(No Model.)

2 Sheets—Sheet 1.

R. J. McCARTY.

VELOCIMETER.

No. 331,517. Patented Dec. 1, 1885.

FIG. I.

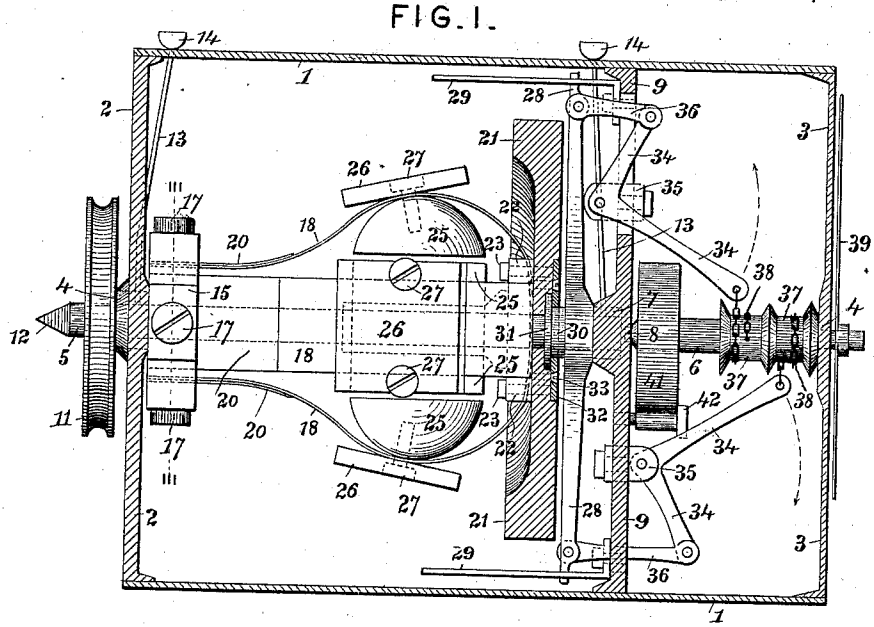


FIG. II.

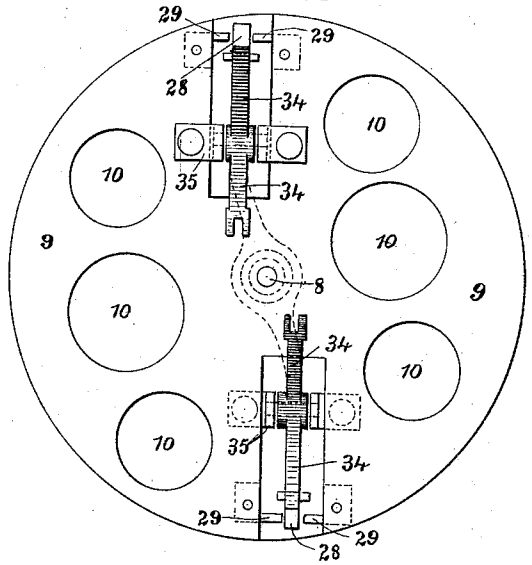
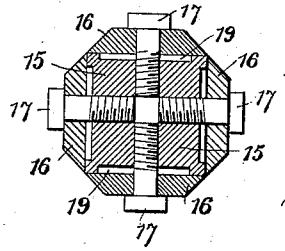


FIG. III.



Attest.
Geo. T. Smallwood.
Jas. K. McCathran.

Inventor:
Richard J. McCarty.
By Knight Bros.
Attys.

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.)

2 Sheets—Sheet 2.

R. J. McCARTY.

VELOCIMETER.

No. 331,517. Patented Dec. 1, 1885.

FIG. IV.

