Oct. 24, 1967 H. A. SHINDLER 3,348,245

CARRIERS, PARTICULARLY FOR VICTIMS OF HIGH ENERGY RADIATION

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FIG. 2

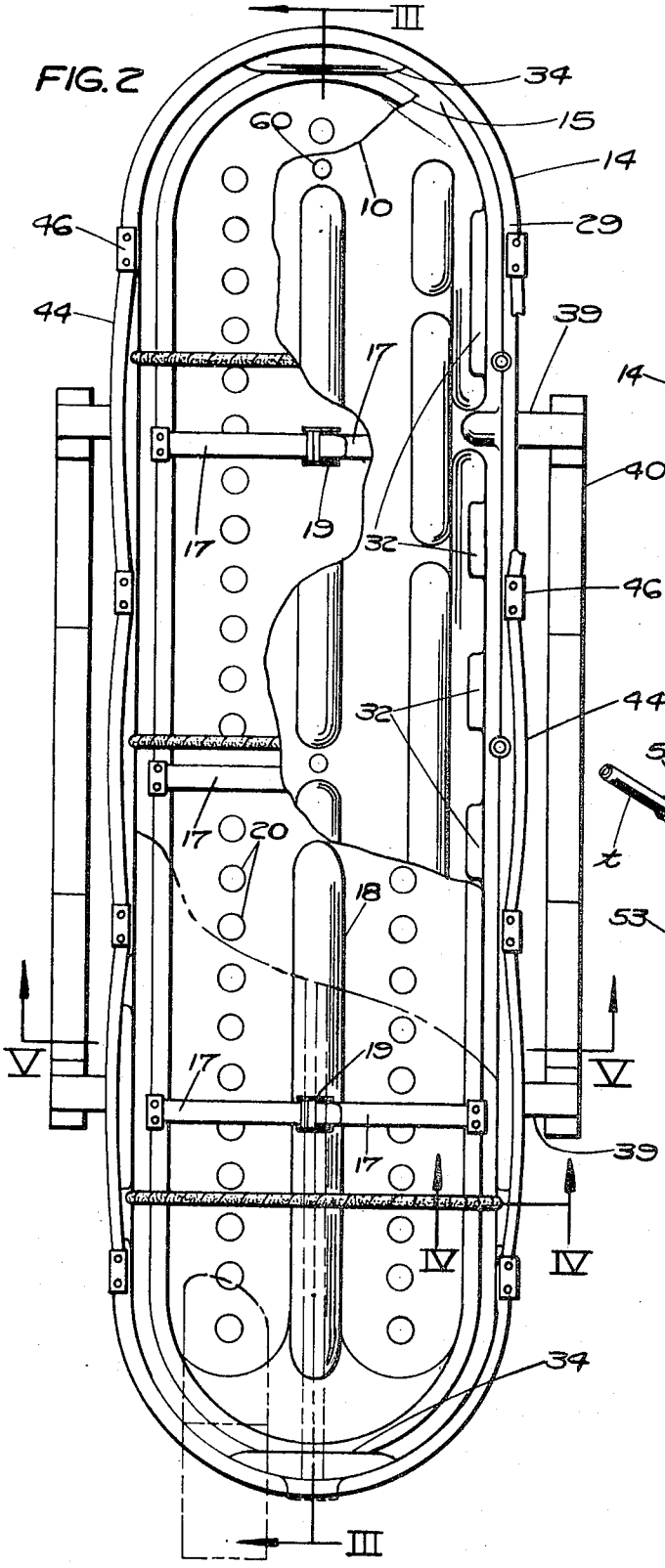
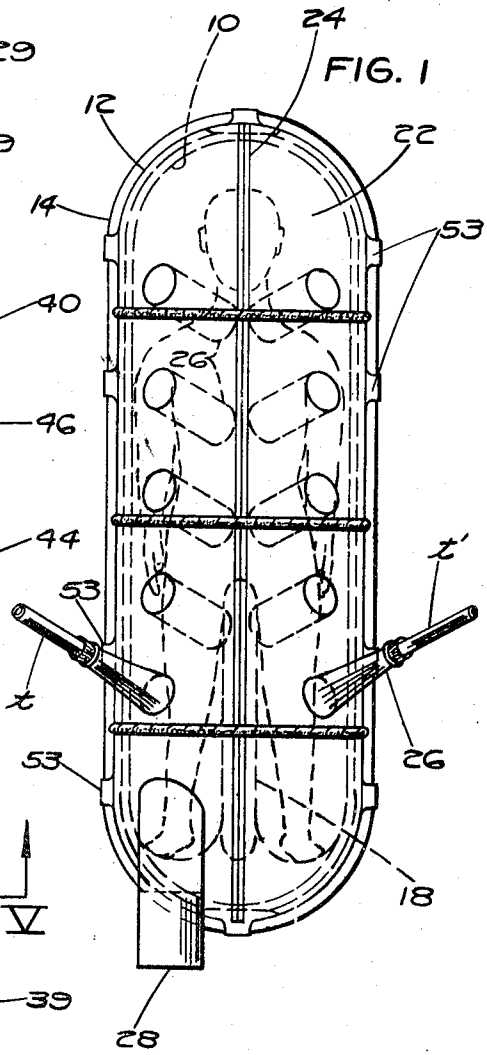


