No. 695,536. Patented Mar. 18, 1902.

# L. J. BURDICK.

## CYCLOMETER AND REGISTER MECHANISM.

(Application filed Sept. 26, 1898. Renewed July 17, 1901.)

(No Model.) 3 Sheets—Sheet 1.

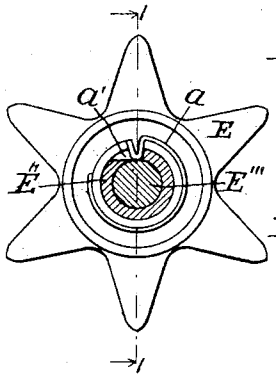



Fig. 2

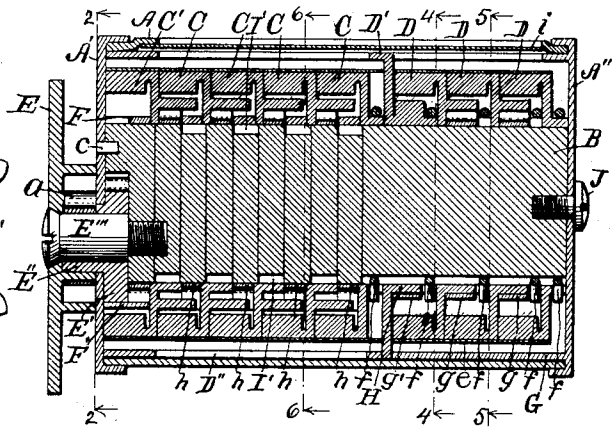



Fig. 1

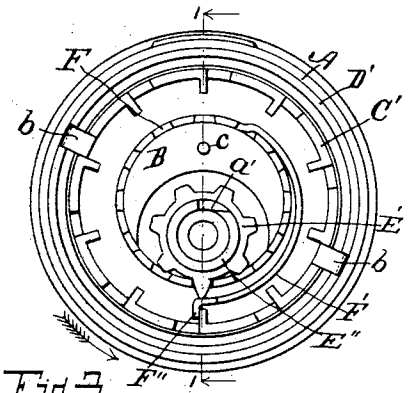



Fig. 3

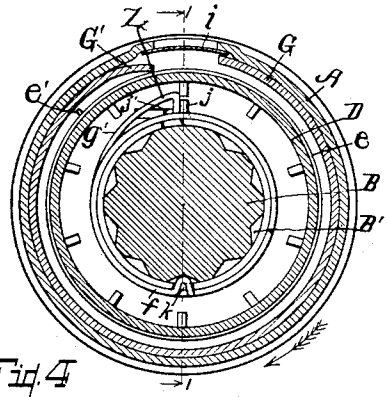



Fig. 4

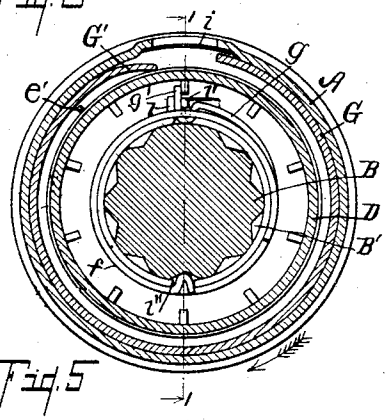



Fig. 5

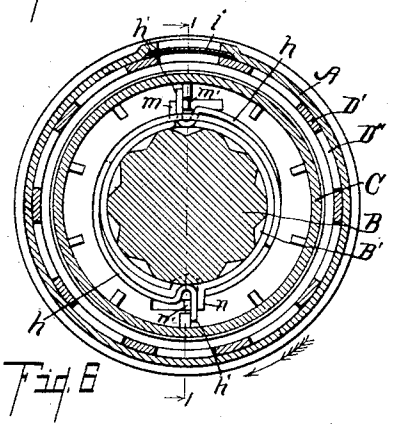



Fig. 6

Witnesses:

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Lela M. Brown

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By David L. Chappell

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CYCLOMETER AND REGISTER MECHANISM.

