Nov. 18, 1952 B. BERKMAN 2,618,257

INSULATED LIFE PRESERVER GARMENT

Filed March 17, 1949 4 Sheets-Sheet 1

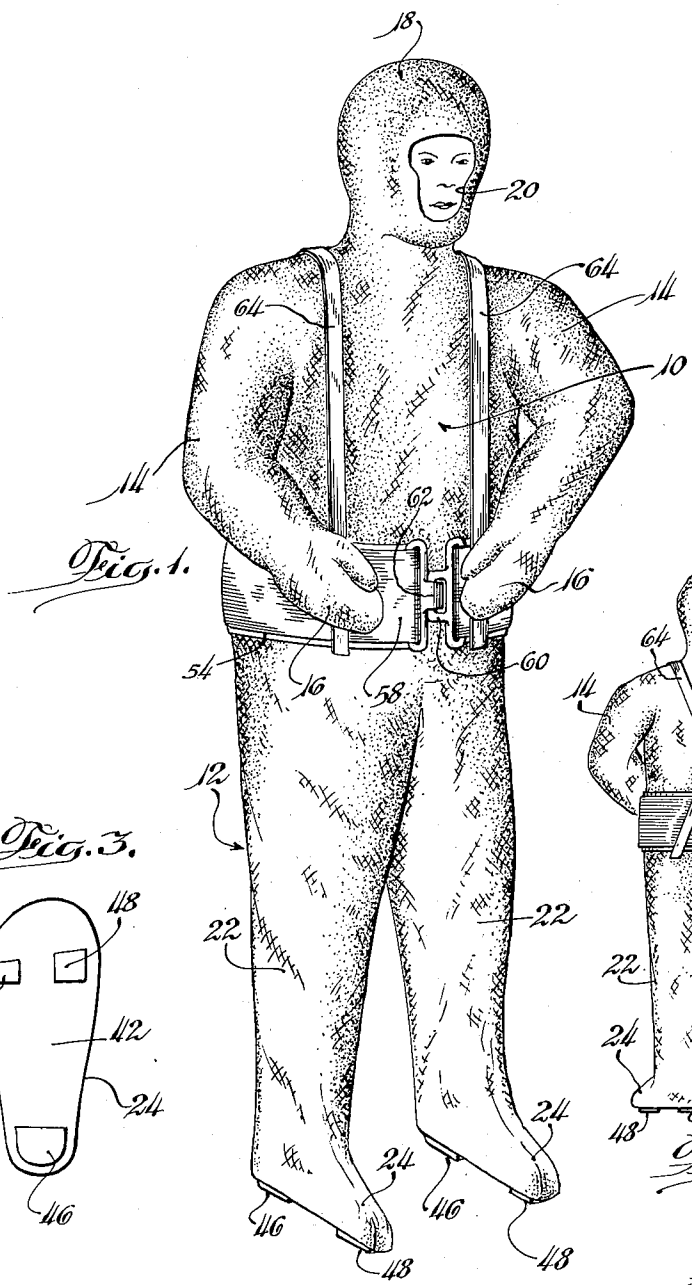


Fig. 1.

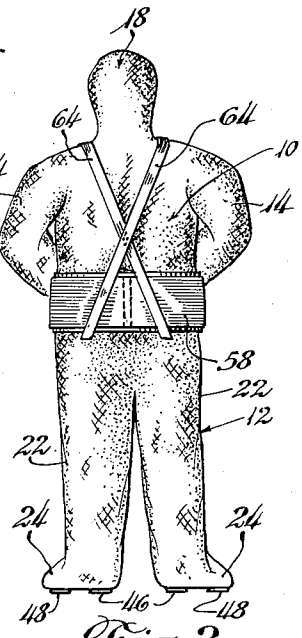


Fig. 2.

Fig. 3.

Inventor:
Boris Berkman
By Hinkle, Horton, Ahlberg, Hansmann & Klupfel
Attorneys.

