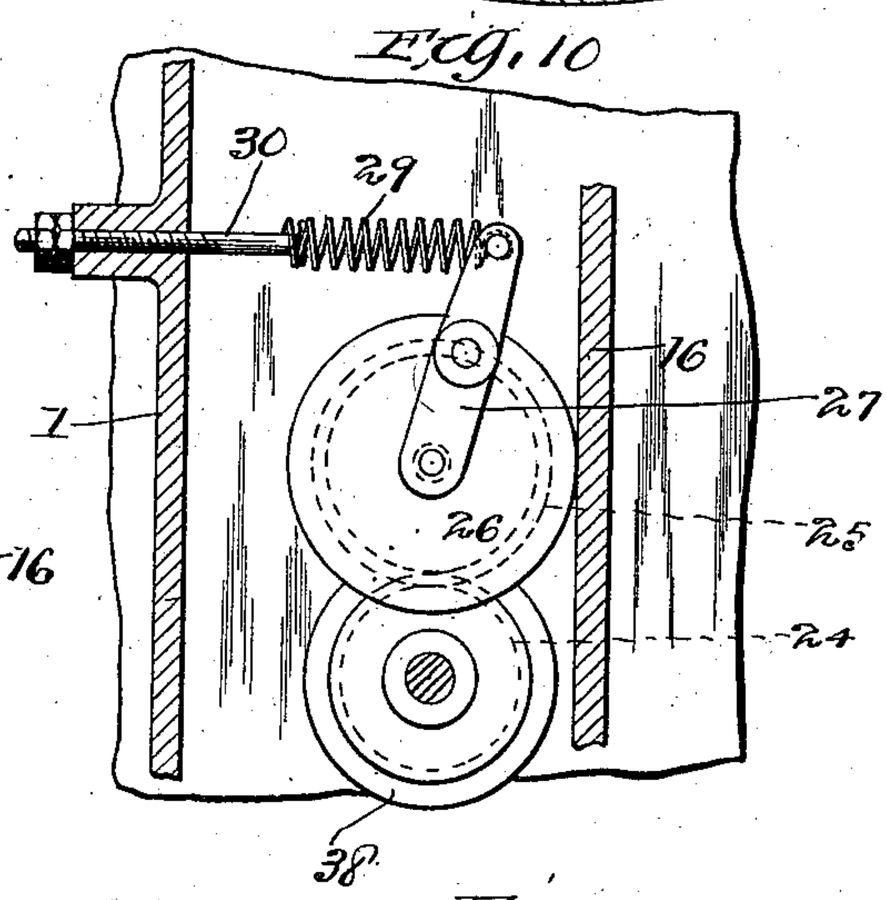


Fig. 11

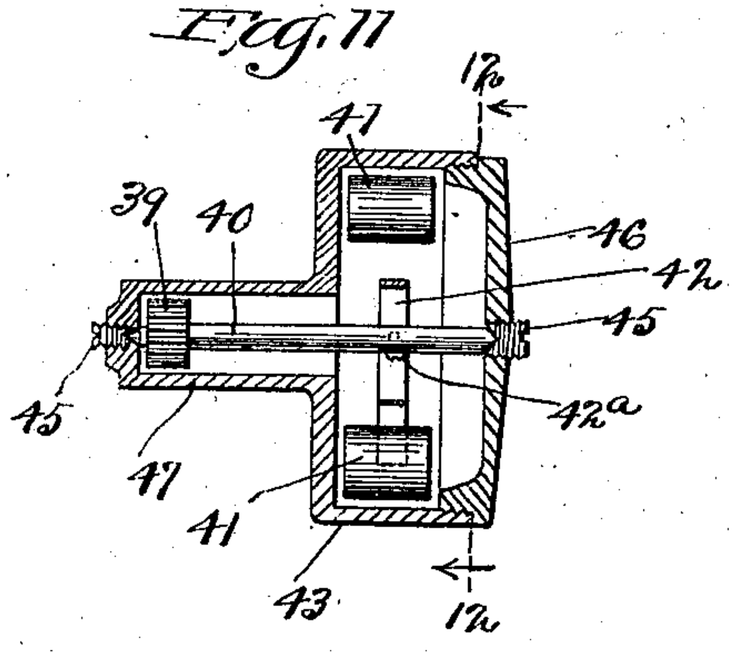
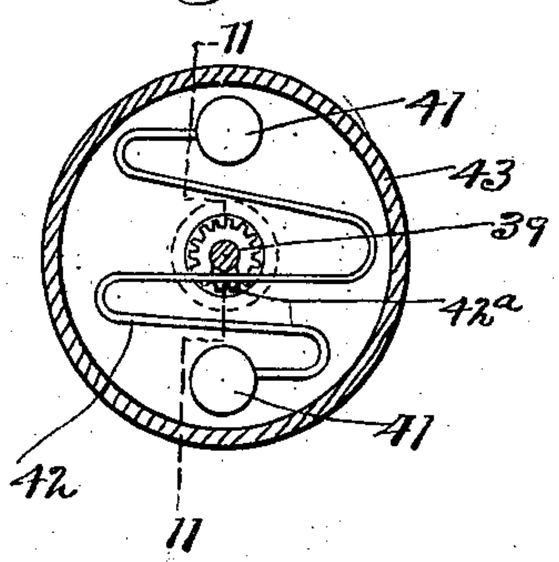


Fig. 12.



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UNITED STATES PATENT OFFICE.

ROBERT N. POWERS, OF KANSAS, ILLINOIS.

SPEED-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 670,432, dated March 26, 1901.

Application filed July 20, 1899. Serial No. 724,466. (No model.)

To all whom it may concern:

Be it known that I, ROBERT N. POWERS, a citizen of the United States, residing at Kansas, in the county of Edgar and State of Illinois, have invented certain new and useful Improvements in Speed-Indicators, of which the following is a full, clear, and exact specification.

My invention relates to speed-indicators for indicating the speed of any rotating wheel, shaft, or other rotary member—such, for example, as velocipede and other vehicle wheels; and my invention has for its primary object to provide a simple and efficient speed-indicator capable of indicating a wide range of variation of speed.

Another object of my invention is to provide improved means to actuate the index by a variation in the speed of rotation of two members both deriving their rotary movement from the rotating member whose speed is to be indicated and one of them having its speed limited or retarded through the agency of its own motion.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said objects and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a side elevation of my improved speed-indicator, showing the preferred manner of applying it to a velocipede-wheel as an example of one