(No Model.)

# S. W. PAINE.

## SPIROMETER.

No. 413,865. Patented Oct. 29, 1889.

Fig. 1.

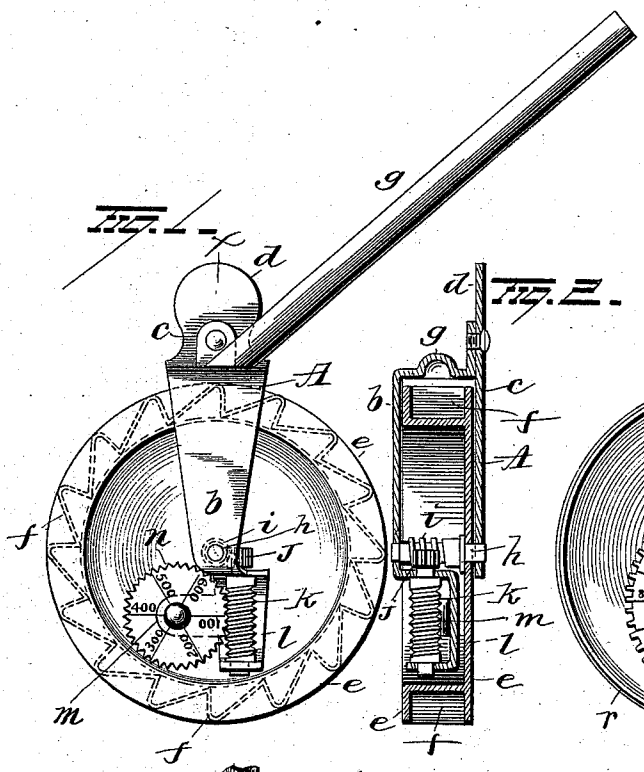



Fig. 2.




Fig. 4.

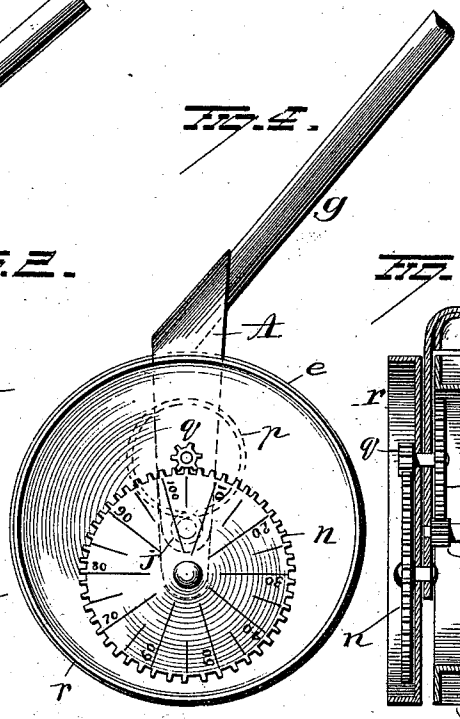



Fig. 5.




Fig. 3.

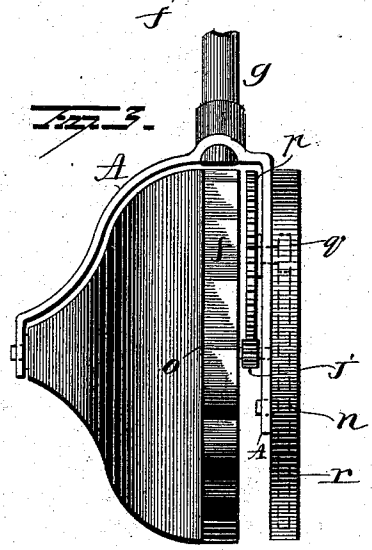
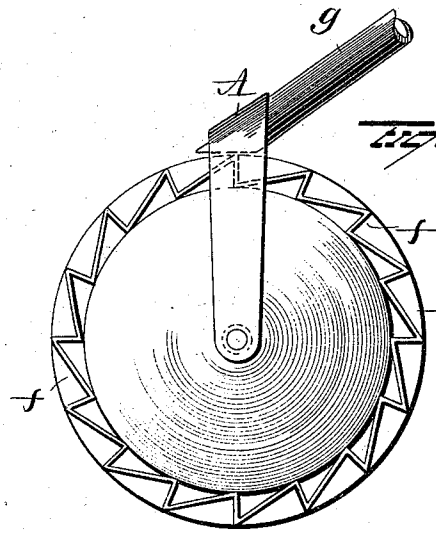



Fig. 6.




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# UNITED STATES PATENT OFFICE.

SETH WHITE PAINE, OF ROCHESTER, NEW YORK.

## SPIROMETER.

SPECIFICATION forming part of Letters Patent No. 413,865, dated October 29, 1889.

Application filed January 12, 1889. Serial No. 296,190. (No model.)

*To all whom it may concern:*

Be it known that I, SETH WHITE PAINE, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Lung-Developers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in lung-developers.

The object is to provide a device consisting of comparatively few parts, disposed in such a manner as not to get out of order readily, and one which may be placed in the market at a slight initial cost.

A still further object is to provide an instrument for promoting health and vigor by increasing respiration and lung capacity, at the same time furnishing a pleasing and harmless toy for children.

With these objects in view my invention consists in certain novel features of construction, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in perspective of one form of lung-developer. Fig. 2 is a transverse sectional view on line *x x* of Fig. 1. Fig. 3 is a modification. Fig. 4 is another modification. Fig. 5 is a sectional view of the same, and Fig. 6 is a still another modification.

