(No Model.)

G. H. GOULD.

CYCLOMETER.

No. 354,128. Patented Dec. 14, 1886.

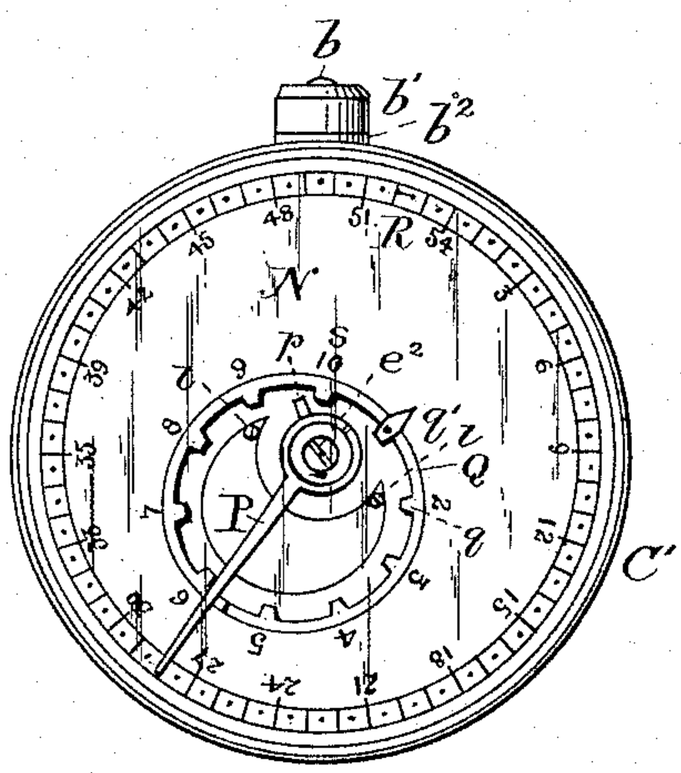
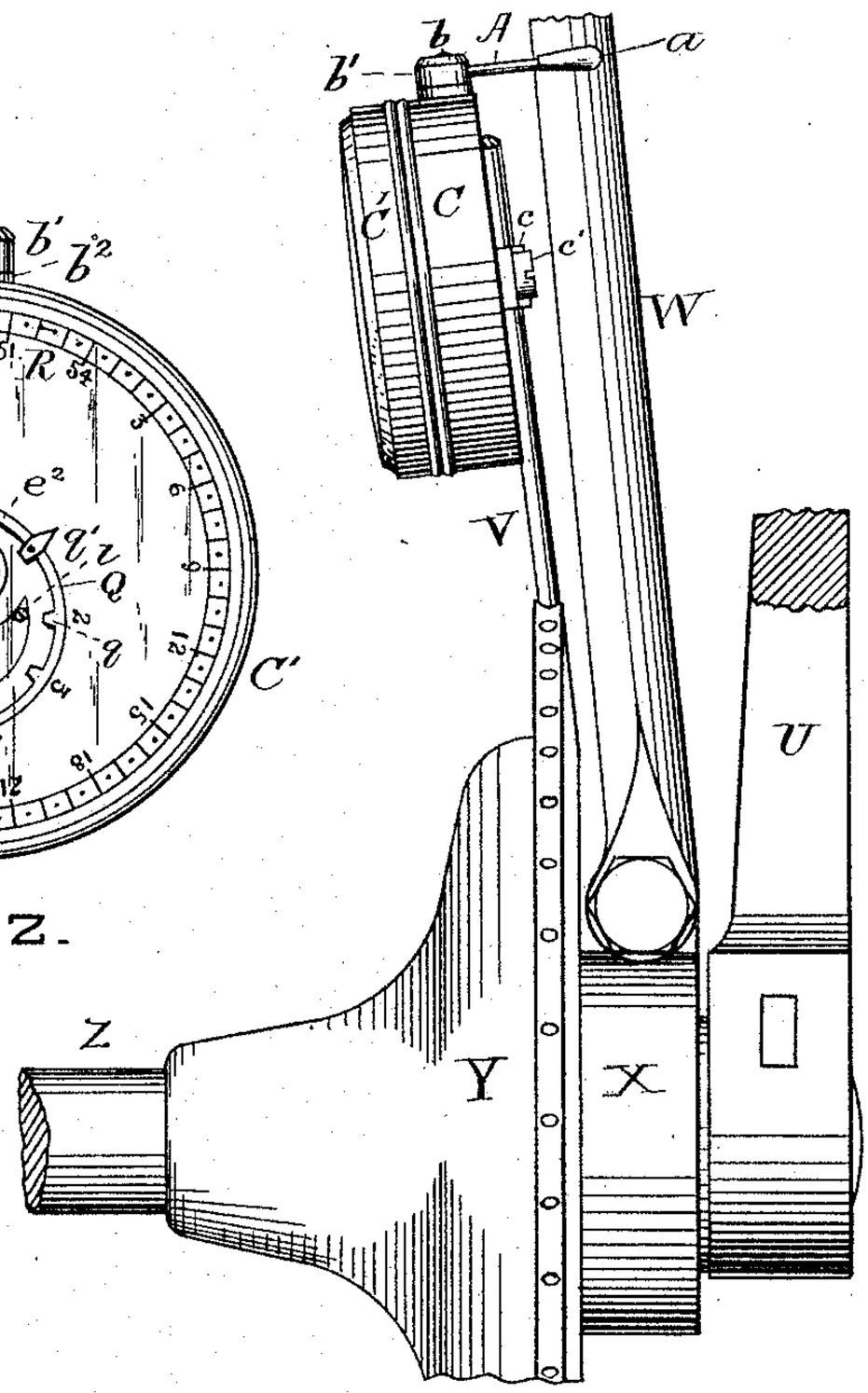


