United States Patent [19]

Keindl

[11] **3,884,223**

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[54] **NASAL FILTER**

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[73] Assignee: **Lawrence Peska Associates, Inc.,** New York, N.Y. ; a part interest

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[52] **U.S. Cl.** ..... **128/140 N;** 55/DIG. 35

[51] **Int. Cl.** **A61m 15/08**

[58] **Field of Search** ..... 128/140 N, 140 R, 147, 128/206, 207, 208, 211, 146.6, 152; 55/DIG. 35, 103

[56] **References Cited**

UNITED STATES PATENTS

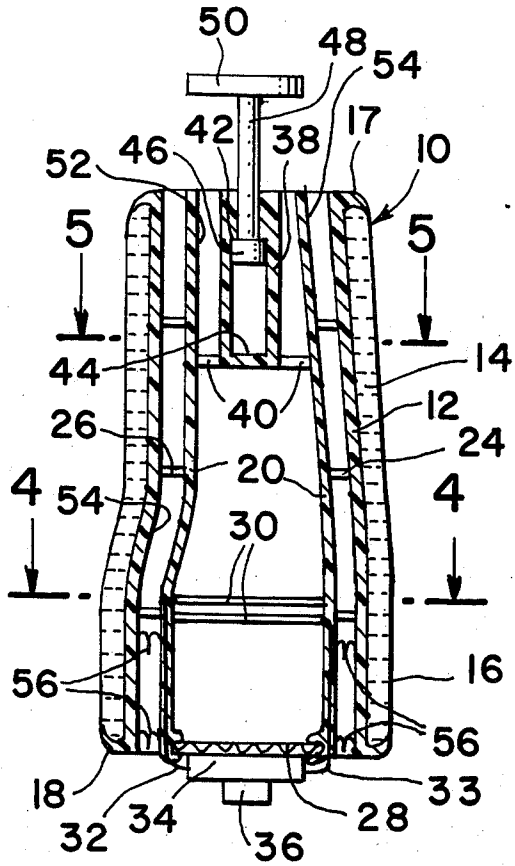
2,067,822	1/1937	Biederman	128/146.6
2,526,586	10/1950	Shuff	128/140 N
3,028,864	4/1962	Minto	55/103
3,457,917	7/1969	Mercurio	128/140 N
3,731,678	5/1973	Pyzel	128/147

Primary Examiner—Richard A. Gaudet
Assistant Examiner—Henry J. Recla

[57] **ABSTRACT**

A nasal filter has a pair of members fitting in the nostrils, each member having a central air intake passage with a screen between the front end of the passage and the ambient air. The central passage is surrounded by an annular exhaust channel closed by a one way valve allowing exhaled breath out. A slidable closure plate closes the back end of the air intake passage during exhaling to avoid mixing fresh and vitiated air, the plate being pushed against the end of the channel by the pressure of the exhaled air. An electronic filter powered by a battery to which both members are attached is positioned in the central passage for holding dirt or other particles which may pass through the screen.

