B. S. CHURCH.
Pedometer.

No. 210,096. Patented Nov. 19, 1878.

Fig. 1.

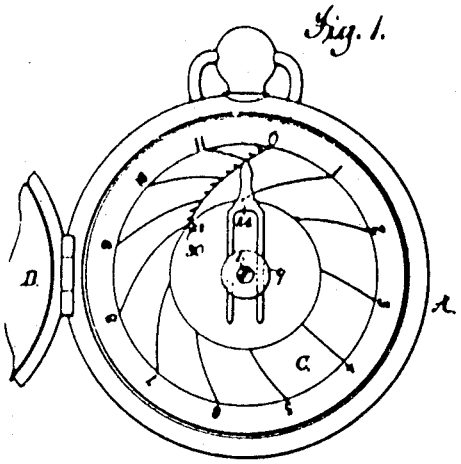


Fig. 2.

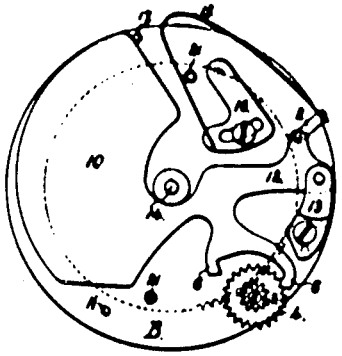


Fig. 3.

Fig. 4.

Fig. 5.

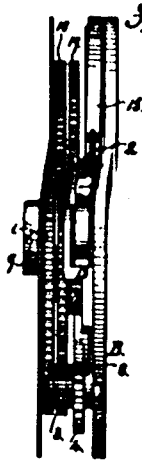
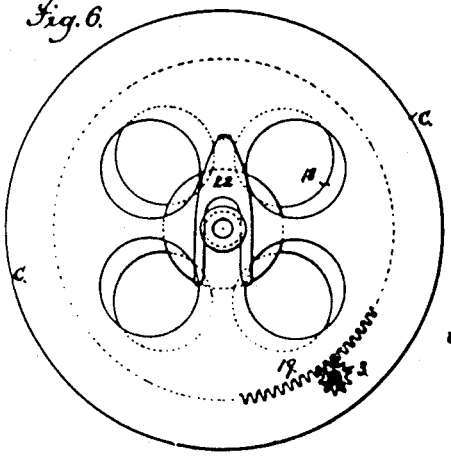


Fig. 6.



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BENJAMIN S. CHURCH, OF SCARBOROUGH, NEW YORK.

IMPROVEMENT IN PEDOMETERS.

Specification forming part of Letters Patent No. 210,096, dated November 19, 1878; application filed September 24, 1878.

To all whom it may concern:

Be it known that I, BENJAMIN S. CHURCH, of Scarborough-on-the-Hudson, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Pedometers; and I do hereby declare that the following specification, when taken in connection with the accompanying drawings, is such a full, clear, and exact description of the same as will enable others skilled in the art to make and use the same.

In said drawing, Figure 1 is a front elevation of the instrument, showing the cover of its case removed, in order to expose the face of the registering-disk and indicator. Fig. 2 is a similar view of the internal driving mechanism, which is attached to the back plate, the registering-disk and the parts carried by it being removed to expose the same. Fig. 3 is a vertical sectional view taken on the vertical center of Figs. 1 and 2. Fig. 4 is an enlarged vertical sectional view of the registering mechanism, thus showing the indicator, registering-disk, its hub, the differential wheels, and the fastening-spring. Fig. 5 is an edge elevation of the registering and driving mechanisms, as adjusted in their operative positions. Fig. 6 is a rear view of the registering mechanisms which are carried by the registering-disk, showing more particularly the mode of fastening the parts in place by means of the flat spring 22.

The object of this invention is to secure a more perfect operation of this class of instruments than has heretofore been attained; and to that end the invention consists in an improved construction of the parts and combinations thereof, whereby distances walked over may be accurately measured and recorded, whether the steps taken in passing over the distance recorded be long or short, all of which is too particularly hereinafter set forth to need further preliminary description.