FIG. 1



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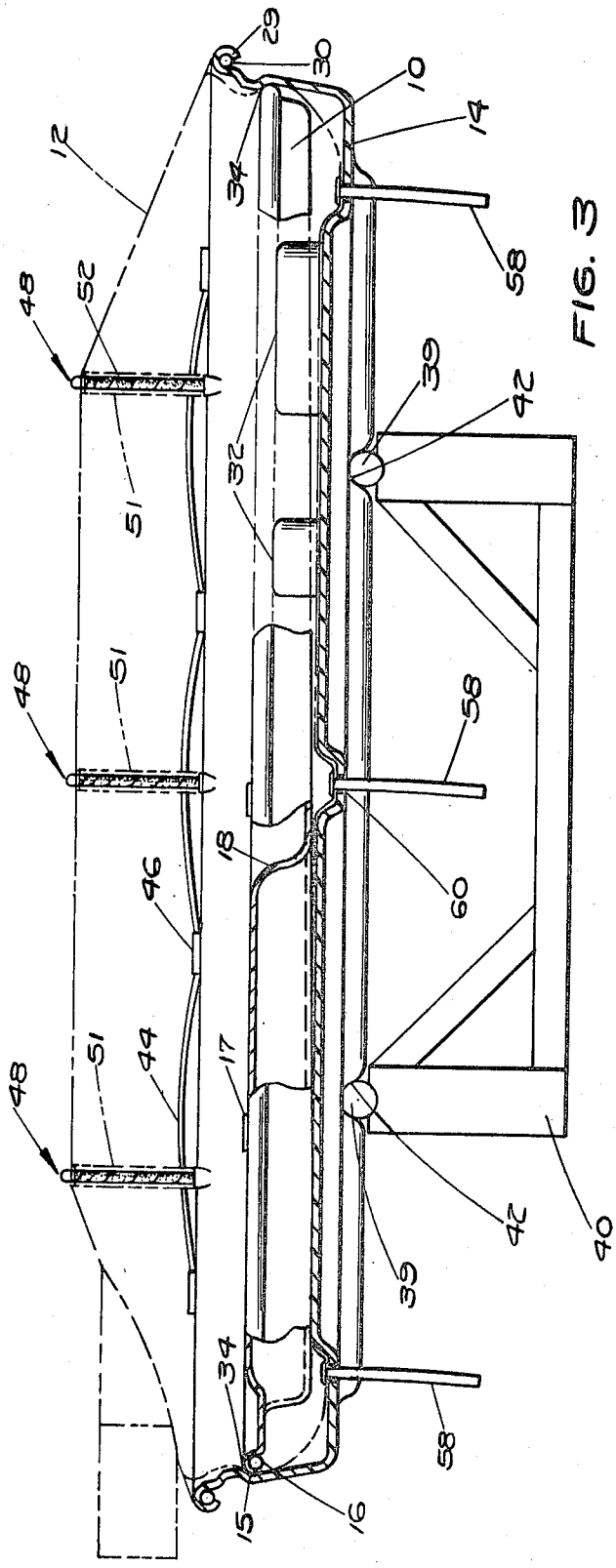
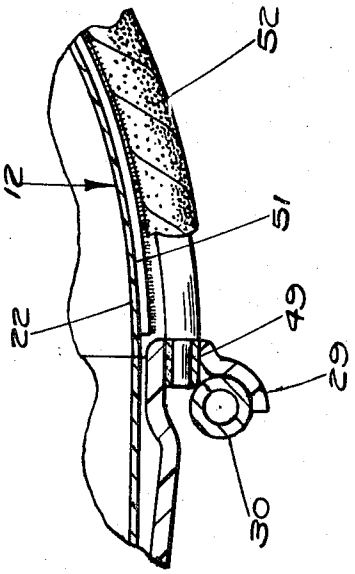


