F. A. HOLLEMAN.

INHALING APPARATUS.

APPLICATION FILED JUNE 1, 1907.

999,451.

Patented Aug. 1, 1911.

3 SHEETS—SHEET 1.

fig 3.

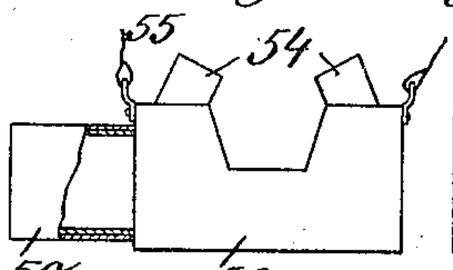


fig. 4.

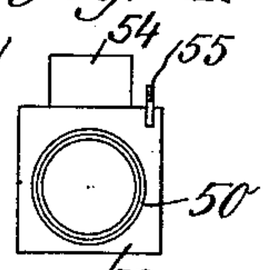


fig. 1.

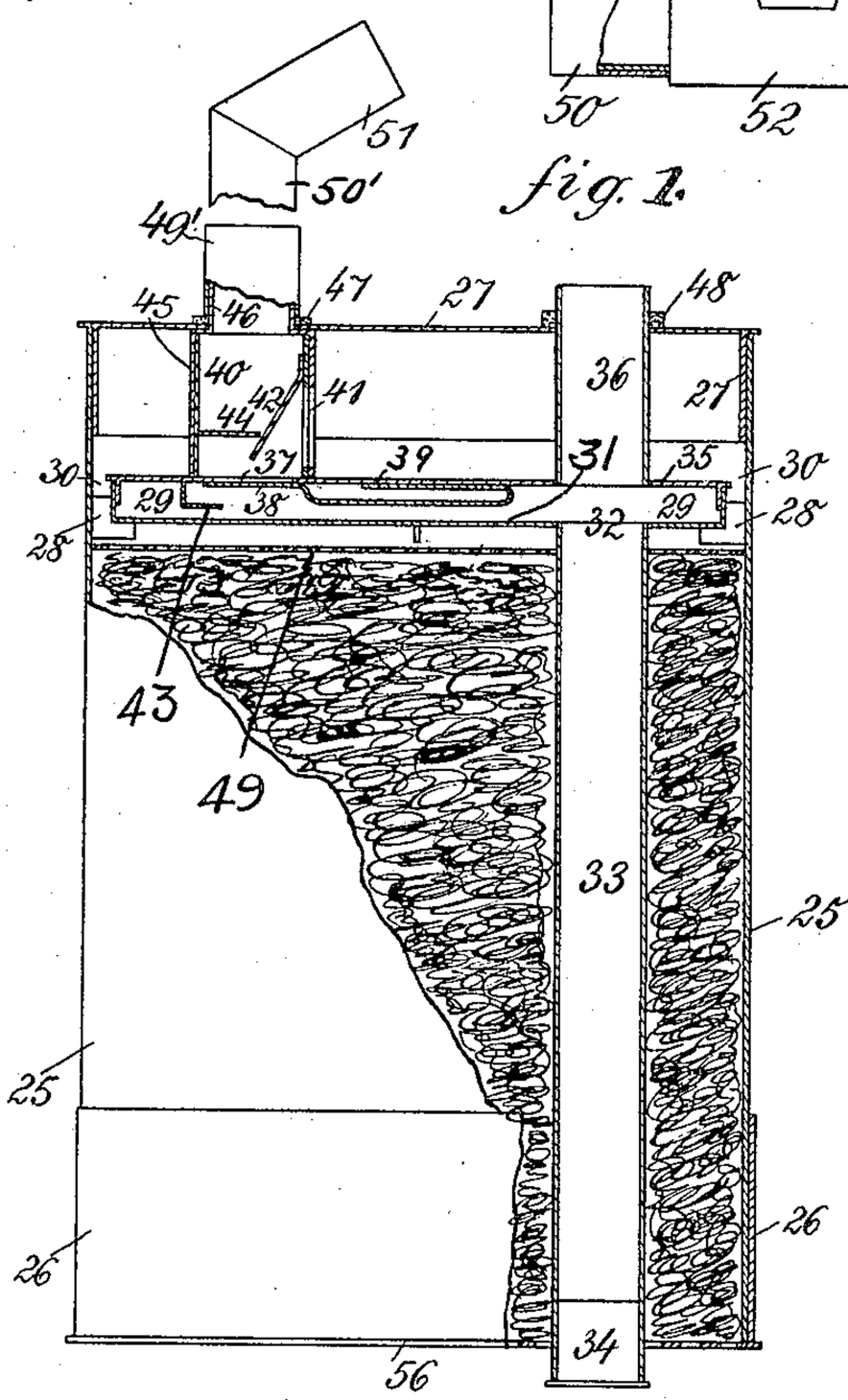
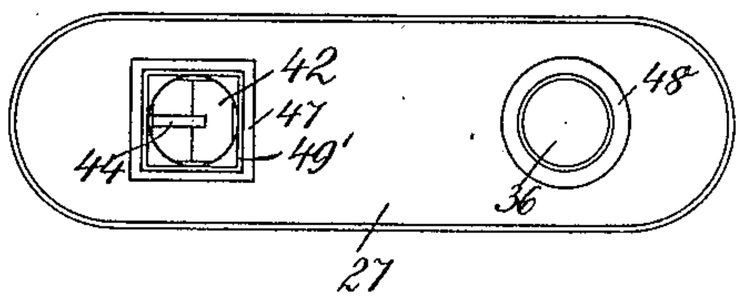