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(No Model.) 3 Sheets—Sheet 2.

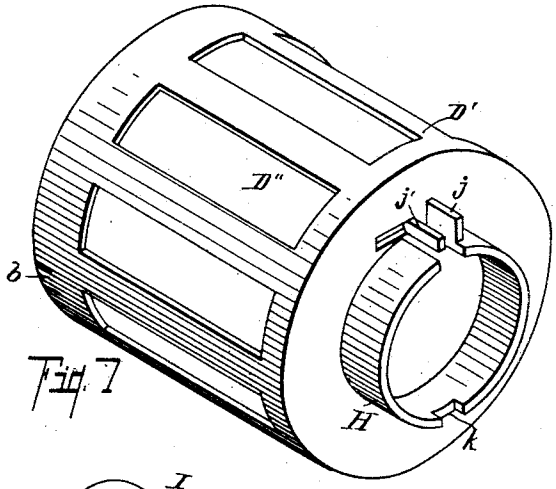



Fig. 7

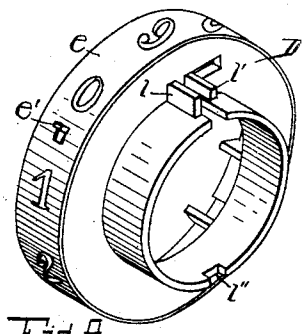



Fig. 8

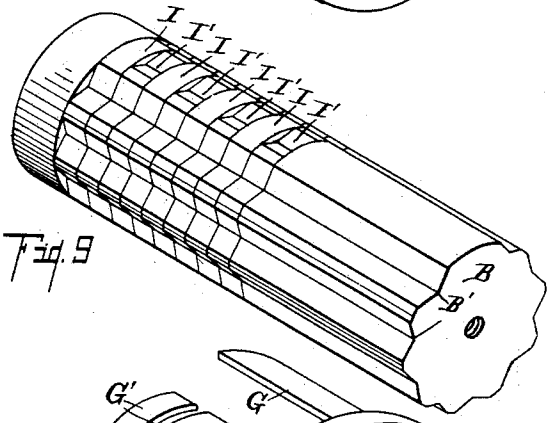



Fig. 9

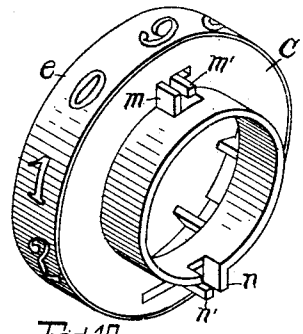



Fig. 10

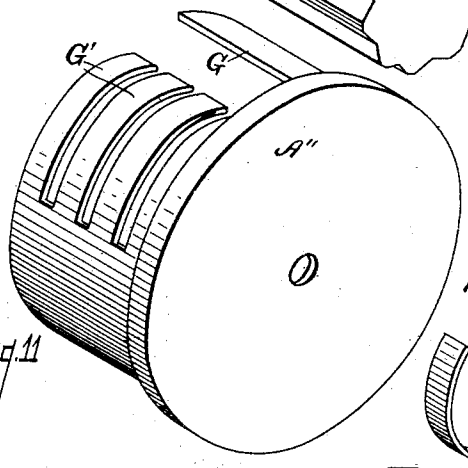



Fig. 11

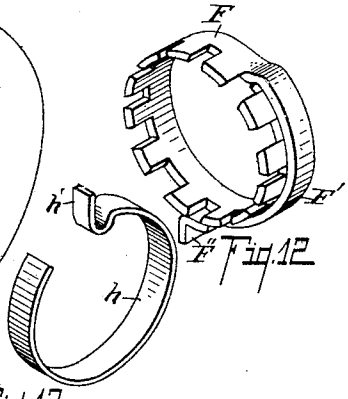



Fig. 12

Fig. 13

Witnesses:

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CYCLOMETER AND REGISTER MECHANISM.

