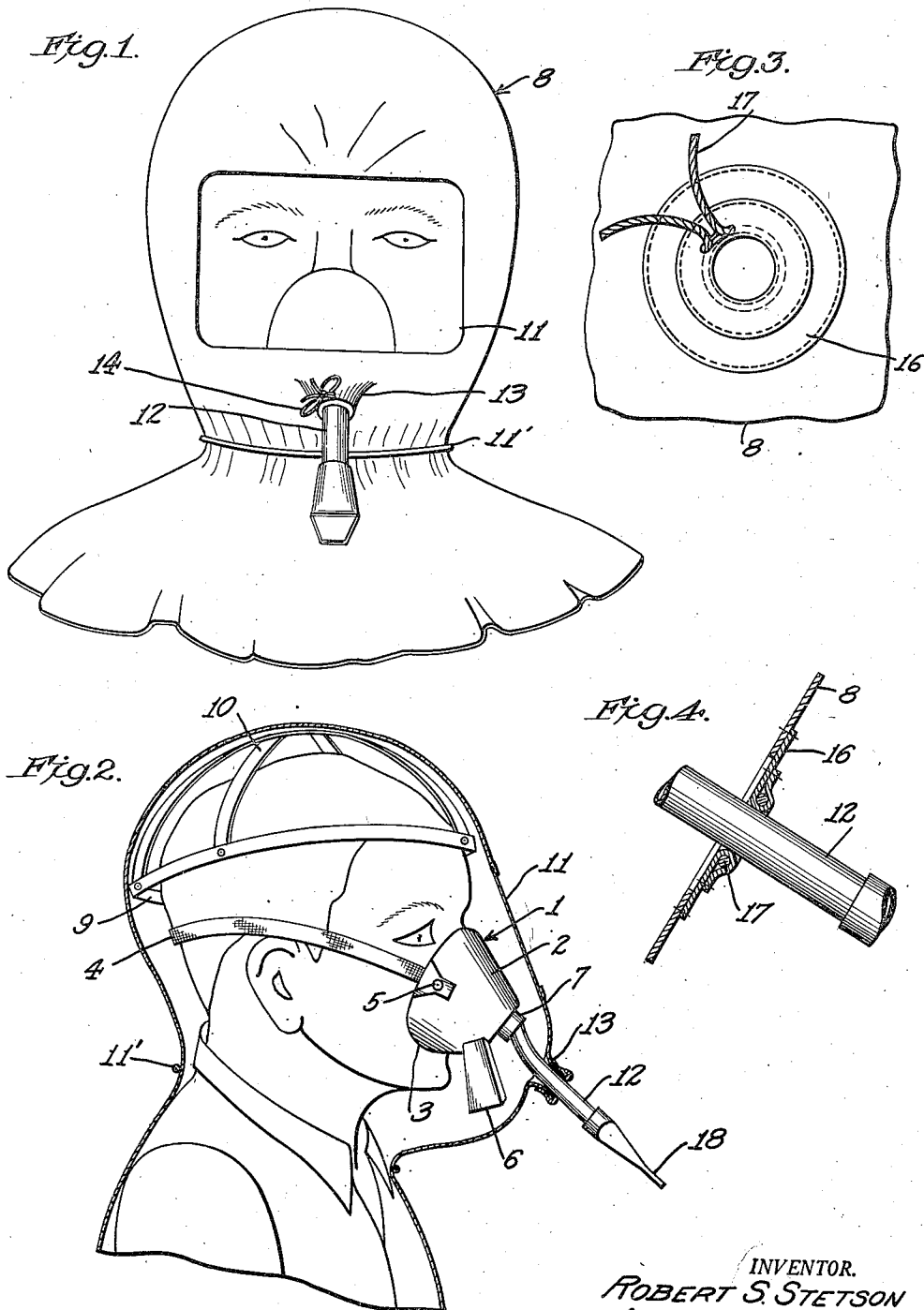


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R. S. STETSON
PROTECTIVE DEVICE
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INVENTOR.
ROBERT S. STETSON
BY *Gordon A. Wilkins*
ATTORNEYS

UNITED STATES PATENT OFFICE

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PROTECTIVE DEVICE

Robert S. Stetson, Buffalo, N. Y., assignor to
Allied Chemical & Dye Corporation, New York,
N. Y., a corporation of New York

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This invention relates to an improvement in devices for protecting the wearer from irritating and harmful matter suspended in the atmosphere, such as dust and the like.

The protection of workers in industrial factories and other occupations from harmful matter suspended in the air, such as irritating dusts and fumes, is of recognized importance. Various filter-type respirator masks prevent inhalation of dust but do not protect the head and neck of the wearer against irritation. While a hood for protecting the head and neck may be worn over the mask, in practice such hoods cause serious discomfort by either restricting the head movement of the wearer or by promoting accumulation of moisture and heat within the hood, or both. Owing to this discomfort, workers are prone to remove the hoods after wearing them for a relatively short time even at the risk of irritating or otherwise injuriously affecting the eyes and skin due to the foreign matter in the atmosphere.