A represents the frame of a yoke or instrument, consisting, preferably, of two thin plates *b* and *c*, of metal, secured together and extending parallel with each other to receive the bucket-wheel and form journal-bearings for the axle of the latter. One of the plates *c* projects a short distance beyond the point where the two are joined to form a handle *d*, to be held by the operator while using the developer.

The bucket or breath wheel *e* consists of a thin disk with an L-shaped flange formed integral with it near the periphery, the outer edge of which extends parallel with the disk, and in the space formed between this flange and disk a series of buckets *f* are formed to receive the impact of the air-current, whereby the wheel is turned and the device is operated. The breath is directed upon these buckets through a tube *g*, secured to the frame and projecting tangentially from the wheel.

The following constitutes the registering mechanism used with this particular form of lung-developer: The axle *h* of the breath-wheel *e* is provided with a spiral thread *i*, and a pinion *j* on the end of worm *k*, journaled in the offset *l* of the frame, meshes with the threads of this axle, and is in consequence driven by it as the wheel revolves. Jutting out from the offset *l*, and at about right angles thereto, is an arm *m*, and on this arm an indicator-disk *n* is revolubly supported. This disk is provided with teeth on its periphery, which are engaged by the worm *k*, whereby the disk is turned. The disk is numbered to represent a scale indicative of the capacity and power of the lungs.

In using this device it is better to hold it upturned and after exhausting the breath upon it the instrument may be removed from the mouth, so that the indicator can be easily watched and the record observed by the operator.

In the modification shown in Fig. 3, A represents the frame. In this case the frame is in the form of a kind of fork carrying the tube *g*, it extending tangentially from the wheel, as before. This fork-shaped frame spans the wheel *e*, and in its sides the ends of the axle of the wheel are journaled. The wheel in this instance is flat on the end *o*, and the opposite end has the general shape of a toy top. Around the periphery of the flat end *o* the buckets *f* are arranged, they being located in position to receive the air from the tube. The indicator in this device is turned in the following manner: On the axle of the breath-wheel and adjacent to the flat end a small pinion *j* is affixed. This pinion meshes with a toothed wheel *p*, mounted on one arm of the frame, and a small pinion *q* on the opposite end of the spindle, carrying the wheel *p*, is meshed with the teeth of the large indicator-disk *n*, which latter is mounted on a post screwed into an arm of the frame. In the former construction the indicator-disk was protected by the flange of the wheel; but in this modification a flanged disk *r* performs this function, and it is lo-

cated between one arm of the frame and the indicator-disk, so that the flange around its periphery serves as a guard to protect the parts. The indicator-disk is of course provided with a scale, as in the other construction.

In the modification shown in Figs. 4 and 5 the frame A consists of one strip of metal bent around the end of the breath-tube, with one arm longer than the other. Between these arms the bucket-wheel is journaled, and secured to one arm is the flanged guard-disk *r*. This disk is preferably formed with a circular concaved depression on its back near the periphery, in order to partially fill the cavity between it and the breath-wheel, so as to prevent the latter from tipping either to one side or the other; or it may be provided with a ring of material, as shown, instead for the same purpose. The indicator in this device is turned in precisely the manner as in the last construction.

The modification shown in Fig. 6 is similar to that shown in Fig. 3 in many respects, the only difference being that the registering mechanism is omitted entirely, and the wheel, being in the shape of a top, presents a very pleasing little toy, and the top, it is evident, may be spun regardless of any smooth surface to spin it on.

Not only is the use of this instrument quite entertaining to a party of people trying to outdo one another and as a pleasing toy for the young, but also when judiciously used it is calculated to develop and strengthen the lungs, so as to not only prevent pulmonary consumption, but to improve the health of the entire system. As a general rule, in ordinary breathing the lungs are no more than half filled, and hence it is of radical importance that they should be, occasionally at least, fully expanded and filled with pure oxygen, in order to preserve robust health. By the constant use of these instruments precisely the exercise needed is given to the lungs and all the vital organs by oxygenizing the blood and enriching it. This is especially adapted to the use of persons continually housed up and breathing more or less impure air all the time. An occasional trial with this instrument in a well-aired and ventilated place will work untold benefits.

It is evident that slight changes might be resorted to in the form and arrangement of the several parts described without departing from the spirit and scope of my invention; hence I do not wish to limit myself to the particular construction herein set forth; but,

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

1. In a lung-developer, the combination, with a yoke consisting, essentially, of two side arms connected at the top, and a tube secured to the top of the yoke, of a wheel journaled on a pin supported in the free ends of the yoke and provided with concentric flanges around its periphery, and buckets located between the flanges and arranged to pass in close proximity to the end of the tube, substantially as set forth.

2. In a lung-developer, the combination, with a yoke carrying a tube, of an axle journaled in the yoke, a bucket-wheel rigidly secured to the axle, a movable indicator-wheel journaled on one arm of the yoke, and gearing connecting the axle and indicator-wheel, substantially as set forth.

3. In a lung-developer, the combination, with a yoke carrying a tube, of an axle journaled in the yoke, a bucket-wheel rigidly secured to the axle, an indicator-wheel journaled on one arm of the yoke, and worm-gearing between the axle and indicator-wheel for imparting motion from the former to the latter, substantially as set forth.

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

SETH WHITE PAINE.

Witnesses:
JOHN A. NIVEN,
B. J. MOSS.