

Nov. 4, 1947.

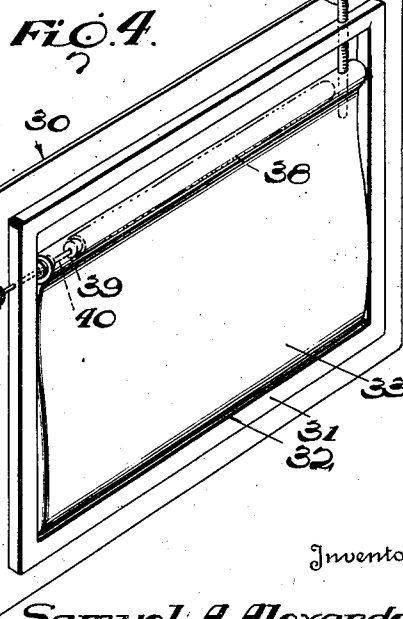
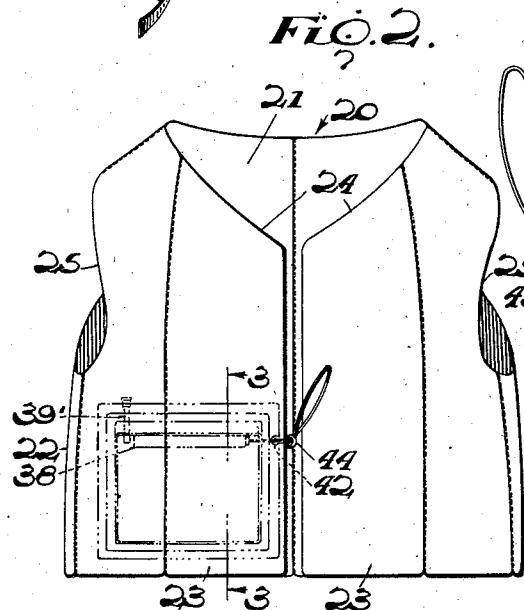
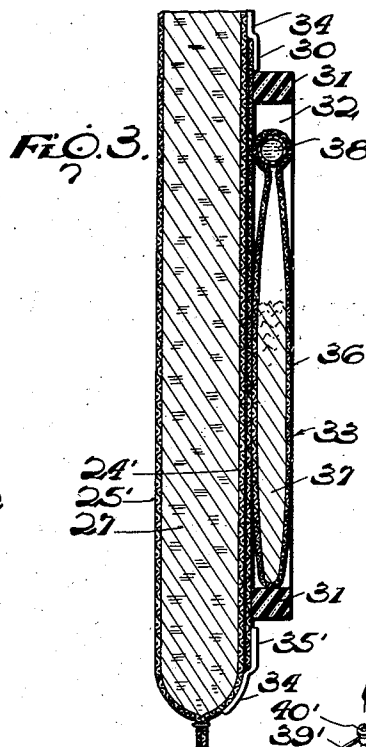
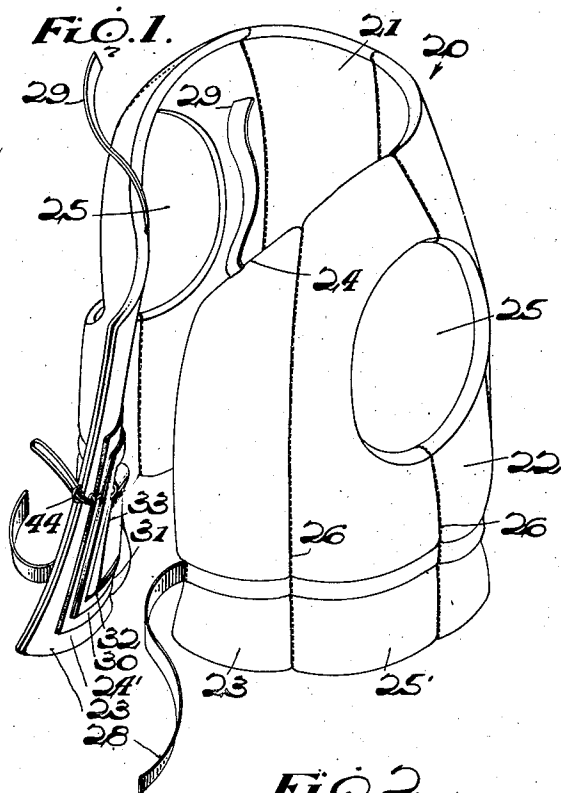
S. A. ALEXANDER

