(No Model.)

2 Sheets—Sheet 1.

J. BUTCHER.

CYCLOMETER.

No. 353,479. Patented Nov. 30, 1886.

Fig. 1

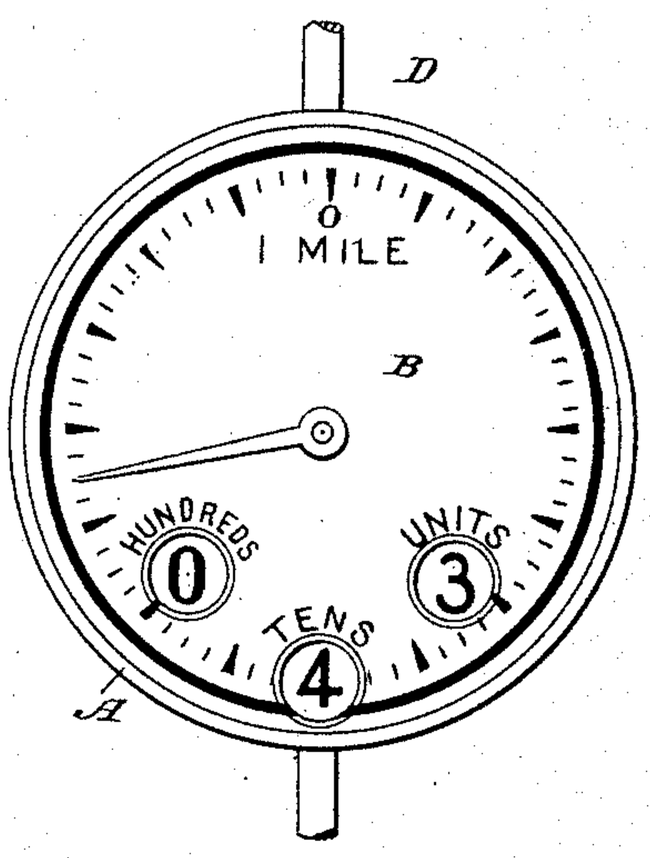


Fig. 3.

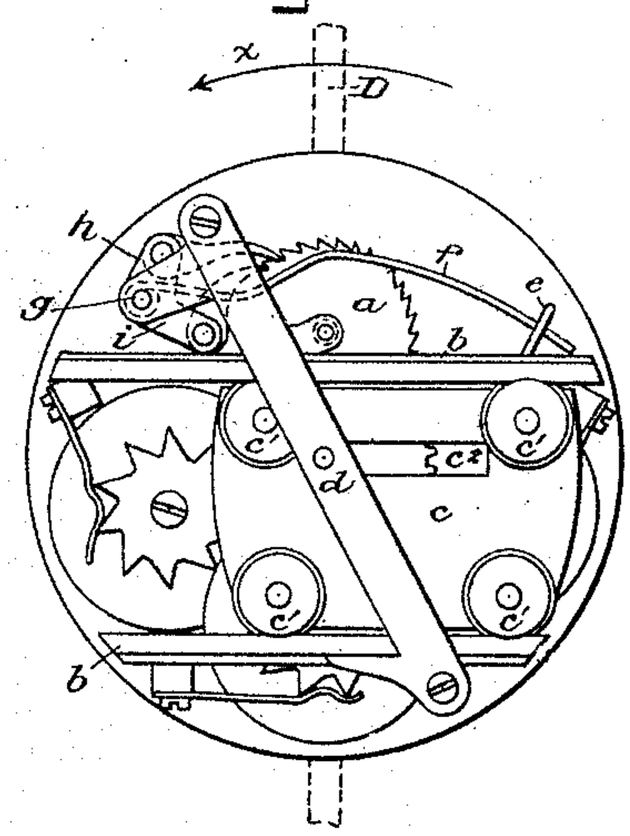


Fig. 2.