Nov. 18, 1952 B. BERKMAN 2,618,257

INSULATED LIFE PRESERVER GARMENT

Filed March 17, 1949 4 Sheets-Sheet 2

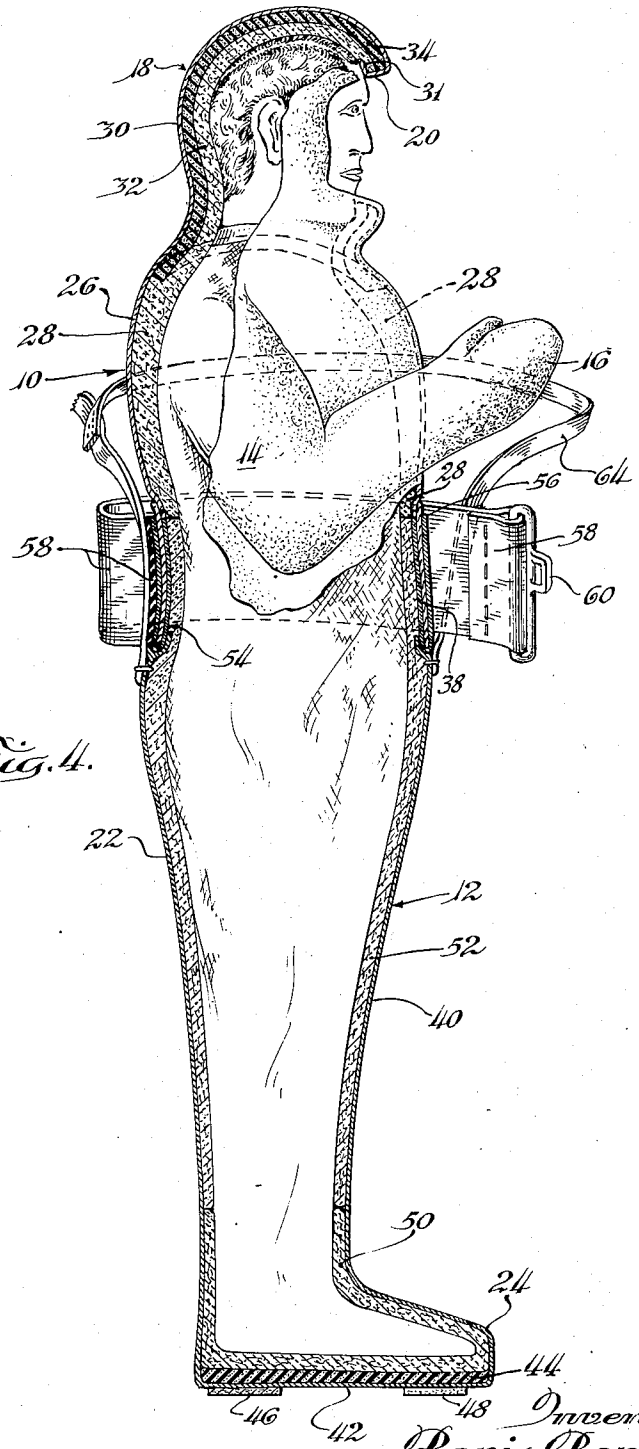


Fig. 4.

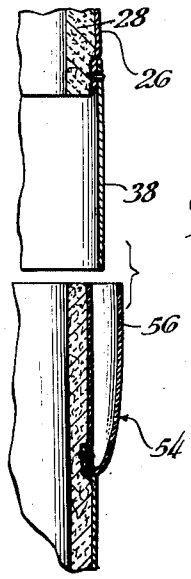
Inventor:
Boris Berkman
By Hinkle, Horton, Ahlberg, Hansmann & Wupper
Attorneys.

Nov. 18, 1952 B. BERKMAN 2,618,257

INSULATED LIFE PRESERVER GARMENT

Filed March 17, 1949 4 Sheets-Sheet 3

Fig. 6.



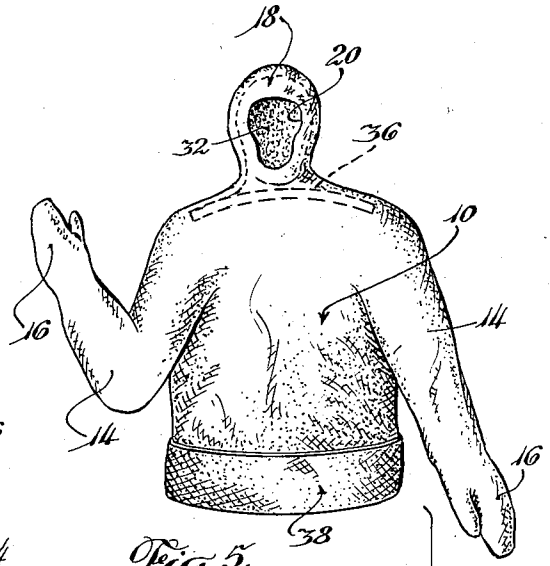


Fig. 5.

