

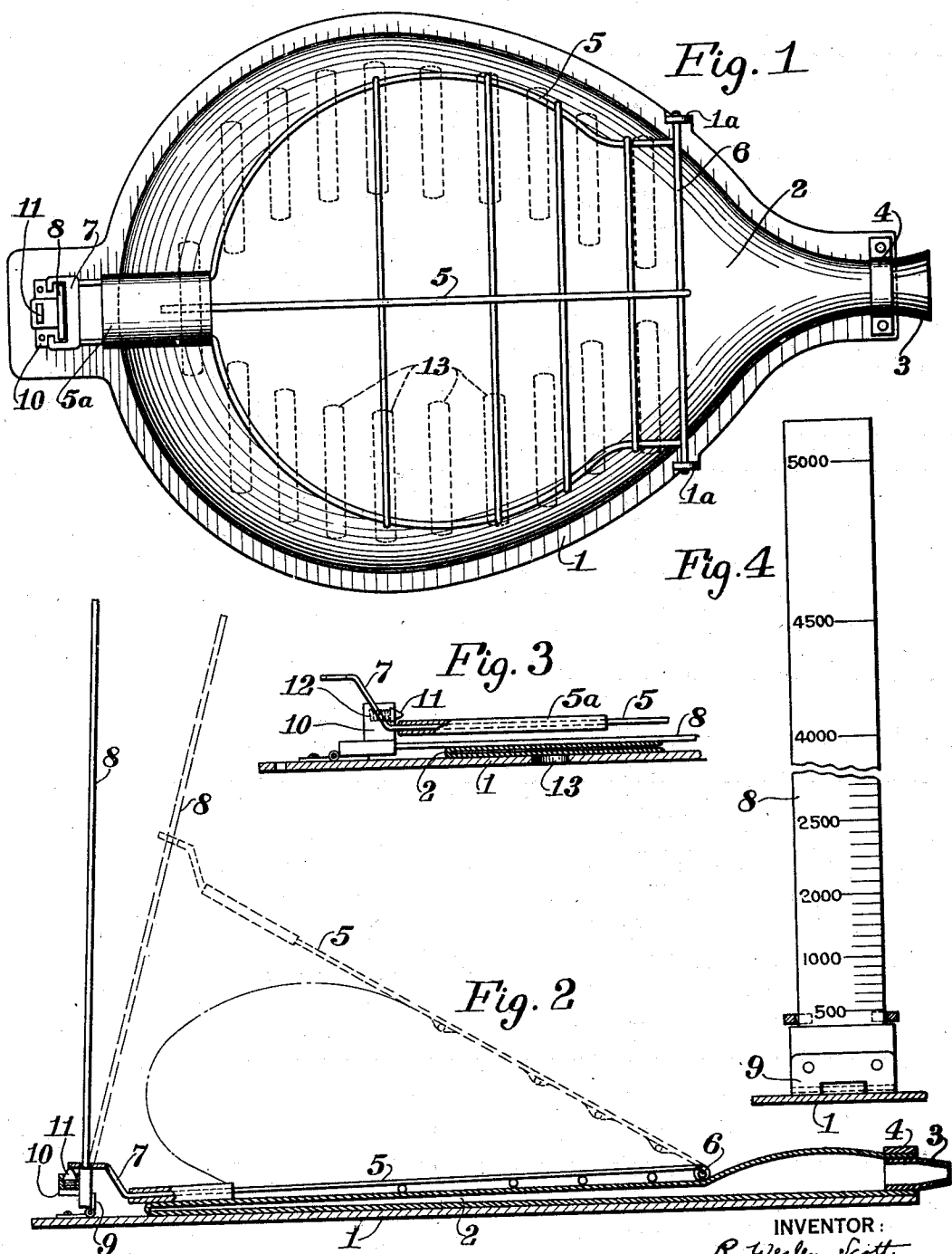
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APPARATUS FOR MEASURING THE VITAL CAPACITY OF THE LUNGS

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APPARATUS FOR MEASURING THE VITAL CAPACITY OF THE LUNGS

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This invention relates to apparatus for measuring the vital capacity of the lungs.

It is the principal object of the invention, to provide an apparatus of the class referred to, which satisfies to the highest degree all the practical requirements and, at the same time, is simple in construction and simple in operation.

For a full understanding of the invention, its construction, principle of operation and its advantages, reference is made to the accompanying drawings, wherein

Fig. 1 is a plan view of an apparatus representing what I consider at present as a preferred embodiment of the invention;

Fig. 2 is a longitudinal sectional view thereof;

Fig. 3 is a sectional view of a detail; and

Fig. 4 is an elevation of another detail, a part being shown in section.

In the drawings 1 is a relatively thin plate, preferably of light metal, serving as a base for the flexible bag 2 serving as a receiving vessel for the products of expiration. The bag 2 is preferably composed of two pieces of thin and light fabric, substantially co-extensive and united at their edges and adapted, when the bag is collapsed or deflated, to be perfectly flat in superposition. The bag is substantially pear-shaped in outline and the base 1 is correspondingly shaped, providing a small margin beyond the edge of the bag. At the contracted end, the bag has a blow opening provided with a mouth piece 3 or the like which, for convenience of use, projects outwardly from the base 1.

