S. BANTA & B. L. STOWE.

AIR PURIFYING INHALER ATTACHMENT.

APPLICATION FILED SEPT. 9, 1911.

1,013,722.

Patented Jan. 2, 1912.

3 SHEETS—SHEET 1.

Fig. 2.

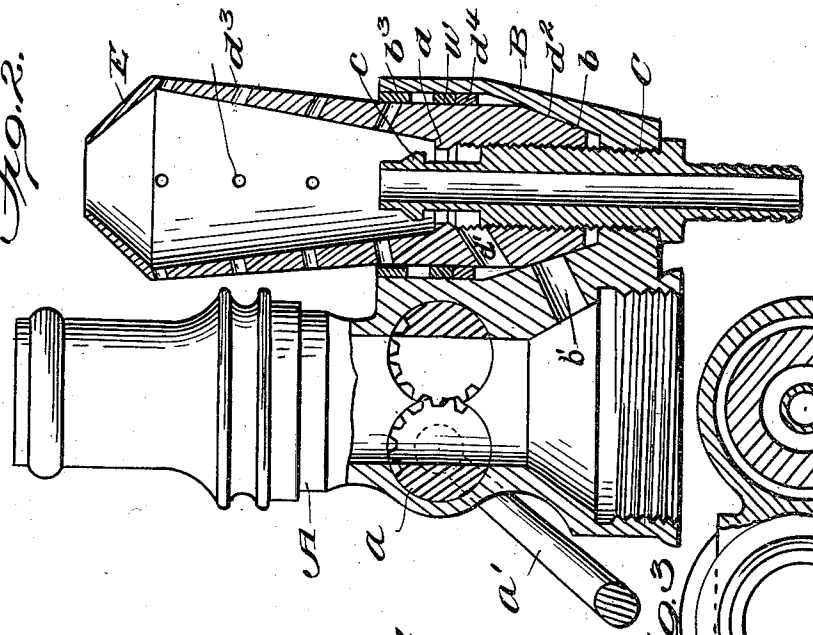

Fig. 3.

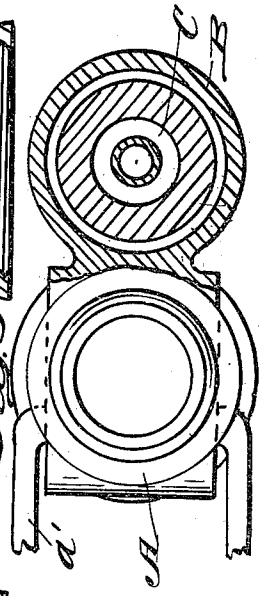

Fig. 1.

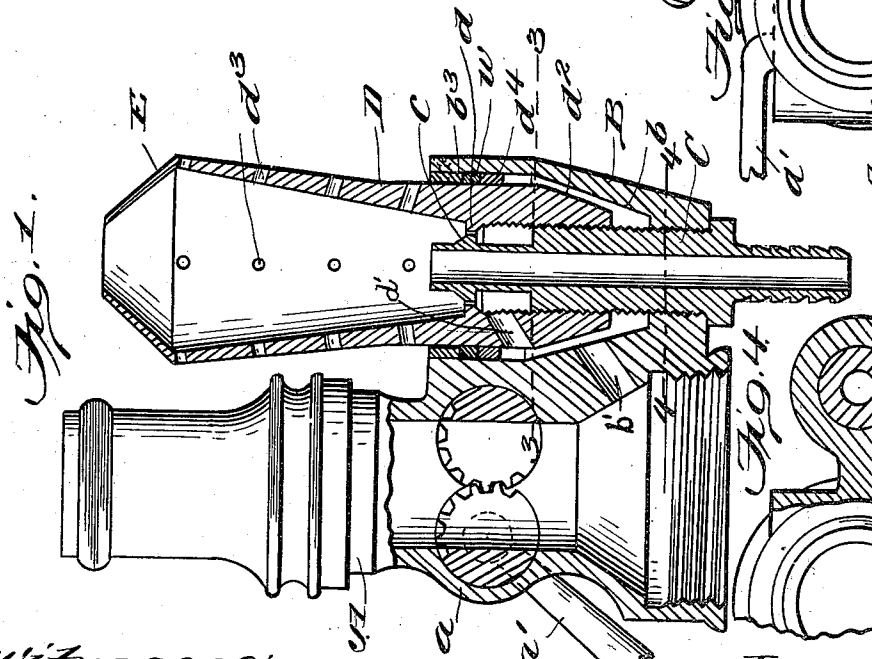

Fig. 4.