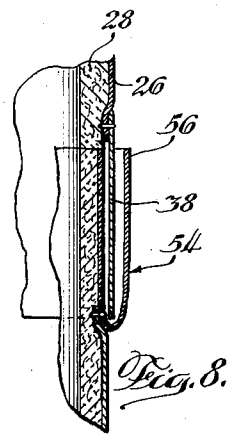
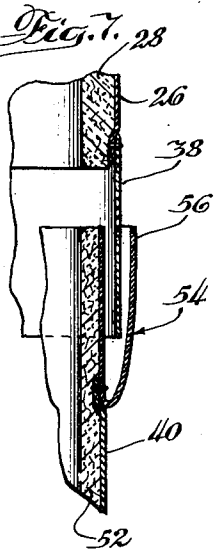
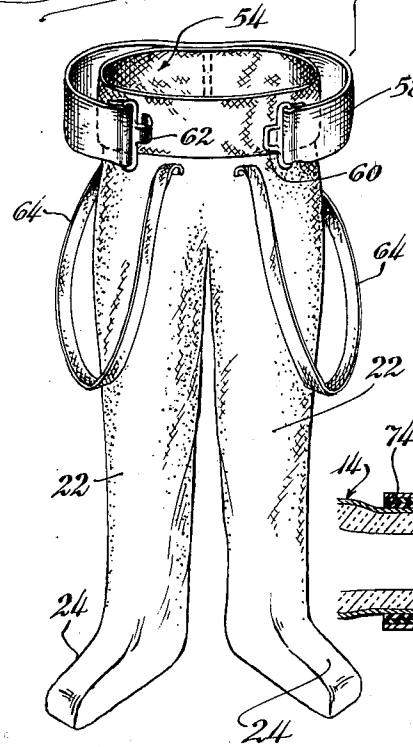


Fig. 8.

Fig. 7.





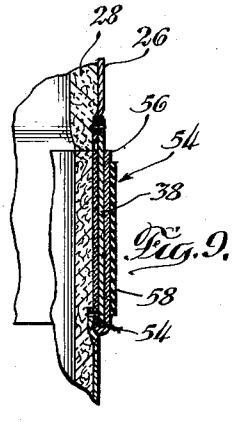
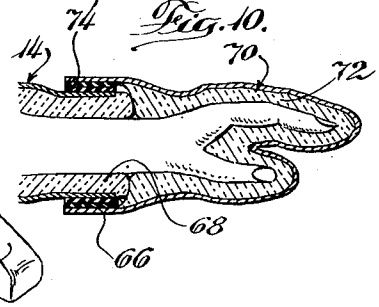


Fig. 9.

Fig. 10.



Inventor:
Boris Berkman
By Hinkle, Horton, Ahlberg, Hansmann & Klupper
Attorneys.

Nov. 18, 1952 B. BERKMAN 2,618,257

INSULATED LIFE PRESERVER GARMENT

Filed March 17, 1949 4 Sheets-Sheet 4

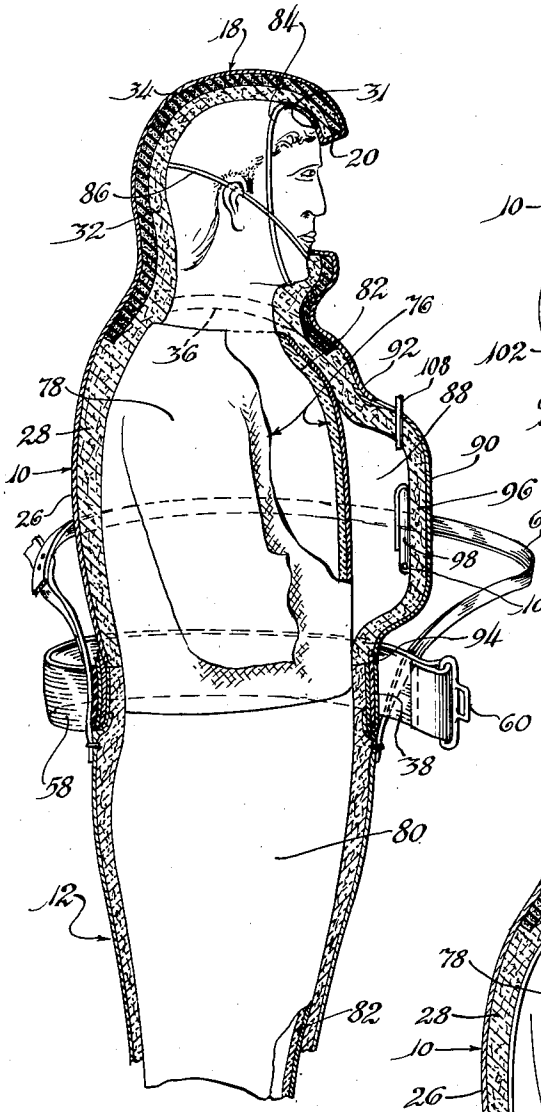


Fig. 11.