It is an object of this invention to provide a novel combination of a hood or helmet for the head of the wearer and a respirator mask, which combination adequately protects the head and thereby the eyes and respiratory system of the wearer from dust, and may be worn for prolonged periods with little discomfort.

It is a further object of the invention to provide a hood for the head and neck and a filter-type respirator mask adapted to cover the oral and nasal passages of the wearer, the hood and mask being arranged to minimize accumulation of moisture around the head and neck and permit head movement with minimum restriction. Other objects and advantages will appear hereinafter.

The invention involves a respirator mask adapted to cover the mouth and nasal passages of the wearer, a hood readily permeable to water vapor and air but resistant to passage of dust adapted to cover the mask and head of the wearer, the mask being provided with an inhalation inlet equipped with an air filter within the hood and an exhalation outlet discharging through flexible means exteriorly of the hood. The invention promotes circulation of relatively dry air in the space between the hood and head of the wearer and discharge of moisture-laden breath without the hood, thus minimizing accumulation of heat and moisture around the head. The flexible connection for discharge of exhaled air exteriorly of the hood is constructed to permit movement of the head without undue restriction.

The structure of the invention and the advantages thereof will be more fully understood from

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the following detailed description and from the accompanying drawing illustrating a preferred embodiment of the invention, in which

Fig. 1 is a front view of the invention on the head of a wearer;

Fig. 2 is a side view illustrating the combined hood and mask on the head of a wearer, parts of the hood being shown in section; and

Figs. 3 and 4 are detail views illustrating a modified form of connection between the hood and exhalation tube.

Referring more particularly to the drawing, reference numeral 1 designates a respirator mask of the oronasal type which covers the mouth and nasal openings of the wearer. The mask comprises shell 2 provided with a compressible face mold conventionally designated at 3, adapted to form an air-excluding seal with the face of the wearer. The shell 2 is preferably constructed of relatively rigid material, e. g. metal, and the face mold is preferably constructed of resilient material, such as natural or synthetic rubber. The mask is held in position on the head by adjustable strap 4 secured to opposite sides of the shell 2 by any suitable means, such as snap buttons indicated at 5. The mask has an air inlet designated by reference numeral 6, provided with a dust-excluding filter through which air to be inhaled is drawn and with an air outlet 7 through which exhaled air is discharged. In the illustrated embodiment, the air outlet is located in the front portion of the mask at about the level of the nasal openings of the wearer and the air inlet is disposed below the outlet. The respirator mask described herein does not, per se, constitute this invention. The general structure of the respirator mask, for example, may be similar to that disclosed by Lewis Patent 2,220,374 of November 5, 1940. While such masks adequately filter the air to be inhaled and exclude suspended solid matter, such as dust, from the respiratory system of the wearer, they do not afford protection for the head and neck.

Reference numeral 8 designates generally a hood adapted to cover the entire head and neck of the wearer. The lower portion of the hood preferably extends down over the shoulders a sufficient distance to prevent entry of dust beneath the hood. Attached within the upper portion of the hood is an adjustable head gear of conventional structure involving an adjustable band 9 and stays 10. It will be observed that the head gear maintains the hood out of contact with the top of the head of the wearer. The hood is provided with a window portion 11 constituted of

transparent material such as glass or resin located in front of the eyes of the wearer. 11' is a drawstring by which the hood may be constricted about the neck to the extent desired. At least a substantial portion, e. g. the major portion and preferably all, of the remainder of the hood is constituted of flexible fabric which is readily permeable to air and water vapor but resistant to the passage of suspended matter, such as dust; for example, the portion of the hood other than the window may be constructed of such fabric as closely woven, medium thickness cotton twill. Such fabric is light in weight, readily permeable to air and vapors, but effectively excludes dust. Any other fabric which is permeable to air and water vapor but resistant to the passage of dust, for example, fine-mesh metal screening (e. g. 200 to 300 mesh), glass cloth, and the like, may be employed. The fabric may be rendered fire-resistant by conventional fireproofing materials.

In order to promote maintenance of a comfortable atmosphere and prevent undue accumulation of moisture and heat within the hood, it is important that the exhaled air be discharged exteriorly of the hood. For this purpose a flexible tube 12, which may be made of rubber, synthetic rubber, or other sufficiently flexible material, extends downwardly and forwardly from the air outlet 7 of the respirator mask through a contractible opening located in the front portion of the hood at about the level of the chin of the wearer. The opening through which the tube extends may be provided by a sleeve 13 sewed on or integral with the body of the hood, which sleeve is adapted to be closed around the exterior of the tube by drawstring 14 or elastic material, e. g. a rubber band. Alternatively, a reinforcing patch 16 may be sewed on the hood around an opening therein and the opening closed about the exterior of the tube 12 by a drawstring or elastic 17, as illustrated in Figs. 3 and 4. A suitable valve is provided to prevent inhalation of air through the drawstring and tube 12; such valve may be a conventional "flutter" valve 18 or normally collapsed rubber tube design located at the outer end of tube 12, or a suitable valve may be located directly in the opening 7. As shown on the drawing, the inhalation inlet 6 of the mask is located within the hood.

