

No. 821,664.

PATENTED MAY 29, 1906.

J. A. MORRIS.  
SPIROMETER.

APPLICATION FILED JAN. 30, 1905.

Fig. 1.

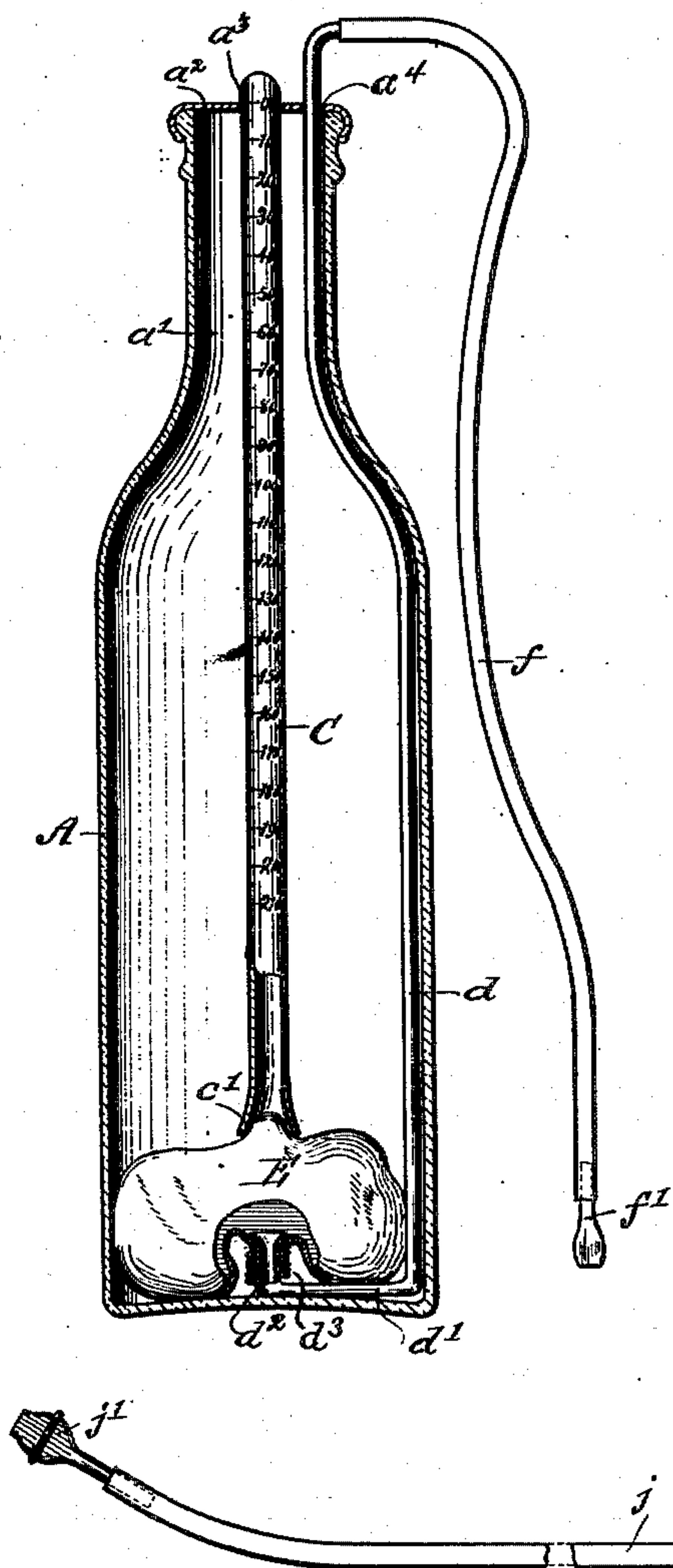


Fig. 2.