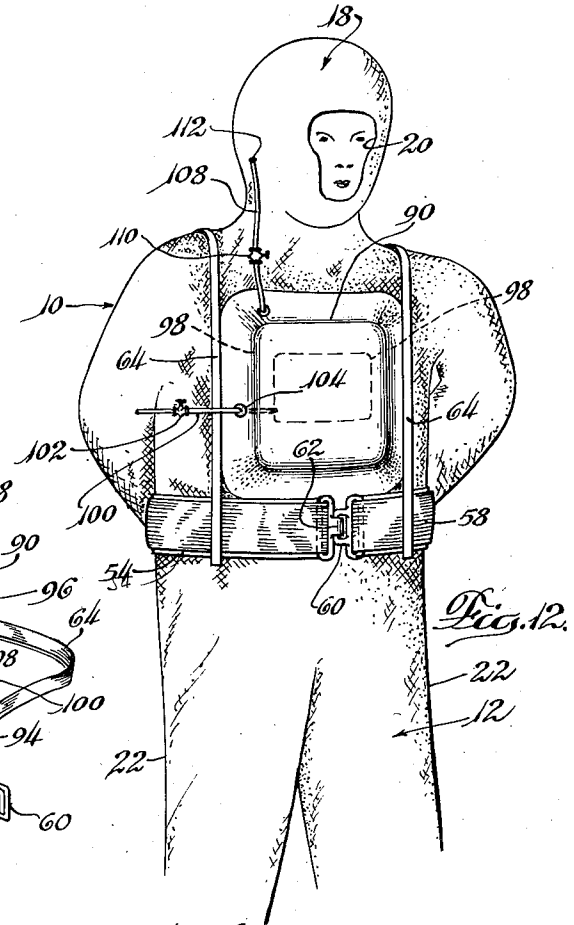


Fig. 12.

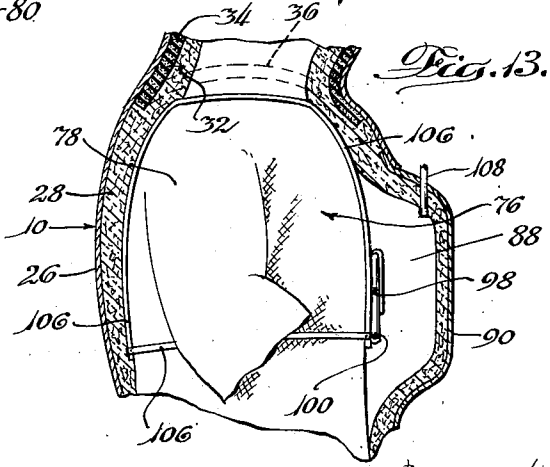


Fig. 13.

Inventor:
Boris Berkman
By Hinkle, Horton, Ahlberg, Hansmann & Wupper
Attorneys.

Patented Nov. 18, 1952 2,618,257

UNITED STATES PATENT OFFICE

2,618,257

INSULATED LIFE PRESERVER GARMENT

Boris Berkman, Chicago, Ill., assignor to Milkweed Products Development Corporation, Chicago, Ill., a corporation of Illinois

Application March 17, 1949, Serial No. 81,952

4 Claims. (Cl. 126—204)

1

The present invention relates to an insulated life preserver garment and more particularly to an improved emergency garment of this class which enables the wearer to remain in the water at near freezing temperatures for several hours.

It is known that among the chief causes of death from immersion in water following a disaster at sea or in arctic or similar waters is freezing, particularly of the extremities such as the hands and feet. This freezing is due in part to the direct cooling of the body extremities by the cold water and in part to extremely poor blood circulation caused by a contraction of the blood vessels by the splanchnic nerve system of the abdominal cavity. The sensory center of this nerve system is in the abdomen and either sudden shock or intense cold at the abdomen will cause the splanchnic nerve system to contract the blood vessels which contain, at any one time, about four-fifths of the body's blood supply. If the splanchnic nerve system is relaxed while the person is in the water, normal blood circulation is assured with the maintenance of normal or near normal body temperature which prevents freezing.

It is, therefore, the principal object of the present invention to provide a novel insulated life preserver garment which prevents freezing of the wearer even though he be in arctic or near freezing temperature waters for several hours.

Another object is to provide a novel insulated life preserver garment which is watertight so that after the wearer is immersed no water will infiltrate the suit either through the material or otherwise.

Another object is to provide a novel life preserver garment of the emergency type which is comprised of two main parts and may be put on by the wearer in two minutes or less, not having any buttons, slide fasteners or complicated hooks of any kind.

Another object is to provide a novel insulated life preserver suit wherein the insulating material is highly buoyant so that no separate life preserver need be worn. Also buoyancy is provided by air spaces in the upper part of the suit.

A further object is to provide a novel thermally insulated life preserver suit which might also incorporate a heating unit of different known types to augment the heat generated by the body to assist in the prevention of freezing the wearer.