Fig. 2.



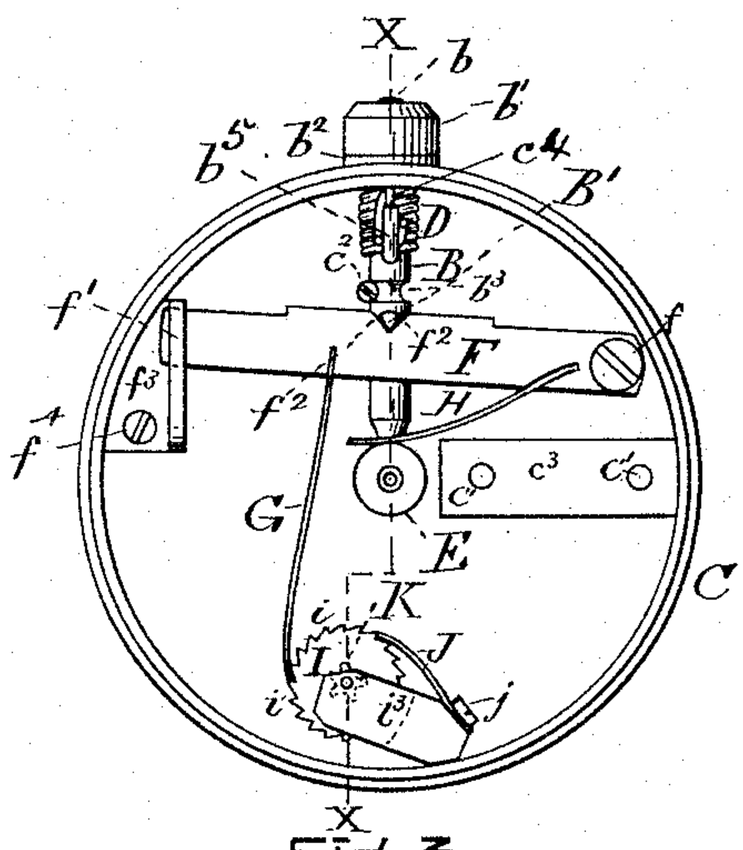


Fig. 3.

Fig. 1.