In order to promote maximum comfort of the wearer, the hood is preferably of such shape that it follows generally the contour of the head and neck of the wearer; the head gear, mask and shape of the hood cooperate to maintain the portions of the hood normally out of contact with the head and neck, thus providing a free space within the hood for the circulation of air around the head and neck. In this connection, it will be observed that the head gear maintains the fabric of the hood out of contact with the upper portion of the head and the respirator mask prevents the hood from contacting the lower portion of the face. The neck portion of the hood is somewhat larger than and tends to hang away from the neck of the wearer. Thus, a free space for circulation of air is maintained between the hood and the head of the wearer. Of course, some contact between the hood and the wearer, especially the sides of the head and neck, may occur, particularly when the head is out of normal erect position.

In service, the wearer, by inhaling through the filtering inlet 6, draws air through the air-permeable fabric into the hood and, by exhaling through flexible tube 12, discharges moisture-

laden air exteriorly of the hood. Thus, relatively dry air is drawn into the space between the hood and the wearer's head, and tends to evaporate perspiration, to minimize condensation of moisture on window 11, and to maintain an even temperature within the hood and thereby to contribute to the comfort of the wearer. The inhalation filter acts to remove any finely suspended particles which may pass into the hood. Some of the evaporated moisture is expelled by exhalation of the wearer and some is diffused through the permeable fabric of the hood. Flexible tube 12 extending through the hood and the shape of the hood permit a high degree of head movement without tiring restriction. The filter medium of the mask, being protected by the hood, does not require frequent replacement to maintain its efficiency. This combination of features permits the combined mask and hood to be worn for prolonged periods, e. g. several hours, without undue discomfort from accumulation of heat and moisture within the hood and undue restriction of the head movement of the wearer.

Since certain changes may be made without departing from the scope of the invention, it is intended that the above shall be interpreted as illustrative and not in a limiting sense. Thus, for example, while it is preferred to make all the hood except the window 11 and the head gear of flexible woven fabric permeable to air and water vapor but resistant to passage of dust, if desired, a portion of the hood may be made of impermeable, flexible fabric. However, the permeable fabric portion of the hood should be at least sufficient in extent to permit ready passage through the hood of air required for inhalation.

I claim:

1. A device for the protection of the wearer against dust comprising in combination a respirator mask adapted to cover the oral and nasal openings of the wearer, said mask being provided with an air inlet having a filter and an air outlet, a hood adapted to cover substantially completely the head of the wearer, a portion of said hood in front of the eyes of the wearer being transparent, at least the major portion of the remainder of the hood being constructed of flexible material permeable to air and water vapor and resistant to the passage of dust, flexible means for discharging exhaled air from said outlet exteriorly of said hood, said air inlet being located within said hood, whereby breathing of the wearer promotes circulation of air within said hood and discharge of moisture in the breath of the wearer exteriorly of said hood.

2. A device for the protection of the wearer against dust comprising in combination a respirator mask adapted to cover the oral and nasal openings and to make air-excluding contact with the face of the wearer, a hood adapted to cover substantially completely the head and neck of the wearer and to extend over the shoulders in dust-excluding relation therewith, a portion of said hood in front of the eyes of the wearer being transparent, substantially all of the remainder of said hood being constituted of flexible, woven fabric permeable to air and water vapor and resistant to passage of dust, said mask being provided with an air inlet having a dust-excluding filter located beneath said hood and an air outlet, a flexible tube extending from said air outlet through a contractible opening in said hood, and a valve for preventing inhalation of air through said outlet, whereby respiration of the wearer draws air to be inhaled through said hood and said inlet, thus promoting circulation of air with-

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in said hood, and exhaled air is discharged through said tube exteriorly of said hood.

3. A device for the protection of the wearer against dust comprising in combination a dust-excluding respirator mask adapted to cover the oral and nasal openings and to make dust-excluding contact with the face of the wearer, said mask being provided with an air outlet in the front thereof at approximately the level of the nasal openings of the wearer and with an air inlet having a dust-excluding filter located below said outlet, a hood constituted of cotton twill adapted to cover substantially completely the head and neck of the wearer and to extend over the shoulders in dust-excluding relation therewith, said hood being of substantially the same general shape but larger than the head of the wearer and being provided with a head gear adapted to maintain said fabric out of contact with the top of the head of said wearer, said hood being provided with a contractible opening in the front thereof at about the level of the chin of the wearer, a flexible tube extending from said air outlet downwardly through said contractible opening for discharge of exhaled air exteriorly of said hood and a valve on the outer end of said tube for preventing inhalation of air therethrough, a portion of said hood in front of the eyes of the wearer being constructed of transparent material, said head gear,

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the shape of said hood, and said mask cooperating to maintain said fabric normally out of contact with the head of said wearer, thus providing a free space for circulation of air between the hood and head.

4. A device as specified in claim 1 comprising a valve for preventing inhalation of air through said air outlet and a head gear within said hood, said mask, hood and head gear being constructed and arranged to provide space for circulation of air within said hood around the head of the wearer.

ROBERT S. STETSON.

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