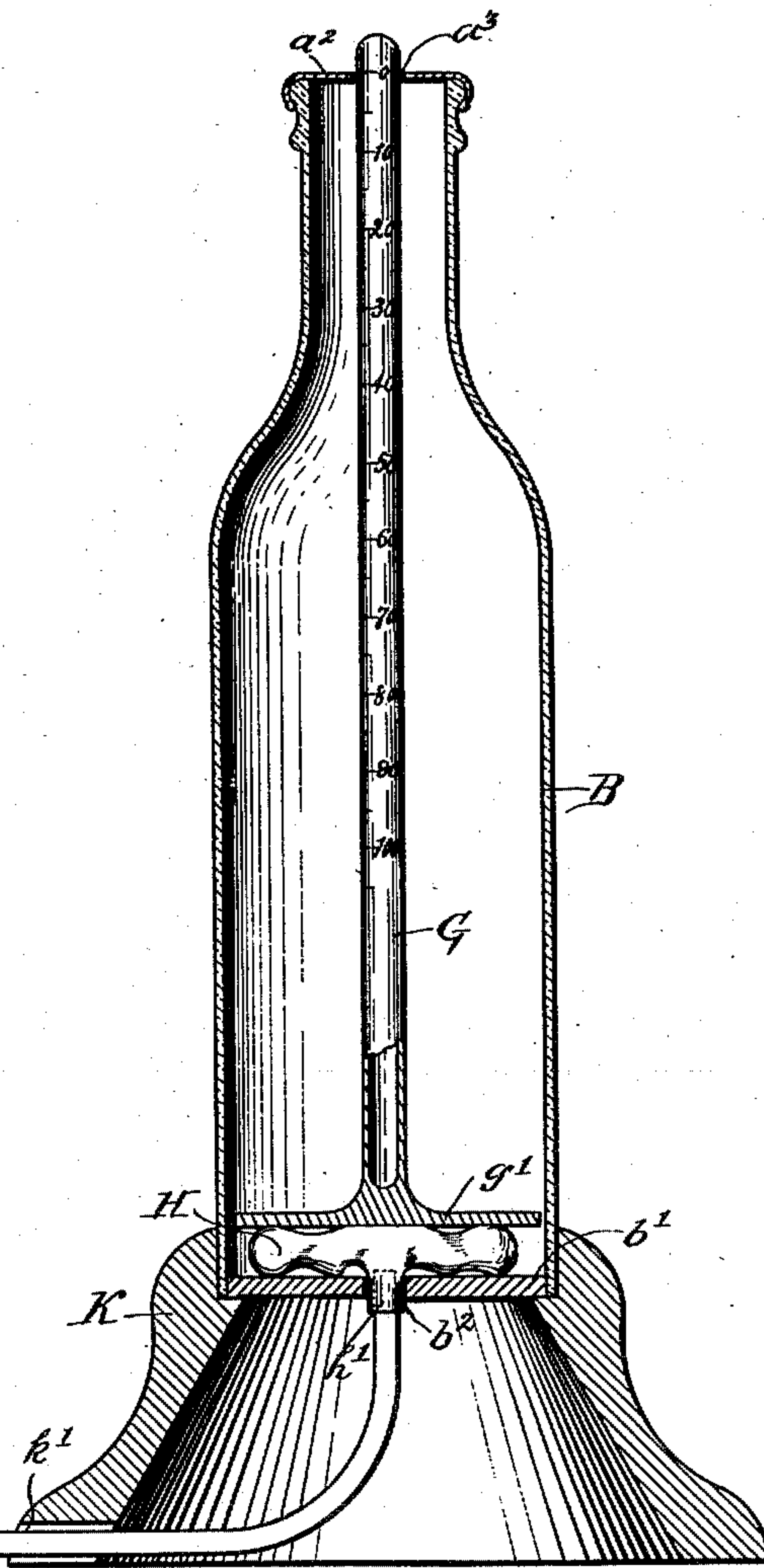
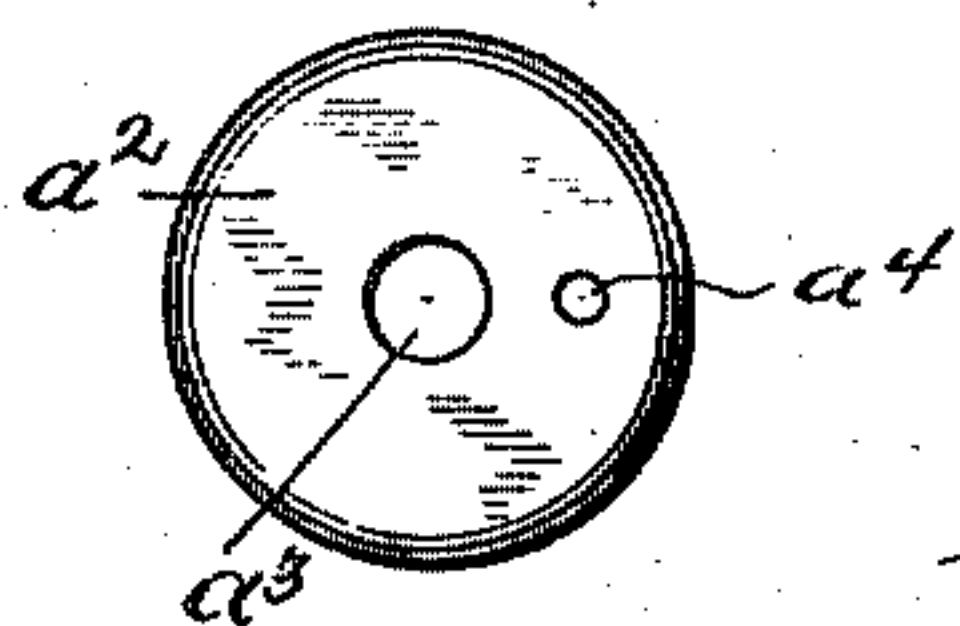


Fig. 3.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## SPIROMETER.