2,429,973

LIFE PRESERVER WITH CHEMICAL HEATER

Filed July 13, 1943

3 Sheets-Sheet 1



Inventor

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Nov. 4, 1947.

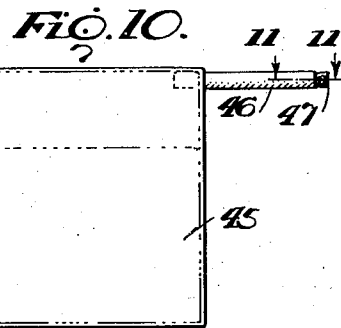
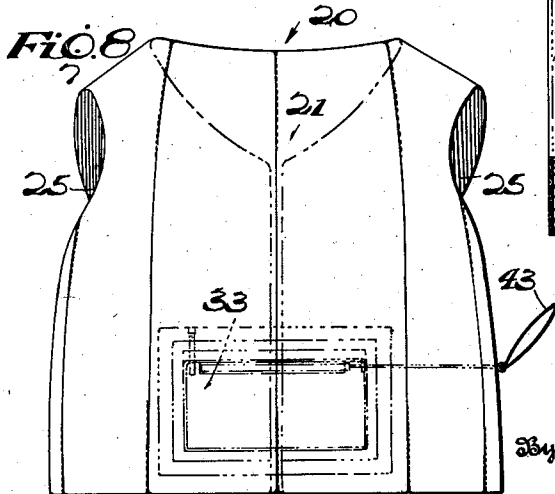
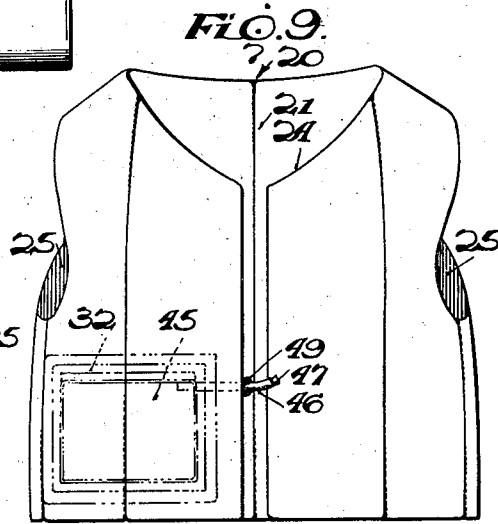
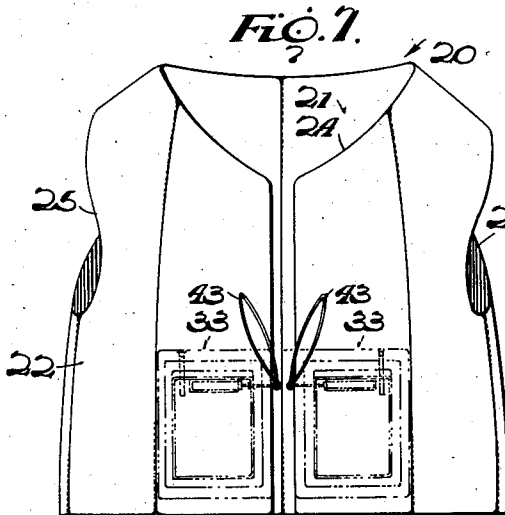
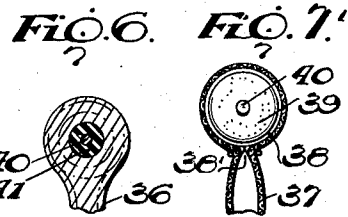
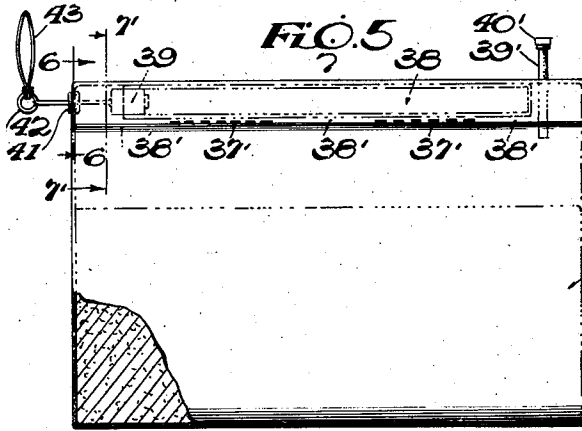
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2,429,973

