

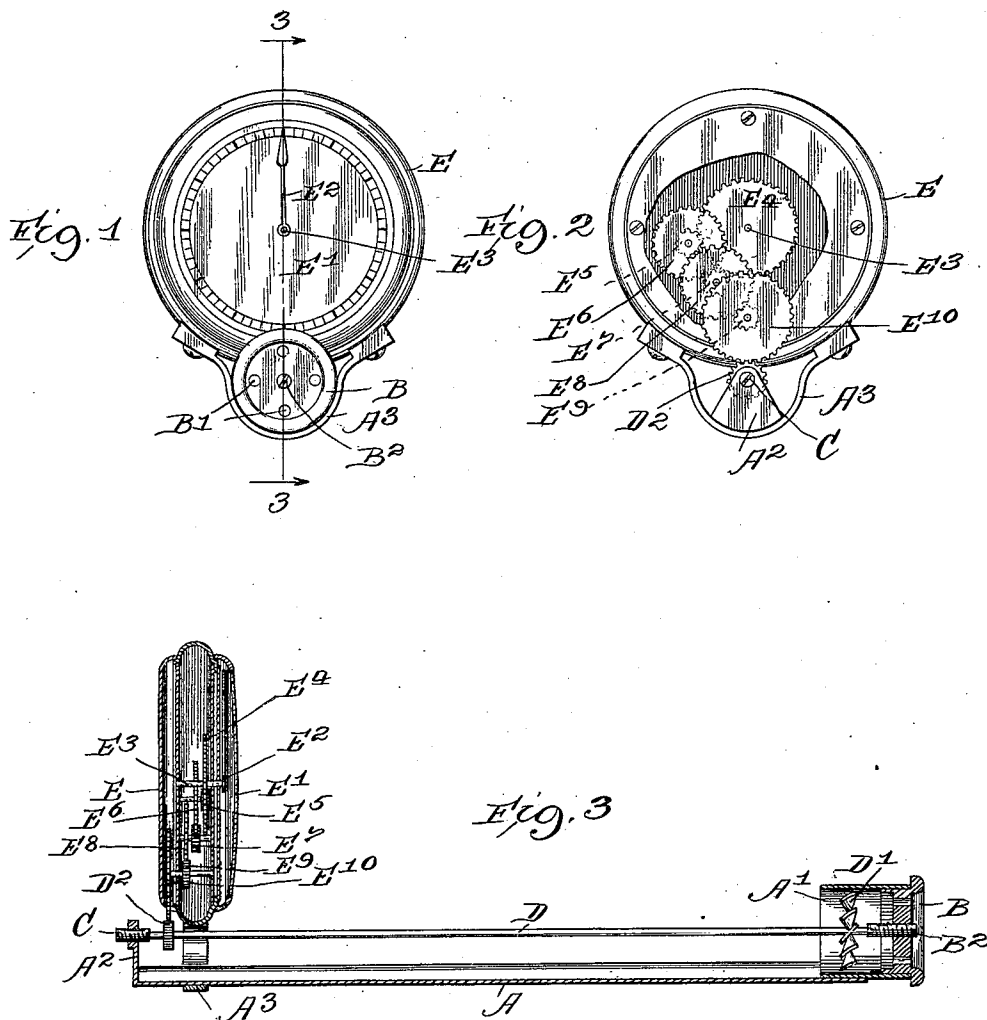
No. 666,676.

Patented Jan. 29, 1901.

I. HOGELAND.  
SPIROMETER.

(Application filed Aug. 27, 1900.)

No Model.)



Witnesses:  
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# UNITED STATES PATENT OFFICE.

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## SPIROMETER.

SPECIFICATION forming part of Letters Patent No. 666,676, dated January 29, 1901.

Application filed August 27, 1900. Serial No. 28,160. (No model.)

*To all whom it may concern:*

Be it known that I, ISRAEL HOGELAND, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Spirometers, of which the following is a specification.

The object of this invention is the production of a spirometer for voice culture and lung development embodying the improvements hereinafter set forth.

In the accompanying drawings, Figure 1 is a front elevation of my spirometer. Fig. 2 is a rear view, a portion of the gear-casing being removed to show the gearing therein. Fig. 3 is a longitudinal central section on dotted line 3 3 of Fig. 1.

Like letters of reference indicate corresponding parts throughout the several views.

