United States Patent [19]

Nielsen

[11] **3,754,551**

[45] **Aug. 28, 1973**

[54] **PORTABLE COLLAPSIBLE RECOMPRESSION CHAMBER**

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[73] Assignee: **The United States of America as represented by the Secretary of the Navy,** Washington, D.C.

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[52] **U.S. Cl.** **128/204,** 128/298

[51] **Int. Cl.** **A61m 16/02**

[58] **Field of Search** 128/298, 204

[56] **References Cited**

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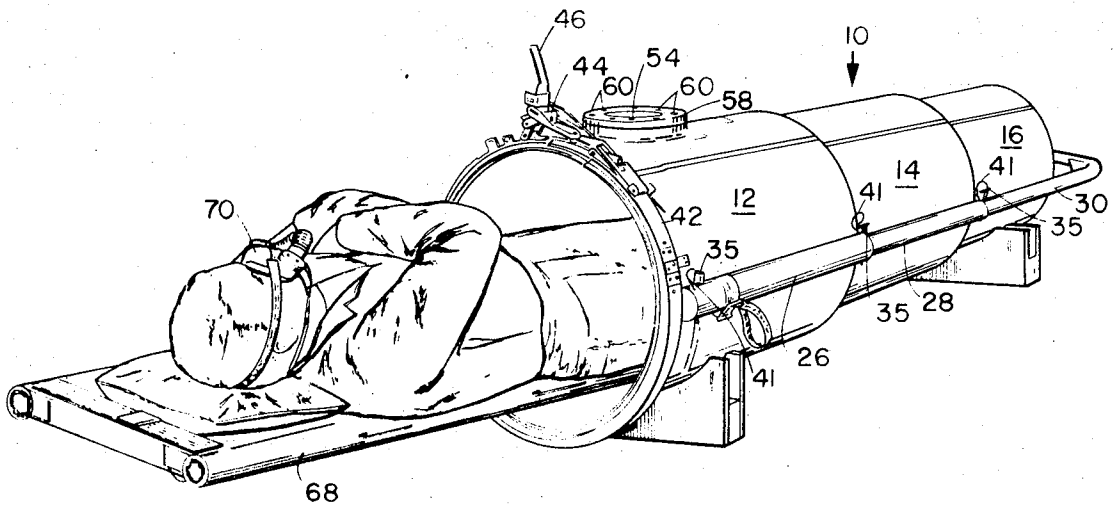
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Assistant Examiner—G. F. Dunne
Attorney—Richard S. Sciascia, Q. Baxter Warner et al.

[57] **ABSTRACT**

A portable recompression chamber for emergency treatment of and transportation of divers stricken with the "bends." It is in the form of an elongate pressure chamber of circular cross section capable of receiving a patient on a stretcher. It is collapsible into a small space and has an end closure means which is reversible in order to protect the instruments located thereon during storage.