LIFE PRESERVER WITH CHEMICAL HEATER

Filed July 13, 1943

3 Sheets-Sheet 2



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2,429,973

LIFE PRESERVER WITH CHEMICAL HEATER

Filed July 13, 1943

3 Sheets-Sheet 3

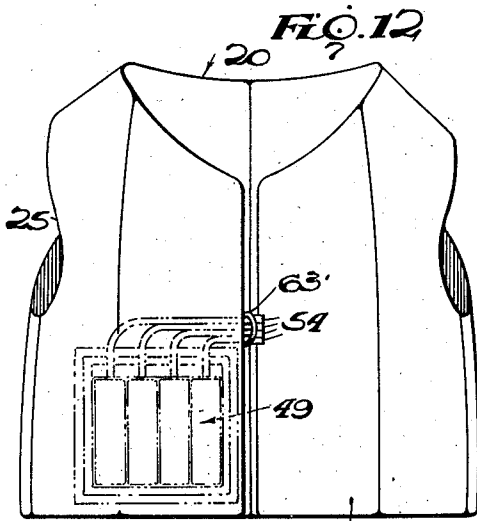


FIG. 12

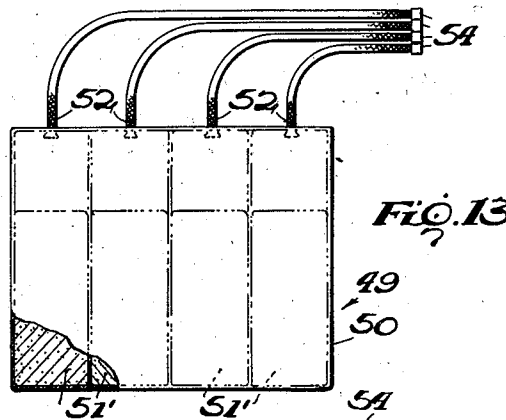


FIG. 13

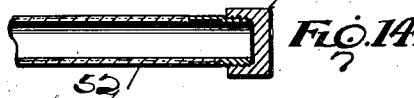


FIG. 14

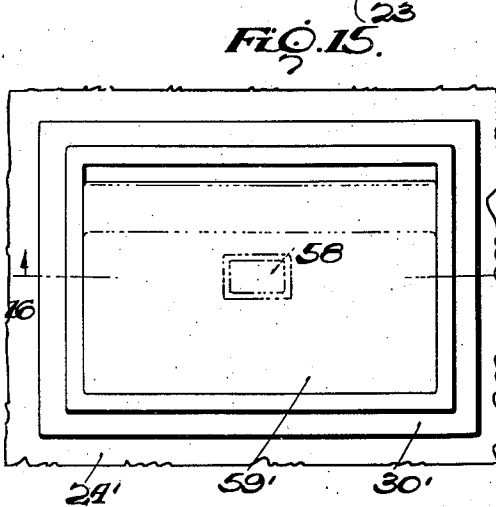


FIG. 15

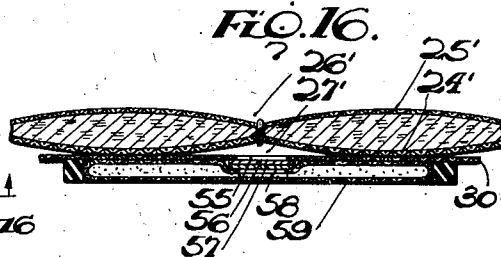


FIG. 16

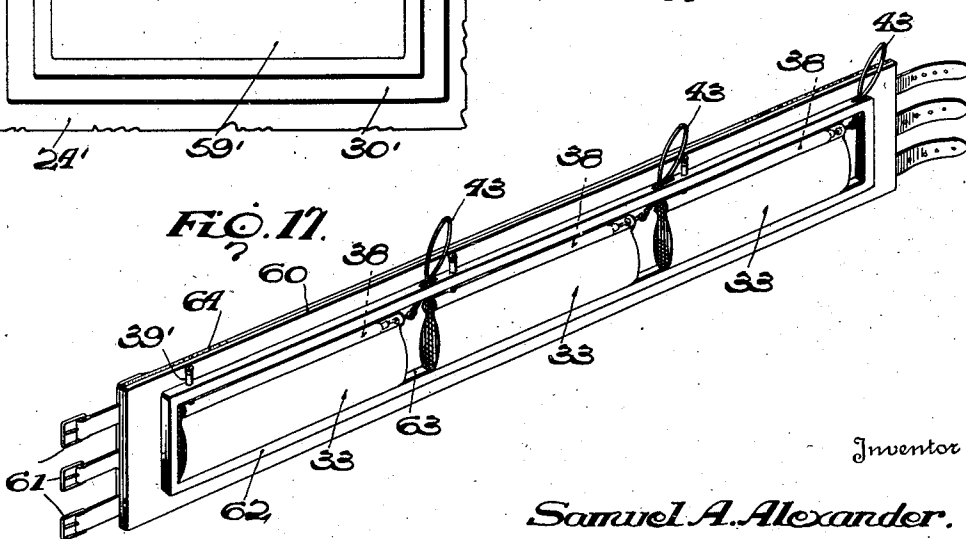


FIG. 17

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UNITED STATES PATENT OFFICE

2,429,973

LIFE PRESERVER WITH CHEMICAL HEATER

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Application July 13, 1943, Serial No. 494,555

12 Claims. (Cl. 126—204)

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My invention relates to life preservers.

An important object of the invention is to provide heating means for a buoyant life preserver, thus prolonging the life of the user, when exposed to cold or floating in cold water.

A further object of the invention is to provide a buoyant life preserver having heating means arranged in proximity to or in contact with the abdomen so that the heat is readily transmitted to the blood circulated to and from the stomach, and transmitted by the blood to various parts of the body.

A further object of the invention is to provide means for forming a heat insulating chamber next to the body, receiving the heating unit, and preventing the dissipation of the heat.

A further object of the invention is to provide a buoyant life preserver with a chemical heating compound, rendered active by the introduction of water into the compound.

A further object of the invention is to provide means for introducing a predetermined amount of water into the heating chemical compound.

A further object of the invention is to provide means whereby water will be automatically introduced into the heating chemical compound, when the life preserver is immersed in whole or in part in the ocean or the like.

A further object of the invention is to provide means whereby separate masses of the heating chemical compound may be rendered active in succession thus continuing the heating process for a prolonged period.

A further object of the invention is to provide the sack containing the heating chemical compound with a window covered by an absorbent sheet, whereby the water may be supplied to the heating chemical compound by capillary action.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a perspective view of a life preserver embodying my invention, the same being shown partly open,

Figure 2 is a front elevation of the same, partly diagrammatic,

Figure 3 is a vertical section taken on line 3—3 of Figure 2,

Figure 4 is a perspective view of the heat insulating chamber and heating unit contained therein,

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Figure 5 is a rear elevation of the heating unit removed, parts broken away,