fig. 2.



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3 SHEETS—SHEET 2.

fig. 7. fig. 8.

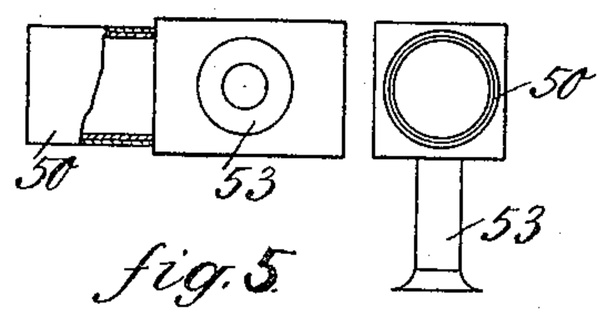


fig. 5.

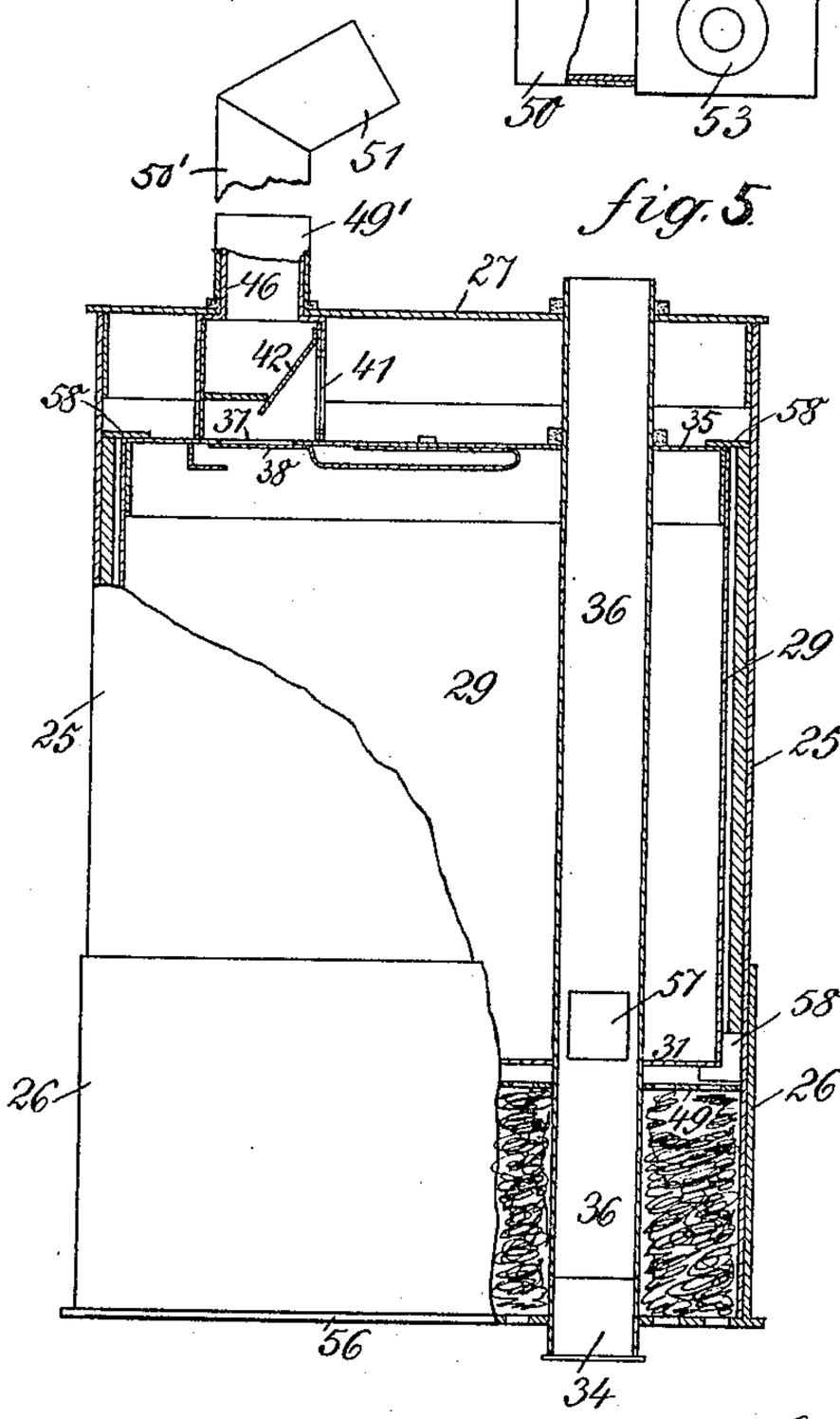
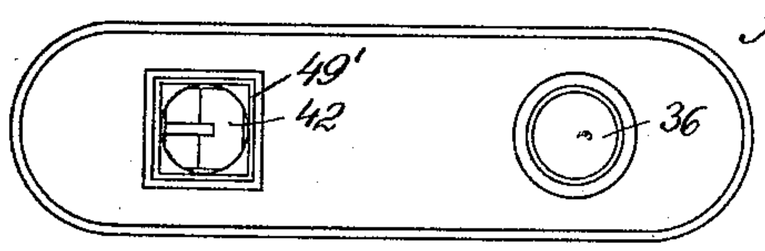


fig. 6.



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3 SHEETS—SHEET 3.

fig. 9.