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3 SHEETS—SHEET 2.

Fig. 5.

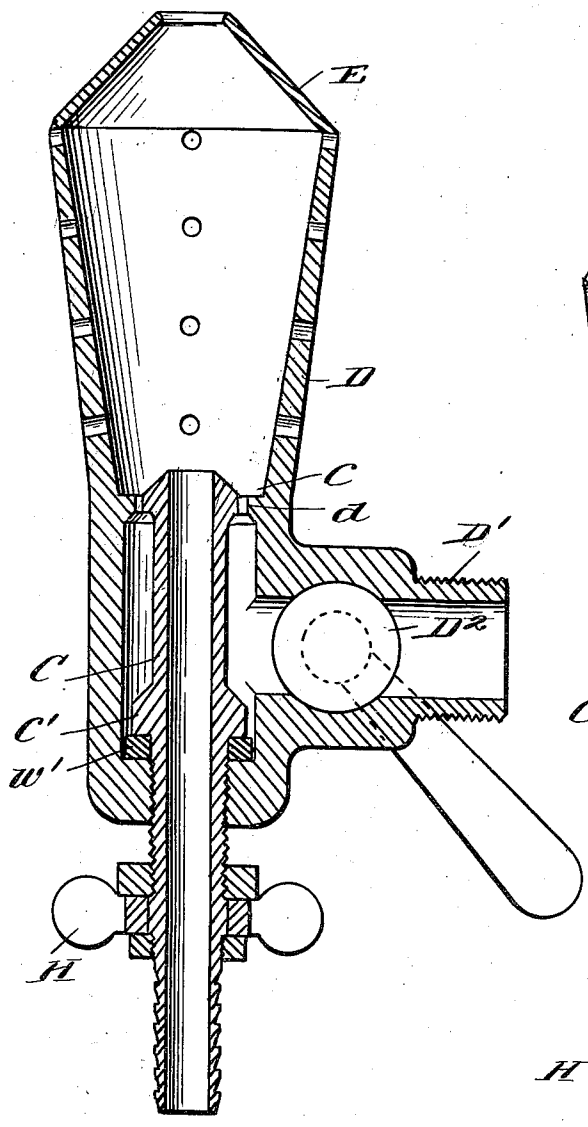
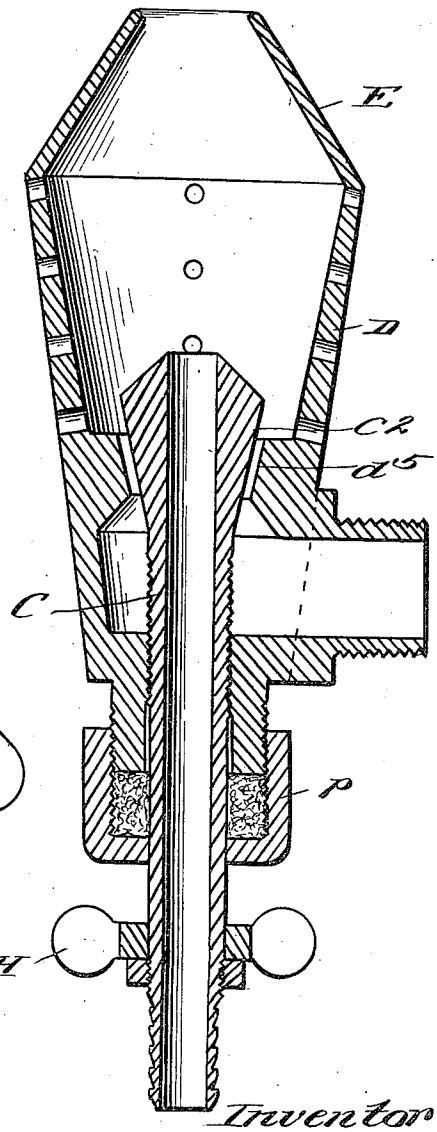


Fig. 6.



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3 SHEETS—SHEET 3.

Fig. 7.