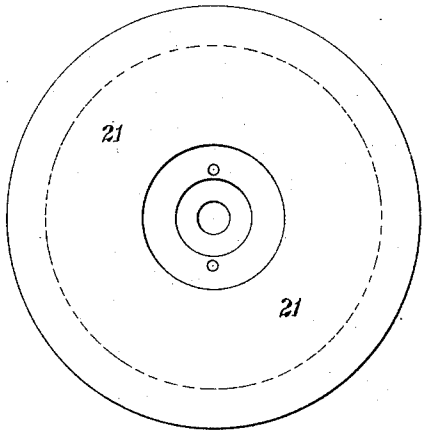


FIG. V.

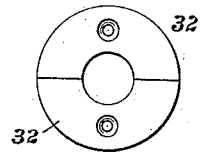


FIG. VI.

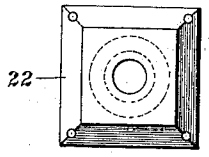


FIG. VII.

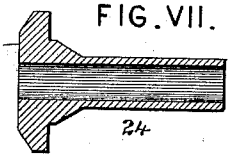


FIG. VIII.

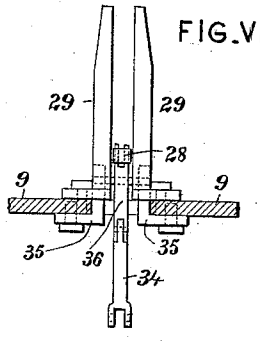
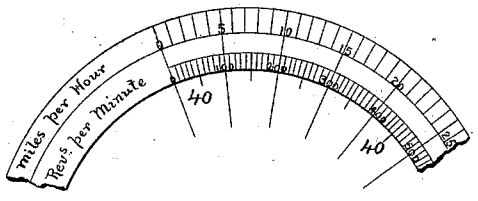


FIG. IX.



Attest

Geo. T. Smallwood.

Jas. K. McCathran.

Inventor:

Richard J. McCarty.

By Knight Bros.

Attys.

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

RICHARD JUSTIN McCARTY, OF FORT SCOTT, KANSAS.

VELOCIMETER.

SPECIFICATION forming part of Letters Patent No. 331,517, dated December 1, 1885.

Application filed June 27, 1885. Serial No. 169,987. (No model.)

To all whom it may concern:

Be it known that I, RICHARD JUSTIN McCARTY, a citizen of the United States, residing at Fort Scott, in the county of Bourbon, State of Kansas, have invented a new and useful Improvement in Velocimeters, of which the following is a specification.

My improved velocimeter is intended to indicate either rotary or linear velocity, the connection of the velocimeter being made in the first case directly or indirectly with the rotary mechanism whose speed is to be indicated, and in the second case with the reciprocating mechanism, through the medium of any preferred form of device for converting its motion from reciprocating to rotary.

The improvement consists of an arrangement of rotary shaft, spring-arms, and weights acting centrifugally, in the manner of a governor, to produce lineal motion of a suitable head-block or frame, which motion is transmitted to an indicating-needle by means of bell-crank levers, chains, and a spring-arbor.

The invention involves certain details of construction of these parts, which will be better understood from the following description, and which will be more specifically pointed out in the claims.

In the accompanying drawings, Figure I represents in orthogonal projection my improved velocimeter, the outer casing and the momentum-disk being shown in vertical section. Fig. II is a side elevation of the diaphragm fixed in said casing intermediate of its ends, and supporting parts of the moving mechanism of the velocimeter. Fig. III is a vertical sectional view on the line III III, Fig. I. Fig. IV is a face view of the momentum-disk. Fig. V is a face view of two-part clamp-plate. Fig. VI is a face view of the reciprocating head-block, and Fig. VII is an axial section thereof. Fig. VIII is a plan view of one of the bell-crank levers and the yoke guide. Fig. IX is a detail of dial.