Figure 6 is a detail section taken on line 6—6 of Figure 5,

Figure 7' is a transverse section taken on line 7'—7' of Figure 5,

Figure 7 is a front elevation, partly diagrammatic, of a modified form of the invention,

Figure 8 is a rear elevation, partly diagrammatic of a further slightly modified form of the invention,

Figure 9 is a front elevation, partly diagrammatic of a further modification of the invention,

Figure 10 is a front elevation of the heating unit of Figure 9, removed, and parts broken away,

Figure 11 is a longitudinal section taken on line 11—11 of Figure 10,

Figure 12 is a front elevation, partly diagrammatic, of a further modified form of the invention,

Figure 13 is a front elevation of the heating unit of Figure 12, removed, and parts broken away,

Figure 14 is a central vertical longitudinal section through the cap carried by each water supplying tube,

Figure 15 is an inner side elevation of a further modified form of the invention, showing the attaching section of fabric and the sack provided with absorbent windows,

Figure 16 is a horizontal transverse section taken on line 16—16 of Figure 15, and

Figure 17 is a perspective view of a further modified form of the invention.

In the drawings, wherein for the purpose of illustration are shown preferred embodiments of my invention, the numeral 20 designates a life preserver, preferably in the shape or form of a vest. This buoyant life preserver includes a back 21, sides 22, and front sections 23. At the top is an opening 24 for the neck and 25 designates arm openings. The life preserver is formed of inner and outer sections 24' and 25' of fabric, which may be unbleached drill or twill. These inner and outer sections 24' and 25' are stitched together as indicated at 26 to form pockets to receive the buoyant material 27. These filled pockets provide exterior and interior vertical passages 26' and 27', in free communication with the water. The buoyant material may be block cork, balsa wood or Kapok or any suitable buoyant material. At the lower end of the life preserver there is a strap 28, securely attached to the same by stitching or the like and there are neck straps

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29 at the top, secured to the life preserver by stitching or the like.

A life preserver of this type, being in the shape of a vest, is easy to apply to the wearer. When applied to the wearer, the ends of the strap 28 are tied together and the ends of the straps 29 are tied together. The above described life preserver is of the conventional type and is in accordance with the requirements outlined in the pamphlet entitled "United States Coast Guard, General Rules and Regulations, September 1942." This disclosure is found on pages 25 to 27 inclusive of the pamphlet.

As more clearly shown in Figure 4, the numeral 30 designates a preferably rectangular attaching section of fabric which may be formed of drill or twill, and rendered waterproof, by any suitable means. Arranged upon the inner face of the attaching fabric section 30 and spaced from the marginal edges thereof is a preferably rectangular frame 31, formed of sponge rubber. This sponge rubber is readily compressible but will not permit the passage of water through the same. This frame 31 is secured to the attaching fabric section 30 by a waterproof cement, while it may be secured thereto by other means. The frame 31 forms with the attaching section 30 a heat insulating chamber 32 for receiving a heating unit 33. The inner side of the chamber 32 next to the body is open while its outer side is covered by the attaching fabric section 30 and the wall of the life preserver, which serves to heat insulate the same. The attaching fabric section 30 is preferably attached to the inner fabric section 24' of the life preserver, after the inner and outer fabric sections 24' and 25' have been stitched together to form the pockets containing the buoyant material. The attaching fabric section 30 may be attached to the inner fabric section 24' by a waterproof cement and may also be secured to the same by fabric straps 34, sewed to the inner fabric section 24' when it is in the flat condition and the straps 34 are subsequently sewed to the marginal portions of the fabric section 30, as shown at 35'. Any suitable means may be employed to securely attach the fabric section 30 to the inner fabric section 24' of the life preserver. The attaching fabric section 30 extends across the inner passages 27'.

In Figures 1 and 2, the attaching fabric section 30 and frame 31 are arranged adjacent to the abdomen at the front and upon the side of the front center opening of the life preserver. When the life preserver is applied to the user it may be caused to closely hug the body by manipulation of the straps 28 and 29. The compressible frame 31 is next to the body and may engage directly with the abdomen or with the clothing. In either event, the frame 31 will be readily compressed and will conform to the curvature of the body, whereby the heat insulating chamber 32 is covered by the body at its inner side. The heat generated within the chamber 32 will therefore be confined within the chamber, to a considerable extent, and transmitted to the abdomen or body.