The mechanisms are all contained in a case, A, similar to a watch-case, which may be provided with a hook, pin, loop, or button for securing the instrument to the person in an upright position, and with a protecting-cover, D.

The actuating or driving mechanism is attached to and supported by a circular back plate, B, which is secured to the inner side of the back of the case A by means of screws passing through screw-holes 21 21.

The actuating weighted lever 10 is fulcrumed upon a pivot which projects from the back plate, B, passes through an arm 12 of the lever 10, and is fixed in place by a bridge-piece, 13. The lever 10 is counterbalanced by means of a low-spring, 15, which, seated in the end of an adjusting-block, 16, is connected to the arm 12 of said lever by a link, 2, and the power of this spring 15 is capable of regulation by means of the adjustable block 16, which is slotted, so as to move to and fro over a fastening set-screw, by which its position may be fixed. The preferable form of this block 16 is a swinging lever, as shown. The actuating weighted lever 10, which vibrates between limits constituted by the stop-pins 11 17, is thus suspended from the spring 15, whose power is nicely adjusted so as to overcome the gravity of or balance the weighted end of said lever and hold it in its uppermost position against the stop-pin 17, or in its lowermost position against the stop-pin 11, as may be desired. This lever 10 has projecting from its lower side palates 6 8, which are so shaped as to alternately engage the teeth of a star-wheel, 4, according as said lever is in its uppermost or lowermost position, and when said lever is vibrated so act as to revolve said star-wheel step by step. This star-wheel 4 is fast upon a stud, upon which is also fixed a driving-pinion, 3, which latter engages with and drives the differential toothed wheels 18 19 when said star-wheel is revolved, as will presently appear.

The registering mechanism consists of an indicator, 20, and a registering-disk, C, which devices are revolved in the same direction at different speeds by means of the differential-toothed wheels 18 19. The toothed wheel 18 is centered on the hub 9, and fixed to the rear face of the registering-disk C by means of a pin, 7, and hence the disk C and wheel 18 may freely rotate together upon the hub 9. This hub 9 has a flanged head, which rests upon the face of the disk C, while its stem, projecting from the rear side thereof, is stepped, so as to form independent shouldered seats for the wheels 18 19. The toothed wheel 19 is secured to the hub 9, so that the same shall revolve

with it, by means of a forked spring, 22, the limbs of which enter a recess cut in the stem of said hub near its inner end, and bear upon the outer face of the wheel 19, while the end of the spring has a right-angular stud that engages in a hole made in the outer face of said wheel 19. This spring 22 thus by its friction holds the wheels 18 19 and registering-disk C in their proper relative positions on the hub 9, while at the same time permitting the hub, which carries the indicator 20, to be turned by hand without moving the said wheels when it is desired to adjust or set the indicator at any point upon the registering-disk.

The indicator 20 is bifurcated, so as to provide two prongs, which pass through corresponding holes provided in the head of the hub 9, as is clearly shown in Fig. 1.

The parts of the registering mechanism held together by the spring 22 are placed on the post 14, which projects from the center of the back plate, B, and finds its bearing in a central perforation through the hub 9, in which position the toothed wheels 18 19 will properly mesh with the teeth of the pinion 3. These parts may then be adjusted fixedly in place by means of a screw, 1, which is entered into a tapped hole in the end of the post 14, and has its flanged head seated in a socket formed in the outer end of the perforation in the hub 9.

The indicator-carrying wheel 19 has a lesser number (one or more) of teeth than has the registering-disk-carrying wheel 18, and it therefore follows, since both are simultaneously rotated in one direction by the same pinion 3, that the pinion 19 will move faster than and gradually gain upon the wheel 18, and thus that the indicator 20 will be advanced on the registering-disk C a distance equal to the width of one or more teeth during each revolution of said wheels.