A part of the thermal insulation may be provided by a closely fitting inner suit, properly insulated, in addition to the outer two piece suit, and it is one of the objects of this invention to provide such a combination.

Still another object is to provide a novel insulated life preserver garment attaining all of the

2

foregoing objectives which is not bulky and allows the wearer freedom of motion in both his arms and his legs so that he can at least perform all of those functions necessary to abandoning a sinking ship with safety to his life.

Other objects and advantages will become apparent from the accompanying drawings in which:

Fig. 1 is a front perspective view of a man wearing a first form of the novel insulated life preserver garment of this invention and ready to be immersed in water;

Fig. 2 is a rear view, on a smaller scale, of a man wearing the same garment showing the arrangement of the suspenders;

Fig. 3 is a plan view of the bottom of the sole of one of the foot portions of the garment showing the positioning of the leather tread blocks to provide walking comfort and safety;

Fig. 4 is a greatly enlarged sectional view, partially in elevation, taken in part on the centerline of the right leg and in part on the centerline of the body;

Fig. 5 is an elevational view illustrating the separated jacket and trousers of the garment;

Figs. 6 to 9 are fragmentary sectional views illustrating the successive steps taken during the insertion of the lower edge of the jacket into a pocket at the upper edge of the trousers;

Fig. 10 is a sectional view of a modified construction wherein the mitten is separate from the jacket;

Fig. 11 is a sectional view, similar to Fig. 4, illustrating another form of insulated life preserver suit which incorporates a heating unit;

Fig. 12 is a front perspective view of a man wearing the garment of Fig. 11; and

Fig. 13 is a fragmentary sectional view, similar to Figs. 4 and 11, illustrating a further form of this invention.

Referring to Figs. 1 to 9, the suit comprises a jacket part 10 and a trousers part 12. The jacket has a pair of sleeves 14 provided with attached or integral mittens 16 and also has a helmet 18 which, as will appear hereinafter, closely fits the face so as to provide a small opening 20 for the eyes, nose and mouth. The trousers part is provided with separate leg portions 22 each terminating in a foot portion 24.

As can be seen more clearly from Fig. 4, the outer layer of the jacket is constructed from a material 26 which is water-repellent; around the body the jacket is lined with a substantially thick layer 28 of thermal insulating material of the buoyant type, such as milkweed floss. Milkweed floss is particularly well suited for this purpose because its buoyancy characteristics are very

good and it is an excellent thermal insulator; furthermore, it is not subject to mildew.

The helmet portion 18 likewise is formed with a covering of water-repellent material 30 which may be continuous with the jacket material 26 and is similarly lined with a layer 32 of insulating material such as milkweed floss which may be continuous with the body insulation 28. However, in the helmet between the water-repellent outer covering 30 and the insulating material 32 there is interposed a layer of molded sponge rubber 34. The molded sponge rubber gives the helmet 18 its shape and also makes certain that it closely fits the head of the wearer; since it is resilient, it will press snugly against the forehead, cheeks and chin of the wearer to insure that no water will seep into the space between the wearer's body and the suit through the opening at the face. It will be observed from Fig. 4 that the outer layer 30 of the helmet is brought around the edge of the opening and is turned under at 31 so that this material shields the sponge rubber liner 34 and the insulating layer 32 from water, since both the sponge rubber and the insulating material will adsorb water to a more or less extent. However, by covering the edge of the opening 20 with the water-repellent material, seepage of water is effectively prevented. It is also preferable that the water repellent outer layer 30 of the helmet portion be vulcanized to the molded sponge rubber liner 34.

As seen very clearly in Figs. 4 and 5, the sponge rubber liner 34 is provided with a portion 36 overlying the shoulders in a fashion very similar to the helmet of a diver's suit. This again is for the purpose of insuring that the helmet closely fits the head, face and neck of the wearer. The sponge rubber layer is insulated from the head, face and body of the wearer by the insulating material 32 or 28.

The jacket 10 is provided at its lower edge with a wide band 38 of molded rubber or similar material which is somewhat flexible. The band 38 may be secured to the water-repellent material 26 by any suitable means, and preferably is vulcanized thereto to eliminate the possibility of leakage between the band 38 and the water-repellent material 26 of the jacket. The purpose and function of the band 38 will appear hereafter.

The trousers 12 are made of a water-repellent material 40 which is the same as or similar to the material 26. The trousers are, as has been previously indicated, made with two leg portions 22 terminating in foot portions 24.