4 Claims, 7 Drawing Figures



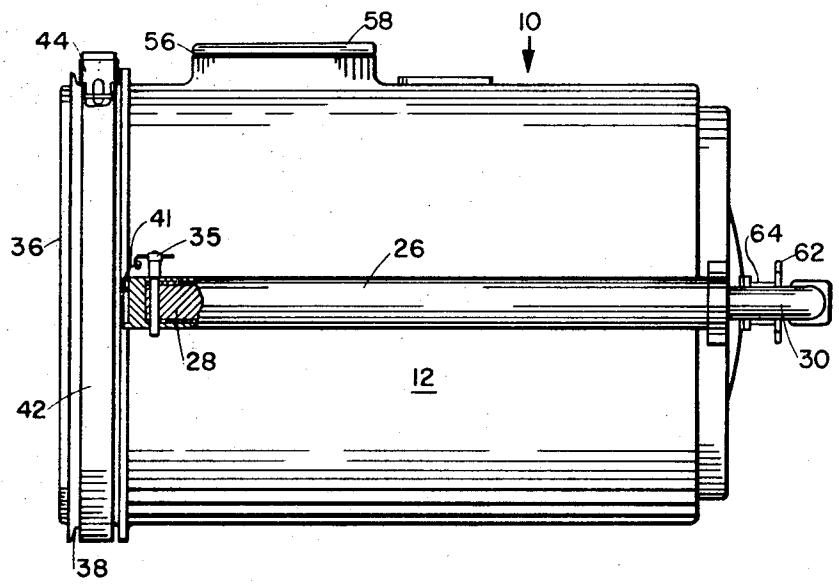

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FIG. 1

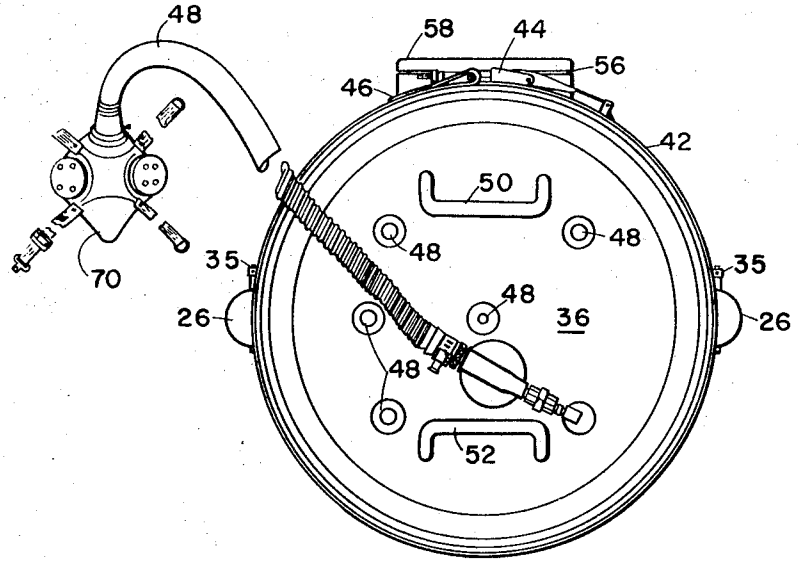

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FIG. 2

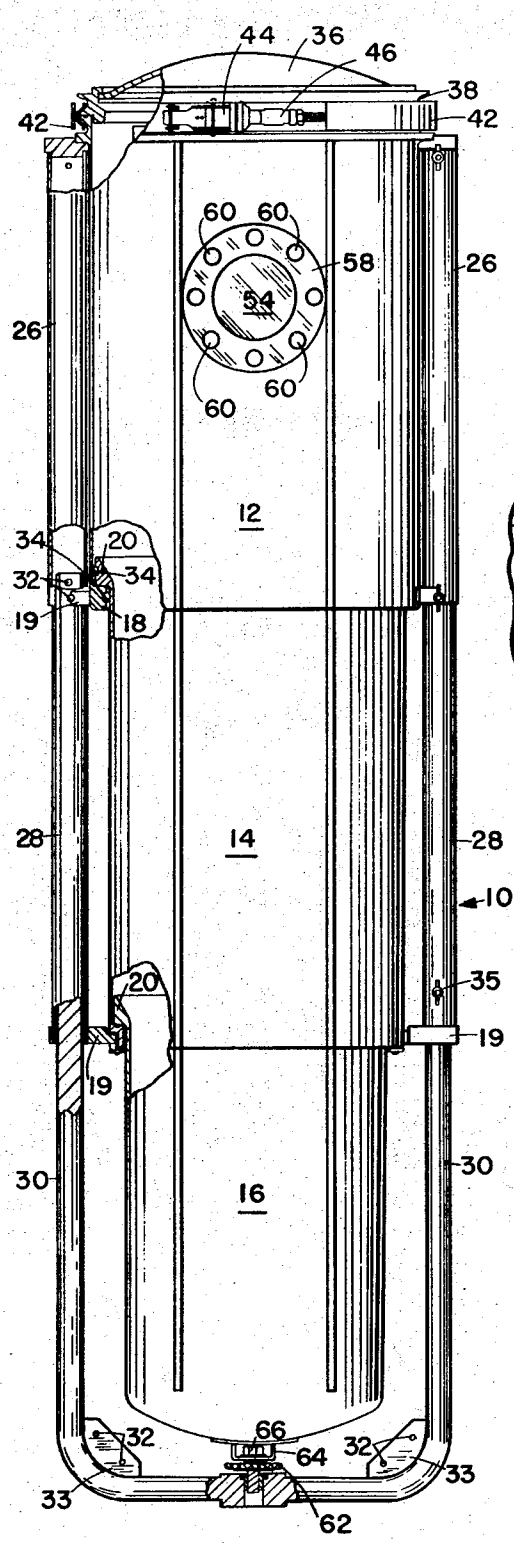


FIG. 3

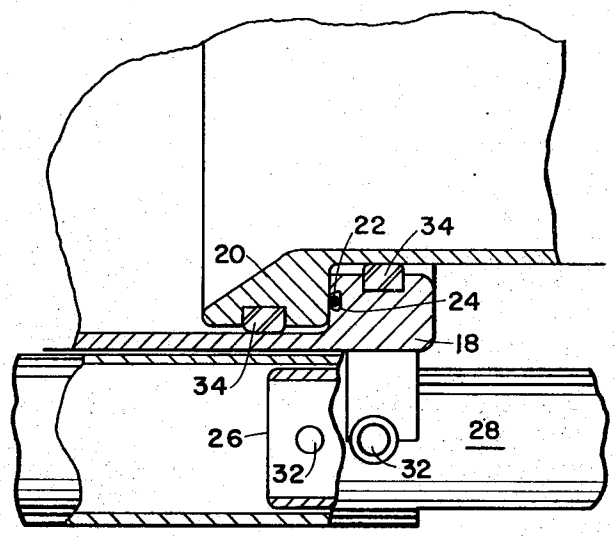


FIG. 4

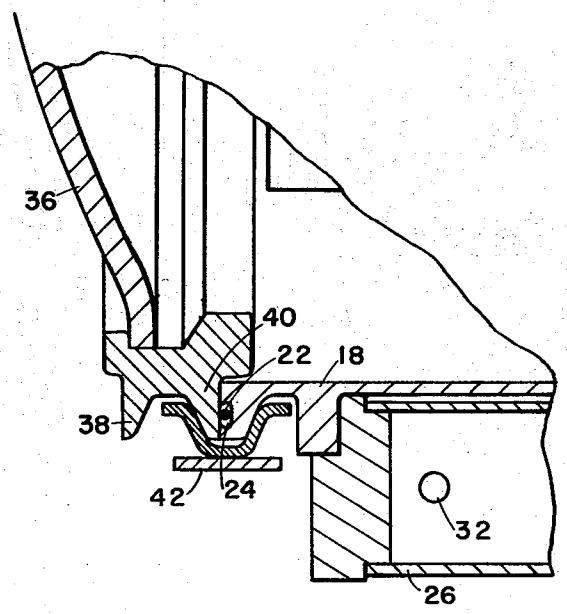


FIG. 5

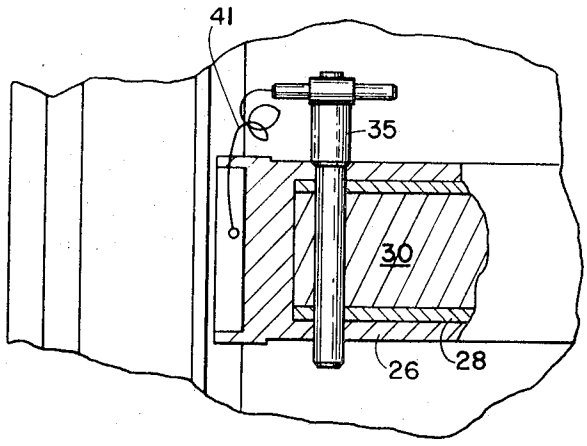

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FIG. 6

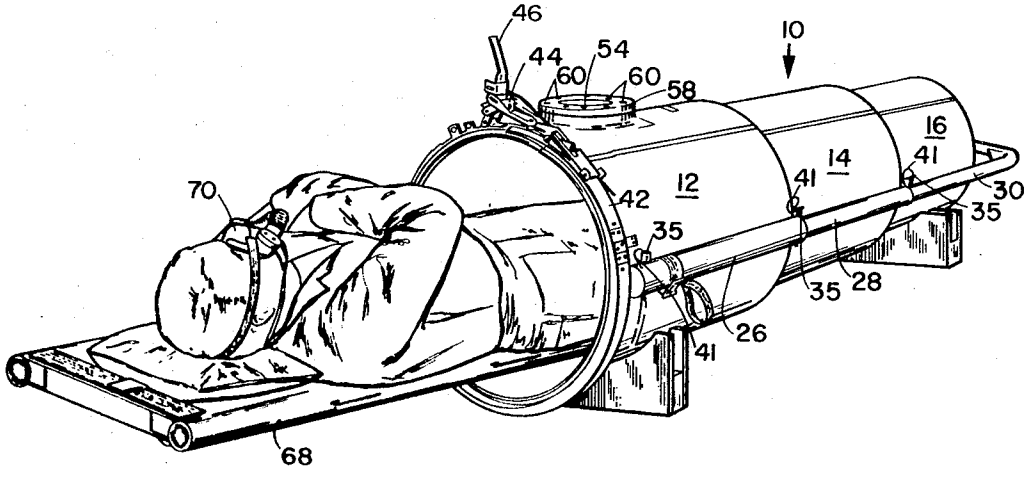

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FIG. 7

PORTABLE COLLAPSIBLE RECOMPRESSION CHAMBER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to recompression chambers and in particular to a portable collapsible recompression chamber capable of immediate treatment of a diver stricken with the bends.

2. Description of the Prior Art

Various recompression chambers have been employed for treatment of divers stricken with the bends. However many of these chambers are subject to numerous limitations and disadvantages. Most are quite heavy and cannot conveniently be transported to areas where they may be needed. Also their external dimensions prohibit them from entering the large medical double lock recompression chambers where the diver can receive additional treatment under a doctor's care.

