

Aug. 1, 1961

B. E. FERGUSON, JR., ET AL

2,994,089

PROTECTIVE GARMENT

Filed April 12, 1954

2 Sheets-Sheet 1

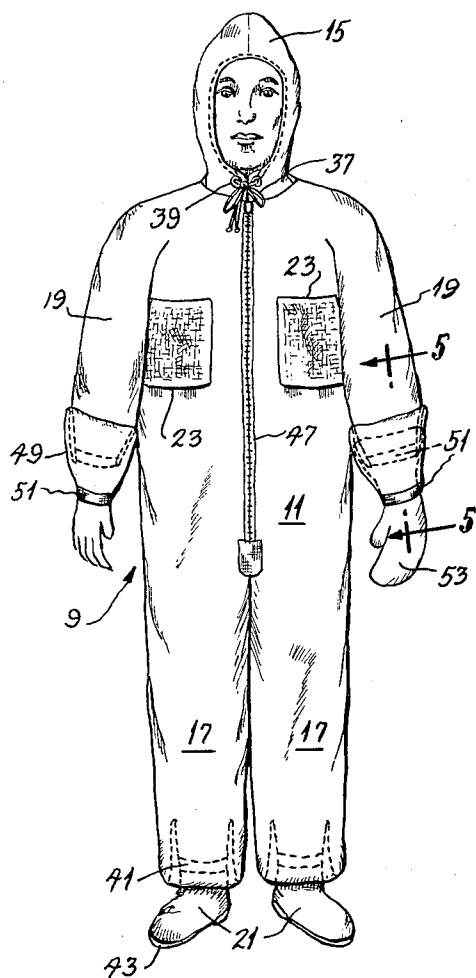


Fig. 1

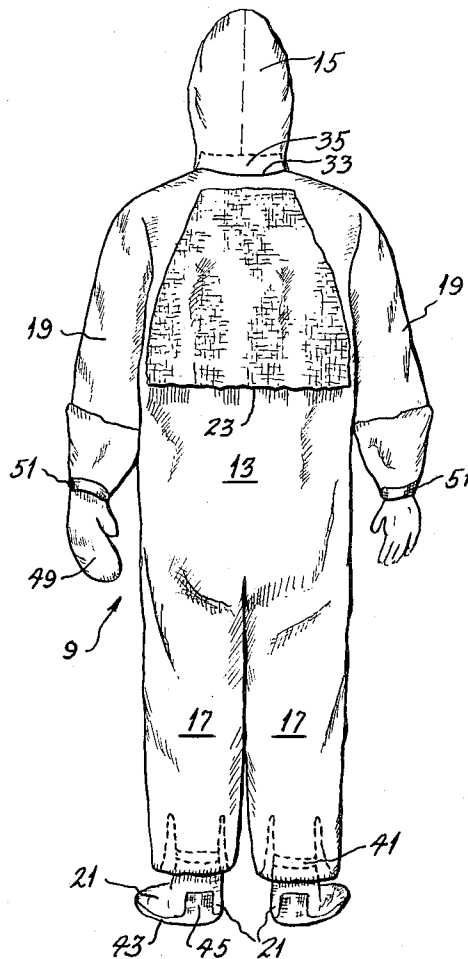


Fig. 2

INVENTORS.
BENJAMIN E. FERGUSON, JR.
RALPH ORBEN
BY *P. G. Snyder*
Rodrick B. Jones
ATTORNEYS