In its use this instrument will be adjusted upon the body of the user so that the medial line of the actuating-lever 10 will be horizontal, as in Fig. 2. Now, as each step is taken the concussion produced thereby will overcome the counterbalancing-spring 15 and cause the lever 10 to be vibrated one pulsation, which will, through the pallets 6 and 8, advance the star-wheel 4 one tooth, and, through the driving-pinion 3, move the toothed wheels 18 19 a corresponding distance. The indicator 20 and registering-disk C will thus be simultaneously moved onward or rotated in the same direction, the result being that when the wheels 18 and 19 have each made one revolution the indicator will have gained a certain distance upon the registering-disk, which distance will be registered by the scale marked thereon, and which may indicate a mile or any other distance.

As it is obvious that there are fewer long steps than short ones taken in passing over a mile of distance, and therefore that the number of pulsations of the actuating-lever 10 is decreased accordingly, the instrument must be adapted to register the distance traveled over, whether the number of steps taken in each mile be greater or less as they are longer or shorter than the average. Supposing that the average number of steps taken in traveling a mile be such as will, through the vibrations of the actuating-lever 10 cause the indicator 20 to advance over the registering-disk a distance equal to that between two of the scale-lines, 0 to 11, at a point upon the disk corresponding with a given one of the subdivisions marked upon the unit-line 30, it follows that a lesser number of steps, as longer ones, fewer of which constitute a mile of distance, will produce a lesser number of vibrations of the actuating-lever 10, and therefore that the indicator will advance over the registering-disk a lesser distance; or, if the number of steps be greater than the average, a correspondingly-increased number of vibrations of the lever 10 will ensue, and a greater extent of movement of the indicator will result, as will be readily understood.

In order that this difference in the length of steps taken by different individuals may be compensated for, and each mile correctly registered, no matter what the length and consequent number of steps constituting it may be, the registering-disk is provided with a varying scale, increasing from the outermost, where it is divided into twelfths, to the innermost graduation thereof, where it is divided into eighths; and the indicator 20 is made adjustable in the hub 9, so that its point may be readily moved to coincide in position with any one of the graduating-marks subdividing the unit-line 30, which marks indicate inches, increasing in number toward the perimeter of said disk, the example shown consisting of marks indicating inches, increasing from 23 to 35.

In adjusting the instrument to suit the length of step taken by the user, it is only necessary to ascertain by trial the average length of step in inches, and then to adjust the indicator so that its point coincides with the subdivisions of the unit-line 30 of the registering-disk which corresponds to that number of inches, whereupon the instrument will record the number of steps taken, and consequently the distance in miles traveled over.

As shown in the drawing, the indicator is set to register distances covered by steps equal to 32 inches in length; hence, when the point of the indicator reaches the line 1 of the scale one mile will have been traveled over, and so on, it being understood that for a longer or shorter step the indicator is set at the proper graduation on the line 0.

Having thus described the construction and operation of my improved pedometer, what I claim therein as new, and desire to secure by Letters Patent, is—

1. The combination, with the counterbalanced actuating-lever 10, having pallets 6 8, of the star-wheel 4 and driving-pinion 3, substantially as described.

2. The combination, with the weighted act-

uating-lever 10, of the attaching-link 2 and compensating-spring 15, substantially as described.

3. The combination, with the registering mechanisms, the weighted actuating-lever 10, and compensating-spring 15, of the adjusting-block 16, substantially as described.

4. The combination of the registering-disk C, indicator 20, differential-wheels 18 19, flanged and stepped hub 9, and spring 22, substantially as described.

5. The combination of an adjustable indicator with the registering-disk, having a variable scale whose divisions increase in number from the innermost to the outermost, or vice versa, and which are subdivided by a unit-line graduated by a scale of inches, whereby the pedometer may be set to suit the length of step of the user and record the distance traveled over, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BENJ. S. CHURCH.

Witnesses:
H. T. MUNSON,
GEO. H. GRAHAM.