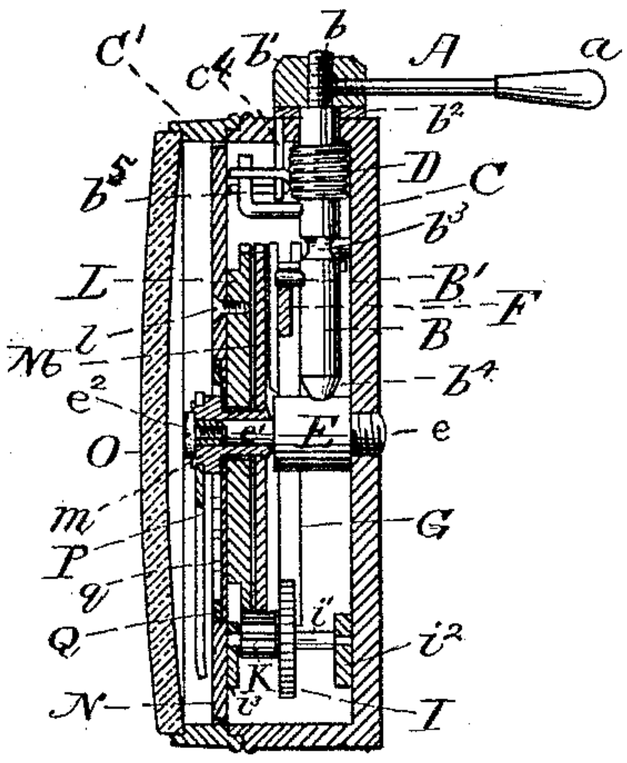


Fig. 4.

WITNESSES

Stephen Britton

Homer H. Fisher

INVENTOR

George H. Gould

By Charles E. Britton

Atty

UNITED STATES PATENT OFFICE.

GEORGE H. GOULD, OF SOMERVILLE, ASSIGNOR TO THE POPE MANUFACTURING COMPANY, OF BOSTON, MASSACHUSETTS.

CYCLOMETER.

SPECIFICATION forming part of Letters Patent No. 354,128, dated December 14, 1886.

Application filed June 26, 1885. Serial No. 169,914. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. GOULD, of Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Cyclometers, of which the following is a specification.

Referring to the accompanying drawings, which show a cyclometer adapted for use on a bicycle or tricycle containing my improvements in one form, Figure 1 shows in elevation part of the shaft, head, spoke, and fork of a bicycle and a side view of the cyclometer as attached to a spoke of a traveling wheel thereof. Fig. 2 shows in front elevation the case, dials, and pointers. Fig. 3 shows in elevation the interior of the case, with crystal and dials removed; and Fig. 4 shows in sectional view, on the line *x x* in Fig. 3, the interior and exterior of the cyclometer with all the parts in place.

Z is an axle. Y is a hub or flange attached to the axle. X is the bearing-box. W is a fork or part of the frame of a velocipede. V is a spoke, and U is a crank, by means of which the shaft Z is made to revolve in the bearing X, and to carry with it the hub Y and spoke V of a traveling wheel, and with it the cyclometer as attached.

A is a lever-arm, the outer end of which, *a*, may be covered with a cushion or muffled with a roller in any desirable form, and the inner end of which is inserted in the outer end, *b*, of the rock-shaft and the head b' thereon. The rock-shaft B may also have between the head b' and the case C a felt washer, b^2, or other device for keeping out the dust, and a groove, b^3, in which the stud c^2 operates to prevent longitudinal movement of the rock-shaft, and also a step or bearing, b^4, in the stud E and a bent arm, b^5.

B′ is a presser-arm fixed in the rock-shaft, and extending between the inclines f^2 f^2 in the lever F.

C is a cylindrical metallic case with a complement, C′, holding a crystal, O, for completing and covering the cylinder.

c is the removable part of a clamp held by small screws c', between which and the back of the case C the spoke V is clamped.

c^3 is a strengthening piece or bar on the inside of the case to give a hold for the screws.

D is a spiral spring upon the rock-shaft B, having its ends brought nearly together and extending at right angles to the rock-shaft, so as to inclose the pin c^4, projecting from the case C, and the vertical part of the bent arm b^5.

E is a stud set centrally at *e* in the case C, having a smaller part, e', to which certain parts are held by means of the screw e^2, as will be afterward described.

F is a lever, fulcrumed at *f* at one end and free to move at the other end in the slot f' in the bracket f^3, held by the screw f^4 to the case C. The lever *f* has also a notch with two inclined surfaces, f^2 f^2, and sufficient bearing-surfaces on the side in which the notch is for the presser-arm B′ to turn upon when it is depressed, and the spring H, bearing upon the stud E, to keep it up against the presser-arm.

G is a spring-pawl fixed in the lever F, and extending to and operating upon the teeth *i* in the ratchet-wheel I. This ratchet-wheel I is axled in the bracket i^3, which is fixed to the case C.

J is a spring-pawl fixed at one end to the bracket i^2 i^3, and operating over the teeth *i i* to prevent backward motion.

K is a small pinion fixed to revolve with the ratchet-wheel I.