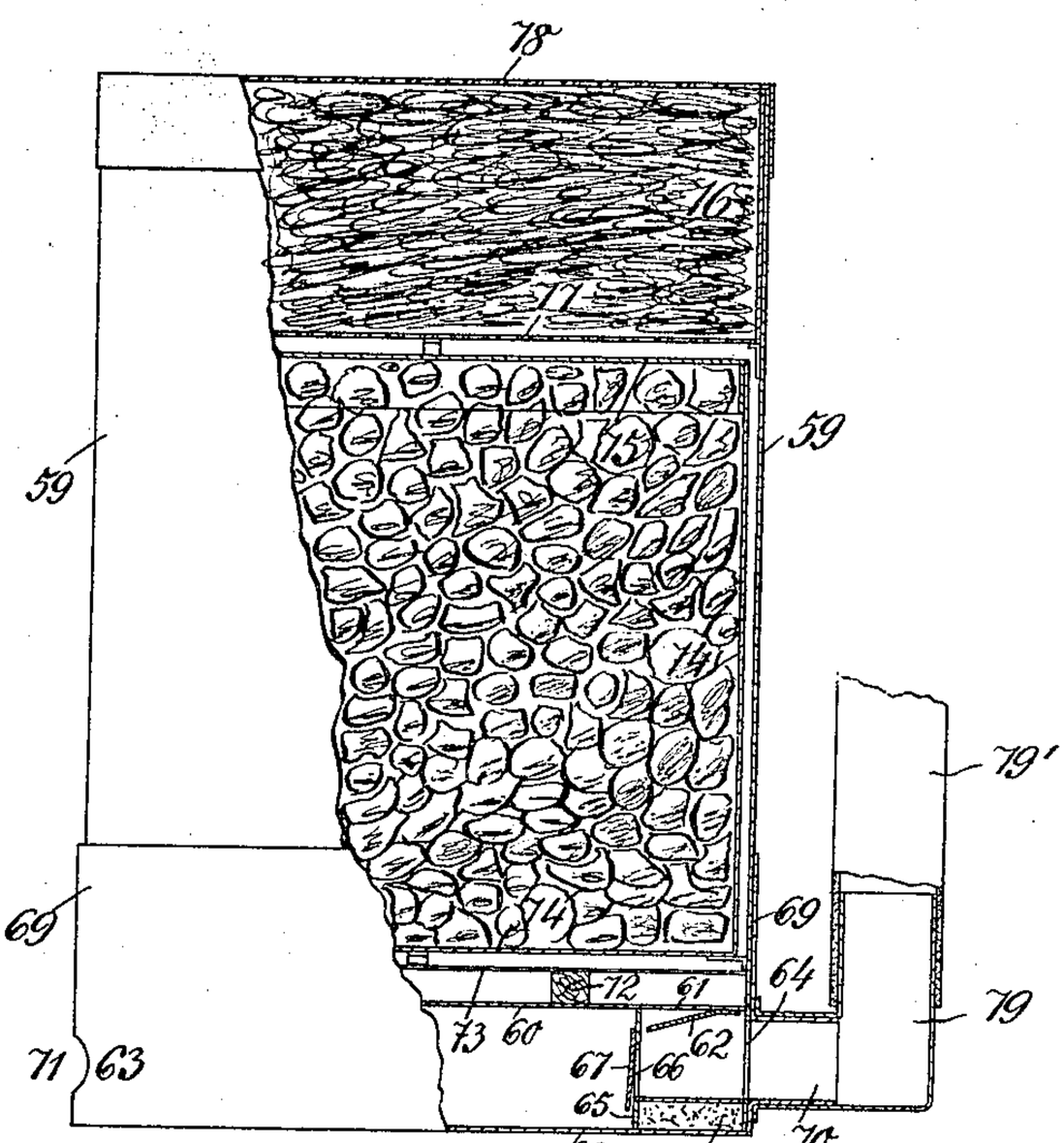
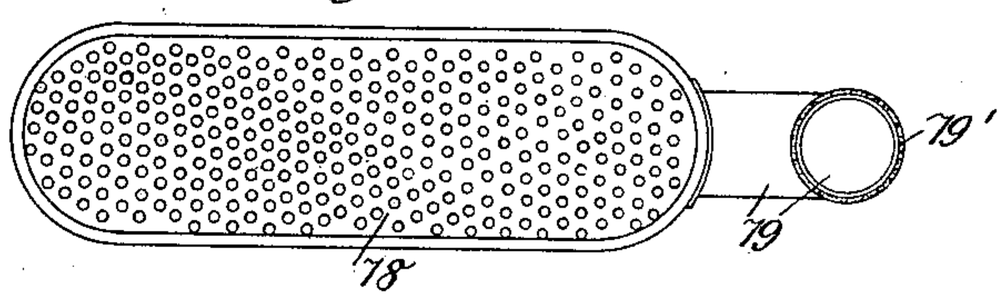


fig. 10.