(Application filed Sept. 26, 1898. Renewed July 17, 1901.)

(No Model.) 3 Sheets—Sheet 3.

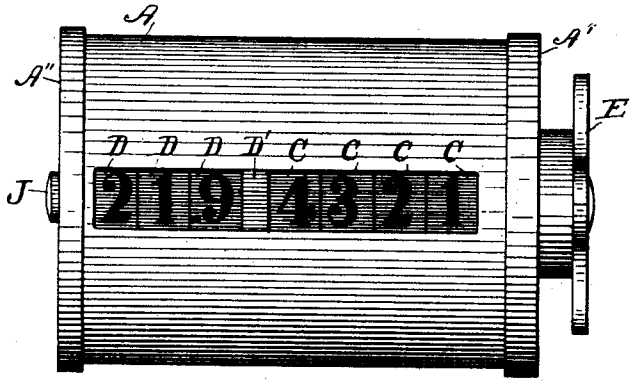



Fig. 14

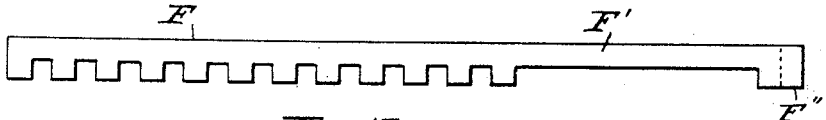



Fig. 15

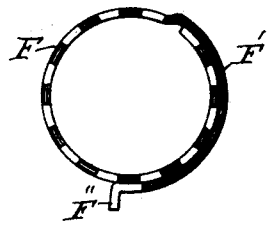



Fig. 16

Witnesses:

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# UNITED STATES PATENT OFFICE.

LEO J. BURDICK, OF STURGIS, MICHIGAN.

## CYCLOMETER AND REGISTER MECHANISM.

SPECIFICATION forming part of Letters Patent No. 695,536, dated March 18, 1902.

Application filed September 26, 1898. Renewed July 17, 1901. Serial No. 68,682. (No model.)

*To all whom it may concern:*

Be it known that I, LEO J. BURDICK, a citizen of the United States, residing at the city of Sturgis, in the county of St. Joseph and State of Michigan, have invented certain new and useful Improvements in Cyclometers and Register Mechanism, of which the following is a specification.

This invention relates to improvements in cyclometers and register mechanism. In certain particulars it is an improvement on the cyclometer for which I received Letters Patent No. 588,727, dated August 24, 1897, and in other particulars it relates to an improved single-trip or detail mechanism for use with a total, whereby short distances or small amounts can be registered in connection with the total and the detail or single trip be returned to zero without interfering with the total distance or amount registered, my improvements being adapted for use on any register mechanism, though they are specially well adapted for use on cyclometers.

The objects of this invention are, first, to provide improved means of distributing the power to secure positive, even, and easy action of the number-wheels in a cyclometer or register; second, to provide improved stop means for the number-wheels of the cyclometer or register to prevent overregistration; third, to provide an improved internal gear with movable teeth for the initial mechanism for a cyclometer or register; fourth, to provide an improved single-trip mechanism for a cyclometer or register; fifth, to provide an improved setback means specially adapted for single-trip cyclometer or detail register; sixth, to provide an improved ratchet means for use in a cyclometer or register mechanism of the class described; seventh, to provide improved means of supporting the window in the case.

Other numerous objects will appear from the detailed description of the various parts of the mechanism in the specification.

I accomplish these objects of my invention by the mechanism and means described in this specification.

