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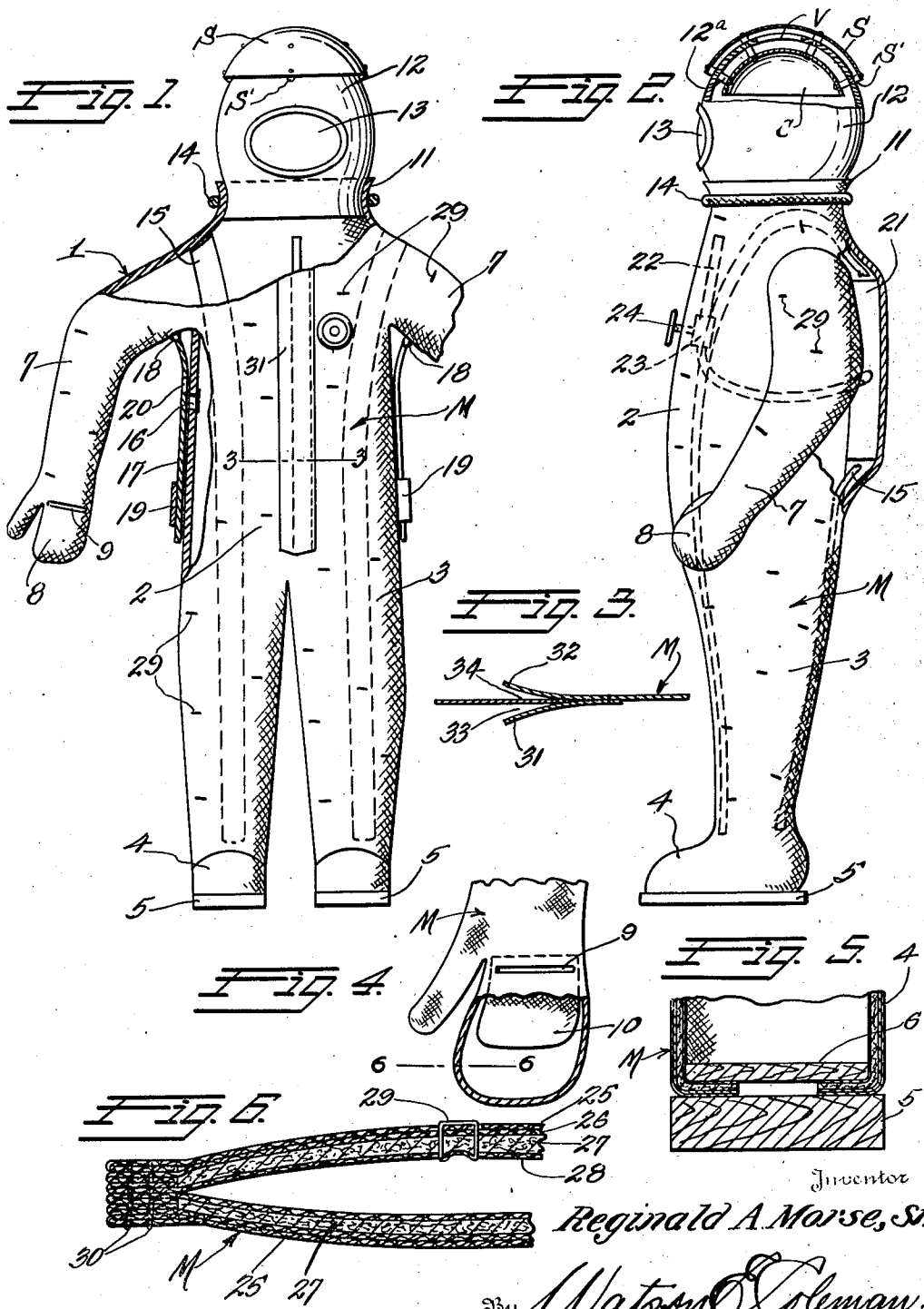
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BODY COVERING FOR RESISTING TEMPERATURE EXTREMES

Filed June 17, 1941.