Aug. 1, 1961

B. E. FERGUSON, JR., ET AL

2,994,089

PROTECTIVE GARMENT

Filed April 12, 1954

2 Sheets-Sheet 2

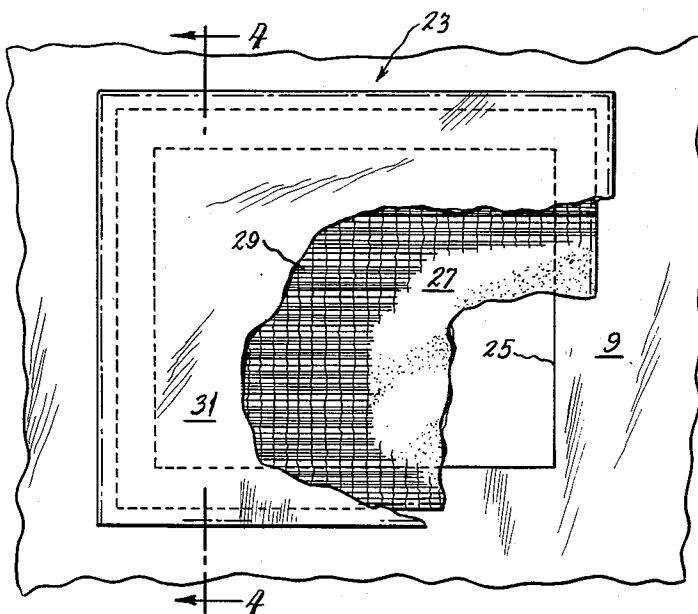


Fig. 3

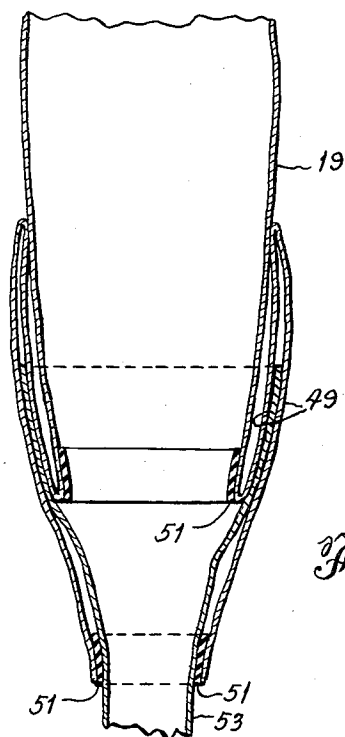


Fig. 5

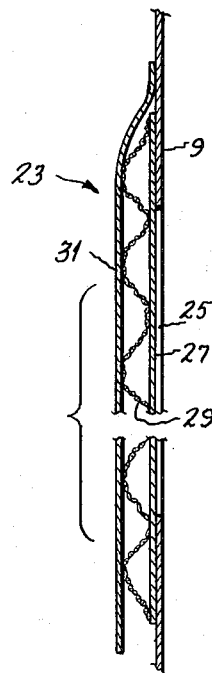


Fig. 4

INVENTORS.
BENJAMIN E. FERGUSON, JR.
RALPH ORBEN
BY *D. C. Snyder*
Roderick B. Jones
ATTORNEYS

1

2,994,089 PROTECTIVE GARMENT

Benjamin E. Ferguson, Jr., Winnsboro, S.C., and Ralph Orben, Brooklyn, N.Y., assignors to the United States of America as represented by the Secretary of the Navy

Filed Apr. 12, 1954, Ser. No. 422,705

7 Claims. (Cl. 2-81)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment of any royalty thereon.

The present invention relates to protective garments and more particularly to outer coverings adapted to be worn by persons subjected to contamination by atomic, biological and chemical agents.

There are presently available various types of protective suits which are utilized by civilian and military personnel to handle contaminants. Such suits are composed of impermeable materials and are costly to manufacture. A paramount disadvantage of these garments is that no adequate provision is made for the release of the build-up of heat within the suit resulting from the body energy transferred by the wearer. Because of this build-up of heat the efficiency of personnel to maintain their assigned duties and functions is greatly reduced.

In order to overcome the above-mentioned disadvantage it is an object of the invention to provide a garment of the impermeable type having self-ventilating means.

Another object of the present invention is to provide a suit that protects the wearer from exposure to atomic, biological and chemical agents.

A further object of the present invention is to provide a self-ventilating protective garment that is easily donned and that can be doffed without the contaminated outer portions of the garment coming into contact with the exposed skin surfaces of the wearer.

A still further object is to provide novel ventilating means for use in clothing bags of the impermeable type.

Other objects and many of the attendant advantages of the invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a front-elevational view of the garment including the self-ventilating means;

FIG. 2 is a rear-elevational view of the garment of FIG. 1;

FIG. 3 is a cross-sectional view of the self-ventilating means included in the invention of FIGS. 1 and 2;

FIG. 4 is a sectional view of the self-ventilating means taken along lines 4-4 of FIG. 3;

FIG. 5 is a sectional view of a portion of the sleeve of the garment and hand covering taken along lines 5-5 of FIG. 1.