The invention is clearly defined and pointed out in the claims. The structure and various modifications are fully illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical longitudinal detail sectional elevation of my improved register mechanism, taken on a line corresponding to line 1 1 of Figs. 2, 3, 4, 5, and 6, adapted for use as a cyclometer without any bracket or supporting means shown in connection, the view showing the structure much enlarged. Fig. 2 is a detail sectional view taken on line 2 2 of Fig. 1, showing the actuating-wheel, against which the striker on the bicycle-wheel operates. Fig. 3 is a detail end elevation of the cyclometer with the head A′ removed, showing details of the initial mechanism. Fig. 4 is an enlarged detail sectional view taken on line 4 4 of Fig. 1, showing the ratchet means between the single-trip or detail register and total-register mechanism to permit the setting of the same at zero. Fig. 5 is an enlarged detail sectional view taken on line 5 5 of Fig. 1, showing the improved stop mechanism, the movable tooth of the transfer mechanism, and the connections and means for the setback mechanism. Fig. 6 is an enlarged detail sectional view taken on line 6 6 of Fig. 1, showing the means for distributing the power and applying the same equally on opposite sides of the shaft in transferring from a lower to a higher wheel in the total-register mechanism. Fig. 7 is a perspective view of the windowed shell for transferring from the initial mechanism trip portion of the cyclometer. Fig. 8 is an enlarged detail perspective view of one of the number-wheels of the single-trip or detail register mechanism, showing recesses for the spring, the lug struck up for the engagement of the ratchet-pawls of the setback. Fig. 9 is an enlarged detail perspective view of the shaft which supports the number-wheel, showing the special formation of cams. Fig. 10 is an enlarged detail perspective view of one of the number-wheels of the total-register mechanism. Fig. 11 is an enlarged detail perspective view of the rotating setback-cap with its specially-constructed spring-pawls for returning the single-trip or detail register to the zero-point. Fig. 12 is an enlarged detail perspective view of a combined movable spring-tooth and internal gear for use in connection with

the initial register mechanism. Fig. 13 is an enlarged detail perspective view of the spring *h* and movable tooth *h'* for effecting the transfer in the total-register mechanism. Fig. 14 is an enlarged perspective view illustrating the arrangement of the numerals of the register. Fig. 15 is an enlarged detail view of the blank of which the spring-gear F shown in Fig. 12 is made. Fig. 16 is an enlarged detail perspective view of the spring-gear F after it is rolled into form.

In the drawings all of the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines.

Similar letters of reference refer to similar parts throughout the several views.

Referring to the lettered parts of the drawings, A is the case, which is cylindrical in form, having a window consisting of a thin strip of celluloid *i* resting within the case on flanges at each side that are struck out therefrom. The inner end of the case is provided with a head A', which is secured rigidly in position by suitable screws, pins, or other means. This casing carries a star-wheel E on the outside and has a suitable ratchet-spring *a* on its hub, the whole being secured to the central shaft B of the cyclometer by the shouldered screw E'''. This extends through sleeves E'' on the gear E'. This gear is one member of a hunting-tooth gear like that in my patent above referred to. The internal gear with which it meshes, however, is specially and economically formed from a strip of metal F, which is stamped out in the flat and rolled up, one end F' lapping over the other to form a spring and carrying the tooth F'', which covers one of the apertures, to be pushed out by the projecting tooth on the gear E'. The advantages are apparent, as it avoids the necessity of forming a separate spring and attaching it to the ring F, the whole being formed as easily as either of the single parts could be. The movable tooth F'' is forced out by the projecting tooth of the gear E' and actuates the first number-wheel of the series, the same as in my former patent, above referred to, by engaging one of the internal gear-teeth. In this structure there are two separate register mechanisms on the same shaft, both of which are actuated from the single initial mechanism to which I have just referred. The total-register mechanism is on the portion of the shaft appearing on the left on Figs. 1 and 9, and the single-trip mechanism appears to the right-hand portion of the shaft appearing in Figs. 1 and 9. The right-hand portion of the shaft is substantially the same as the shaft appearing in my former patent, with the exception that there is no small detaining-groove in the full portion to locate the number-wheels during the transfer, that being accomplished by another means, which will be hereinafter pointed out. The left-hand portion of the shaft has cams formed upon it for the purpose of more evenly distributing the power in the longer main register mechanism in transferring from a lower to a higher number-wheel. The shaft as illustrated is divided up into sections I I' I I', &c., as clearly appears in Figs. 1 and 9. These portions are identical and are like narrow transverse sections of the right-hand portion of the shaft, with the exception that the sections I' are situated as though they had been turned exactly halfway around. The shaft can be in this form when made of a single piece. The hub of a number-wheel is exactly the width of two of these sections, and it carries upon it two springs *h*, with outwardly-projecting movable teeth *h'*, which are supported one in the guide consisting of the lugs *m m'*, (see Fig. 10,) and the other of which is supported on the opposite side in the guides *n n'* on the opposite side of the wheel. Both of them clasp the hub and rest side by side. From this description it will be observed that when any number-wheel is about to complete its revolution that the teeth on each side will be forced outwardly by passing onto the full portion of the shaft and will engage the internal gear-teeth on the next higher number-wheel on diametrically opposite sides, thus turning the same by a pressure evenly distributed around the shaft, greatly lessening the friction and securing a more perfect action.