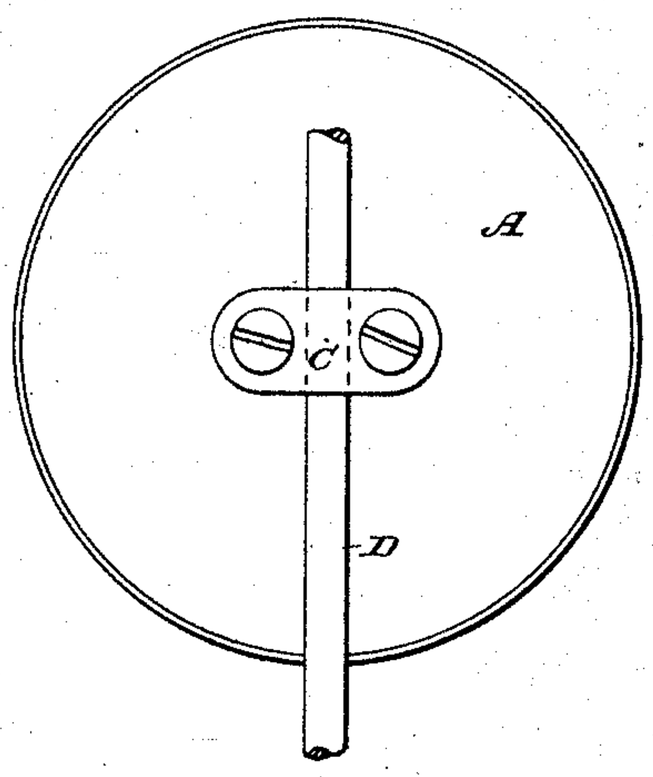
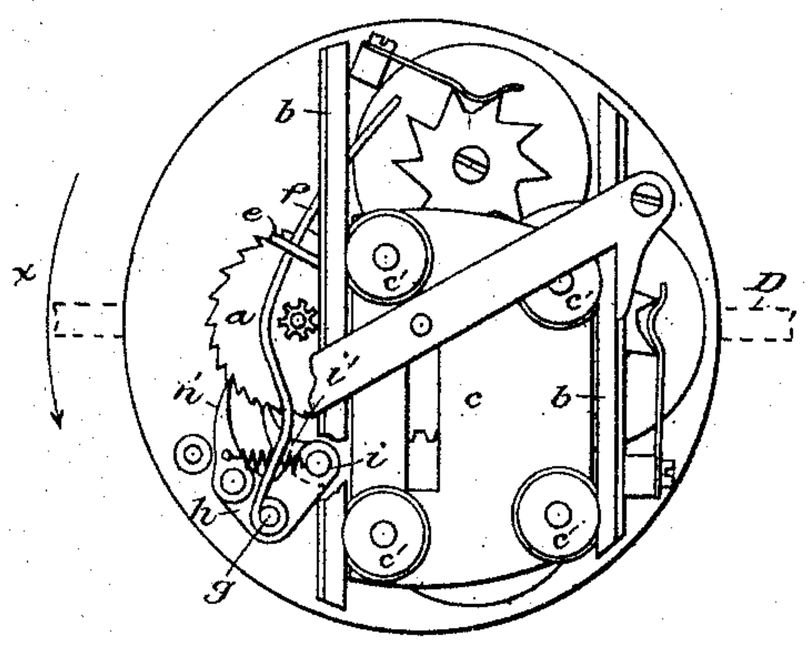


Fig. 4.



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INVENTOR:

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By his Attorney,

Henry Connett

(No Model.) 2 Sheets—Sheet 2.

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CYCLOMETER.

No. 353,479. Patented Nov. 30, 1886.

Fig. 5.