FIG. 3

FIG. 4



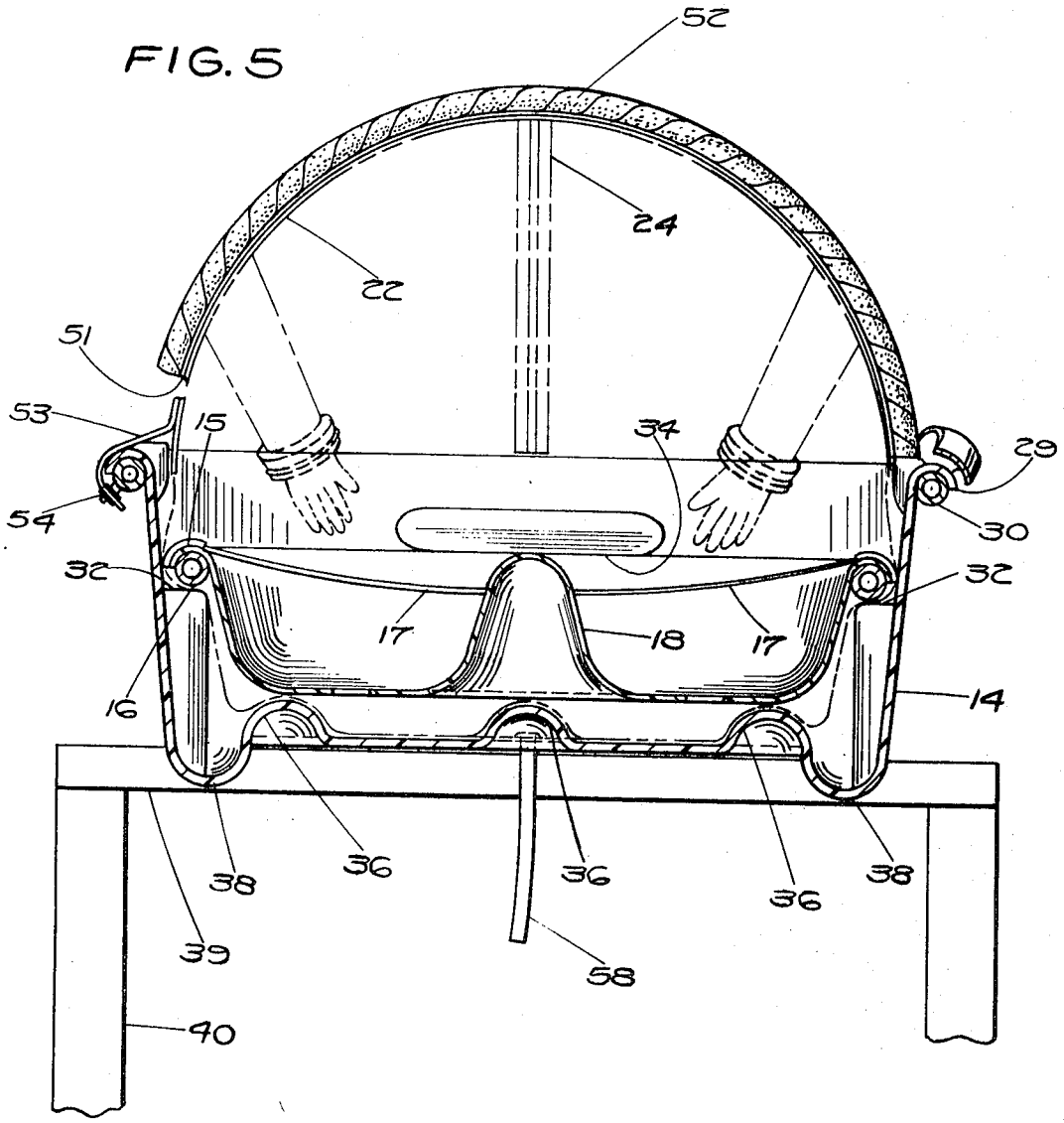
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CARRIERS, PARTICULARLY FOR VICTIMS OF HIGH ENERGY RADIATION

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FIG. 5



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3,348,245

CARRIERS, PARTICULARLY FOR VICTIMS OF HIGH ENERGY RADIATION

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Filed Oct. 1, 1965, Ser. No. 492,052
10 Claims. (Cl. 5—82)

The present invention relates to improvements in carriers for injured or disabled persons and more particularly those who are victims of an over exposure to harmful high energy radiation, such as beta and gamma rays.

