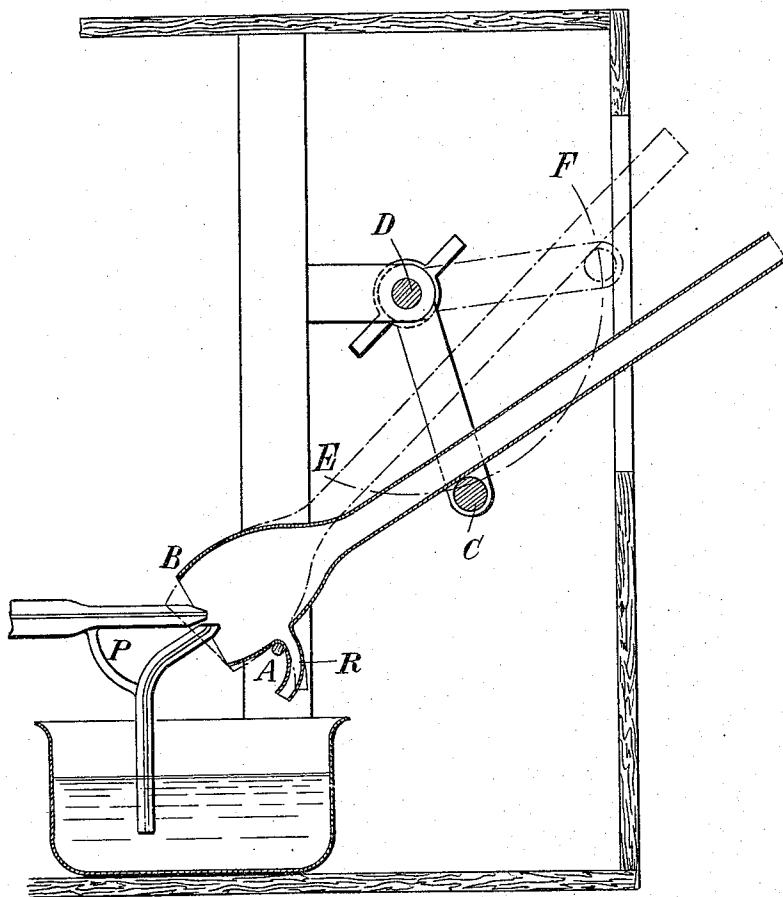


A. STEFANINI & G. GRADENIGO.
INHALER.

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ANNIBALE STEFANINI, OF PISA, AND GIUSEPPE GRADENIGO, OF TURIN, ITALY.

INHALER.

1,171,364.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, ANNIBALE STEFANINI and GIUSEPPE GRADENIGO, subjects of the Italian King, and residents, respectively, of Pisa and Turin, Italy, have invented certain new and useful Improvements in Inhalers, of which the following is a specification.

The present invention relates to an inhaler in which a double atomizing of the substances is obtained by the rebounding of the liquid jet on the wall of an adjustable funnel provided with a long tube.

The improvement consists in that the tube of the funnel, which latter rotatably rests on a fixed bolt, rests on a stirrup which pivots on a bolt and may be secured to the latter in such a manner that the tube may be adjusted in any inclined position on said stirrup, in order that the moisture of the atomized liquid in said tube may be varied at will.

The advantage of the novel device consists in that, even without heating, and by means of only one tube, inhaling substances of any degree of moisture, from a wet mist to a dry dust or powder may be obtained, according to the inclination of the adjustable tube.

The inhaler is shown in lateral view in the accompanying drawing.

It comprises a plurality of atomizing devices which, under the action of compressed air at $1\frac{1}{2}$ to 2 atmospheres, project the liquid jet against the wall of a balloon or funnel B having a long tube (about 30 to 35 centimeters long) which may be inclined at will by rotatably mounting the funnel B on a bolt A located below the joining parts of the funnel and the outlet R through which the water, having not become atomized, is discharged. With this object in view, the tube is maintained by means of a rotary wooden fork or stirrup C, which may be adjustably secured on its pivot D mounted on the frame.