Special attention is called to the construction of the foot portions because the feet are the extremities which become severely frozen under conditions of immersion in arctic waters. Each foot portion 24 (Fig. 4) has a sole part 42 to which is vulcanized a sponge rubber inner sole 44. Sponge rubber is preferred because it forms a comfortable pad for the feet and also has a certain amount of insulating characteristics. On the exterior and bottom of the sole portion 42 there are permanently secured a heel block 46 and a pair of blocks 48 locatable under the joints of the large and small toes (Fig. 3). These three points are those of primary support for the feet. The blocks 46 and 48 are preferably made of leather or leather-like or other tractive material so that a person wearing the suit of this invention may walk around on the deck of a ship or elsewhere without fear of slipping or falling.

In order to provide warmth for the foot and also to give the foot portion 24 a shape, it is lined with an inner lining of molded felt material 50 the form of which is seen most clearly in Fig. 4. It will be observed that when a person wears this garment he wears no other shoes, either street shoes or working shoes, but dons the suit with his feet preferably encased in heavy woolen socks. Thus, with the feet clothed in woolen socks and the portion 24 formed with the molded felt into liner 50, a person wearing the garment will have his feet sufficiently insulated against the cold and will also have an air space between the foot and the molded felt liner.

The trousers 12 are lined similarly to the jacket 28. However, it is advisable that the trousers be lined with a layer of wool lining 52 rather than milkweed floss lining, since wool lining does not have the buoyant properties of milkweed floss. It is obvious, of course, that the buoyant material in the immersible suit should be arranged about the upper portion of the body, particularly around the chest and underneath the arms and in the helment proper, so that when a person is in the water the buoyant material will hold him upright with the water level being several inches below his chin. If the feet and legs were to be encased in insulating material of the buoyant type they would have too great a tendency to float to the top of the water, and the person would not be held upright but in a reclining position.

The upper edge of the trousers is, as is seen particularly in Figs. 4 and 5, provided with a continuous pocket 54 which is adapted to receive, as shown in the successive Figs. 6 to 9, the band 38 which is secured to the lower edge of the jacket 10. The pocket 54 is made of molded flexible rubber or similar material and is suitably permanently secured to the water-repellent material 40 of the trousers, preferably by vulcanizing. It will be noted from Figs. 4 and 6 to 9 that the insulating material 52 of the trousers extends up to the top edge of the pocket 54 so that it meets with the insulating liner 28 of the jacket. There is, therefore, a continuous inner sheath of insulation between the jacket and the trousers protecting the wearer against cold.

The cooperation of the band 38 and the pocket 54 provides a means whereby the ingress of water to the interior of the suit is prevented. When the band 38 is seated at the bottom of the pocket (Figs. 4, 8 and 9) a trap is formed which prevents water from seeping or flowing past the band 38, and even if some water should enter between the outer face of the band 38 and the front 56 of the pocket this water is prevented from going any farther than the bottom of the pocket.

In order to make certain that the band 38 and the pocket 54 are tightly compressed against each other, the trousers are provided with a wide elastic belt 58 having cooperating buckle parts 60, 62 at either end. The elastic belt is permanently affixed to the outer face 56 of the pocket 54 in the center of the back so that it will not become detached and lost. Furthermore, affixing the belt to the pocket prevents it from sliding up off the trousers while the garment is worn. Figs. 4 and 9 show the belt 58 compressing the pocket walls against the band 38 and holding the jacket snugly against the body of the wearer when the buckle parts 60, 62 are engaged. These figures clearly illustrate how the band 38 is secured firmly between the inner and outer walls of the pocket 54 so that no water can seep between the joint formed by the jacket and the trousers.

In order to prevent the trousers from slipping off of the wearer, there is provided a pair of suspenders indicated by the numeral 64, which are sewed or otherwise suitably fastened to the trousers at the front and rear and immediately below the lower edge of the pocket. When the suspenders are in their customary position over the shoulders (Fig. 1), they hold up the trousers and prevent them from slipping off and also prevent the elastic belt 58 from sliding down from its operative position.

The life preserver garment of Figs. 1 to 9 is to be worn ordinarily by an individual wearing his ordinary clothes. If these clothes are somewhat bulky, however, he should remove them and preferably wear only nonbulky clothing, fitting fairly close to the skin. As previously indicated he should not wear shoes but clothe his feet in a pair of woolen socks which preferably should reach above the angles. It will be observed from Fig. 4 that the molded boot portion 50 extends above the ankles and the socks should likewise extend above the ankles. The jacket is pulled on first and the helmet 18 adjusted so that the sponge rubber 34 about the opening 20 presses the helmet 18 securely against the face above the eyes, across the cheeks and across the chin. The trousers are pulled on and are brought up so that the band 38 enters the pocket 54 in the manner progressively shown in Figs. 6, 7, 8 and 9. When the trousers have been raised sufficiently and the band 38 shoved all the way down to the bottom of the pocket 54 as indicated in Fig. 8, then the loose ends of elastic belt 58 are brought around to the front and the buckle parts 60, 62 engaged. Lastly the wearer slips the suspenders over the shoulders by reaching down and sliding his arms through the loops seen in Fig. 5 of the drawings. The garment is then arranged as shown in Figs. 1 and 2, and the wearer is fully equipped to be immersed in water.