In spite of the high safety standards which are followed in all aspects of the various and ever increasing utilization of nuclear energy, nonetheless, occasional accidents occur wherein an accident victim is exposed to hazardous amounts of radiation and a resultant contamination of the accident victim. Such exposure, alone or coupled with physical injury, can and frequently does incapacitate the victim so that he is unable to decontaminate himself. In fact, a victim may well receive so much radiation that other persons are unable to readily and/or competently assist him due to the radiation hazard created by the victim himself. Also, in many, if not most instances, it is necessary or desirable to remove the victim from the accident scene so that effective treatment can be given, and in so doing to protect him from physical injury. Further it is essential to protect others from radiation exposure in moving the victim and also when he has finally been taken to a place of treatment.

The object of the present invention is to provide an improved carrier particularly suited for the needs, exemplified above, of victims of an over exposure to high energy radiation.

A further object of the invention is to provide an improved carrier of light weight construction which satisfies the above ends in a simple and inexpensive manner.

In its broader aspects, the invention is characterized by a carrier comprising a litter in the form of an elongated shallow shell on which an accident victim who has been exposed to high energy radiation may be placed. The litter is preferably formed of resilient, plastic material and provided with means for lashing the victim thereto. A containment area device in the form of a transparent, flexible sheet material envelope is provided with a sealable opening so that the litter may be introduced therein and then maintained in an isolated atmosphere. The basic combination of elements in the present carrier further includes a basket also in the form of an elongated shell but having a depth somewhat greater than that of the litter. The litter is nested within the basket and releasably held therein preferably by detent means formed on the basket and litter.

Further preferable features include the provision of inwardly extending sleeves, sealable means for the introduction and discharge of air, or the like, and means for introduction of washing liquid in the containment area device. A filter is employed in the air discharge means to prevent spread of contamination from the isolated atmosphere of the containment area device. The containment area device is further provided with drain means which are registered with openings in the basket to enable washing liquid to be discharged from the containment area device and collected in sealed receptacles. The bottom wall of the litter is perforate so that the washing liquid employed in decontaminating the victim may freely flow to the drain means of the containment area device. Gloves are attached to the sleeves of the containment area device to facilitate treatment of the victim without any radiation hazard to those who are assisting him.

The above and other related objects and features of

the invention will be apparent from a reading of the following description of the disclosure found in the accompanying drawings and the novelty thereof pointed out in the appended claims.

In the drawings:

FIG. 1 is a plan view of a victim carrier embodying the present invention;

FIG. 2 is an enlarged plan view of the carrier seen in FIG. 1, with portions thereof broken away and others in section and also illustrating the use of a rack support for the carrier;

FIG. 3 is a section taken generally on line III—III in FIG. 2;

FIG. 4 is a fragmentary section, on an enlarged scale, taken on line IV—IV in FIG. 2; and

FIG. 5 is a section, on an enlarged scale, taken on line V—V in FIG. 2.

The present carrier preferably comprises three basic components (FIGS. 1 and 3), namely a litter **10** to which the accident victim may be lashed, a containment area device **12** in which the litter **10** is placed and a basket **14** which receives the litter **10** in nested relation and preferably includes means for holding the containment area device **12** away from the victim.

The litter **10** (FIGS. 2, 3 and 5) is preferably an elongated, shallow shell having an outwardly projecting flange **15** along its upper periphery which is attached to a reenforcing tube **16**. Straps **17** are secured at spaced points along the litter flange and may be joined by buckles **19** to lash a victim to the litter **10**. The litter shell is preferably formed of plastic, such as polybuterate, to provide a cushioning effect from its resilient property while obtaining necessary strength from a light weight construction. Fabrication of this shell can be made by economical molding techniques well known to those skilled in such arts. The litter **10** and more particularly the bottom wall thereof is further characterized by a longituidnal rib **18** extending from the foot end thereof to provide separate compartments for the legs of the victim, as is best indicated in FIG. 1.

It will be noted that the depth of the litter **10** (FIG. 3) increases progressively from the head end to the foot end thereof so that the victim will be more comfortably positioned when the litter is nested in the basket **14**. It will also be seen that the bottom wall of the litter **10** is perforated by holes **20** (FIG. 2) for drainage purposes which are more fully described hereinafter.