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UNITED STATES PATENT OFFICE.

FREDERIK ARNOLD HOLLEMAN, OF THE HAGUE, NETHERLANDS.

INHALING APPARATUS.

999,451. Specification of Letters Patent. Patented Aug. 1, 1911.

Application filed June 1, 1907. Serial No. 376,811.

To all whom it may concern:

Be it known that I, FREDERIK ARNOLD HOLLEMAN, gentleman, a subject of the Queen of the Netherlands, residing at No. 149 Tasmonstraat, The Hague, Netherlands, have invented new and useful Improvements in Inhaling Apparatus, of which the following is a specification.

This invention relates to an apparatus for separating dust and other impurities from air which is to be inhaled.

The novel features of the invention will be hereinafter fully described and then particularly pointed out in the claim.

In the accompanying drawings, Figure 1 is an elevation and part section of a portable filter, and Fig. 2 is a plan thereof. Fig. 3 is a plan and part section of a nose piece, and Fig. 4 is an end elevation thereof. Fig. 5 is a plan and part section of a modification of the portable filter, and Fig. 6 is a plan thereof. Fig. 7 is a plan and part section of a mouth piece, and Fig. 8 is an end elevation thereof. Fig. 9 is an elevation and part section of another modification of the portable filter, and Fig. 10 is a plan thereof.

Figs. 1–10 show portable air filters for individual use. 25 is a case of ebonite or varnished metal, whose bottom is closed by a cap 26 having a perforated base, while the top is closed by a cover 27 which fits into it. To the case 25 are attached four small lugs 28, supporting a box 29, between which and the case 28, there is sufficient room 30 for the air to pass. The bottom 31 of the box 29 has an opening 32, which constitutes the mouth of a tube 33, attached to the box and passing through the case 25 and through the cap 26, its lower end being closed by a stopper 34. This tube 33 serves to collect exhaled moisture, and can be emptied by removal of the stopper 34. The box 29 is closed by a cover 35 which fits into it. This cover 35 has attached to it a tube 36 which passes up through the cover 27 of the case 25. The cover 35 has a square opening 37 closed by a spring valve 38 attached at 39 to the cover 35. Above this opening 37 the cover 35 has attached to it an open valve box 40 and having at one side an opening 41 which is closed by a valve 42. The extent of opening of the valves 38 and 41 is limited by studs 43 and 44 respectively. The box 40 is entirely inclosed by a casing 45, which has an opening corresponding with the valve opening 41 and supports a tube 46, through which air is inhaled. A tight joint is made between the cover 27 and the pipes 46 and 36 respectively by means of rubber gaskets 47, 48. Below the lugs 28 there is a perforated partition 49 covered with wire gauze. The case 25 is loosely, but uniformly filled with mineral, vegetable or animal fibers, moistened with an antiseptic solution (for example chlorid of zinc at 55° Baumé) and is then closed by the cap 26, having a perforated bottom 56. The tube 46 is joined by means of tightly fitting collars 49′, 50′, and an elbow 51, to a casing 52 (Figs. 3 and 4), or to a mouthpiece 53 (Figs. 7 and 8). The casing 52 has two small nipples 54, adapted to fit the nostrils, and can be attached to the head by bands 55. The apparatus, now ready for use, may be placed in an outside pocket, if the air to be inhaled is to be kept cool, or in an inside pocket if it is to be warmed. The casing 52 having been applied to the nose (or the casing 53 to the mouth), the inhaled air will flow through the perforated bottom 56, filtering material, partition 49, and past the box 29, to the valve 42, which it opens, then rushing farther through the tube 46 to the casing 52 (or to the mouthpiece 53). On expiration the exhaled air will close the valve 42, and, opening the valve 38, will escape through the tube 36 to the open air.