The number-wheels of the single-trip portion are provided with only a single spring *g* and tooth *g'*, located in a guide *l l'*, similar to the other tooth-guides referred to. However, the guide *l l'* does not extend the entire width of the hub, and a small spring *f* embraces the hub and has an inwardly-projecting portion or tooth *f'* extending through a notch *l''*, diametrically opposite the guide for the movable tooth *g'*, so that it engages in the longitudinal recesses in the shaft and positively locates the wheel in the central position when the movable tooth *g'* engages the internal gear-tooth of the next higher number-wheel. This makes the action of the device surer and avoids the necessity of forming the small detaining-notch in the raised portion of the shaft.

The operation of both sections of the mechanism after the initial movement is secured has thus been fully described.

Connected to the lowest wheel C' of the main register mechanism is a lantern-like cylinder or drum D', having longitudinal openings D'' at intervals, which serve as windows through which the numbers on the main number-wheels can be seen. The connection between this drum and number-wheel C' is effected by little lugs or ears *b*, turned in from opposite sides of the cylinder D'. The inner end of this cylinder D' is formed with a projecting hub on it corresponding to the hub of a number-wheel. On the hub of this drum is placed a spring Z Z, the end of which projects outside of the tooth-guide I' I'' and into the guide from the outside, thus forming a ratchet for the actuation of the number-wheels of the single-trip device, which will

permit the first number-wheel of the same being returned to the zero-point without disturbing the position of the drum D'. This consequently will allow the setting of the single-trip mechanism to the zero-point without disturbing the total-register mechanism. This structure fully appears in Fig. 4 of the drawings. The guide *j j'* for this ratchet does not extend the entire width of the hub, but leaves room for the spring *f'*. The hub has a notch K opposite the guide *j j'* to serve as a locating and stop means on the shaft.

On the outside of each number-wheel D of the single-trip mechanism is a thin plated band *e*, bearing the numbers. The band D also has lugs *e'* struck up therefrom. These little lugs could be formed in any well-known way on the exterior of the number-wheel; but this method of covering the number-wheel and forming the lug is preferred by me, because the complete ring forms a perfectly smooth surface for the numbers, and the little lugs are easily struck up from the same. Just outside the number-wheel is a circular drum G, open at one side corresponding to the window *i*, in the outer case. This is divided up into spring-pawls G' (see Fig. 11) to act upon each of the number-wheels of the single-trip portion and engage the little lugs *e'* to return the same to the initial position or zero-point. It is preferred to divide this circular drum G into separate pawls for each number-wheel, because that secures an independent pawl of just sufficient strength to take care of the number-wheel and yet let it pass freely during registration, though I am aware that the device would be effectively operative without so dividing it. The drum or shell G is secured to the head A'', and the head is pivoted at its center by the screw J to the center of the main shaft B, so that the whole will freely rotate upon it. The end of the casing A fits into a rim on the head, so that it will easily revolve. The drum G fits closely in the outer casing and is prevented from accidental turning by friction at that place. When it is desired to set the single-trip or detail portion at zero, all that is required with this device is to take hold of the end A'' of the casing and turn the same once around to the right, when all of the spring-pawls G' will have at some point during their passage engaged the lugs *e'* and returned each separate number-wheel to the zero-point. The number-wheel D, next to the drum D', passes very readily over the spring *z* like a ratchet, the trip or distance traveled will be registered up to the limit of the single-trip device, and the whole will also be registered on the total-register mechanism, because that is not disturbed by setting the single-trip device back to zero, and both are actuated by the same initial mechanism. In this connection I desire to state that the drum D' could be made of transparent material, as celluloid or glass or the like, and serve the same purpose as this drum D', with slots for the windows. The ratchet between the parts could be otherwise constructed, though the form I have adopted is superior on account of its simplicity and ease of construction. The set-back mechanism can also be greatly modified. Numerous other variations will no doubt occur to those skilled in the art to which my invention pertains. I have illustrated only one form in this connection, which is the best for many reasons.