of the many devices or rotary members to which it may be applied. Fig. 2 is a front view thereof. Fig. 3 is an enlarged detail view of one end of the velocipede-hub, showing the manner of attaching the driving-pulley, the latter being in section. Fig. 4 is a detail side view of the pulley. Fig. 5 is an enlarged plan view of the speed-indicator, its pulley being omitted. Fig. 6 is a plan section thereof. Fig. 7 is a vertical sectional view taken on the line 7 7, Fig. 6. Fig. 8 is a vertical sectional view taken on the line 8 8, Fig. 6. Fig. 9 is an enlarged detail side elevation of the combined rotary nut and friction-wheel, hereinafter described. Fig. 10 is a similar view of the friction-wheel and train of gears for driving the worm or screw, hereinafter described, the casing and disk being in section on the line 10 10, Fig. 6. Fig. 11 is an enlarged sectional view of the governor or centrifugal brake, hereinafter explained, taken on the line 11 11, Fig. 12; and Fig. 12 is a transverse section thereof, taken on the line 12 12, Fig. 11.

In carrying out my invention I preferably inclose the working mechanism of the speed-indicator in a dust-proof casing 1, in the upper end of which is secured a dial 2, upon which the graduations are marked and through which projects a stem 3, carrying a rotary index 4 above the dial, and preferably over the dial is arranged a glass or other transparent medium 5, which is held in place by a threaded ring 6. This casing 1 is provided on one side with a clamp 7, which constitutes a bracket, whereby it may be attached to the fork of a velocipede or to any other suitable support.