The removal of the life preserver suit is accomplished by reversing the steps of putting it on.

It will be observed that the only parts that need to be engaged in donning the garment are the insertion of the band 38 into the pocket 54 and the engagement of the belt buckle parts 60, 62. It is preferable that this belt buckle be of very simple construction so that the parts 60 and 62 may be grasped at the upper and lower edges of the belt and engaged by a minimum amount of movement requiring the free use of the fingers since the wearer's hands will be encased in the mitten parts 16.

It will be noted from Fig. 4 that the pocket 54 and the band 38 are of substantial width—about six inches—and that the elastic belt 58 is almost as wide as these two parts. In the form shown in Figs. 1 to 9, the upper edges of these three elements are located so that they are just under the lower rib. This location of these parts permits very great freedom of movement of the wearer and yet places them in a position so that they are secure with a minimum amount of opportunity for them to slide either up or down.

It might be preferable in some circumstances that the mittens be separate from the remainder of the jacket. A separate construction for the mittens is shown in Fig. 10. When separable mittens are worn the sleeve 14 is provided at its outer end with an elastic band 66 which encircles the outer end of the sleeve and firmly presses the sleeve against the wrist. The insulating liner for the sleeve extends down to the far end of the sleeve, as indicated by the reference character 68, and prevents the sleeve from becoming excessively cold. The separate mitten 70 is similarly insulated with a liner 72 and is provided with an elastic wristlet 74 which overlies the elastic wristlet 66 on the lower end of the sleeve. When the immersible suit is provided with the separate mittens they are put on last so that complete freedom and use of the hands can be had while donning the suit. Using the separate mittens, the wearer pulls the sleeve down so that the insulating lining 68 fully covers the wrist and then pulls on the mittens making certain that the elastic wristlet 14 on the mittens overlies the elastic wristlet 66 on the sleeve.

In Figs. 11 and 12, there is illustrated a modified garment which incorporates a separate and self contained heating unit. In this garment the trousers 12 may be made as previously described, but a comparison of Fig. 11 with Fig. 4 shows that the jacket 10 is slightly longer and that the band 38 and jacket 54 are somewhat narrower. However, their construction and function are the same.

In using the suit of Figs. 11 and 12, it is preferred for reasons which will appear hereinafter that a person also wear an insulated inner suit 76 which is fitted close to the body and comprises a jacket 78 and trousers 80. It is not essential that this inner suit be made of any particular material but it is preferably insulated throughout with a milkweed floss batt 82. The inner suit 76 is preferably of a type which would normally be worn by a person on shipboard while the ship is operating in arctic waters.

The jacket 10 of the outer garment is made of the water-repellent material 26 and is lined with the layer 28 of milkweed floss insulation. It incorporates the helmet 18 which has added thereto a pair of elastic bands 84 and 86 which assist in properly locating the helmet 18 and also in ensuring that the edges of the face opening 20 snugly fit the face. To this end the band 84 encircles the head under the chin and up across the cheek bones. The band 86 fits across the chin and around the back of the head crossing above the ears. It is preferred that the bands 84 and 86 be stitched or otherwise secured to the turned under edge 31 of the outer material 30 of the helmet 18.

At the front of the jacket an air pocket 88 is formed by a shell 90 of a molded rubber, plastic or similar material. The shell 90 is generally pan shaped and at its upper and side edges is secured at 92 in any suitable manner to the outer water-repellent material 26 of the jacket 10. At its lower edge 94, the shell 90 is secured to the band 38. On its inner surface the shell 90 is lined with a layer 96 of milkweed floss insulation which is preferably continuous with the insulation 28 which lines the remainder of the jacket.

The air space 88 covers the upper portion of the abdominal cavity and the lower portion of the chest cavity and extends completely across the front of the body. A self-contained heating element or unit 98 is mounted on the inner side of the shell 90 and within the space 88. This self-contained heating unit might be of any type, but that which is illustrated is one utilizing iron granules and oxidation accelerating chemicals so that when water is added oxidation of the iron will take place at a sufficiently rapid rate to generate substantial heat. A typical self-contained heating unit and that which is illustrated and described is sold by Bauer & Black Division of The Kendall Co. of Chicago, Illinois, under the trade-

mark "Thermat." This oxidation will commence with the introduction of water into the unit 98.