The containment area device **12** (FIG. 1) is basically in accordance with the teachings of my U.S. Patent No. 3,148,699 and comprises a thin, flexible, transparent sheet material envelope **22** which functions as a radiation shield. The envelope **22** has a lengthwise opening therein that may be closed by separable fastener means indicated at **24**. The separable fastener means **24** may take the form of endless extrusions and can be overlaid by a sealing tape (not shown) to further insure complete sealing of the envelope **22** to maintain an isolated atmosphere therein. The containment area device **12** further comprises a plurality of inwardly extending sleeves **26** and an outlet opening having a filter **28** through which air or the like is discharged as will later be more fully explained.

The basket **14** is similar to the litter **10** in being formed as an elongated shell and likewise has an outwardly projecting flange **29** along its upper periphery, which is attached to a reenforcing tube **30**. Again the shell of the basket **14** may be advantageously formed of a resilient plastic, such as polybuterate, by known molding techniques to economically provide the preferred light weight configuration shown in the drawings. As was indicated above, the litter **10** is placed in the basket **14** in use and more specifically is nested therein (FIGS. 3 and 5) to

give greater protection to the victim as well as to facilitate his transportation and treatment. It is thus desirable to provide means for releasably maintaining the litter **10** in this nested relation. These means are preferably of the detent type and comprise the peripheral flange (**15, 16**) of the litter, a series of ledges **32** integrally formed on the side walls of the basket **14** and protrusions or latch portions **34** integrally formed at opposite ends of the basket to firmly hold the litter flange against the ledges **32**.

The bottom wall of the basket **14** is provided with upwardly extending, longitudinal ribs **36** and downwardly extending, longitudinal ribs **38** which serve to increase the strength of the basket while minimizing its weight. These ribs also serve other and equally important functions. Having in mind the resilient character of both the basket and litter, discussed above, the ribs **36** cooperate with the bottom wall of the litter **10** (FIG. 3) to give a relatively firm support to the legs of the victim by being contiguous therewith from the inner end of the dividing rib **18** to the foot end thereof. From the inner end of the rib **18** to the head end of the litter, the resilient bottom wall of the litter gives a cushioned support to the torso of the victim. The downwardly extending ribs **38**, adjacent the side walls of the basket, provide means for locating the carrier on cross bars **39** of a rack type of support **40** (FIGS. 2 and 3) by being spaced apart to form laterally aligned notches **42**.

While the peripheral flange of the basket **14** may be employed as a gripping means for moving the carrier, greater flexibility and maneuverability is had by the preferred provision of straps **44**, secured by fasteners **46** along opposite lengthwise portions of the peripheral flange of the basket.

The unique advantages of the present carrier will be more readily apparent from the following description of a typical sequence of events when its use is necessitated, with reference at this time being made to further structural features which contribute to the effectiveness of the overall combination herein disclosed.

After the occurrence of an accident in which an incapacitated victim has been subjected to any substantial amount of high energy radiation, as for example leakage of radioactive material during the repair of a nuclear power plant, it is of paramount importance that the victim be decontaminated at the earliest possible moment. Seldom is effective treatment possible at the accident scene. Thus the present carrier is generally first employed to transport the victim to a suitable place of treatment.

As soon as possible after an accident, the victim is placed on the litter **10** with his legs disposed in the compartments defined by the rib **18**, as indicated in FIG. 1. The straps **17** are then jointed by the buckles **19** to securely lash the victim to the litter, so that the victim is then initially protected from any, or further, physical injury and can be immediately carried to an area of lesser radioactive contamination. Preferably after removal from an area of high contamination, the litter-bound victim is placed within the containment area device **12** and the separable fastener **24** thereof is closed so that the victim is within an isolated atmosphere preventing air-borne contamination being spread from the victim. Preferably at this time the victim is also placed in the basket **14** and assembly of the carrier, as shown in the drawings, is completed.