2 Sheets-Sheet 1



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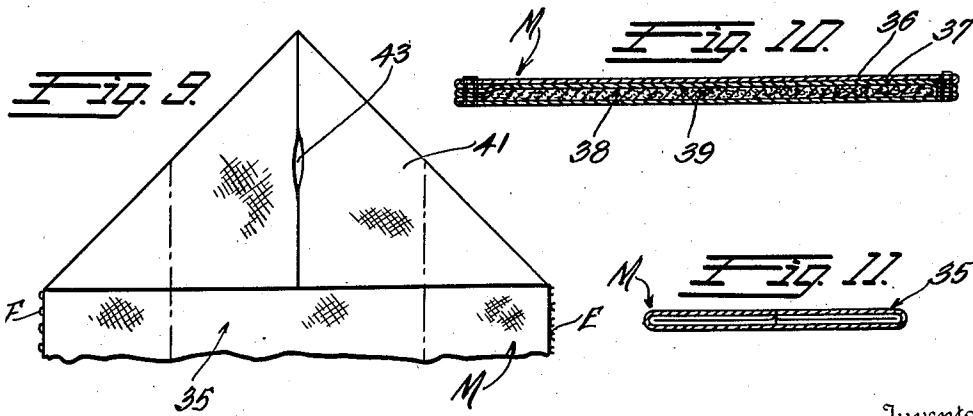
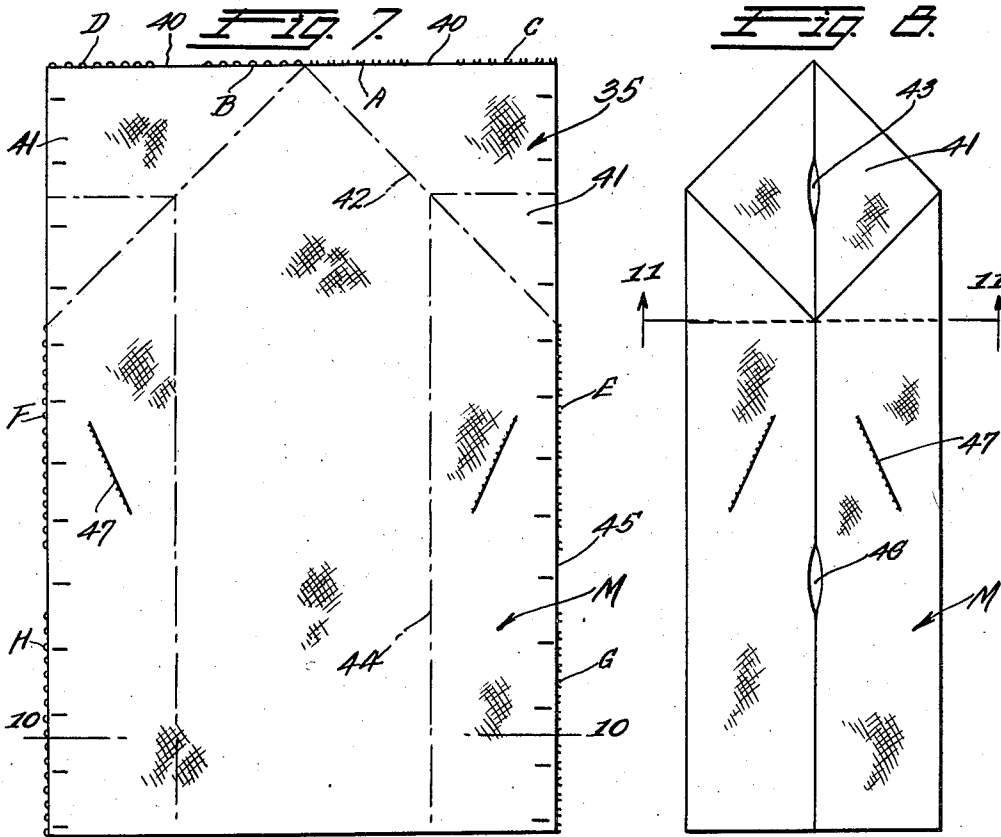
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BODY COVERING FOR RESISTING TEMPERATURE EXTREMES

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5 Claims. (Cl. 128—144)

This invention relates generally to the class of garments and pertains particularly to improvements in garments or body coverings designed for the protection of the body against extremes of temperature.

The primary object of the present invention is to provide an improved body covering or garment which is constructed in a novel manner to enable a wearer to go into or to remain in situations where the temperature of the atmosphere may be excessively high or excessively low, without danger, thus enabling the wearer to perform duties which would otherwise be impossible even by the use of present day fire-resisting or cold-resisting garments.

More specifically, the present invention has for an object to provide an improved material which may be made up into a garment designed to completely envelop the body or into a blanket form of garment which can be drawn around the body and over the head, which will withstand direct contact with flame without becoming ignited and which will also resist the transmission of heat through from the side which is in direct contact with flame to the opposite side so that a person wearing a garment constructed of the material can remain in direct contact with or close proximity to burning materials at high temperatures without having the temperature of the air within the garment raised materially above that of body temperature.