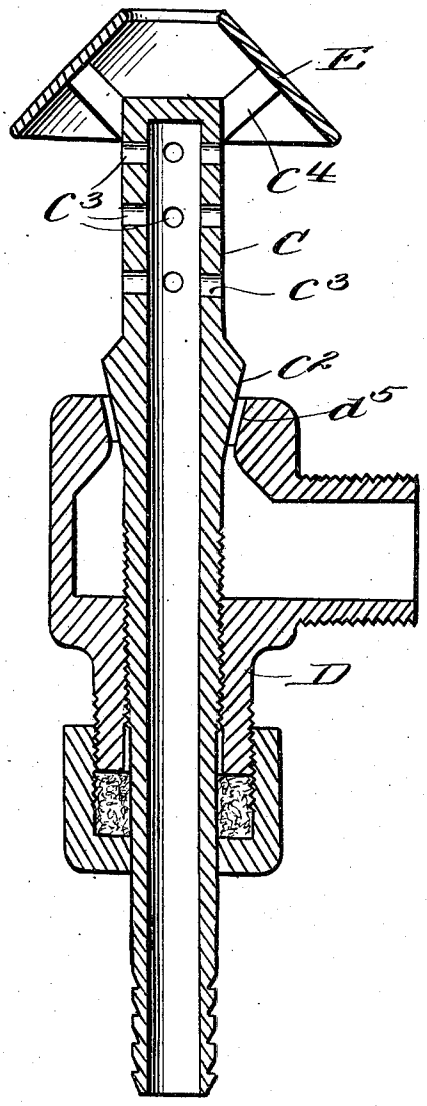
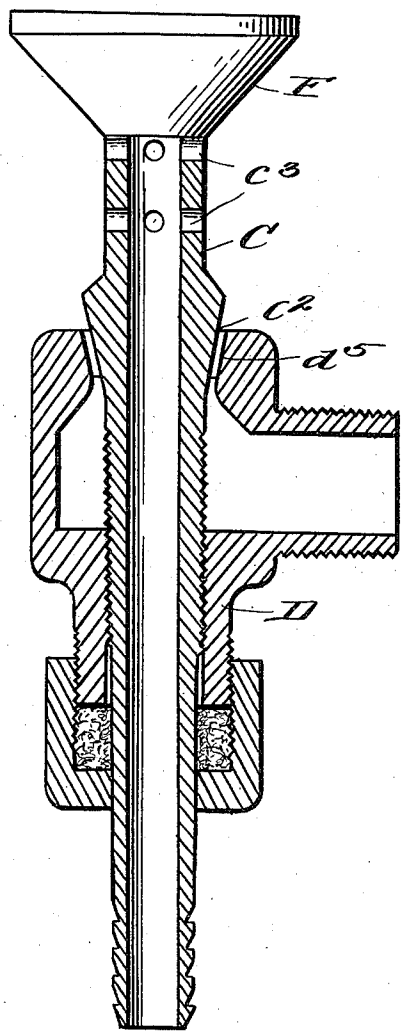


Fig. 8.



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UNITED STATES PATENT OFFICE.

SAMUEL BANTA AND BENJAMIN L. STOWE, OF JERSEY CITY, NEW JERSEY, ASSIGNORS TO EUREKA FIRE HOSE MANUFACTURING COMPANY, OF JERSEY CITY, NEW JERSEY.

AIR-PURIFYING INHALER ATTACHMENT.

1,013,722. Specification of Letters Patent. Patented Jan. 2, 1912.

Application filed September 9, 1911. Serial No. 648,431.

To all whom it may concern:

Be it known that we, SAMUEL BANTA and BENJAMIN L. STOWE, citizens of the United States, and residents of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Air-Purifying Inhaler Attachments, of which the following is a specification.

Our invention relates to that class of air inhaler attachments, in which a moving body of water is used as the purifying agent, the attachment being designed more particularly for use in connection with fire hose nozzles, but being adapted to be connected to any other suitable source of water supply, and being intended, in either case, to secure to the user an ample supply of pure air to breathe, even though he may be surrounded by so dense a smoke, or by such poisonous fumes, that he would otherwise be quickly suffocated.