No. 821,664.

Specification of Letters Patent.

Patented May 29, 1906.

Application filed January 30, 1905. Serial No. 243,208.

*To all whom it may concern:*

Be it known that I, JAMES A. MORRIS, a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented certain new and useful Improvements in Spirometers, of which the following is a specification.

This invention relates to improvements in spirometers or devices for testing the lungs.

The object of my invention is to produce a device of this kind that can be cheaply manufactured and that will be adapted for popular use.

A further object is to so construct the device that it will not be liable to get out of order under ordinary uses.

Having the foregoing and other objects of general utility in view, I have produced the device shown in preferred and modified forms in the accompanying drawings, which form a part of this application, and in which—

Figure 1 is a view, partly in vertical section and partly in elevation, of a preferred form of my device. Fig. 2 is a similar view showing a modified form of my invention; and Fig. 3 is a top plan view of the cap-plate, which is a detail of the device.

Referring to the drawings in detail, and especially Fig. 1, it will be seen that A represents a glass bottle of ordinary cylindrical form having the usual neck portion  $a'$  terminating at the top in a mouth, the latter being partially closable by the top or cap  $a^2$ , in which are formed a central opening  $a^3$  and a smaller opening  $a^4$  at one side of the central opening. The central opening  $a^3$  is adapted to receive and serve as a guide for the tube C, which may be of glass or other suitable material and which is provided on its surface with a graduated scale extending for a portion of its length and is formed with a flaring and open lower end  $c'$ . Arranged within the bottle and preferably following the contour of the inner walls is a tube  $d$ , having its lower portion bent at an angle, as at  $d'$ , and having the extreme end bent upwardly, as at  $d^2$ . Connected with the upturned end  $d^2$  of the tube  $d$  is a rubber bulb E, formed with a centrally-disposed open neck which is adapted to receive and embrace the portion  $d^2$  of the tube  $d$ , and, if necessary, a tight joint can be formed at this point by reinforcing the con-

nection with a cord or wire  $d^3$ , as indicated in Fig. 1. Attached to the upper end of the tube  $d$  is a flexible pipe  $f$ , to the outer end of which is secured a mouthpiece  $f'$ .

From the construction described it will be apparent that upon blowing through the mouthpiece  $f'$ , pipe  $f$ , and tube  $d$  the bulb E will be inflated, whereby its expanding walls will press upwardly against the lower end of the tube C, thereby pushing the latter upwardly through the central opening  $b'$  in the cap  $b$ . The cap serves both as a guide and indicator for the tube C. It will be understood that the bulb will be of such size and capacity as to lift, when entirely inflated, the tube C the full distance indicated by the graduated scale.

In the form of the device shown in Fig. 2 B represents a bottle of glass or other material of the same general form as A, but having its lower end open, and in such open end is inserted the bottom plate or disk  $b'$ , in which is formed a central opening  $b^2$ . The mouth of this bottle is closed by the cap  $a^2$ , made as above described, except without the opening  $a^4$ . Arranged centrally of the bottle B is a tube G, having a graduated scale on the side thereof and formed with a circular base  $g'$ , which normally rests upon a bulb H, which is placed in the bottom of the bottle and rests upon the plate  $b'$ . The bulb H is formed with an open neck  $h'$ , which is adapted to receive the inner end of a flexible tube  $j$ , the outer end of which is provided with a mouthpiece  $j'$ . The bottle B rests upon and is supported by a base K, which may be of any suitable material and is formed with a horizontal opening  $k'$  to permit the passage of the tube  $j$ . This form of my device is adapted to operate in the same manner as that shown in Fig. 1.

It will be understood that in the construction of the central graduated element C or G, I may use any material—such as wood, metal, or glass—and may make it solid or hollow and in any form in cross-section.

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

In a spirometer, a bottle having a perforated cap, a tube slidably arranged in said bottle and passing through said cap, said tube provided with a graduated scale, an ex-

pansible element arranged within said bottle  
and adapted to support said slidable tube,  
and an inflating-tube having a portion ex-  
tending through the mouth of the bottle and  
5 communicating with the expansible element  
and a flexible pipe communicating with said  
inflating-tube, substantially as described.

In testimony whereof I affix my signature  
in presence of two witnesses.

JAMES A. MORRIS.

Witnesses:

FRANK J. SUMMERS,  
C. P. F. McKEMIL.