When rotating the fork C, the middle portion of same describes an arc E F and the inclination of the tube varies accordingly. In such a manner the position of all funnels or of some of same may be adjusted according to the nature of the dry powder or mist to be produced. Instead of a fork a horizontal rod may be utilized on which rest the various funnel tubes so that they may be arranged in any inclined position. The inclination of the tubes should not be-

come lower than 40 degrees when it is desired to blow dry powder through tubes which are not too long. The length of the forks is such that inclinations from 40 to 60 degrees may be obtained. For inclinations lower than 40 degrees the fork should be longer.

Varying substances may flow from the tubes according to the inclination of the latter. When the tubes are nearly in a horizontal position, a clear, thick mist is produced which feels very wet when it strikes the hand; when the tubes are brought in a more upright position, the dust becomes thinner and seems less wet until it looks like a white smoke which becomes progressively thinner and nearly bluish. The microscopical inspection of a mist or powder deposited on an interposed glass plate shows more clearly the cited properties.

When comparing the products from six differently inclined tubes it is found that the three first tubes, having an inclination of between 20 and 35 degrees, provide a mist formed of droplets of 24, 18 and 14 thousandths of a millimeter while the three tubes inclined from 40 to 60 degrees provide a dry powder composed of mineral grains of from 12, 8 and 1-3 thousandths of a millimeter. Furthermore the dry powder from the above apparatus is charged with electricity which remains long after the powder has left the apparatus. This property cannot be found when making use of other systems. The apparatus renders possible to accumulate, in the water used for inhaling purposes, the natural radioactivity of said water or that transmitted to the water in any way by the substances deposited in the recipients of the apparatus, because the apparatus is the only one in which the water, which has not been pulverized, flows back to the recipients, and the active products directly exhale in the room without being heated again and without flowing through long wooden or metal pipes.

When the pressure of the atomizing jet is low, or when the tube B C is short and slightly inclined with respect to the direction of the jet, a wet mist is produced; but the latter may be dried by heating the pipe by means of an electric current flowing through a coil of high specific resistance such as nickelin, wrapped around the tube. In such conditions the temperature in the tube may be raised to 150 degrees Celsius,

owing to which the water (under normal pressure) cannot remain in a liquid state. Owing to such heating a dry powder is obtained when using a tube of 50 centimeters, even when making use of an atomizer operated by hand, by means of a small rubber ball or the like. This process is more particularly advised when the above apparatus is used for dry inhalings for domestic use or in hospitals and the like.

Owing to the system of electric heating in combination with the varying of inclination of the tube, a more or less hot, wet mist may be obtained which is very convenient for complaints of the nose and the wind pipe. The temperature and the degree of moisture of the mist may be varied at will by adjusting the strength of the electric heating current and the inclination of the tube.

Having now fully described our said invention, what we claim and desire to secure by Letters Patent, is:

1. In an inhaler, the combination with a tube having an enlarged portion at its lower end provided with a draining aperture provided with a spout, a framework, a pivot on said framework adapted to engage said spout for supporting the lower end of said tube, and means carried by the framework for varying the angle of inclination of the tube.

2. An inhaler comprising a tube, an enlarged portion at the lower end of said tube, and open at its end, a frame, a pivot secured on said frame for pivotally supporting said enlarged lower portion of said tube, a bolt on said frame, a stirrup pivotally mounted on said bolt and supporting said tube and means for securing said pivoted stirrup, in any inclined position on said bolt, according to the inclination to be given to said tube.

3. An inhaler comprising an inhaling tube, an enlarged portion at the lower end of said tube, an aperture at the end of said enlarged portion, a frame, a pivot secured on said frame, for pivotally supporting said enlarged lower portion of said tube, a bolt secured on said frame, a stirrup pivotally mounted on said bolt and supporting said tube, means for adjusting said pivoted stirrup in any desired inclined position according to the inclination to be given to said tube, an inhaling solution receptacle, a connecting tube between said solution receptacle and the lower end of said tube, a nozzle opening in said enlarged portion of said tube and adjacent the opening of said connecting tube, for sucking said solution and atomizing same within said tube.

In testimony whereof we have hereunto set our hands.

ANNIBALE STEFANINI.
GIUSEPPE GRADENIGO.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."