The chief characteristic of the inhaler is that the air tube is combined with a water chamber connected to a suitable source of water supply, and provided with an annular water discharge orifice or nozzle surrounding the air tube, under such an arrangement that when in operation the mouth of the air tube is completely inclosed within the annular stream of water issuing from said annular orifice or nozzle, whereby the external air is compelled to first pass from the outside through the walls of the annular water jet, before it can reach and enter the air tube. Suitable means are provided for closing the annular water jet at a selected distance beyond the point of discharge, so as to more effectually exclude the entrance of all air except such as shall pass through the walls of the annular jet. These and other features of our improvements can best be explained and understood in connection with the accompanying drawings to which we shall now refer for a better understanding of our invention.

In said drawings—Figure 1 is a longitudinal axial section, partly in elevation, of one form of our inhaler attachment and of a fire hose nozzle of known construction, to which it is represented as being operatively connected. In this figure the parts of the inhaler are shown in the position they occupy when water is turned on. Fig. 2 is a like section of the inhaler with the parts in the position they occupy when water is shut off. Fig. 3 is a section on line 3—3, Fig. 1. Fig. 4 is a section on line 4—4, Fig. 1. Figs. 5, 6, 7, 8 are longitudinal axial sections of modified forms of inhaler attachments hereinafter more particularly referred to.

Like letters of reference indicate corresponding parts in all the figures.

Referring now to Figs. 1–4, A is a hose nozzle or play pipe of any known or suitable construction, having cut-off valve a and operating handle a' as usual. The nozzle, with its valve and handle, is of well known type and requires no further description. B is a metallic tubular shell located on one side of and cast in one with the hose nozzle A. C is the air pipe of the inhaler, passing up axially into the shell B and screwing tightly into a screw tapped opening in the bottom of the same as shown. The lower portion of the air tube within the shell B is thickened; and upon this thickened portion is mounted the nozzle tube D, so as to be adjustable lengthwise of the air tube. This adjustment in the present instance is provided for by a screw joint between the tubes C and D, which will permit the latter to be screwed up or down on the air tube as desired. The tube D has upon its lower portion an external conical bevel d^2, which forms a valve, the seat for which is formed by a corresponding annular bevel b upon the interior of the shell B. The shell B communicates through passage b' with the water way of the hose nozzle at a point in rear of the cut-off valve a. Through this passage b', when it is not closed by the conical valve d^2, water from the water way of the hose nozzle can enter the inhaler shell B, whether the hose nozzle cut-off valve a be open or closed, thus permitting the supply of water to the inhaler to be controlled independently of the hose nozzle valve a. The front or upper portion of this air tube is reduced in diameter to leave between it and the nozzle tube D an annular space forming a water chamber which is supplied with water through conduits d' formed in the walls of the nozzle tube and leading from said chamber into the space in the shell B, which communicates with the water passage b'. At or near the front end of the reduced portion of the air tube C, is an annular rib or flange c, and