1 may represent a cylindrical metallic case closed hermetically at its ends by heads 2 3, which have central bearings, 4, for one end of the main shaft 5 and of the arbor 6 of the indicating-needle, respectively. The inner ends of said shaft and arbor are supported in suitable bearings, 7 8, in a diaphragm, 9, fixed transversely within the casing 1. To render said diaphragm as light as possible while interfering but little with its strength, it is cast or otherwise provided with a number of circular or other formed perforations, 10. The portion of the shaft 5 projecting beyond the head 2 has keyed or otherwise fixed thereon a pulley, 11, which is arranged to receive motion by belt from any rotary part of the mechanism the speed of which is to be indicated. The extreme end of the shaft is made of pyramidal or diamond shape, as shown at 12, for the more direct connection of the shaft 5 with such rotary part, when desirable. The bearings of the shaft 5 within the head 2 and diaphragm 9 are lubricated by way of tubes 13, having oil-cups 14 at top without the casing.

Keyed or otherwise fixed to the shaft 5 near the head 2 is a hub, 15, to the four faces of which are clamped by plates 16 and bolts 17 the ends of two bent plate-springs, 18. The faces of the hub 15 are recessed, as shown at 19, to receive the said springs, the shoulders thus provided on the faces of the hub serving to prevent the twisting of the springs when the said hub and its shaft are rotated. To stiffen the springs and strengthen them at the point of entry into their clamps, I supply a short additional leaf, 20, also clamped to the hub and projecting some inches beyond the same on the outside of the springs 18. The springs 18 are made of steel, tempered in flat form, and subsequently bent into the represented approximately horseshoe form. They are then fixed to the hub so that their bows intersect at right angles, and at the point of intersection both are slotted to receive the shaft 5 and permit them to slide freely thereupon.

21 is a circular plate having a periphery somewhat heavier than its central portion, as shown. To the center of this disk 21 the bows of springs 18 are clamped by head-block 22 and bolts 23. The block 22 has an elongated neck, 24, surrounding the shaft 5 in such manner as to prevent any binding of disk 21 upon said shaft when being moved longitudinally of the same by the action of the governor-springs 18. The disk 21, when in motion, assists, by its tendency to assume a position per-

pendicular to shaft 5, in preventing binding of the head-block upon said shaft, and any irregularity of the lineal motion of said head-block and of the indicator-needle from this cause is thus avoided. It also acts as a fly-wheel in steadying the action of the governor, and thus prevents fluctuations of the indicator-needle, which might arise from changes in the position of the weights.

The governor-weights fixed to the springs 18 are of peculiar form. The bowed shape of said springs, due to the fact that they are tempered in straight form, allows considerable space between the said springs and the shaft 5. I am thus enabled to fix the weights 25 to the inner surfaces of said springs and to utilize them for varying the tension of said springs according to the degree of expansion of the governor. It has been demonstrated by actual test that after the governor has attained a high momentum, due to very rapid rotation, it will respond with much greater delicacy to increments of speed than when it has but slight momentum, due to much slower rotation. A consequence of this action is that the action of the indicating-needle will vary according to the speed of the velocimeter, and different widths of spaces on the indicating-scale are required for showing equal increments of velocity. To avoid this difficulty and enable the division of the indicator-scale throughout into equal spaces, I form the weights 25, as here shown, curved on the side, serving for attachment to the springs 18. The effect of this arrangement is that as the springs expand more and more by increase of the velocity of rotation of the shaft 5 they will bear for an ever-increasing part of their length upon the curved surfaces of weights 25. Their free portion lying between the said weights, and the head-block 22 being thus gradually diminished in length, its action is correspondingly stiffened. Thus the more rapid the rotation of the shaft 5 the stiffer will become the effective portion of the springs 18, and by properly adjusting the curvature of the weights 25 to the length and flexibility of the said springs the action of the indicating-needle at any part of the scale is equalized. The weights 25 are fixed to the springs by clamp-plates 26 and screws 27, passing on each side of the springs, so as not to weaken them.

28 is a yoke bearing loosely on shaft 5 at center, and arranged to slide freely on the same longitudinally of the shaft, while prevented from rotary motion around the same by means of parallel guides 29, fixed to the diaphragm 9, so as to receive between them the ends of said yoke. The yoke 28 has a neck, 30, at center, whose flange 31 is retained within a recess in the disk 21 by means of a two-part circular clamp-plate, 32, and bolts 33. The head-block 22 and disk 21 are thus allowed rotary motion independently of the yoke 28, while said yoke is forced to follow the reciprocating movement of head-block and disk upon the shaft due to the mutations of the springs 18 under the action of the governor-weights.