The litter **10** is firmly held in nested relation in the basket **14** by the detent means comprising the protrusions **34** and ledges **32**, as it is enveloped within the containment area device **12**. After nesting of the litter **10** in the basket **14**, it is next desirable and preferable to hold the containment area device in generally spaced relation from the victim. To this end removable canopy bars **48**, of U-shape, are fitted into bushings **49** spaced along opposite sides of the peripheral flange of the basket **14** (FIG. 4). In usual practice, the canopy bars **48** would be

removed when the litter is nested in the basket **14**, to facilitate this step. After the bars **48** are in place, the containment area device **12** is secured thereto by releasable means which advantageously take the form of minute barbs or hooks mounted on strips **51, 52**. The strips **51** are secured to the containment area device envelope **22** in registered relation with the three canopy bars **48** around which the strips **52** are respectively wound. Simply by pressing the strips **51, 52** together, the envelope **22** is releasably secured to the canopy bars **48**. In this same connection, a plurality of flaps **53** are secured, as by heat sealing, to the containment area device and are attached to the peripheral flange of the basket **14** by separable snaps or fasteners **54** spaced along the length thereof (FIGS. 1 and 5). There is, thus, little or no chance of the containment area device envelope **22** draping against the victim or interfering with his treatment.

Up to the point of placing a radiation victim in the containment area device **12**, those persons coming to his assistance would normally be required to wear protective clothing. After the described assembly of the carrier, the victim may be safely moved to "clean" areas for further and more intensive treatment by persons unhampered by such protective clothing. With the completed carrier assembly, the victim is also more fully protected from physical injury and may be carried up ladders and through narrow hatches, as would often be the case should the accident have occurred on board a ship. The exterior of the carrier would, of course, be monitored to make certain it carried no contamination into "clean" areas.

In any event, when the victim arrives at a hospital, or other place of treatment, he is already in an isolated treatment zone or chamber so that spread of contamination is prevented. When at the hospital, one of the sleeves **26** may be used as an inlet for the introduction of air, oxygen or other breathing gas. To this end a tube *t* (FIG. 1), connected to an appropriate source of pressurized gas, is shown connected and sealed to an everted sleeve **26**. Such gas is then exhausted through the filter **28** to prevent spread of contamination.

Another important aspect in the treatment of the victim is that he be thoroughly washed to rid him of contamination. To this end a second tube *t'* is shown connected and sealed to another of the sleeves **26** which has also been everted. The tube *t'* is connected to an appropriate source of washing liquid. The sleeves **26** may also be used to introduce or remove items from the containment area device lest some of these sleeves have gloves attached to their inner ends so that the victim may be safely handled in his treatment.

In washing the victim, the liquid employed must be flushed over the victim and carried away from the containment area device. To this end the bottom wall of the litter **10** is perforated by the holes **20** so that the washing liquid will not be trapped against his body. The washing liquid, nonetheless remains confined wtihin the containment area device **12**, passing to the portion of the envelope **22** which is supported by the bottom wall of the basket **14**. Disposal of the washing liquid is provided for by drain tubes **58** which are secured to the envelope **22** and extend through registered holes **60** in the bottom wall of the basket **14**. Appropriate containers may be connected to the tubes **58** for the safe disposal of the contaminated washing liquid. The tubes **58** are preferably secured to the containment area device in locations which will assure complete drainage of contaminated liquid therefrom. Thus it will be seen that one tube **58** is provided at the head end of the carrier, one in the middle where the victim's torso would be, and another adjacent the foot end thereof. Further, the central rib **36** is relieved so that the surrounding areas of the bottom wall of the basket **14** provide for complete drainage of liquid through the tubes **58**.

During treatment of the victim, the carrier may be readily and safely spaced above the floor by employing the rack previously referred to. Thus the cross bars **39** of

the rack 40 are received by the notches 42. Not only is the carrier positioned at a convenient height for treatment of the victim, but the containers for receiving contaminated washing liquid may be readily connected to and disconnected from the tubes 58.

The above described sequence for use of the present carrier is, of course, exemplary and other ways of employing the novel structure of the invention will occur to those faced with the problems of treating accident victims, particularly where radioactive contamination has been a factor. Likewise variations in the disclosed embodiment of the invention will be apparent to those skilled in the art, wherefore, the scope and limit of the present inventive concepts are to be derived solely from the following claims.

Having thus described the invention, what is claimed as novel and desired to be secured by Letters Patent of the United States is:

1. A carrier for accident victims, particularly those who have been exposed to high energy radiation,
said carrier comprising
a litter in the form of an elongated, relatively shallow shell on which the victim may be placed and then lashed thereto,
a basket in the form of an elongated shell having a depth somewhat greater than that of the litter and in which the litter is nested, and
means for releasably holding the litter in such nested relation.