The set-back mechanism might be utilized in other styles of cyclometers where the transfer between the numbers is effected by other means than those here shown, though of course there is a special relation and a special adaptation of the several parts of the structure here appearing. With regard to the special construction of the main registering mechanism I would respectfully state that while two actuating-springs and teeth on the hubs will be sufficient under all ordinary circumstances, yet under certain conditions and large sizes it may be desirable to form the shaft with more than two sections for each hub with corresponding springs and teeth distributed at closer intervals than opposite to each other. These features will be so clear to the skilled mechanic that further illustration is not necessary. The same distribution of springs and engaging teeth is employed. I have only shown the one form for the reasons before stated, but add this statement to show that I realize and fully understand the possibilities of the invention which is given a special embodiment in the drawings herewith presented. The structure is here shown in the best and most practical form for a cyclometer, though in practice some slight modifications and improvements in the details may be developed. Other forms may be required for other styles of register mechanism.

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

1. In a cyclometer mechanism, the combination of a central shaft B, a cylindrical case A; an initial mechanism at one end to be acted upon by a striker or other means, a main register mechanism consisting of wheels C, C, C, C, adjacent to and actuated by said initial mechanism; a cylindrical drum D', surrounding the said register mechanism having windows therein through which the numbers of the main register mechanism show and secured to the first wheel C', actuated by the initial mechanism and formed into a suitable hub at the opposite end; a single-trip or detail register mechanism consisting of wheels D, D, supported on the shaft beyond the total-register mechanism; a pawl on the hub of said drum D', to permit the independent movement of the single-trip or detail mechanism, a cylindrical drum G, embracing the single-trip portion having a spring-pawl G', adapted to rest on the periphery of each number-wheel of the single-trip mechanism; little lugs *e'*, on the peripheries of each wheel D, to be actuated by the said pawls when

traveling in one direction; a head A″, to the register pivoted at J, on the central shaft and secured to the drum G, and having a cap extending over the outer casing A, to permit the rotation of the said drum G, to carry the single-trip register past the pawl between it and the drum D′, to zero, all coacting together substantially as described for the purpose specified.

2. In a cyclometer or register mechanism, a central shaft, a main register mechanism to one end thereof consisting of parallel wheels, a detail or single-trip register mechanism on the opposite end of said shaft, an initial mechanism for actuating both of said register mechanisms, a cylindrical drum surrounding the main register mechanism and connected to the initial mechanism having windows through which the main mechanism is visible; a ratchet between said drum and the single-trip or detail mechanism to permit of independent rotation thereof, a ratchet mechanism adapted to engage all of the number-wheels of the single-trip mechanism at the same relative point and means of rotating the same to carry all of the wheels thereof to the initial position, for the purpose specified.