Near the end having the mouth piece 3, there is pivotally supported on the base, by means of lugs 1^a, a flat and relatively light member 5 disposed to overlie the bag and extend beyond the latter at the end opposite to the blow opening for co-operation with a scale 8 pivoted at 9 on the base 1.

The member 5, at its pivoted end presents a straight edge 6 extending across the bag substantially parallel to the base and in close proximity thereto and at its opposite end is provided with a member 7 adapted to embrace the scale 8 and have a sliding fit therewith for free relative motion.

The operation is as follows:

When a person exhales through the mouthpiece 3, the bag expands in proportion to the amount of gas passing into it. Since the edge 6 of the flat member 5 restrains the bag from expanding along the line of contact between them, the expansion of the bag takes place progressively from that line of contact toward the far end. In fact, the part of the bag disposed between the mouthpiece 3 and the edge 6 may be and preferably is made of heavier and stronger material so that also for that reason the bag tends to expand, so to speak, about the line 6 as a pivot.

Owing to the fact that the bag is increasing in width outwardly from the edge 6, the expansion increases in proportion with the result that the central portion of the upper surface of the bag presents a substantially straight line the angle of which relative to the base increases as the volume received is increasing. The flat member 5 resting on the bag is thus lifted as the result of inflation and the relative position of the part 7 of member 5 on the scale 8 is a reliable measure of the degree of inflation. The scale 8 may be calibrated to indicate any desired unit of volume or degree of vital capacity.

If desired, the scale may be provided with a self-locking member adapted to freely move in an upward direction on scale 8, but to be restrained against return movement until released by hand. Such a contrivance which is well known as such, is automatically retained in the highest position reached and facilitates the reading of the scale, as is well understood.

On the rear surface of scale 8, near its pivot, is attached a block 10 containing a latch member 11 normally projected outwardly by a spring 12 or the like. When the instrument is not in use, the scale 8 is turned down flat on the bag and the flat member 5 is turned down upon the scale 8, as indicated in Fig. 3. Just before the member 5 reaches its final position, the free edge of the part 5^a of member 5 passes over the latch member 11 which is retracted thereby and projects again to hold the member 5 in locked position.

In order to make the member 5 as light as possible, the latter is constructed of wire, as indicated.

The bag is preferably made of a thin flexible rubber covered fabric, but any other material which is light and flexible and does not leak, is suitable.

The essential point in the selection of the material and the construction is that the work done as an incident of the expansion of the bag remains a negligible factor.

Since rubber-faced fabrics have a tendency to adhere to a flat surface, I preferably provide a series of openings 13 along the marginal portion of the base 1, allowing air to come into contact with the lower surface of the bag and thereby preventing a vacuum condition such as might occur and might introduce an irregularity in the operation and variations in the function and the results.

The blow end of the bag is held down upon the base by means of a strap 4.

In the foregoing I have described what I consider a preferred embodiment of the invention. It is understood that the essential features forming part of the invention may be modified in various ways.

I claim:

1. In apparatus of the character described, the combination with a support, of a normally flat bag of flexible material on said support, means for inflating the bag, means for indicating degree of inflation, including a member pivotally supported at one end and having a portion overlying the bag.

2. In apparatus of the character described, the combination with a support, of a bag of flexible material, having a blow opening at one end and increasing in width from said opening toward the opposite end, and means for indicating degree of inflation, including a member pivotally supported near the end having the blow opening and overlying the bag.

3. In apparatus of the character described, the combination with a support, of a bag of flexible material, having a blow opening at one end and increasing in width from said opening toward the opposite end and means for indicating degree of inflation, including a member pivotally supported near the end having the blow opening and overlying the bag, a member pivotally supported near the opposite end of the bag and a sliding connection between said members.

4. In apparatus of the character described, the combination of a normally flat bag of flexible material, having a blow opening at one end and increasing in width from the blow opening toward the opposite end, a plate-like support for the bag, means for securing the bag at the blow end to the support and means for indicating degree of inflation, including a member pivotally sup-

ported on the plate near the end of the bag having the blow opening and overlying the bag, a member pivotally supported on the plate near the opposite end of the bag and a sliding connection between the said members.

5. In apparatus of the character described, the combination with a support, of a normally flat bag of flexible material, having a blow opening at one end and increasing in width from the blow end toward the opposite end, and means for indicating degree of inflation, including a flat member pivotally supported near the end of the bag having the blow hole and overlying the bag, a member pivotally supported near the opposite end of the bag and a slidable connection between the said members.

6. Apparatus according to claim 5, wherein the flat member, at its pivoted end, has an edge portion extending across the bag and bearing upon the latter.

In testimony whereof I affix my signature.
ROY WESLEY SCOTT.