2. A carrier for accident victims, particularly those who have been exposed to high energy radiation,
said carrier comprising
a litter in the form of an elongated, relatively shallow shell on which the victim may be placed and then lashed thereto,
a containment area device in the form of a transparent, flexible, plastic sheet material envelope having a sealable opening therein through which the litter may be introduced and the victim then enclosed within an isolated atmosphere, and
a basket in the form of an elongated shell having a depth somewhat greater than that of the litter and in which the litter is nested with the containment area device enveloped thereabout.

3. A carrier for accident victims, particularly those who have been exposed to high energy radiation,
said carrier comprising
a litter fabricated of resilient plastic material in the form of a thin-walled, elongated, relatively shallow shell on which the victim may be placed and then lashed thereto,
a containment area device in the form of a transparent, flexible, plastic sheet material envelope having a sealable opening therein through which the litter may be introduced and the victim then enclosed within an isolated atmosphere,
a basket in the form of an elongated shell having a depth somewhat greater than that of the litter and in which the litter is nested with the containment area device enveloped thereabout, and
cooperative detent means, integral with said litter and basket, for releasably maintaining the litter in such nested relation.

4. A carrier for accident victims, particularly those who have been exposed to high energy radiation,
said carrier comprising
a litter fabricated of resilient plastic material in the form of a thin-walled, elongated, relatively shallow shell on which the victim may be placed and then lashed thereto, said litter having an outwardly projecting flange extending along its upper periphery and having a depth progressively increasing from the end intended to receive the victim's head to the end for receiving the victim's feet,
a containment area device in the form of a transparent, flexible, plastic sheet material envelope having a sealable opening therein through which the litter may be introduced and the victim then enclosed within an isolated atmosphere,
a basket fabricated of resilient plastic material in the form of a thin-walled, relatively shallow shell having an essentially uniform depth somewhat greater than the maximum depth of said litter and in which the litter is nested with the containment area device enveloped thereabout,
the opposed side walls of said basket having integrally formed, inwardly extending ledges on which the flange of said litter rests to position the deepest part of the litter contiguous with the bottom wall of the basket with the bottom wall of the litter inclined upwardly therefrom, the side wall portions of said basket also having integral, inwardly extending protrusions between which and the ledges, the litter flange is captured, the litter flange being forceably displaceable past said protrusions thus providing detent means maintaining the litter in such nested relation.

5. A carrier for accident victims, particularly those who have been exposed to high energy radiation,
said carrier comprising
a litter in the form of an elongated, relatively shallow shell on which the victim may be placed and then lashed thereto,
a containment area device in the form of a transparent, flexible, plastic sheet material envelope having a sealable opening therein through which the litter may be introduced and the victim then enclosed within an isolated atmosphere, said containment area device further having an opening for the introduction of a breating gas therein and a filtered outlet to prevent spread of air-borne contamination therefrom, and
a basket in the form of an elongated shell having a depth somewhat greater than that of the litter and in which the litter is nested with the containment area device enveloped thereabout as a breathing gas supply is provided to the victim

6. A carrier for accident victims, particularly those who have been exposed to high energy radiation,
said carrier comprising
a litter in the form of an elongated, relatively shallow shell having a perforate bottom wall on which the victim may be placed and then lashed to the litter,
a containment area device in the form of a transparent, flexible, plastic sheet material envelope having a sealable opening therein through which the litter may be introduced and the victim then enclosed within an isolated atmosphere, and
a basket in the form of an elongated shell having a depth somewhat greater than that of the litter and in which the litter is nested with the containment area device enveloped thereabout,
said containment area device further having an opening therein through which liquid for washing the victim may be introduced and a drain in the lower portion thereof, whereby such liquid may flow from the victim through the perforate bottom wall of the litter to thereby facilitate disposal of the washing liquid while maintaining the victim in an isolated atmosphere.

7. A carrier for accident victims, particularly those who have been exposed to high energy radiation,
said carrier comprising
a litter in the form of an elongated, relatively shallow shell having a perforate bottom wall on which the victim may be placed and then lashed to the litter,
a containment area device in the form of a transparent, flexible, plastic sheet material envelope having a sealable opening therein through which the litter may be introduced and the victim then enclosed within an isolated atmosphere,

a basket in the form of an elongated shell having a depth somewhat greater than that of the litter and in which the litter is nested with the containment area device enveloped thereabout,

means for releasably maintaining the litter in such nested relation, and

means for holding the containment area device in spaced relation from the victim in the litter once the litter is nested in the basket,

said containment area device further having an opening therein through which liquid for washing the victim may be introduced and a drain in the lower portion thereof, whereby such liquid may flow from the victim through the perforate bottom wall of the litter to thereby facilitate disposal of the washing liquid while maintaining the victim in an isolated atmosphere.