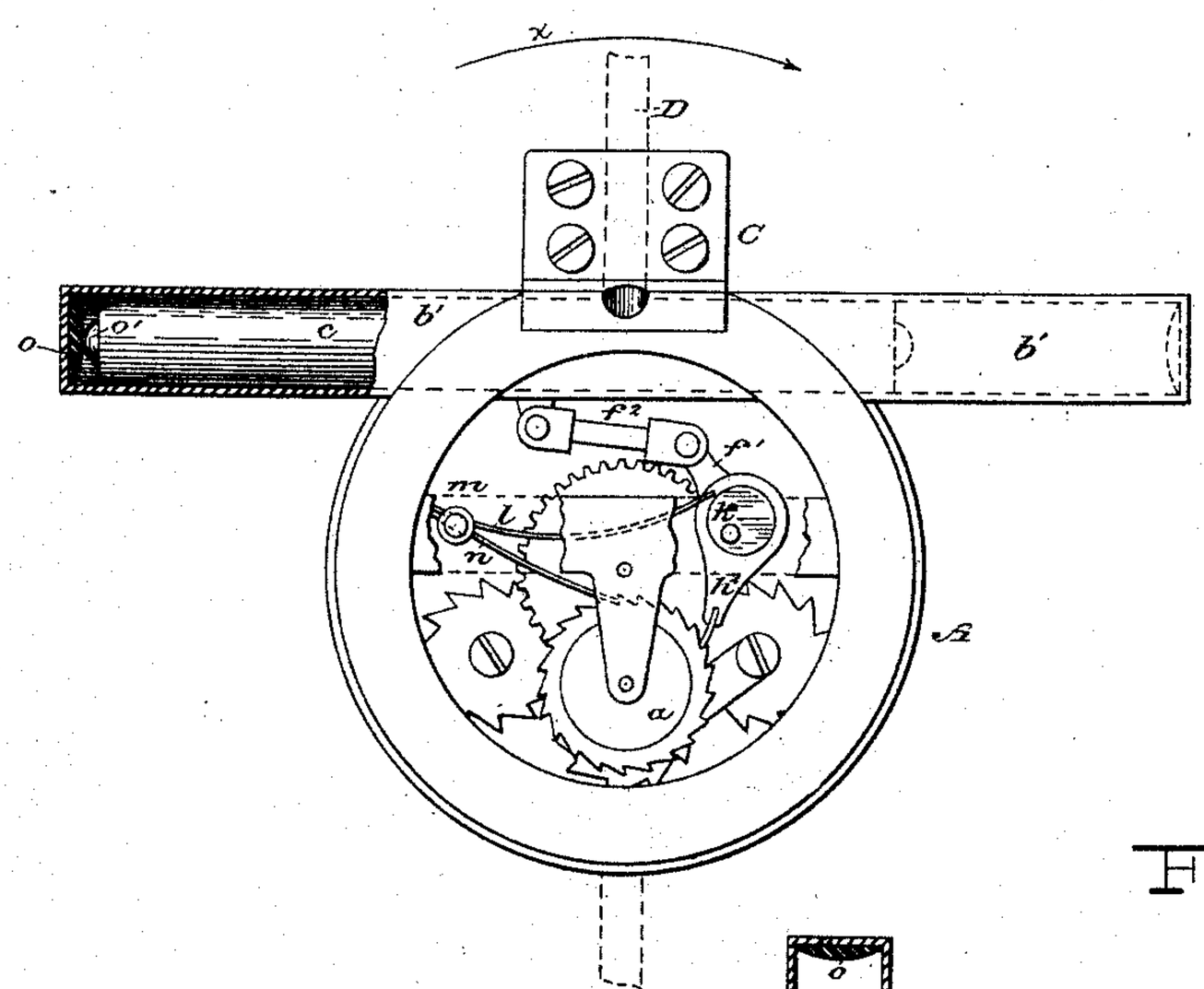


Fig. 7.