Journaled in the casing 1 in any suitable manner is a horizontal shaft 8, upon the outer end of which is secured a pulley 9, which is adapted to be driven by the rotary member whose speed is to be indicated. In the example shown in the drawings this rotary member is a velocipede-wheel 10, and as a convenient and efficient way of transmitting the motion of this wheel to the pulley 9 I provide the hub 11 of the wheel 10 with a grooved pulley 12, having a number of lugs 13, through which are passed clamping-screws 14, whereby the pulley 12 may be attached to the hub 11. The pulleys 9 and 12 may be connected together by a simple cord belt 15. On the inner end of the shaft 8 is secured a rotating member in the form of a large flat disk 16, and extending across the face of this disk and radiating from the center thereof is a screw or worm 17, one end of which is mounted on an adjustable cone-bearing 18, while the other end is journaled in one end of a lever 19, whose other end has a pin or lug 20, to which is secured one end of a spring 21, the other end of the latter being attached at 22 to the inner side of the casing 1. Sleeved loosely upon the worm 17 is a rotary nut 23, which is provided with a thread or feather engaging in the groove of the worm 17 and is also formed with or secured to a friction-wheel 24,

held in engagement with the face of the disk 16 by the tension of the spring 21. On the other end of the screw or worm 17 is secured a beveled pinion 24^a, which meshes with a companion gear 25, secured to or formed on a friction-wheel 26, which also engages with the face of the disk 16. The gear 25 and wheel 26 are journaled on the end of a lever 27, which is fulcrumed at 28 to the side of the casing 1, the opposite end of the lever 27 being secured to one end of a spring 29, whose other end is attached to the inner end of an adjusting-rod 30, which passes through a suitable housing 31, formed on the side of the casing, and is provided on its exterior end with adjusting-nuts 32, whereby the tension of the spring 29 may be regulated and the pressure of the friction-wheel 26 against the disk 16 thereby varied as required. It will thus be seen that by the rotation of the disk 16 the worm 17 and friction-wheel 24, carrying the nut 23, will be revolved in the same direction, and as long as the speed of rotation of said worm and nut remains the same the nut will maintain a relatively-fixed position on the worm; but as soon as the speed of the two varies the nut will run toward or from the center of the disk 16, accordingly as the speed of one increases or decreases over that of the other. For instance, if the speed of the nut exceeds the speed of the worm the nut will run inward along the worm by virtue of its feather engaging in the groove of the worm, but its travel inward will gradually decrease, even though the speed of the disk 16 be maintained the same, because as the friction-wheel 24 nears the center of the disk said friction-wheel will be acted on by a smaller circle of the disk, and consequently be subjected to less motion, and as a result will revolve at a less rate of speed, more nearly approaching the speed of the worm. In order that this variation in the speed of rotation of these two rotary members—namely, the worm or screw 17 and the rotary nut 23—may be utilized for actuating the index or pointer 4, I attach to the nut 23 a rack-bar 33 in any suitable manner—such, for example, as by means of a fork or yoke 34, which engages a groove in the nut 23 in a well-known manner—and the other end of this rack-bar I hold in engagement with a pinion 35 on the lower end of the index-stem 3, the lower end of the stem 3 being stepped in a standard 36, supported in the bottom of the casing and having a guide-bracket 37, which maintains the rack-bar 33 in perfect engagement with the pinion 35. Thus it will be seen that as the nut 23 runs back and forth on the worm 17 the pinion 35 and shaft 3 will be accordingly rotated and the speed of the wheel 10 thereby indicated.