The heating unit 33 comprises a sack 36, which is closed, flexible, and waterproof. This sack may be formed of rubber, a rubber coated fabric or any other material which is flexible and waterproof. The sack has a lower chamber for receiving and holding a normally dry heating chemical compound 37. The side walls of the sack 36 are secured together, at spaced intervals, as indicated at 37', for forming an upper compartment for receiving a tube 38, containing

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water, such as fresh water. The tube 38 is held against movement within the upper compartment by any suitable means, such as frictional engagement or it may be secured thereto by a waterproof cement. The connections 37' form water passages 38', as shown. The open end of the tube 38 is normally closed by a removable stopper 39, connected with a rod 40, operating within an opening formed in a plug 41 and having a watertight connection therewith. The outer end of the rod 40 has an eye 42 to which is attached a cord 43 or other flexible element, passed through an eye 44, secured to the front section 23 of the life preserver, and serving as a guide for the cord. The sack 36 has a gas outlet tube 39', equipped with an outwardly opening check valve 40', which opens when the pressure within the sack exceeds that exteriorly of the sack, and closes when the exterior pressure exceeds the interior pressure. The sack 36 is held in place by having its outer side secured to the attaching fabric section 30 by a waterproof cement or by any other suitable means.

The dry heating chemical compound may be of any well known or preferred composition, which will generate a suitable heat, when water is added to the same. I may use the heating chemical compounds shown in United States Patents 1,760,102; 1,558,248; 1,602,456; 1,488,656; 1,910,874; 1,978,388 and 2,040,406.

In the operation of this form of the invention, when the life preserver is applied to the user, the compressible frame 31 will engage with the body or clothing next to the body and be compressed, thereby covering the inner side of the heat insulating chamber 32 by the body. The heating unit 33 will now be adjacent to the abdomen of the user. When the user goes overboard he will be floated by the life preserver, in the usual manner. The user then pulls the flexible element 43 which removes the stopper 39 from the tube 38 and the water within this tube passes through the passages 38' into the sack 36 and into contact with the chemical compound 37. The chemical reaction is then started and heat is generated. The inner side of the sack 36 is in close relation to or in contact with the abdomen or clothing next to the abdomen, since the frame 31 is compressed, so that this contact may occur. The heat generated is therefore transmitted to the body. The heat originating within the heat insulating chamber 32 has its major portion transmitted to the body and is conserved within the chamber 32, as much as possible. Even if water entered the chamber 32, there would be very little, if any, circulation of water into and from the chamber and the water within the chamber will become heated and this heat will be transmitted to the body.

In Figure 7, two of the heating units 33 are used and are secured to the inner side of the front sections 23 upon opposite sides of the center opening of the life preserver. The same fabric sections 30 and frames 31 are employed and all parts remain identical as described in connection with the first form of the invention.

In Figure 8, one heating unit 33 is arranged at the back of the life preserver and is secured to the inner side of the same. The same fabric section 30 and frame 31 are used and all parts remain identical with those shown and described in connection with the first form of the invention.

In Figure 9, I have shown a further modification of the invention. In this modification, the

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attaching fabric section 30 and frame 31 are used and are attached in the same manner as shown in connection with the first form of the invention. I provide a flexible sack 45, preferably formed of waterproof material and this sack is closed against the entrance of water. The sack 45 is arranged within the heat insulating chamber 32 and the outer side of the sack is attached to the fabric section 30 by waterproof cement or by other suitable means. This sack contains the dry heating chemical compound. The sack 45 has a flexible tube 46, attached thereto and leading into its upper end. This tube may be formed of rubber or the like. A plug 47 is secured in the free end of the tube 46 and this plug has a contracted port 48, which will permit of the slow entrance of water into the sack 45. The tube 46 passes through the exterior of the life preserver and is preferably held in place by a ring 49, attached to the life preserver. All other parts of the device remain identical with those shown and described in connection with the first form of the invention.