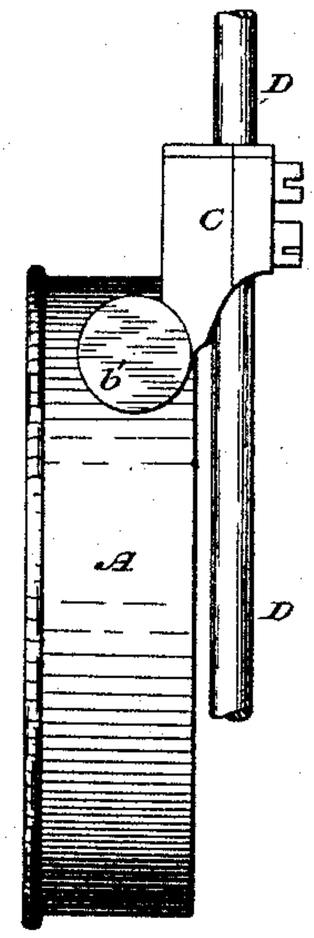
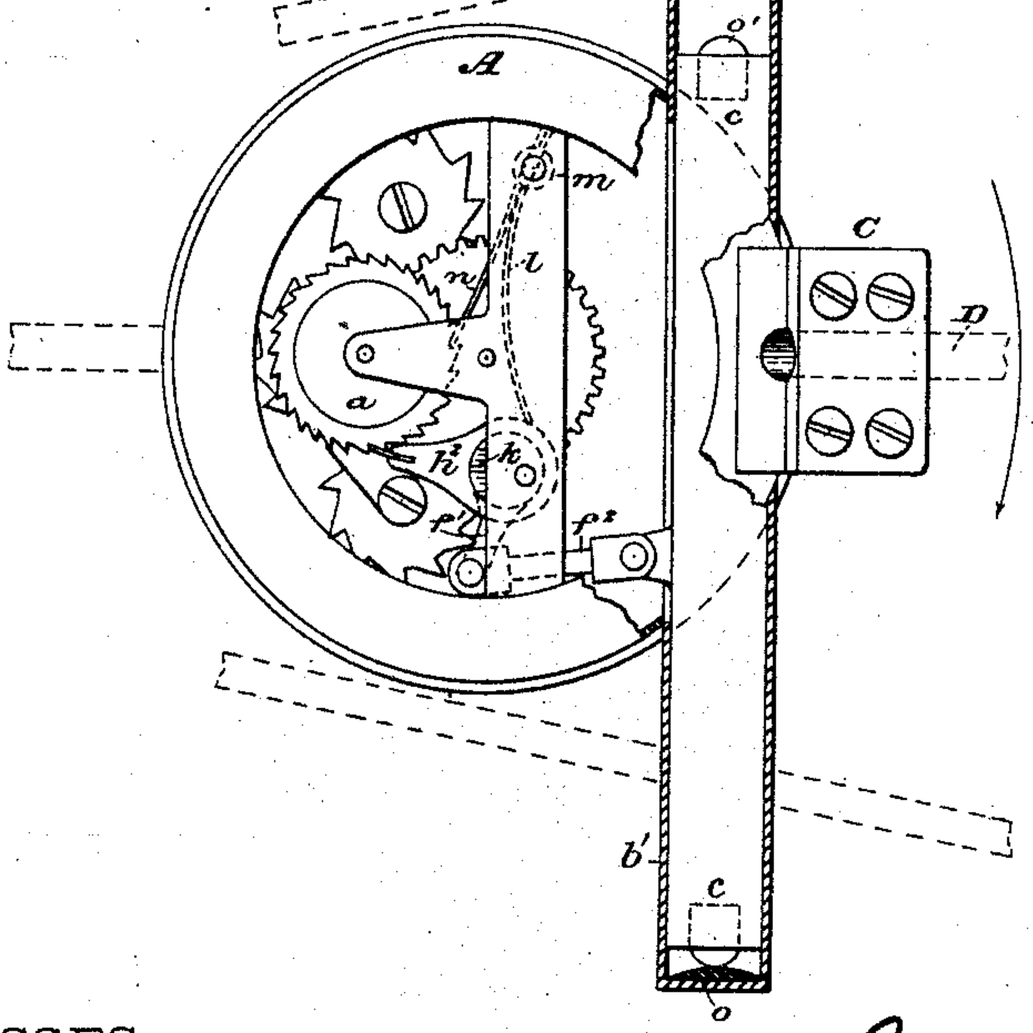


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOSEPH BUTCHER, OF BOSTON, MASSACHUSETTS.