L is a toothed wheel fixed by means of screws *l* to the dial-plate N, with which it freely revolves on a sleeve, *m*.

M is another spur-wheel, fixed on the sleeve *m*, with which it revolves freely on the spindle e', projecting from the stud E, both being kept on the spindle by the screw e^2.

O is a glass disk or crystal.

P is a pointer or mile-hand, fixed on the sleeve *m;* and *p* is a small stud or spur, also fixed on the sleeve. The face of the dial-plate N is depressed or cut away to allow this stud *p* to be revolved therein about the axis of the stud E, and also by a larger cylindrical eccentric depression for the annular cam-piece Q. This latter may be split and sprung slightly into place, as shown, where the form of the meeting edges and the spring of the piece will keep it in the plane of the face of the dial-plate, but allow it to revolve by means of the pressure of the spur *p* on either of the teeth *q*.

R is a scale on the circumference of the dial-plate N, on the face side, visible through the

crystal O, and is graduated to a certain number of points relative to the mechanism within and the size of the wheel, whose revolutions on the ground are to be taken in measure of the distance traveled, which points are indicated by lines and the half-points are indicated by dots, the points or certain of them being numbered with figures for ready reading, as shown, for instance, in Fig. 2.

S is another graduated scale on a smaller circle around the cam-piece Q, the points being indicated by numerals, as shown in the same figure.

This particular cyclometer which I have shown and described is adapted for a bicycle front or driving wheel of fifty-eight inches in diameter, which will revolve 347.73 times in a mile traveled; and in the mechanism described the arm A will be moved once for each revolution of that wheel, and will move the ratchet-wheel I forward one tooth. The ratchet I has twenty-two teeth; the pinion K six leaves. The dial-wheel L has one hundred and two teeth, and the pointer-wheel M has one hundred teeth.

Assuming t equals the number of revolutions of the traveling wheel on the ground, which is the number of movements of the lever A or F in a mile, and z equals the number of mile-spaces in the scale R, and the reference-letters for the other wheels to represent their respective numbers of teeth, we have the formula $z=\frac{\text{L M I}}{t\,\text{K (L}-\text{M)}}$ for determining the number of mile-marks on scale R as a general one, and $z=\frac{18700}{t}$ as the specific formula for this mechanism, whatever the value of t. Taking this latter at 347.73, (for a fifty-eight-inch wheel,) $z=54$, with a very small error; hence the scale R is divided into fifty-four parts by lines, and when the pointer P has passed over the circuit the bicycle has traveled fifty-four miles. For a fifty-two-inch wheel the value of t would be taken at 395.19, and then $z=48$, nearly, and the scale R would be divided into forty-eight parts or mile-points. Thus the pointer P and scale R in this cyclometer indicate distance or revolutions of a wheel entirely outside the mechanism, instead of revolutions of wheels inside of it.

The operation of this instrument may be further explained as follows: With each revolution of the wheel to which the cyclometer is attached, as shown, (by means of the clamp c c^3 and screws, and a groove in the back of the case C,) the lever A comes in contact with the fork W and turns the rock-shaft B on its axis, carrying the presser-arm B′ around with it through a greater or less arc. When the lever A has passed the fork, the spring D, acting by one of its ends upon the bent arm b^5, and held by the other end against the pin c^4, restores the rock-shaft, the presser, and the lever A to their former position and readiness for another stroke. The movement of the presser either way against the incline f^2 depresses the free end of the lever F, which forces the pawl G forward the distance of a ratchet-tooth, and the spring H returns the lever F to its position, while the catch J holds the ratchet I with its gain of one tooth. Thereby the pinion K and the dial and pointer-wheels have been advanced, and so on, until the pointer P is at the space-mark on the scale R at which it was in the beginning. On this cyclometer, in putting it together for actual use, the pointer P would be placed so as to indicate 54, and the pointer q' to indicate 10 on the smaller scale, and the click p to be under the pointer P. Then, as the pointer P comes around (or, rather, the dial-plate N falls back) to the point of beginning, the click p, engaging with one of the teeth q, will impel the annulus Q and the pointer q' forward one space, indicating that the machine has traveled once fifty-four miles and is on another, and so on. As the hands stand in Fig. 2, they show a distance traveled of 54+28=82 miles, and the scale will indicate altogether five hundred and forty miles, and then begin again.