4 Claims, 7 Drawing Figures



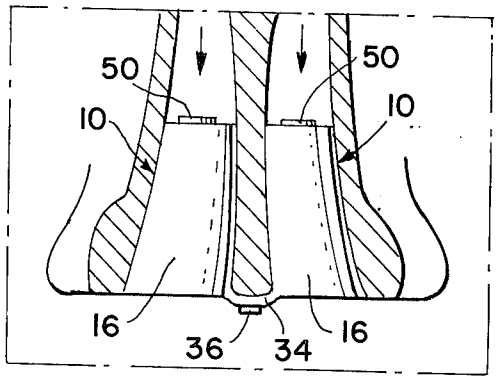


Fig. 1

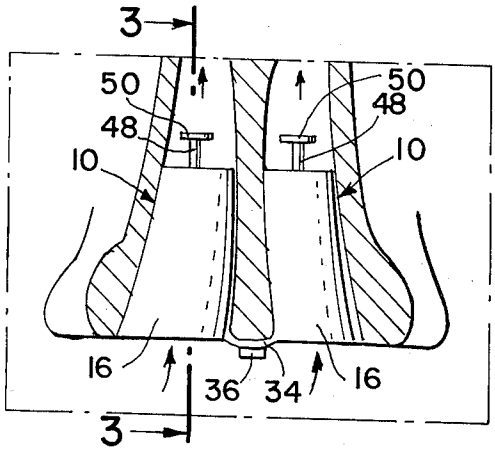


Fig. 2

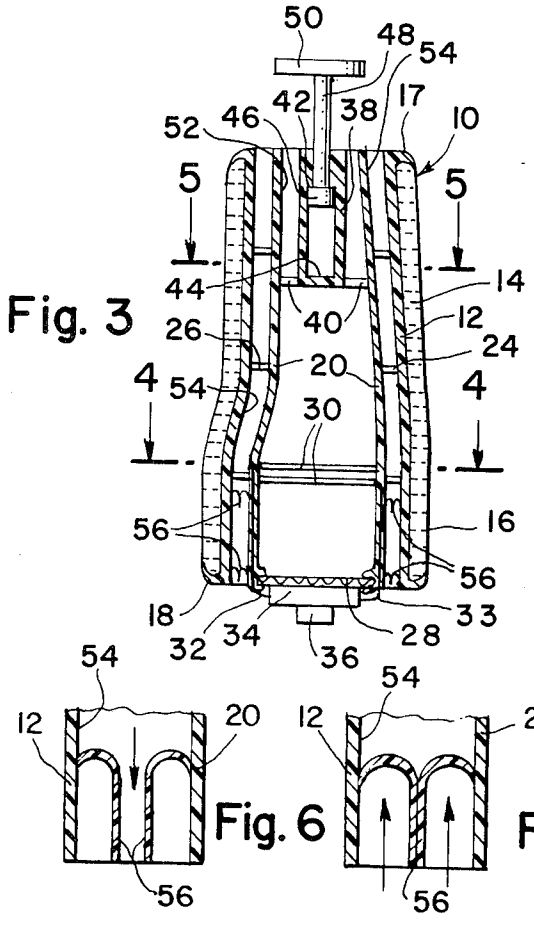


Fig. 3

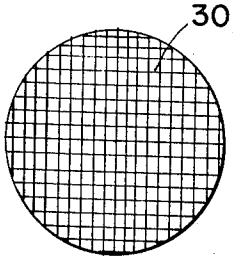


Fig. 4

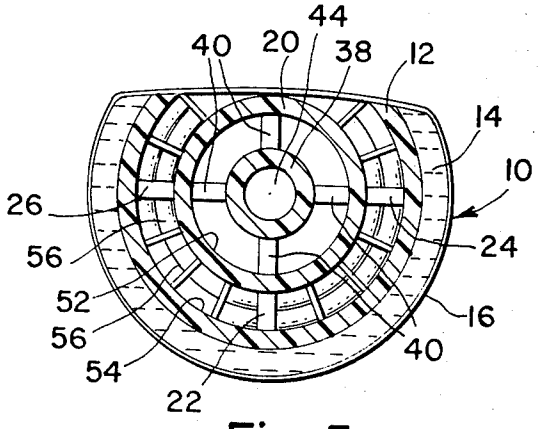


Fig. 5

Fig. 6

Fig. 7

NASAL FILTER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention is concerned with a filtering device for insertion in the nostrils to prevent foreign particles from entering the nasal passages by excluding physically the greater part of such particles and the rest by electrostatic precipitation.

Nasal filters are being used more in industry and by inhabitants of cities where the air quality is unacceptable. Heretofore such filters depended on physical means only to exclude foreign matter and were not completely successful in so doing. Some of the filters proposed are uncomfortable to wear. Others do not effectively prevent mixing air being inhaled from vitiated air being exhaled.

2. State of the Art

The art to which this invention relates already is aware, inter alia, of the devices described in U.S. Pat. Nos.: 2,526,586; 2,535,155; 2,890,695 and 3,457,917. The filters described in these patents do not include electrostatic precipitating means.

SUMMARY OF THE INVENTION

The principal object of this invention is to provide a device or article of this character which combines simplicity, strength and durability in a high degree, together with inexpensiveness of construction.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the following claims.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawing, in which is shown one of the various possible illustrative embodiments of this invention, wherein like reference character identify the same or like parts:

FIG. 1 is an elevational view of a filter of the invention shown in place within the nose of a wearer and showing the filter during exhalation;

FIG. 2 is the same as FIG. 1 for the inhalation cycle;

FIG. 3 is a cross-sectional side view of one filter unit;

FIG. 4 is a top plan view of one of the electrostatic precipitator;

FIG. 5 is a cross-section through line 5—5 of FIG. 3 showing details of the air shafts and canals;

FIG. 6 is a detailed cross-sectional view of the one way valve in the air canals of FIGS. 3 and 5 shown open during exhaling; and

FIG. 7 is the same showing the valve closed.