CYCLOMETER.

SPECIFICATION forming part of Letters Patent No. 353,479, dated November 30, 1886.

Application filed July 13, 1886. Serial No. 207,867. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH BUTCHER, a citizen of the United States, and a resident of Boston, Suffolk county, Massachusetts, have invented certain Improvements in Gravity-Cyclometers, of which the following is a specification.

My invention relates to that class of cyclometers for registering the number of rotations of a vehicle-wheel which are carried around by the wheel or other rotating part, and the registering mechanisms of which are actuated by the force of gravity operating to shift some moving part, usually arranged within the cyclometer-case, as the wheel revolves. In all cyclometers of this class, so far as I am aware, the difficulty is that the centrifugal force generated by the rapid rotation of the vehicle-wheel acts on the pendent or swinging weight in such a manner as to neutralize more or less the force of gravity, and thus render the action of the cyclometer uncertain and the instrument unreliable.

The object of my present invention is to overcome this difficulty by so arranging the part acted upon by gravity that the centrifugal force cannot act effectively upon it in a direction opposite to that in which the force of gravity acts upon it. In other words, I so arrange this moving part that these two forces cannot directly and effectively oppose each other, and so that the force of gravity will always have the advantage. This I accomplish by providing the cyclometer with a sliding weight or rolling carriage mounted to move in guideways or tracks, preferably in a straight line, and preferably exactly at right angles to the radius of the wheel at the point of attachment. As the centrifugal force always acts on lines corresponding to the radii of the wheel, and this weight must move, if at all, in a line perpendicular to the radius, it follows, as a matter of course, that when the weight is in a position to move under the influence of gravity—that is, vertically downward—the centrifugal force will be acting horizontally on it, and not in a direction opposed to the force of gravity.

My invention will be fully described hereinafter, and its novel features carefully defined in the claims.

In the drawings, which serve to illustrate my invention, I have for convenience shown its novel features embodied in a spoke-cyclometer having registering mechanism substantially identical with that illustrated in my pending application, Serial No. 164,737, filed May 8, 1885.

Figure 1 is a front view of the cyclometer, showing the dial, and Fig. 2 is a rear view showing the clamp for attachment to the spoke. These are merely exterior views. Fig. 3 is a back or rear view of the internal mechanism of the cyclometer removed from its case. This view shows the cyclometer as it stands when the spoke to which it is secured stands vertical. Fig. 4 is a similar view to Fig. 3, but showing the position of the cyclometer when the spoke to which it is attached stands horizontal. Figs. 5, 6, and 7 illustrate a modified form of the cyclometer, which will be hereinafter described.

For convenience I prefer to inclose the registering mechanism in a circular sheet-metal case, and this case I close hermetically. The dial construction, units, tens, and hundreds, disks, ratchets, and train are in substance the same as those described in my pending application, before mentioned, and will need no particular description. In fact, the registering mechanism may be constructed in any way, so long as it is capable of being actuated intermittently by a pawl-and-ratchet movement.

The novel features of my present invention relate to the means for imparting an intermittent forward rotary motion to the leading or driving wheel of the registering mechanism, and this wheel may be made to impart its movement to the said mechanism in any of the well-known ways.

A represents the case of the cyclometer, B the dial-plate, C a clamp of any kind for attaching the cyclometer to a spoke, and D the spoke of a wheel—in this case supposed to be the wire spoke of a bicycle-wheel. None of these features is new, so far as this application is concerned.