10 is a convenient number for the scale S, though any other may be taken within the practical limit of the number of teeth that may be operated in the annulus Q, which may be enlarged for the purpose of carrying more teeth.

I make a series of dial-scales on the above formula for each inch of variation in the diameter of bicycle and tricycle wheels from forty-six to sixty-two inches, inclusive, the mile-spaces being in numbers from forty-two to fifty-eight, inclusive; and no other part of the mechanism needs to be changed therefor. This advantage, and also the other advantages offered in this machine of positive action, least error, economy of construction, safety against accidental impairment, equal operation whichever side or part of the ground-wheel it is attached to, or whichever direction the lever A is moved in, and others, will be obvious to those skilled in the subject.

Certain formal changes, as the use of a thimble and shoulder instead of groove b^3 and screw c^2, or the construction of presser B′ and bent arm b^5 in one piece, may obviously be made without departing from the spirit of my invention; and I do not mean to be limited to the precise forms and arrangements and proportions herein shown and described, or to the application of this instrument to velocipede-wheels, as it is equally applicable to others.

I claim as new and of my invention—

1. In a cyclometer, a dial-plate constructed with a cylindrical depression or cavity and a movable piece, Q, therein, with a graduated scale on the dial-plate around the cavity, and a pointer on the cam-piece, and means of connection with the working mechanism, constructed and combined essentially as set forth.

2. Combined with a pinion, as K, and its

actuating mechanism in a cyclometer or distance-register, two toothed wheels revolving about the same axial line in the same direction, one carrying a dial-plate and the other a pointer with a differential motion, a scale concentric with said toothed wheels, and another scale eccentric to them, a secondary pointer for the eccentric scale, and devices for connecting and operating this secondary pointer with the mechanism for operating the first, essentially as set forth.

3. Combined in a cyclometer, a lever-arm, A, a rock-shaft, B, a spring, D, tending to restore it when rocked, a presser-arm, B′, a lever, F, an incline, f^2, a spring, H, and pawls G J, all constructed to actuate a train and pointer, essentially as set forth.

4. Combined with a rock-shaft and case of a cyclometer, essentially as set forth, a spiral spring, D, free on the rock-shaft, having its free ends set out from the rock-shaft, and both engaging a projection from the case and a projection from the rock-shaft, so as to restore the rock-shaft to one position when deflected either way.

5. The combination, in a cyclometer or distance-register, of a vibrative lever-arm outside of the case for actuating the mechanism within the case, connecting mechanism consisting in a rock-shaft and spring, a presser-arm, a hinged lever and spring, and a pawl and spring for communicating the reciprocating motion of the vibrative lever-arm to the first wheel of a train, and a registering-train consisting in a ratchet or first toothed wheel, a pinion and two other toothed wheels having nearly equal numbers of teeth and revolving in the same direction about the same axial line, one carrying a pointer and the other a dial-plate having a graduated scale, essentially as set forth.

6. An interchangeable dial-plate, as N, constructed for attachment to the dial-wheel of a train consisting of a dial-wheel, a pointer-wheel, a pinion, and a ratchet-wheel, and to operate in combination with said train and a pointer, and with positive actuating mechanism connected with a traveling wheel and its frame, and intermediate positive connecting mechanism, and with a circular scale, as R, marked upon its face into mile-points, equal in number to the nearest whole number found by dividing the number of revolutions of the assumed traveling wheel in a mile traveled into a constant obtained by multiplying together the number of teeth in the dial-wheel, pointer-wheel, and ratchet, and dividing this product by the difference in numbers of teeth of the dial and pointer wheels multiplied by the number of leaves in the pinion, essentially as set forth.

7. The combination, in a cyclometer or distance-register, with a suitable case and means of attachment to a traveling wheel, and with positive actuating mechanism, of a train consisting of a ratchet or first wheel, a pinion, a dial-wheel, and a pointer-wheel, and a dial-plate, a pointer, and a circular scale on said dial-plate marked into equal divisions or mile-points, to a number equal to the nearest whole number found by dividing the number of revolutions of said traveling wheel in a mile traveled into the quotient obtained by dividing the product of the number of teeth in the pinion multiplied by the difference in numbers of teeth in the dial and pointer wheels into the product of the numbers of teeth in the ratchet and dial and pointer wheels multiplied together, essentially as set forth.

GEO. H. GOULD.

Witnesses:
CHARLES E. PRATT,
H. A. LIENHARD.