With reference to the drawing, there is shown and illustrated a nasal filter constructed in accordance with the principles of the invention and designated generally by reference character **10.**

As shown in FIGS. **1** and **2,** the filter comprises an insertable unit for each nostril. The unit is illustrated in detail in FIG. **3.** The filter unit comprises a body **12** shaped to conform generally to the contour of the nasal passage and made of easily moldable plastic such as polyethylene, polystyrene, polypropylene bakelite or of hard rubber. To fit better in the nasal passage, body **12** is surrounded by a coating of liquid or petroleum jelly

14 covered by a thin flexible membrane **16** of polyvinyl chloride or polyethylene fused to the crimped end of body **12** as at **17** and **18** (FIG. **3**). An inner plastic elongated member **20** with its sidewalls generally parallel to body **12** is connected thereto by a plurality of spaced ribs - **22, 24, 26.** Member **20** forms the air intake passage for the filter as indicated by the six arrows in FIG. **3.**

At the outer end of member **20** is removably mounted a disc filter **28** of well known construction, such as for example, but not by way of limitation, a mesh metallic gauze having a plurality of closely packed openings. This filter prevents particulate foreign matter from entering the nasal passages of the wearer. Preferably, the disc is force-fitted at the extremity of member **20** so that it may be removed for cleaning. Interposed within member **20** is a precipitator screens **30** (FIG. **4**). The top screen of which is connected by wire **32** to the positive side of battery **34** and the bottom screen of which is connected to the negative pole by wire **33.** The wires leading from the battery **34** to the two bodies **10** can serve also to keep these together in the manner of a clip. A micro-switch **36** is provided on the battery since the same is intended to be turned on only when the ambient air is highly polluted.

As shown in FIG. **3,** a cylinder **38** is formed at the inner end of member **20** and is secured thereto at its outer end by radial ribs **40** (FIG. **5**). Cylinder **38** is formed with an upper stop **42** and lower stop **44** for limiting the course of plunger **46** in its axial bore. Rod **48** connects plunger **46** to flat closure **50** so as to close the peripheral air passage **52** between the outside of cylinder **38** and the inner section or wall of member **20** during exhaling (FIG. **1**). Plunger **46** preferably should be of self-lubricating plastic such as "teflon" in order to slide easily in response to inhaling (FIG. **2**) and exhaling stages. During the latter stage, no exhaled substances (mainly CO_2, N, and H_2O) pass through body **20** but instead through air canal **54** between the outer surface of body **20** and the inner surface of body **12.** Air canal **54** has a one way valve **56** which opens upon application of exhaling pressure as shown in FIG. **6** but remains closed during inhaling as shown in FIG. **7.**

This filter is especially useful in alleviating the symptoms associated with hay fever and is also adapted for use by persons in areas where various foreign substances are present in the air which might cause discomfort or even occupational diseases.

The operation and use of the invention hereinabove described will be evident to those skilled in the art to which it relates from a consideration of the foregoing.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

Having thus described the invention, what is claimed as new is:

1. A nasal filter comprising a pair of insertable members shaped to conform to the shape of nasal passages; each member including: a central air intake passage ex-

tending longitudinally of each member; a filtering element at one end of said passage positioned transversely thereof; a closure at the other end of said passage slidably mounted therein for closing said passage upon the application of exhaling pressure on said closure; electrostatic precipitator means in said passage; an annular exhaust air canal around said central passage spaced therefrom having a one way valve therein for allowing egress of exhaled air only; a battery and electrical connectors connecting said battery to said precipitator means and serving also to hold said insertable members together.

2. The filter of claim **1** wherein said insertable members have an outer coating of flexible plastic.

3. The filter of claim **1,** wherein said closure consists of a disc fitted over said other end of said passage; said disc being secured to one end of a rod, said rod having at its other end a plunger of self lubricating material, a cylinder in said passage, said plunger being slidably mounted in said cylinder.

4. The filter of claim **1,** wherein said battery is provided with a switch.

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