Referring now to Figs. 3 and 4, *a* is the driving-wheel of the registering mechanism, which in this case is a ratchet-wheel. This wheel may impart its movement to the disks and index or hand of the cyclometer by any mechanism whatever. My object is to impart an intermittent forward rotary motion to this wheel,

and I will now describe the means I employ for effecting this object. Two guideways or tracks, *b b*, are provided, which are parallel and extend across the cyclometer perpendicular to the radius of the vehicle-wheel at the point of attachment of the cyclometer thereto. Where the attachment is made to a spoke, D, as seen in Fig. 2, these guideways or tracks will be substantially perpendicular to the spoke when the cyclometer is attached. *c* is a slide weight or carriage mounted in or between said ways or tracks and arranged to move freely back and forth. I prefer to provide this weight with wheels or rollers *c'*, as shown, to roll on the tracks *b*, these wheels being grooved so as to hold the weight to the track. To limit the movement of the weight, I form in it a slot, c^2, through which passes the central arbor, *d*, of the registering mechanism. Suppose the wheel to be revolving in the direction of arrow *x* in Figs. 3 and 4. When the spoke D (to which the cyclometer is attached) reaches a vertical position, as in Fig. 3, the weight *c* will be at the right-hand end of its track or path; but as the wheel continues to revolve, when the spoke D reaches a horizontal position, as seen in Fig. 4, the tracks *b* will have reached a vertical position, and the action of gravity on the weight *c* will have caused it to fall to the other end of its track. In making this movement it will be seen that while the weight *c* is perfectly free to move under the impulse of gravity, the action of the centrifugal force on it will be almost nothing, as the outer guideway or track, *b*, will prevent any movement of the weight laterally, and the rollers *c'* will reduce the friction on this track to a minimum. In making this movement the weight *c* imparts one impulse to the ratchet-wheel *a* through the medium of the following-described mechanism: On the weight *c* and projecting therefrom is an eye-piece, *e*, through which passes the free end of an arm, *f*, attached to a rock-shaft, *g*, which carries two arms, *h* and *i*. To the arm *h* is pivoted a pawl, *h'*, and to the arm *i* is pivoted a pawl, *i'*, both of which engage the teeth of the ratchet-wheel *a*. In Fig. 4 the frame-work is broken away, so as to show these pawls clearly. When the weight *c* slides from the position seen in Fig. 3 to that seen in Fig. 4, the eye-piece *e* slides along arm *f* and draws the latter down to the position seen in Fig. 4. This rocks shaft *g*, advances pawl *h'*, and imparts a forward motion to wheel *a*. Now, as the wheel continues to revolve, when the spoke D reaches a horizontal position opposite to that seen in Fig. 4, the weight *c* will shift or drop back to the other end of its track—that is, to the position seen in Fig. 4. This movement will cause the eye-piece *e* to raise arm *f*, retract pawl *h'*, and advance pawl *i'*, whereby this latter pawl imparts a forward movement to wheel *a*. Thus at each revolution of the wheel two forward intermittent impulses are given to wheel *a*. It is not essential, of course, that there should be two pawls, *h'* and *i'*; but I prefer this arrangement. If but one pawl were employed, each revolution of the vehicle-wheel would impart one forward impulse to wheel *a*.

I do not wish to limit myself to the mechanism shown as the intermediary between the slide weight or carriage *c* and the wheel *a*, as this may be varied almost indefinitely without departing from the true spirit of my invention. I have shown a simple and operative device; but I am aware that the motion of the weight *c* may be communicated to the wheel *a* in various ways.

If it be desired to make the weight larger and heavier than the usual size of the cyclometer-case will admit of, or to give the weight a greater extent of movement than the ordinary size of the case will allow, the case may be furnished with wings or lateral extensions, as shown in Figs. 5, 6, and 7. This modified construction I will now describe.

Figs. 5 and 6 are back views of the cyclometer, corresponding in position to Figs. 3 and 4, and Fig. 7 is an edge view or elevation. The cyclometer-case here illustrated is designed to have a glass plate set in the back of its case, through which the mechanism may be seen. In Fig. 6 a part of the case and the tube in which the weight slides are broken away in order to better illustrate the operative mechanism, and in Fig. 5 a part of the frame-work or movement-plate is broken away for the same purpose. As in Figs. 1 to 4, A represents the case of the cyclometer; C, the clamp for securing it to the spoke; D, the spoke, and *a* the driving-wheel of the registering mechanism, which is a ratchet-wheel. *b'* is a tubular guideway fixed to the case A, and extending laterally beyond the limits of the case to afford room for an elongated weight, *c*, which slides back and forth in guideway *b'*.