34 34 are bell-crank levers pivoted between brackets 35, fixed to the diaphragm 9, and having their shorter arms connected by links 36 to the outer ends of the yoke 28. The levers 34 are arranged to rock in planes tangential to spools or drums 37 on the arbor 6, being connected to said drums by chains 38, substantially of the pattern employed for the fusee of a watch. The portion of the arbor 6 projecting beyond the head 3 is provided with an index or indicating needle, 39, the point of which moves over the face of a circular scale, 40, on which markings indicate the number of revolutions of shaft 5 per minute. A second removable scale is also provided, as shown, outside of the first, for indicating miles traveled per hour, this scale being replaced by a new one whenever the connections of the velocimeter to a locomotive or other engine are changed.

41 is a spiral spring fixed at its outer end by a pin, 42, to the diaphragm 9, and at its inner end to the arbor 6, in such manner as to return the needle 39 to zero on the scale when the apparatus is in a state of rest, and also to return all the other moving parts of the mechanism to their normal condition, as shown in Fig. I.

The provision of bell-cranks 34—one on each end of the yoke 28—equalizes the strain on said yoke, and thus aids the sleeve 24 and disk 21 in preventing binding upon the shaft and enabling me to use a spring, 41, of such strength that it will act effectively in maintaining the proper tension between all the parts of the apparatus and prevent vibrations of the needle, due to the jarring of the locomotive or other machinery to which the velocimeter is applied.

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

1. In combination with the rotary shaft of a velocimeter, bowed plate-springs fixed at their ends thereto, centrifugal weights fixed to the bows of said springs, and means of connection with the indicating-needle, substantially as set forth.

2. In combination with the main shaft of a velocimeter, a hub rigid thereon having recessed faces, as shown, bowed governor-springs and their weights, and clamps for fixing said springs on said hub, substantially as set forth.

3. In combination with plate-springs fixed to the main shaft, the centrifugal weights fixed within the bows of said springs and having curved outer surfaces, substantially as and for the purpose set forth.

4. In combination with the main shaft 5, plate-springs 18, fixed thereto, and two-part weights 25 26, bolted together, so as to clamp said springs between them, as shown.

5. In combination with the main shaft and a centrifugal governor thereon, the momen-

tum-disk arranged to slide on said shaft and regulate the movement of the indicator-connections, substantially as described.

6. The combination of shaft 5, plate-springs 18 clamped thereto, centrifugal weights fixed to said springs, momentum-disk 21, clamped to said springs and arranged to slide upon shaft 5, and connections from said disk to the indicating-needle, substantially as set forth.

7. In combination with the main shaft and the centrifugal governor thereon, the yoke connected to said centrifugal governor, so as to accompany its reciprocating but not its rotary motion, an indicating-needle and its arbor, bell-crank levers, and connections between said yoke, levers, and arbor, substantially as and for the purpose set forth.

8. In combination with a centrifugal governor, the yoke 28, connected thereto, parallel guides for said yoke, an indicating needle and arbor, and bell-crank levers connecting said arbor and yoke, substantially as set forth.

9. In combination with an indicating needle and arbor, a centrifugal governor, levers connecting said arbor and governor, and a spiral spring wound on said arbor for returning it to a normal position when the apparatus is at rest, substantially as set forth.

10. The combination of a centrifugal governor and an indicating-arbor, a tension-spring on said arbor, and two levers connected to both governor and arbor, substantially as and for the purpose set forth.

11. In combination with governor, head-block, yoke, and bell-crank levers, the indicating-arbor, and connecting-chains from said levers to said arbor, substantially as set forth.

RICHARD JUSTIN McCARTY.

Witnesses:
E. F. BLAKELEY,
C. MUSSER.