In the production of this spirometer I provide the frame A, having the tubular portion A' at the forward end of the frame and the upwardly-extending ear A<sup>2</sup> at its rear end. Two arms A<sup>3</sup> extend upwardly from the frame A, the purpose of which arms will be mentioned later herein.

The tubular portion A' of the frame A is provided with the mouthpiece B, communicating with the tubular portion A' by means of the openings B'. A bearing-screw B<sup>2</sup> is threaded centrally through said mouthpiece, and a similar bearing-screw C extends through the ear A<sup>2</sup> of the frame A. The two bearing-screws B<sup>2</sup> and C are in axial alinement, supporting between their countersunk inner ends the shaft D, the latter having pointed ends to lie within the countersunk cups of the screws B' and C and being free to rotate between said screws. A fan D' is fixed on the shaft D, the blades of which fan are set at a slight angle to the plane of its rotation in order that it may be rotated by a current of air passing through the tubular portion A' of the frame A. The opposite end of the shaft D is provided with a pinion D<sup>2</sup>, fixed on said shaft. The upwardly-extending arms A<sup>3</sup> of the frame A support a casing E, intended to inclose the reducing-gear of the mechanism. The forward side of this casing is arranged in dial form, as shown at E', and is provided with an index-hand E<sup>2</sup>, fixed on its central bearing-shaft E<sup>3</sup>. Within

the casing E this bearing-shaft E<sup>3</sup> carries the gear E<sup>4</sup>, fixed thereon. This gear meshes with the pinion E<sup>5</sup>, fixed relative to the gear-wheel E<sup>6</sup>, and the last-mentioned gear-wheel meshes with the pinion E<sup>7</sup> of the wheel E<sup>8</sup>. The wheel E<sup>8</sup> meshes with the pinion E<sup>9</sup> on the gear-wheel E<sup>10</sup> and the latter with the pinion D<sup>2</sup> before mentioned. It will thus be seen that the speed of the shaft D is "geared down" very considerably.

In operation the mouthpiece B of this instrument is applied to the lips of the user, who after taking a deep inspiration forcibly expels the air from his lungs through the perforations B' in the mouthpiece B. The currents of air coming from said openings impinge upon the vanes of the fan D', turning the latter rapidly and rotating the shaft D, upon which it is mounted. The rotation of the shaft, with its gear D<sup>2</sup>, fixed thereon, imparts rotatory motion to the train of gears E<sup>10</sup>, E<sup>9</sup>, E<sup>8</sup>, E<sup>7</sup>, E<sup>6</sup>, E<sup>5</sup>, and E<sup>4</sup>, gearing down the speed of the shaft D. The movement of the gear E<sup>4</sup> moves the index-hand E<sup>2</sup> upon the dial E'. The extent of the travel of this hand indicates the amount of air expelled from the lungs of the user.

The instrument may be used for testing the amount of inhalation as well as that of exhalation. The air drawn into the mouth of the user through the tubular portion A' of the frame A rotates the fan D' in a direction contrary to that caused by exhalation.

By means of this device the capacity of the lungs is tested and by its use they are strengthened.

I claim as my invention—

1. In a spirometer, in combination, a longitudinal frame, having a tubular portion at one of its ends, a shaft rotatably mounted axially of said longitudinal frame, a fan fixed on said shaft and situated within said tubular portion, an indicator-dial mounted on said longitudinal frame near the end thereof opposite to said tubular portion and projecting to one side of the frame so the dial shall be visible to the person using the spirometer, a movable indicator-hand for said dial and a train of gearing for transmitting rotatory motion from said shaft to said indicator-hand.

2. In a spirometer, in combination, a lon-

gitudinal frame, having a tubular portion at  
one of its ends, a mouthpiece for said tubu-  
lar portion, a shaft rotatably mounted axi-  
ally of said longitudinal frame, a fan fixed on  
5 said shaft and situated within said tubular  
portion, a bearing in the mouthpiece for one  
end of said shaft, a bearing in the frame for  
the other end of said shaft, a pinion rigidly  
secured to said shaft, a gear-casing mounted  
10 on the frame to one side and near the end  
thereof opposite to that having the tubular  
portion, a dial for the gear-casing so situ-  
ated as to be visible to the person using the  
spirometer, an indicator-hand for said dial,  
and a train of gearing for transmitting ro- 15  
tatory motion from said pinion to said hand.  
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Witnesses:

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