upon the interior of the nozzle tube D is a corresponding annular rib or flange d, which, when the parts are in the position shown in Fig. 1, with the passages or ducts b', d' all open, will be opposite to the flange c on the air tube, the two being separated by a narrow annular interval or space, which constitutes the annular orifice from which the water supplied to the inhaler through ducts b', d' is discharged in the form of an annular jet, surrounding and inclosing the mouth of the air tube. The nozzle tube D is prolonged some distance beyond the mouth of the air tube to form the support for a funnel or conical cap E, which surmounts the nozzle tube and has in it a central contracted opening for the escape of the water jet. The object of the funnel E is to close the outer end of the annular water jet against entrance of air, and such is its effect. The water stream issuing from the annular nozzle of the inhaler as an annular jet will retain its annular form until it strikes the funnel E, when its impact against the inclined interior of the same will cause it to contract and condense in the form of a solid jet or stream which will issue from the central hole in the funnel—thus cutting off all communication between the external air and the air tube except through the walls of the annular water jet. External air is supplied to the interior of the nozzle tube D, through suitable air ports d^3, formed in the front portion of the walls of that tube. When it is desired to shut off the supply of water from the inhaler, all that is needed is to screw the nozzle tube D down or back on the air tube C until the valve face d^2 brings up against and closes the water passage b', as indicated in Fig. 2. With the parts in this position it will be noted that the flange d on the nozzle tube D is carried back and away from the flange c on the air tube, enlarging the opening between them, and thus permitting the escape of any solid matter that may lodge in the annular water orifice between these two flanges when the inhaler is in action. This is a feature of practical value inasmuch as, if provision for widening this orifice were not made, dirt and particles of other solid matter, which at times are carried in with the water, might accumulate in the orifice in such quantity as to choke the operation of the inhaler. In lieu of supporting the funnel E upon a flaring prolongation of the nozzle tube D, perforated with air ducts as shown, it can be supported in place by rods or standards, secured to the nozzle tube or other convenient part of the inhaler as preferred, as will be manifest without further description. When the nozzle tube D is screwed back to its rearmost position its tapered valve end d^2 closes the water inlet b', as seen in Fig. 2, thus stopping the action of the inhaler. To start the inhaler, the nozzle tube is screwed forward, and instantly opens the water inlet b', thus permitting water to enter and pass through the annular water space surrounding the front portion of the air tube, and to wash out any dirt therein before the flange d on the nozzle tube is brought opposite to the flange c on the air tube. An annular guide ring b^3 is fixed on the inner face of the shell B, and a like external guide ring d^4 fixed to or formed in one with the nozzle tube D and located at the rear end of the latter. Between these two rings is interposed an annular washer w of leather or other suitable material. When the nozzle tube D is screwed forward to the position shown in Fig. 1, the washer (as there shown) is compressed and packed between the two rings b^3, d^4, acting as a stop, and also to prevent leakage of water from the water chamber of the inhaler. A flexible rubber tube will lead from the rear end of the air tube of the inhaler to the mouth or nostrils of the person who may be using the inhaler, as usual in devices of this character.

In the modification illustrated in Fig. 5, the shell B is dispensed with and the nozzle tube D constitutes also the shell of the inhaler. It is provided with a tubular externally screw threaded connection D′, which communicates with the water chamber of the part D, and by which said part may be attached to a hose nozzle suitably constructed to receive it, or it may be attached to a hose leading to any suitable source of water supply. A water cock D^2 controls the flow of water through the connection D′ into the water chamber of the part D. The air tube C enters the rear end of the nozzle tube D, making a screw joint with the same, so that it may screw forward and back and lengthwise of the nozzle tube. When it is screwed back to rearmost position, the flanges c, d of the air tube C and the nozzle tube D are directly opposite one another to form the annular water discharge orifice surrounding the mouth of the water tube as shown in Fig. 5. In this position an annular shoulder c', on the air tube, will strike and compress a suitable packing washer w', interposed between it and the rear end of the nozzle tube, so as to prevent leakage at the screw threaded joint between the air tube and nozzle tube at this point. The distance between the nozzle orifice flanges c, d, can be increased so as to permit the washing out of any refuse, by advancing the air tube C, on the nozzle tube, a handle H being secured upon its outer squared rear end to facilitate this operation.

In the modification shown in Fig. 6, the construction and operation of the parts are quite similar to that shown in Fig. 5, save that the water cock D^2 of Fig. 5 is dispensed with and in lieu thereof the annular flanges

or ribs on the air tube and nozzle tube, which form the annular water nozzle of the inhaler, have the function of the water cock also. To this end these parts are formed with conical, somewhat prolonged matching faces, contracting from front to rear as shown at c^2, d^5, Fig. 6. They are shown in the position they occupy when ready for use. If the air tube C be screwed forward, the distance between the two faces c^2, d^5, will be increased, so as to permit any refuse or solid matter to be washed out. If it be screwed back far enough, the two faces c^2, d^5, will meet, and shut off the water supply. In this device the joint between the two tubes is kept tight by external packing, and stuffing box, P. The annular jet produced by this inhaler will be a slightly flaring stream, owing to the inclination of the faces c^2, d^5; but will be contracted and drawn together by the funnel E.

In the modification shown in Fig. 7, the upward flaring prolongation of the nozzle tube D, which supports the funnel E, as in Fig. 6, is dispensed with and the funnel is supported by standards c^4, attached to the air tube C. The air tube is prolonged some distance beyond where the nozzle faces c^2, d^5, are located; is closed at its outer or front end; and takes the air in through ports c^3, in its sides. In other respects the arrangement is substantially that of Fig. 6. The standards c^4 are made thin and brought to an edge on the side which the water first strikes, so that while they may split the stream, the disturbance will be very slight, and as the funnel causes all parts of the jet to converge into a solid stream, the complete separation of the air space within the jet from the outside air is maintained.