3. In a cyclometer or register mechanism, a central shaft, a main register mechanism to one end thereof consisting of parallel wheels, a detail or single-trip register mechanism on the opposite end of said shaft, an initial mechanism for actuating both of said register mechanisms, a cylindrical drum surrounding the main register mechanism and connected to the initial mechanism having windows through which the main mechanism is visible; and a ratchet between said drum and the single-trip or detail mechanism to permit of independent rotation thereof, for the purpose specified.

4. In a cyclometer or register mechanism, the combination of a suitable shaft; parallel number-wheels thereon having transfer mechanism between them; projecting lugs on the periphery of said number-wheels; and a rotatable shell open on one side and divided to form fingers or pawls to engage said lugs on the peripheries of the number-wheels and carry the said number-wheels forward to the initial position, for the purpose specified.

5. In a cyclometer or register mechanism, the combination of a shaft consisting of narrow transverse sections or portions formed into successive cam-notches, the said parts having full portions opposite, a number-wheel, the hub of which is of sufficient length to embrace two sections, a second number-wheel having internal gear-teeth projecting over the first and springs on the hub corresponding to the number of sections of shaft, with a movable tooth to be held out by the full portions of the shaft to engage the next number-wheel, the full portions of the shaft being opposite so that the movable teeth will be thrown into engagement on opposite sides of the shaft to distribute the power evenly and lessen the friction to transfer for the purpose specified.

6. In a cyclometer or register mechanism of the class described, the combination of the shaft consisting of narrow transverse sections or portions, each section being provided with successive cam-notches with a portion left full, the said full portions being distributed at different points of the circumference of the shaft; a number-wheel, the hub of which is of sufficient length to embrace a plurality of sections of the shaft; a second number-wheel having internal gear-teeth; and springs on the said hub of said number-wheel corresponding to the number of sections embraced thereby and each having a movable tooth in contact with the shaft to be raised by the full portion into engagement with the next number-wheel so that in transferring from a lower to a higher number-wheel a plurality of teeth will engage the higher number-wheel to reduce the friction on the shaft, as specified.

7. In a cyclometer or register mechanism, the combination of a shaft bearing parallel number-wheels, gear-teeth on said number-wheels, a plurality of movable teeth carried by the lower number-wheel and distributed at intervals around the same, cams to engage each movable tooth at the same time and force it into engagement with the next higher number-wheel to distribute the power evenly and relieve friction on the shaft for the purpose specified.

8. In a cyclometer or register mechanism, the combination of the shaft having longitudinal grooves therein, a plurality of number-wheels, a spring with a movable tooth on the hub of a number-wheel for transferring from a lower to a higher number-wheel and an additional spring on the hub of said number-wheel to engage the notches in the shaft at a different point from the movable tooth to serve as a brake and locating means for the number-wheel as specified.

9. In a cyclometer or register mechanism, the combination of the shaft, number-wheels on said shaft, a spring carrying a movable tooth, a suitable cam to actuate said tooth which has depressions to pass the movable tooth by all of the teeth on the next wheel except the one to be actuated, and an additional spring carried by a suitable number-wheel having a portion to engage said cam to serve as a brake and locating means for the number-wheel, as specified.

10. In a cyclometer or register mechanism having a single trip or detail portion, the combination between the two portions of a ratchet consisting of a wheel and hub with a suitable guideway struck up therefrom and a spring wrapped around the hub and folded to project inwardly through the guide to form an incline portion on one side and an engaging portion on the other, for the purpose specified.

11. In a cyclometer or register mechanism, the combination of a number-wheel, a thin continuous band *e*, of metal around the same

on which the numbers are printed and having lugs *e'* struck up therefrom to be engaged by suitable pawls for the purpose specified.

12. In a cyclometer or register mechanism, the combination of a ring or hub containing gear-teeth and a spring with movable teeth formed from a single strip of metal having the teeth formed by being punched through the same and a portion extended to lap by the full ring and projecting over one of the spaces forming the teeth to be actuated by a suitable cam or projecting portion for the purpose specified.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

LEO J. BURDICK. [L. S.]

Witnesses:
FRED L. CHAPPELL,
W. EDWARD TAYLOR.