Figs. 5 and 6 show a modification of the filter just described, by means of which the air to be inhaled is warmed after being filtered. The box 29 is here considerably larger and is of red copper, which is quickly warmed by the exhaled air. The inhaled air passes through the bottom 56, and filtering material and along the outside of the warmed box 29 to the valve 42 and through the tube 46. The exhaled air closes the valve 42, passes through the valve 38 and enters the box 29, which is warmed by it, and escapes partially cooled through the opening 57 and the tube 36 to the open air. The condensed vapor accumulating at the bottom 31 of the box 29, flows through the opening 57 into the tube 36 and can be drained off by removing the stopper 34. The wall of the space between the zinc case 25 and the copper box 29, like that between the zinc cover 27 and the copper cover 35 is narrowed by woolen cloth stuck to the inside of this cover and of the box 25 and held at equal distances from the box by studs 58, thus forcing the inhaled air to strike quite

closely along the casing 29 and the cover 35 and to take up the warmth collected by them from the exhaled air. The inhaled air flows along the wall of the box 29 and the cover 35 and takes up the warmth absorbed by them from the exhaled air. Since the latter contains much moisture and carbonic acid, all metallic parts of the apparatus should be varnished. The box 29 is held in position by lugs 58.

Figs. 9 and 10 illustrate another modification of the portable air filter. With this apparatus the air which is to be inhaled can not only be filtered but also cooled when the weather is hot, or impregnated with aromatic or other vapors. The apparatus consists of a casing 59 which has near its lower end a partition 60. This partition has an opening 61 closed by a valve 62. Beneath the partition 60 the casing 59 has two openings 63, 64 and a vertical wall 65, having an opening 66 which is closed by a valve 67. After the valve 62 has been fitted to the partition 60 of the casing 59 the space beneath them is closed by a pad 68 of rubber, and then the lower end of the casing 59 is closed by a cap 69. This cap has an opening, and a tube 70 fitted thereto, corresponding with the opening 64 in the casing 59; it has also an opening 71, corresponding with the opening 63 of the casing 59. Air is inhaled through the tube 70 and the exhaled air escapes through the opening 71. Upon the partition 60 are located blocks 72 bearing a perforated partition 73 covered with wire gauze; above this is a box 74, closed by a cover 75. The box 74 is filled with ice, which serves to cool the air passing along its outside walls. Any moisture resulting from condensation can be removed through the openings 66 and 71. Located above the box 74 is a box 76, accurately fitted into the box 59 and containing the filter material, which lies upon the perforated wire gauze covered box bottom 77. The box 76 has also a perforated cover 78. When the air to be inhaled is to be aromatized, the ice box 74 is removed and in its place the casing 59 is filled with impregnated cotton, aromatic plants, or the like. To the tube 70 is joined an elbow 79 and a tube 79^1 of rubber or the like, leading to a casing 52, or to a mouthpiece 53, as shown in the Figs. 3, 4, 7 and 8. The air to be inhaled passes through the cover 78, filtering material, box bottom 77, and along the outside of the ice box 74 closed by the cover 75 (or through the aromatic plants), whereupon it opens the valve 62 and then passes through the aperture 64, and tubes 79 and 79^1 to the nose or to the mouth. On expiration the exhaled air closes the valve 62, opens the valve 67 and escapes through the openings 63, and 71.

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

A filtering apparatus, comprising a case partly packed with filtering material and having an air inlet, inhaling and exhaling means separated therefrom by the filtering material, an ice chamber, a vitiated air chamber communicating with said means and having an outlet to the atmosphere, a back pressure valve controlling the path of flow of filtered air to said means and a back pressure valve controlling the communication between said means and the vitiated air chamber, substantially as described.

In witness whereof I have hereunto signed my name this sixteenth day of May 1907, in the presence of two subscribing witnesses.

FREDERIK ARNOLD HOLLEMAN.

Witnesses:
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