For the purpose of initiating and sustaining oxidation there is provided a tube 100, fitted with a manually operable shutoff valve 102, extending laterally outwardly from the shell 90; the tube 100 is sealed against the shell wall at 104 where it passes therethrough. In order to start operation of the heating unit the wearer of the life preserver garment, when immersed in water, should open the valve 102 to allow water to flow through the tube 100 into the unit 98. Only a small amount of water is required and consequently the valve 102 should be opened only for a very short interval of time, for example, enough time to allow a liquid ounce or two of water to enter the unit 98. It then should be shut off so that excessive water will not enter the unit and then leak into the interior of the life preserver garment.

The life preserver garment illustrated in Fig. 13 is similar to that shown in Figs. 11 and 12 except that the unit 98 is arranged in the cavity 88 adjacent the body rather than on the inner side of the wall of the shell 90. It may be secured to the body in any suitable fashion such as by a harness 106 which extends up over the shoulders and around the body of the person wearing the garment.

When wearing the suit of Figs. 11 to 13 it is always advisable also to wear the inner suit 76 previously described so that when heat is generated by the unit 98 the inner thermally insulated suit will prevent the wearer from being burned if the temperature in the space 88 should become too high. The heat which is generated in the space 88 will disperse throughout the inside of the life preserver garment. However, the air space 88 has been located at the front of the wearer and exposed to the abdominal cavity so that the abdomen will be kept warm at all times. As stated earlier, the splanchnic nerve system responds to extreme cold by greatly contracting the blood vessels of the body, thus dangerously limiting blood circulation, particularly in the extremities. If, however, this nerve system is not exposed to cold—and it will not be because of the heat in the air space 88—it will not react to contract the blood vessels and normal, or nearly normal, circulation of blood will take place throughout the body to prevent freezing, particularly of the extremities such as the hands and feet.

If desired, the cavity 88 may be fitted with an air vent tube 108 provided with a shutoff valve 110 and which extends upwardly with its open end 112 at one side of the helmet 18 of the garment. In this way the air space 88 might be vented to the atmosphere from time to time in the event that the air between the garment and the body becomes excessively stagnated. The air tube 108 preferably is flexible, being made of rubber or a flexible rubber substitute material, and is secured to the jacket 10 and helmet 18 so that it will not become detached or broken away. The opening 112 is positioned at the side of the helmet so that it will be above the water line when the person wearing this garment is immersed in water.

It will be seen from the foregoing description that the different forms which have been described attain the objectives claimed for this invention. It will also be obvious to those skilled in the art that numerous modifications may be made herein without departing from the spirit and scope of this invention. What, therefore, is claimed as new and desired to be secured by United States Letters Patent is:

1. A life preserver garment comprising in combination a jacket part, a trousers part, said jacket and trousers parts being made of a water repellent material, thermal insulation lining said jacket and said trousers parts, and means interposed between said jacket part and said trousers parts to seal said parts against each other thereby to prevent the ingress of water when said parts are in wearing position, said means including an upwardly opening preformed circumferential pocket secured to the upper edge of said trousers part, a depending circumferential band secured to the lower edge of said jacket part adapted to be inserted into said pocket, said pocket and said band being made of a flexible rubber-like material, and belt means encircling said pocket on the outer face thereof to compress the walls of said pocket against said band to provide a water tight seal.

2. A life preserver garment as claimed in claim 1, including an air space defining shell secured in said jacket part above said band and so that the air space is located adjacent the abdominal cavity and between the body of the wearer and said shell, and means for generating heat supported in said air space.

3. A life preserver garment as claimed in claim 2 wherein said heat generating means is of the water activated type, the combination including a water inlet tube extending from said heat generating means and through and sealed against said shell through which water may be supplied to said heat generating means, and a manually operable valve in said tube and located externally of said shell by means of which the water supplied to the heat generating means may be regulated.

4. A life preserver garment as claimed in claim 1, including a head covering helmet, having a face opening, secured to said jacket part and including means snugly to fit said helmet against the face around said face opening, said means including a pair of elastic bands adapted to encircle the head from the chin across the top and back, said helmet having an inner thermally insulating lining continuous with the jacket lining and having an intermediate resilient lining.

BORIS BERKMAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,221,473	Riley	Apr. 3, 1917
1,308,561	Teeters	July 1, 1919
2,244,163	Kronhaus	June 3, 1941
2,305,605	Craig et al.	Dec. 22, 1942
2,329,093	Sommers et al.	Sept. 7, 1943
2,429,973	Alexander	Nov. 4, 1947

FOREIGN PATENTS

Number	Country	Date
455,254	France	July 26, 1913
17,323	France (Addition to No. 455,254)	Aug. 6, 1913
315,121	Great Britain	July 11, 1929

OTHER REFERENCES

Photograph "Electrically Heated Undies," Evening Star, Washington, D. C., page A-4; October 10, 1940.