8. A carrier for accident victims, particularly those who have been exposed to high energy radiation,

said carrier comprising

a litter fabricated of resilient plastic material in the form of a thin-walled, elongated, relatively shallow shell having a perforate bottom wall on which the victim may be placed and then lashed to the litter,

a containment area device in the form of a transparent, flexible, plastic sheet material envelope having a sealable opening therein through which the litter may be introduced and the victim then enclosed within an isolated atmosphere,

a basket in the form of an elongated shell having a depth somewhat greater than that of the litter and in which the litter is nested with the containment area device enveloped thereabout, said basket having an opening in the bottom wall thereof,

cooperative detent means integral with said litter and basket for releasably maintaining the litter in such nested relation, and

means for holding the containment area device in spaced relation from the victim in the litter once the litter is nested in the basket,

said containment area device having an opening sealingly connectable to a tube for the introduction of liquid employed in washing the victim and a drain tube in the lower portion of the envelope which is registered with and extends through the opening in the bottom wall of the basket, said envelope further having inwardly extending gloved sleeves,

whereby the victim may be readily washed while maintained in an isolated atmosphere and the washing liquid can flow from the victim through the perforate bottom wall of the litter to the drain tube and collected in a container which may be secured thereto.

9. A carrier for accident victims, particularly those who have been exposed to high energy radiation,

said carrier comprising

a litter fabricated of resiilent plastic material in the form of a thin-walled, elongated, relatively shallow shell having an outwardly projecting flange extending along its upper periphery and a perforate bottom wall on which the victim may be placed and then lashed to the litter, said bottom wall being inclined so that the depth of the litter increases progressively from the end intended to receive the victim's head to the end for receiving the victim's feet,

a containment area device in the form of a transparent, flexible, plastic sheet material envelope having a lengthwise opening through which the litter may be introduced and means for sealing said lengthwise opening to enclose the victim within an isolated atmosphere,

a basket fabricated of resilient plastic material in the form of a thin-walled, elongated shell having an essentially uniform depth somewhat greater than the maximum depth of said litter and in which the litter

is nested with the containment area device enveloped thereabout, said basket further having an opening in the bottom wall thereof,

the opposed side walls of said baskets having integrally formed, inwardly extending ledges on which the flange of said litter rests to position the deepest part of the litter contiguous with the bottom wall of the basket with the bottom wall of the litter inclined upwardly therefrom, the side wall portions of said basket also having integral, inwardly extending protrusions between which and the ledges, the litter flange is captured, the litter flange being forceable displaceable past said protrusions thus providing detent means maintaining the litter in such nested relation,

means for holding the containment area device in spaced relation from the victim once the litter is nested in the basket,

said containment area device having opening means sealingly connectable to first and second tubes which respectively provide for the introduction of a breathing gas and washing liquid into said containment area device, and further having a filtered outlet for the breathing gas to prevent spread of air-borne contamination and a drain tube in the lower portion of the envelope which is registered with and extends through the opening in the bottom wall of the basket, said envelope further having inwardly extending gloved sleeves,

whereby the victim can be maintained in an isolated atmosphere with a continuous supply of a breathing gas being provided as he is effectively washed with the washing liquid flowing from the victim through the perforate bottom wall of the litter to the drain tube for collection in a container which may be secured thereto.

10. A carrier as in claim **9** wherein,

the litter flange is reinforced by a metal tube compositely forming a part thereof and straps are attached to this flange for lashing the victim to the litter,

the litter has a central rib in its bottom wall extending inwardly from the foot end thereof and defining separate compartments for the feet of the victim,

the basket has an outwardly projecting flange extending along its upper periphery which is also reenforced with a metal tube forming a composite part thereof and further has straps respectively secured to opposite side portions of the flange to facilitate manipulation of the carrier,

the bottom wall of the basket has an upwardly projecting longitudinal rib engageable with the deepest portion of the litter to give firmer support to the foot end of the litter and further has laterally spaced notches for positioning the carrier on a rack type support, and

the means for holding the containment area device in spaced relation from the victim comprises a plurality of canopy bars removably mounted on the basket and overlying the litter and means for detachably securing the containment area device envelope thereto and further include means for detachably securing said envelope to spaced points around the periphery of said basket.

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