As viewed in FIGS. 1 and 2, the garment or suit 9 is of the one-piece coverall design comprising a body having a front portion 11, a back portion 13, a hood portion 15, legs 17, sleeves 19 and foot portions 21. Garment 9 can be constructed of any suitable impermeable material such as polyethylene and can be fabricated by any well-known commercial technique such as dielectric bar heat-sealing method.

Hood 15 is attached at the neckline of garment 9 to a seam 33 to which a stand-up collar 35 is joined to the body portion. A draw cord 37 is passed through a completely closed channel (not shown) around the face opening of hood 15 and emerges at bottom juncture of the hood through reinforced draw cord openings 39. Said hood is designed to provide a positive protective closure about the head of the wearer so that when a gas mask or

2

other respiratory equipment is employed, no portion of the wearer's face or head is exposed.

Foot coverings 21 are secured to the legs and ankles by means of self-adjusting elastic bands 41 inserted in hidden channels (not shown) at the ankles to enable adjustment of sizing by the wearer. Sole 43 is formed of a heavy gage material such as a plastic-rubber composition having a high abrasive index. The rear portions 45 of foot coverings 21 are reinforced with the soling compound for maintaining the shape of the foot covering.

Garment 9 is provided with a vertical front opening having a rapid and positive closure. Said closure extends from the crotch to the top edge of collar 35 and consists of an ordinary chain-type slide fastener (not shown) over which a plastic slide fastener 47 is applied. Said plastic fastener 47 is extruded and provides protection to the vertical opening from liquids and gases. In an alternate construction, the plastic fastener 47 can be eliminated and the chain-type slide fastener can be covered with a strip of masking tape, thereby affording the same protection to the wearer.

An additional sleeve or dummy cuff 49 is attached to the sleeve 19 of garment 9 below the elbow. Self-adjusting elastic bands 51 are secured to the sleeve cuffs 49 as shown in FIG. 5 or can be inserted in hidden channels of sleeve cuffs 49. Hand coverings or mittens 53 to be worn with the suit, are of one-piece construction and are of the mitten-gauntlet design. The gauntlet portion of said covering is of heavy gage material whereas the hand portion is of the same material as suit 9. The gauntlet portion of the hand covering is inserted between sleeve 19 and dummy cuff 49 (see FIG. 5).

Self-ventilating means 23 are located on front portion 11 and back portion 13. As indicated in FIG. 1, ventilating means 23 resembles inverted patch pockets attached to front portion 11, whereas the ventilating means as indicated in FIG. 2 is in the form of a cape attached to back portion 13. Said means 23 comprises a window or cut-out 25 in the body of suit 9, a flexible filter material 27 such as carbon-impregnated or treated fabric sealed to the body of the garment at all edges where the cut-outs are made, a spacer material 29 that is woven of a plastic thread having a permanent crimp for resisting compression and tacked along the top and bottom edges of filter material 27, and an impermeable material 31 similar to the material of garment 9, covering said spacer fabric 29, extending beyond the outmost edges of said fabric and sealed to the body portion at the top and side edges, said material 31 being tacked to body portion at various points along the bottom edge (see Figs. 3 and 4).

In one embodiment, the self-ventilating means 23 in the form of inverted patch pockets are placed under the arm-pits of garment 9 and means 23 in the form of a cape is attached at the back portion 13 and is sealed to the body of garment 9 at the neckline and side edges. The length of said cape is extended to a point below the bottom points of the arm holes. The construction of spacer fabric 29 is such that it will always return to its original shape regardless of the stresses or pressures applied to it. While one type of spacer fabric has been described, any material that will permit free circulation of air and will not lose its original shape after compression can be utilized in the invention. The carbon-impregnated filter 27 affords protection to the wearer against radioactive dust particles and, further, absorbs noxious fumes or gases.