The mechanism whereby the movement of the weight *c* is caused to impart intermittent rotary motion to the wheel *a* will now be described. *k* is an eccentric rotatively mounted in the frame-work or movement-plate, and provided with an arm, *f'*, which is coupled by a link, f^2, to the weight *c*. h^2 is a pawl which engages the teeth of ratchet-wheel *a*, and which is enlarged or widened to form a strap, which embraces the eccentric *k*. *l* is a light spring connected at one end to the pawl h^2, and at its other end at *m* to the movement-plate. This spring keeps the free end of the pawl up to the ratchet-wheel *a*, but permits the pawl to be advanced and retracted by the eccentric *k*.

The operation is as follows: Fig. 5 shows the position of the parts when the spoke D stands vertical, the weight *c* being at the extreme left-hand end of the tubular guideway *b'*. The vehicle-wheel carrying the cyclometer is supposed to be rotating to the right, as indicated by arrow *x*. When the wheel revolves far enough for spoke D to reach the horizontal position seen in Fig. 6, the weight *c* will have

dropped or shifted to the other end (now the lower end) of guideway b'. This movement acts, through link f^2 and arm f', to partially rotate the eccentric k, and this rotation of the eccentric advances pawl h^2, and effects thus a partial rotation of wheel a. When the weight c shifts back again, the pawl h^2 is retracted and put into engagement with another tooth on wheel a. A light spring-pawl, n, serves to prevent any backward rotation of wheel a.

In this last-described construction each revolution of the vehicle-wheel imparts one intermittent forward movement to wheel a, and the intermediate mechanism—that is, the pawl h^2, the eccentric k and its arm, and the link f^2—permits of a very considerable movement of the weight c, while the pawl h^2 has a very limited movement. Thus the power of the weight in its action on the pawl is considerably increased.

The extension laterally of the tubular guideway b' effectually prevents any rotation of the clamp C on the spoke, as its ends overlap the spokes adjacent to spoke D. In order to form a cushion to lessen the noise of the falling weight c in the tubular guideway b', I supply a cushion, o, of felt or other soft material, arranged in the ends of the tube, and I prefer, also, to provide the ends of the weight with similar cushions, o'; but it is not important that a double cushion be used. Any form of cushion to deaden the blow will serve.

Having thus described my invention, I claim—

1. The combination, with the registering mechanism of a cyclometer, of an actuating-weight arranged to slide in a guide way or ways, said guideway, and mechanism for transmitting the motion of said weight to said registering mechanism.

2. A cyclometer comprising a case, a clamp or fastening for securing the cyclometer to the spoke of a wheel, a guide way or ways arranged substantially perpendicular to the radius of the wheel at the point of attachment, an actuating-weight arranged to slide in said guide way or ways, mechanism for transmitting the movements of said weight to the registering mechanism of said cyclometer, and said registering mechanism.

3. The combination, with the registering mechanism of a cyclometer which has a driving ratchet-wheel, a, of a guide way or ways for a sliding weight, said weight c, arranged to slide in said guide way or ways, a pawl engaging the teeth of wheel a, and intermediate mechanism between said pawl and weight, whereby the reciprocating movements of the weight are communicated to said pawl.

4. The combination, with the cyclometer-case, of the guideway b', carried thereby, the weight c, mounted to slide in said guideway, the registering mechanism, and mechanism whereby the reciprocating movements of said weight in its guide are transmitted to the said registering mechanism.

5. As a means for actuating intermittently the registering mechanism of a cyclometer, a weight, c, arranged to slide in a guide way or ways, the eccentric k and its arm, the link which couples the said arm to the weight c, the pawl h^2, constructed to embrace said eccentric in the manner of a yoke, and the pawl-spring.

6. A cyclometer the case of which carries a laterally-extended guideway for a sliding weight, substantially as and for the purposes set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOSEPH BUTCHER.

Witnesses:
HENRY CONNETT,
FRANK MOULIN.