Still another object is to provide a fire-resisting and cold-resisting garment constructed of a novel material and novel design, which will enable the wearer to go into smoke or gas-filled locations and remain therein without ill effect for longer periods than is possible at the present time by the use of known types of garments which completely enclose the body, such action being made possible by the provision of an oxygen supplying means and carbon dioxide venting means for the garment.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings, it being understood, however, that the invention is not to be considered as limited by the specific illustration or description but that such illustration and description constitutes a preferred embodiment of the invention.

In the drawings:

Fig. 1 is a view in front elevation of a body protecting garment constructed in accordance with the present invention, parts of the structure being broken away.

Fig. 2 is a view in side elevation of the garment with portions in section.

Fig. 3 is a sectional view taken substantially on the line 3—3 of Fig. 1.

Fig. 4 is a detailed view partly in elevation and partly in section of a mitten forming a part of the garment.

Fig. 5 is a detailed sectional view of a foot of the garment.

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 4 and showing the construction of the material of which the garment is made up and the manner of joining edges of the same.

Fig. 7 is a view in plan of a body protecting blanket made up of the material illustrated in detail in Fig. 6.

Fig. 8 is a view in elevation of the blanket in the form which it assumes when folded about the body.

Fig. 9 is a view in front elevation of the blanket showing how the top corners are folded in to form the head-protecting hood prior to folding in the sides.

Fig. 10 is a sectional view on the line 10—10 of Fig. 7, showing the details of construction of the material.

Fig. 11 is a sectional view on the line 11—11 of Fig. 8.

Referring now more particularly to the drawings, a description will first be given of the garment shown in Figs. 1 to 6 inclusive. This garment is constructed of the specially prepared material hereinafter described in detail and here indicated by the reference character M. The garment which is designed to cover the entire body comprises the body portion 1 which is formed in one piece from the feet to the neck. The portion 2 covers the trunk or torso while the legs 3 are shaped at the lower ends to form the foot covering portions 4 which, as shown in Fig. 5, are joined to relatively thick soles 5, which are formed of wood which has been given a fire-proofing treatment of a suitable character. As shown in Fig. 5, the lower edges of the legs are drawn in between the sole 5 and an inner sole 6 where they are secured in a suitable manner so that gases and heat cannot pass through into the lower ends of the legs of the garment. The soles 5 are preferably formed of some suitable lightweight wood such as balsa wood or the like, and are of substantial thickness so that the wearer may go into wet areas of substantial depth without having to stand in water.

The arms or sleeves of the garment are indicated by the numeral 7 and these terminate in

mittens 8 which are here shown as being integral parts of the sleeves. However, it is contemplated that these mittens may be formed separate as gauntlets which may be readily removed, in which case any suitable well known means would be provided for tightly securing the ends of the sleeves around the wrists of the wearer.

Where the mittens 8 are an integral part of the sleeves, means are provided for the extension of the hand to the outside of the garment so that the wearer of the suit will be able to more readily perform duties which would be difficult to perform with the hand covered. Such means for baring the hand comprises the provision of a slit 9 in the inner or palm side of each mitten which is covered on the inner side of the mitten by a flap 10 which the wearer of the mitten can work back to uncover the slit so that the hand may be thrust through the slit when necessary. When the flap is in position over the slit, it will be seen that the entrance of gases into the garment will be effectively prevented. The upper part of the suit or garment has a turtle neck 11 which encircles the lower part of a head covering helmet 12, which is formed of the same material as the body portion of the suit and which has a window 13 of suitable transparent material which will withstand high or low temperatures. Any suitable means such as the collar 14 may be employed for maintaining close contact between the neck and the lower part of the helmet.

The suit is interiorly reinforced by straps or bands 15 of leather or suitable heavy tight-woven fabric which are secured to the inner side of the material to extend across each shoulder of the wearer and down the front and back of the garment as is shown in Fig. 1. These straps provide a suitable reinforcement which relieves, to a certain extent, the drag or weight of the garment on the shoulders of the wearer.

The helmet 12, which, as stated, is made of the same material M as the body of the garment, is provided with a suitable vent V in the top thereof. Upon the inside of the helmet there is secured a head engaging cap C which may be formed of a light metal or a stiff buckram which is maintained in spaced relation with the inner wall of the helmet by spaced wedges 12^a of cork, balsa wood or other suitable material so that foul air may pass upwardly around the head and out through the opening V.

Upon the outer side of the helmet there is located over the vent opening V, a shield plate S which is maintained in spaced relation with the top of the helmet by suitable studs S' which are secured to the material of the helmet by rivets or in any other suitable manner. This shield plate S protects the opening in the top of the helmet from fire and heat and the escaping foul air from within the helmet and garment will prevent smoke or other air entering the helmet.