In the operation of this form of life preserver, when the user goes overboard, and may be unconscious when striking the water, the water will at once gradually enter the sack 45 through the restricted port 48. When the user regains consciousness he may regulate the entrance of water into the sack 45 by pinching the tube, or if necessary to accelerate the heating action, he may pull the plug 48 out of the tube.

In Figure 12, I have shown a further modification of the invention. In this figure, the same fabric section 30 and frame 31 are used and are attached to the life preserver in the same manner as shown and described in connection with the first form of the invention. A heating unit 49 is provided including a flexible sack 50, arranged within the frame 31 and having its outer side secured to the fabric section 30 by waterproof cement or by any other suitable means. The sack 50 is formed of waterproof material and is divided into a plurality of separate compartments 51. Each compartment is watertight and is closed against the entrance of water. Connected with the upper end of each compartment 51 is a flexible tube 52, to supply water into the same. These tubes pass through a guide or ring 63' attached to the front section 23 of the life preserver. Each tube 52 is provided at its free end with a removable cap 54. All other parts of the device remain identical with those shown and described in connection with the first form of the invention.

The operation of this form of the invention is as follows:

When the user goes overboard, one of the caps 54 of the tube 52 is removed and water then passes through the tube 52 into the corresponding compartment 51. This water starts the chemical reaction which generates the heat. After the chemical compound in the first compartment is exhausted, water is supplied in a similar manner to each succeeding separate compartment. The user may therefore delay the heating action of the chemical compound in each compartment, and thus prolong the heating action of the device.

In Figures 15 and 16, I have shown a further modification of the invention. In this form of the invention I provide an attaching fabric section 30', corresponding to the fabric section 30, and fabric section 30' is secured to the inner fabric section 24' of the life preserver and ex-

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tends across the passage 27', which passage is in free communication with the water. The fabric section 30' has a window 55 cut therein, which is covered by a section of absorbent material 56, which may be fabric, such as felt. The section 56 will absorb the water and transmit the same slowly by capillary action to a section of absorbent material 57, covering a window 58 formed in a flexible sack 59. The fabric section 30' is preferably waterproof and the absorbent element 56 is secured thereto in any suitable manner. The sack 59 is preferably waterproof and the absorbent element 57 is secured thereto by any suitable means. It is thus seen that the water within the passage 27' will pass in a regulated manner by capillary action through the absorbent elements 56 and 57 to the heating chemical compound contained within the sack 59, and the heat will then be generated. The same frame 31 is used. It is thus apparent that a part of the sack has been rendered absorbent, which will permit of the entrance of water into the same in a regulated manner, without the use of any additional control means. While it is preferred to have a part only of the sack absorbent, yet I contemplate making the entire sack absorbent.

While it is preferred to use the heating apparatus in conjunction with a life preserver, yet I contemplate using the same separately. In Figure 17, I show a heating belt embodying a fabric section 60, which may surround the abdomen and the ends of this belt may be secured together by straps 61 or other suitable means. A frame 62, formed of sponge rubber and corresponding to the frame 31 is secured to the belt 60 and forms a heat insulating chamber 63. The belt 60 may have its outer side covered by a layer of heat insulating material 64, such as asbestos. The belt 60 is preferably waterproof. I may employ a plurality of the heating units 33 described in connection with the first form of the invention and these heating units are arranged within the chamber 63 and are secured to the belt 60 by any suitable means. Instead of using the heating units 33, the other heating units shown and described may be used, in which event water would have to be supplied to the tubes.

The device shown in Figure 17 is to be used to aid in keeping one warm when exposed to extreme cold which might endanger life. It may also be used as an attachment for previously made life preservers.

In all forms of the invention, a heat insulating chamber is provided having an open side next to the body and heating unit or units are arranged within the heat insulating chamber. These heat insulating units use a heating chemical compound set into action by the introduction of water into the compound.