As the wheels 24 and 26 would ordinarily impart an unchanging relative speed of rotation to the nut 23 and worm 17, which would result in the former maintaining a fixed relation to the worm, it is obvious that a governor or some means must be provided for retarding or limiting the speed of rotation of the worm through the agency of its own movement, so that while the speed of the disk 16 may increase and the speed of rotation of the friction-wheel 24 increase proportionately the speed of rotation of the worm will remain uniform after a certain speed has been attained. In order to accomplish this, I provide the worm 17 with a crown-gear 38, which engages with a pinion 39, secured on the shaft 40 of a governor or centrifugal friction-brake consisting of a pair of weights 41, secured to opposite ends of an extensible spring 42, which is secured to and supported on the shaft 40, the weights 41, which act as the shoes of the brake, being housed within a cylindrical casing 43, so that as the shaft 40 revolves the weights will be thrown outwardly by centrifugal force and by their friction against the casing 43 retard the movement of the worm 17, and hence the friction-wheel 26 will be capable of rotating the shaft 17 at only a limited rate of speed, dependent upon the freedom with which the weights or shoes 41 slide within the casing 43. This maximum speed of rotation of the worm 17 may, by a proper increase or decrease of the frictional contact of the shoes 41, be made to occur after the wheel 10 or other rotary member to which the indicator is attached has attained any desired rate of speed. In practice I find it desirable to so govern the rotation of the worm 17 that its speed will cease to increase when the speed of the velocipede reaches a speed of eight miles an hour, and therefore with the invention thus proportioned the indicator will not begin to indicate, or, in other words, the index 4 will remain at rest, until the speed of the vehicle exceeds a speed of eight miles an hour. Until this speed has been attained the worm 17 and nut 23 will revolve at the same rate of speed; but as soon as eight miles is exceeded the nut 23 will begin to travel inwardly on the worm 17 by virtue of its increase of speed over the speed of rotation of the worm, and it will continue this inward movement so long as the speed of the vehicle continues to increase until the friction-wheel 24 reaches the center of the disk 16, whereupon it will revolve as a pivot with the disk 16 and all indication of speed will cease, this being the maximum capacity of the speed-indicator.

The housing or casing 43 is supported in the casing 1 by suitable brackets 44, and the shaft 40 is journaled at opposite ends in suitable adjustable bearing-screws 45, secured in a removable cap 46 of the casing 43 and the end of a neck 47, which incloses the shaft 40 and pinion 39 and which has a suitable side opening 48 for the admission of the edge of the crown-gear 38.

While I have been particular to describe my invention in minute detail, it will never-

theless be understood that the mechanism shown is only an example of the different ways in which the same principle may be carried into effect, and I therefore wish it to be understood that I do not limit myself to the details of construction set forth in the foregoing specification.

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

1. In a speed-indicator the combination of a rotating disk, a worm arranged radially with relation to said disk and having operative relation thereto, a rotary nut arranged on said worm and also having operative relation to said disk, an index having operative connection with said nut, and means for governing the speed of rotation of said worm, substantially as set forth.

2. In a speed-indicator the combination of a rotating disk, a worm arranged across said disk, a friction-wheel having a nut located on said worm and cushioned against said disk, an index, an operative connection between said index and nut, a second friction-wheel cushioned against said disk and operatively connected with said worm for rotating it, a centrifugal friction-brake and an operative connection between said friction-brake and worm for limiting the speed of the latter, substantially as set forth.

3. In a speed-indicator the combination of a disk rotating at a variable speed, a member arranged radially with relation to said disk and having operative relation thereto and rotating at a uniform speed, a second member having operative relation to both said disk and first member and movable by the difference in speed between said disk and first member, and an index operatively related to said second member, substantially as set forth.

4. In a speed-indicator the combination of a disk rotating at a variable speed, a member extending across the center of said disk and having operative relation thereto but rotating at a uniform speed, a second member movable independently of both said disk and first member and having operative relation to both of the latter whereby it will move by virtue of the difference in speed between said disk and first member, and an index operatively related to said second independent member, substantially as set forth.

ROBERT N. POWERS.

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