As described hereinbefore, the garment can be fabricated by any well-known commercial technique. The impermeable material can include any standard supported or unsupported films such as unsupported vinyl films or vinyl films supported on one or both sides by Fiberglas or other materials, or vinyl films laminated to both sides

of a mesh consisting of Fiberglas, nylon or other materials. Several commercial techniques of fabrication that are adaptable for manufacturing the garment include electronic heat-sealing sewing methods, continuous feed-wheel or roller-type machines, solvent sealing methods, cementing methods, etc.

From the foregoing description and illustration of the present invention it is apparent that a protective garment of simple construction having self-ventilating means is provided to reduce materially or eliminate a build-up of heat within the suit created by the wearer. The garment is of such design that its use is not limited to a decontamination suit but can easily be adapted for consumer use in chemical industries, the sportswear field, or for special environment apparel. Further, the novel self-ventilating means can be adapted for use with garment bags of the impermeable type to prevent a build-up of stale air within the bag.

While a particular embodiment of the invention has been shown and described herein, it is not intended that the invention be limited to such disclosure, but that changes and modifications can be made and incorporated within the scope of the claims.

What is claimed:

1. A self-ventilating device for coverall-type garments having a body portion, arm portions, leg portions and foot portions, all of said portions being of similar impermeable material secured together to form a protective garment, said ventilating device comprising a cut-out window in such body portion, a filter fabric secured to such body portion over said window, spacer means secured to said filter fabric, and impermeable material secured to such body portion covering said filter and spacer means, an edge of said impermeable material remaining free from said body portion, whereby a space exists between such edge and said body portion.

2. A self-ventilating device for coverall-type garments having a body portion, arm portions, leg portions and foot portions, all of said portions being of similar impermeable material secured together to form a protective garment, said ventilating device comprising a window in such body portion, a carbon impregnated fabric secured to such body portion over said window, a spacer fabric secured to said impregnated fabric, and an inverted pocket of impermeable material secured to such body portion covering said impregnated and spacer fabrics.

3. A self-ventilating device for coverall-type garments having a body portion, arm portions, leg portions and foot portions, all of said portions being of similar impermeable material secured together to form a protective garment, said ventilating device comprising a window in such body portion, a carbon impregnated fabric secured to such body portion over said window, a spacer fabric secured to said impregnated fabric, and a cape of

impermeable material secured to such body portion covering said impregnated and spacer fabrics.

4. A self-ventilating coverall-type suit made of impermeable material comprising a body portion, arm portions, leg portions and foot portions, all of said portions being of similar material secured together to form a protective garment, a cut-out window in said body portion, a carbon-impregnated fabric secured to said body portion over said cut-out window, a spacer fabric secured to said impregnated fabric, and a cape of impermeable material secured to said body portion covering said impregnated fabric and spacer fabrics.

5. A self-ventilating coverall-type suit made of impermeable material comprising a body portion, arm portions, and leg portions, all of said portions being of similar material secured together to form a protective garment, a cut-out window in said body portion, a carbon impregnated fabric secured to said body portion over said cut-out window, a spacer fabric secured to said impregnated fabric, and an inverted pocket of impermeable material secured to said body portion covering said impregnated and spacer fabrics.

6. In combination with a garment bag covering of impermeable material, means for providing a free circulation of air within such bag, said means comprising a cut-out window in the body of such garment, carbon-impregnated material secured to such body over said window, a spacer material secured to said impregnated material, and an impermeable material covering said spacer and impregnated materials, said impermeable material secured to such body at the top and side edges thereof.

7. In an impermeable type body garment having a body portion and arm portions, means for providing a free circulation of air within such garment, said means comprising a cut-out window in the body portion of such garment, flexible filter material secured to such body over said window, a spacer material secured to said filter material, and impermeable material covering said spacer and filter materials secured to such body portion at its top and side edges.

References Cited in the file of this patent

UNITED STATES PATENTS

1,529,981	Biton	Mar. 17, 1925
2,683,876	Sullivan	July 20, 1954

FOREIGN PATENTS

516,497	Great Britain	Jan. 3, 1940
---------	---------------	--------------

OTHER REFERENCES

Chemical Warfare by A. A. Fries and C. J. West, 1st edition, 1921, McGraw Hill Book Co., New York, pages 271-273 and 274.