I prefer to use the heating chemical compound as a source of heat, for electricity is not available in an emergency at sea. However, in the use of the form of the invention shown in Figure 17, I contemplate substituting electric heating units for the chemical heating units.

It is to be understood that the forms of my invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, what I claim is:

1. The combination with a buoyant life pre-

server, of means arranged upon the inner side of the life preserver and forming therewith a heat-insulating chamber adapted to be near the body of the wearer; a sack arranged within the heat-insulating chamber and holding a chemical compound reacting with water to produce heat, means arranged within the sack for holding a predetermined amount of water, and means to discharge the water from the water holding means into the sack.

2. The combination with a buoyant life preserver, of a sack secured to the inner side of the life preserver for holding a chemical compound to react with water to produce heat, a receptacle for holding water operatively associated with the sack, means to control the discharge of water from the receptacle into the sack, and an element connected with the means and extending to the exterior of the life-preserver to operate the means.

3. The combination of a buoyant life preserver, of a sack secured to the inner side of the life preserver next to the body and having separate compartments for holding a chemical compound to react with water to produce heat, a separate tube connected with each compartment, and separate means to control the entrance of water into each tube.

4. The combination with a buoyant life preserver, of a sack arranged upon the inner side of the life preserver for holding a chemical compound to react with water to produce heat, said sack having a part which is absorbent so that water passes into the sack in a regulated manner.

5. The combination of a buoyant life preserver, of an attaching fabric section secured to the inner side of the life preserver and having an absorbent part, a sack secured to the attaching fabric section for holding a heating chemical compound to react with water, said sack having an absorbent part disposed adjacent to the first named absorbent part, the water passing in a regulated manner through said absorbent parts into said sack.

6. The combination with a buoyant life preserver, of a waterproof sack disposed upon the inner side of the life preserver and secured to the life preserver, a reactant and a chemical compound arranged within the sack, the chemical compound liberating heat when it undergoes chemical reaction with said reactant.

7. The combination with a buoyant life preserver, of a waterproof sack disposed upon the inner side of the life preserver and secured to the life preserver, a chemical compound arranged within the sack, the chemical compound liberating heat when it undergoes chemical reaction, and means for supplying a reactant to the chemical compound to cause the same to chemically react.

8. The combination with a buoyant life preserver, of a sack disposed upon the inner side of the life preserver and secured to the life preserver, said sack being formed of waterproof material, a chemical compound arranged within the sack and adapted to chemically react with water, the chemical compound liberating heat when it undergoes chemical reaction which can occur even when the sack is submerged in water, and means arranged within the sack for holding a measured amount of water to be supplied to the chemical compound.

9. The combination with a buoyant life preserver, of a sack disposed upon the inner side of a life preserver and secured to the life preserver, and a chemical compound arranged within the sack and adapted to chemically react with a reactant, the chemical compound liberating heat when it undergoes chemical reaction which can occur even when the sack is submerged in water, and means for controlling the supply of the reactant to the chemical compound.

10. A body heating device comprising a flexible sheet, a flexible compressible frame arranged upon one side of the sheet and secured thereto, said frame forming with the sheet a chamber open upon one side, the open side being adapted to be arranged next to the user, a sack arranged within the chamber, and a chemical compound held within the sack and adapted to chemically react with a reactant, said sack and chemical compound being disposed between the flexible sheet and the open side of the chamber.

11. The combination, with a buoyant life preserver, of at least one sack secured to the inner front side of the life preserver for holding a chemical compound to react with water to produce heat, a receptacle for holding water operatively associated with the sack, means to control the discharge of water from the receptacle into the sack, and an element connected with the means and extending to the exterior of the life preserver to operate the means.

12. The combination, with a buoyant life preserver, of a sack secured to the inner side of the life preserver for holding a chemical compound to react with water to produce heat, said sack having an opening permitting the entrance of water into the sack, and means in said opening to control the flow of water into said sack in a regulated manner.

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