In the modification shown in Fig. 8, which represents only so much of the inhaler as needed for purposes of explanation, the arrangement is similar to that illustrated in Fig. 7, save that the funnel E is dispensed with, and in lieu thereof there is a beveled disk F mounted upon the outer end of the air tube. This disk, which may be substituted for the funnel in any of the forms of inhaler illustrated, closes the outer end of the air space which intervenes between the air tube and the annular water jet, and, being of somewhat larger diameter at its outer end than the water jet, the latter by its impact against the flaring beveled sides of the disk will be spread and will pass off in the form of spray.

The conical funnel E should be large enough at its base to receive the annular water jet, and it acts to contract and bring this annular jet together into a solid stream at or just beyond the central opening in it, and although the stream again sprays after passing this point, yet the effect of the action of the funnel is to close the annular stream at the selected point, thus effectually shutting off the air space within the annular water jet from direct communication with the outside air, this space being closed by water walls through which the outside air must pass before it can enter therein. We have found in practice that good results can be attained by an annular jet or stream issuing under a pressure of 75 pounds per square inch. The walls of such a stream will slightly expand and contract by exhalation and inhalation, but all the air that one can inhale or exhale passes through the walls of such a stream without serious resistance, the incoming air being thoroughly purified during its passage therethrough. An annular jet under low pressure and with walls smooth and glassy in appearance will not give the desired result, inasmuch as under these conditions the water walls seemingly are impermeable to air, which fails to be supplied to the inhaler.

While mentioning a definite pressure as giving good results, we do not of course desire to be limited to that specified pressure, inasmuch as the same can be varied within considerable limits.

Having described our improvements and the best way now known to us of carrying the same into practical effect, we state in conclusion that we do not restrict ourselves to the structural details hereinbefore set forth in illustration of our invention, for manifestly the same can be varied considerably in many respects without departure from the principle of our invention; but

What we claim herein as new and desire to secure by Letters Patent is as follows:

1. In an air purifying inhaler, a central air tube, provided in rear of its open front and with an opening from which the air to be inhaled is drawn, in combination with a water chamber adapted to communicate with a source of water supply under pressure, and an annular opening surrounding the air tube from which water under pressure is discharged as an annular jet through the walls of which the air to be inhaled must pass before entering the air tube, substantially as and for the purposes hereinbefore set forth.

2. In an air purifying inhaler, a central air tube, a water chamber adapted to communicate with a source of water supply and an annular water discharge opening surrounding said air tube, in combination with means in advance of the said opening for closing the annular stream or jet issuing therefrom, whereby the air space within said jet is completely inclosed by water walls, through which the outside air must pass before reaching the air tube, substantially as and for the purposes hereinbefore set forth.

3. In an air purifying inhaler, the combi-

nation of an air tube and a nozzle tube longitudinally movable relatively to one another, the nozzle tube encircling the air tube and adapted to communicate with a source of water supply under pressure, an annular opening between said air tube and nozzle tube from which the water is discharged in the form of an annular jet, and means controlled by the longitudinal movement of said tubes for shutting off and letting on said water discharge.

4. The combination with a hose nozzle or play pipe and valve for controlling the stream of water issuing from the same of an inhaler attachment comprising a central air tube, a water chamber having an annular water discharge orifice surrounding the air tube, a duct connecting the water chamber of the inhaler with the water way of the hose nozzle at a point in rear of the hose nozzle valve, and a separate and independent valve for controlling the passage of water to the inhaler, substantially as and for the purposes hereinbefore set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

SAMUEL BANTA.
BENJAMIN L. STOWE.

Witnesses:
N. F. McKeon,
Evelyn L. Norris.

Correction in Letters Patent No. 1,013,722.

It is hereby certified that in Letters Patent No. 1,013,722, granted January 2, 1912, upon the application of Samuel Banta and Benjamin L. Stowe, of Jersey City, New Jersey, for an improvement in "Air-Purifying Inhaler Attachments," an error appears in the printed specification requiring correction as follows: Page 3, line 106, for the word "and" read *end;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office,

Signed and sealed this 30th day of January, A. D., 1912.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.