In addition to this helmet vent, other venting means are provided, as hereinafter specifically described.

Each side of the suit is provided beneath the arms with one or more vent openings 16 and these openings are controlled by slip valves 17, which are in the form of strips of suitably stiff material which are hingedly connected at their upper ends to the under side of the adjacent sleeve at 18, and are run through suitable guide loops 19, so as to be held in close contact with the side of the garment. Such valve strips have openings 20 corresponding in number with the

openings in the wall of the garment and arranged to align with such openings when the sleeve is brought in against the side of the body by the wearer of the suit, thus making it possible for the wearer, by bringing his arms in tight against the body, to open the vents and permit stale air to be exhausted from within the suit. The expulsion of such stale air will be assisted when the arms are drawn in against the sides of the body, by pressing the suit inwardly so as to decrease the air space between the suit and the body.

In order that the wearer of the suit may be protected against the exhaustion of oxygen within the suit when the latter is worn in smoke-filled or other gas-filled places for a considerable length of time, there is provided within the suit a tank 21 which is filled with oxygen under pressure. From this tank an exhaust pipe 22 is carried under the arm to the front of the suit and extended upwardly to terminate in close proximity to the mouth or nose of the wearer. A valve 23 located in the pipe 22 is provided with a suitable control stem 24 which extends through a suitable opening in the front wall of the garment so that the wearer of the suit may turn on and off the valve as necessary.

The material M of which the suit or garment 1 and the hereinafter described blanket are constructed is shown in detail in Fig. 6. This material comprises an outer layer or covering 25 of woven asbestos fabric. Overlying the inner face of this asbestos layer is a covering of a suitable light-weight or thin fabric 26 which has been suitably treated to make it thoroughly water-proof and fire-proof. Placed against the second layer of water-proof fabric 25 is a bat layer 27 of rock wool which provides not only a very effective non-inflammable protection but more importantly, a positive insulation against the passage of heat through the material of the garment. The fibers or filaments of this rock wool, when assembled in a bat, maintain innumerable air chambers in the structure which form the desired highly efficient insulation. The inner side of the bat of insulating rock wool is covered with a layer 28 of flannel.

While rock wool is preferred as the insulation layer 27, sheep's-wool or other fibrous material having a high insulation value may be employed, especially where extremely high temperatures or direct exposure to flame may not be encountered, but rock wool is essential where such extremely high temperatures may be encountered with direct exposure to or contact with flame.

In order that the several layers of the material may be effectively secured together and in order particularly that the bat of rock wool may be secured between the layers of woven fabric so that it will not be compressed to any great extent, the several layers of the fabric and the bat are all secured together to form the solid sheet of material by the use of wire staples 29 which are placed at suitable intervals throughout the material. These staples and this method of securing the layers together also prevent the wool bat from shifting and gradually sinking and packing in the lower part of the suit.

As shown in Fig. 6, the edges of the woven material extend beyond the edges of the rock wool bat and these edges are secured together and adjacent edges of sections of the material are likewise secured together, as shown in this figure, by wire stitching 30.

The front of the garment is adapted to be

opened to facilitate donning the same and in order that this opening may be effectively closed, one edge thereof is provided with a flap 31 and suitable fasteners in the form of hooks or of the well known slide or automatic type may be provided for securing the edges of the opening together, and when so secured, it will be readily seen that the flap coacts with the inner edge part 32 of the opening to form a recess or slot 33 of V-cross-section, in which the opposite edge portion 34 of the opening is secured.

Under circumstances where the garment must encounter contact with water as, for example, where the same is worn by seamen or other persons whose duties require that they be constantly exposed to dampness, the outside layer or lamination 25 of asbestos may be replaced by a layer of rubber or rubberized fabric.

The rock wool bat not only withstands high temperatures and forms an effective insulation wall against the passage of heat through the material, but it is also highly non-absorbent of moisture.

It will be seen from the foregoing, that the suit herein described, due to its high insulation characteristic as well as to its ability to resist extremely high temperatures, may be effectively worn by persons who have to go into burning buildings or other places where high temperatures are met with and also by persons who are required to go into extremely low or sub-zero temperatures such as explorers and the like, and the garment is particularly well suited for use by seamen who may have to stand watch during extremely cold weather.

In Figs. 7 to 11 inclusive, there is shown a body protecting structure or garment in the form of a blanket 35, which blanket is also constructed of the material M. In Fig. 10, the details of the material are illustrated where the asbestos outer fabric is indicated by the numeral 35, the water-proofed second layer is indicated by the numeral 37, while the inner layer of wool material is indicated by the numeral 38. In between the wool inner layer and the water-proofed and fire-proofed layer 36 is the bat layer 39 of rock wool.

The blanket 35 is designed to be folded around the body and to be secured so as to provide an effective covering for the entire body from the feet up. To this end the blanket is provided along its top edge with a fastening means consisting of the cooperating portions A and B which extend in opposite directions from the longitudinal center of the blanket outwardly to a predetermined extent toward the edges of the blanket. At the outer ends of the two portions A and B of the fastening unit, the edge of the blanket is free, for a short distance, of fastening devices, as indicated at 40, and then there is located along the edge adjacent one side of the blanket, one portion C of a fastening means which cooperates with a portion D located adjacent the opposite edge of the blanket outwardly of the space 40.

The blanket is designed to have the upper corners 41 folded inwardly along the oblique lines 42 which have their source at the top edge of the blanket on the longitudinal center thereof or at the point where the coacting fastening elements A—B join. These triangular corners 41 when folded in bring together the portions A—B of the central fastening unit and the portions C—D, so that the intumed adjacent edges of the corners can be secured together, leaving the portions 40 of the edges unattached, so that these edges can be separated by the wearer to provide

a sight opening 43. The hood thus formed by folding in the triangular corners 41 is designed to completely cover the head of the wearer.

In addition to folding in the top corners of the blanket in the manner described, the side edges of the blanket are also folded in along the longitudinal lines 44, and these side edges are provided with upper and lower sets of cooperating fastening elements, the two parts or portions of the upper set being indicated by the characters E and F, while the cooperating portions of the lower set are indicated by the characters G and H. These sets of fasteners are spaced apart, as shown in Fig. 7, so as to provide the edge portions 45 which are free of fastening means and, consequently, when the portions E—F are joined together and the portions G—H are joined together, there will be provided an opening 46 between the joined edges through which the hand may be extended.

Adjacent each longitudinal edge of the blanket below the triangular corner portions, the material has a slit formed therethrough, as indicated at 47, which slit may be closed by a slide fastener or any other suitable means. These slits provide hand openings, as will be readily apparent.

What is claimed is:

1. A garment of the character described, comprising an overall body covering formed in one piece from the neck to the feet, said garment having a closure extending lengthwise from the neck through the torso covering portion thereof, a head enclosing helmet adapted to be coupled with the neck portion of the garment, arm encasing sleeves forming part of the garment, mittens connected with and closing the ends of the sleeves, means for supplying oxygen to the interior of the garment, a valve opening through a wall of the garment and adapted to be opened for the exhaustion of foul air from within the garment, and means coupling said valve with a sleeve for effecting opening and closing of the valve.

2. A body covering of the character described, comprising an overall garment having a torso, legs and sleeves, said legs being formed integral with feet enclosing portions, each of said foot enclosing portions having a relatively thick sole, said sleeves terminating in hand enclosing mittens, a head enclosing helmet detachably connected with the top of the torso of the garment, the torso portion of the garment having a closure extending lengthwise thereof facilitating the donning of the garment, means within the garment for supplying oxygen to the wearer thereof, and a valve means for facilitating the discharge of stale air from within the garment, said valve means including a shiftable portion which is operatively connected with a sleeve to facilitate opening and closing the valve by the movement of the sleeve relative to the body.

3. A body protecting garment constructed to completely enclose the body from head to foot whereby outside air is kept from the wearer, means within the garment for supplying a wearer with oxygen and means for exhausting stale air from within the garment, comprising a valve opening in the wall of the garment beneath a sleeve thereof and a slide valve maintained against the said wall of the garment for shifting movement and having operative connection with the adjacent sleeve whereby shifting of the valve element is effected upon raising and lowering the sleeve, the valve element having an opening therein which is brought into alinement with the first-

mentioned opening by the movement of the sleeve to one position whereby stale air may be vented from within the garment.

4. A body protective covering of the character described, comprising a garment constructed to completely enclose the human body including hands, feet and head, the garment including arm receiving sleeves, means within the garment for supplying oxygen to the wearer thereof, a venting valve for facilitating the discharge of stale air from within the garment, said valve including a shiftable portion, and an operative coupling between the said shiftable portion of the valve and a sleeve for effecting the opening and closing of the valve through the movement of said shiftable

portion, by movement of the sleeve relative to the body.

5. A body covering as set forth in claim 4, in which the said shiftable portion of the valve comprises an apertured elongated slide member supported upon the body of the garment for movement of the aperture thereof into and out of registry with a corresponding aperture in the adjacent wall of the garment, the slide being located between a sleeve and the wall of the garment, and the operative connection between the said shiftable portion and the sleeve joining the upper end of the slide member with the under side of the sleeve.

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