Some recompression chambers are collapsible but various essential parts thereof are not collapsible and do not fit within the interior of the collapsed stowed chamber. These loose parts are subject to being lost or misplaced. Furthermore, most collapsible recompression chambers have vulnerable seals which are subject to damage each time the chamber is expanded or collapsed.

SUMMARY OF THE INVENTION

The present invention involves a portable recompression chamber having three telescoping sections with dovetail flanges for O-ring seals, telescoping side rails which are pinned to the recompression device serve as an expansion bar to preseal the chamber and to provide a lifting means. A hatch cover which may be reversible is equipped with a double machined flange and is sealed to the chamber body by a ring and clamp arrangement and a viewing window is secured to the chamber body. The expanded chamber body is presealed by a sealing wheel to assure initial close engagement of the sealing surfaces.

STATEMENT OF THE OBJECTS OF THE INVENTION

Accordingly, it is an object of this invention to provide a portable collapsible recompression chamber for immediate on the spot treatment of a diver stricken with the bends and safe transportation of the diver to a large medical recompression chamber where he can receive additional treatment.

Another object is to provide a portable recompression chamber having telescoping side rails which preseal the recompression chamber and also serve as a lifting means.

Still another object is to provide a portable recompression chamber having portected O-ring seals for the telescoping chamber sections.

Yet another object of the invention is to provide a portable recompression chamber which is relatively simple in construction but effective in operation.

Other objects, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation partially broken away showing the recompression chamber in a telescoped condition.

FIG. 2 is an end view of the invention showing the instrumented hatch cover sealed with a clamp ring arrangement.

FIG. 3 is a top plan view of the recompression chamber partially broken away and in the expanded condition.

FIG. 4 is a fragmentary enlarged detail view of one of the telescoping tube arrangements of FIG. 3.

FIG. 5 is a fragmentary enlarged detail view of the seal portion of FIG. 3.

FIG. 6 is a fragmentary enlarged detail view of the broken away portion of FIG. 1 showing the pin arangement for the side rails in the telescoped condition.

FIG. 7 is a diagrammatic view showing the recompression chamber in an expanded condition with the hatch removed and a patient being placed therein.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, the present invention comprises a telescoping recompression chamber assembly **10** which in its expanded state has the shape of an elongated sectioned cylinder. The chamber assembly **10** includes the telescoping sections **12, 14,** and **16** with the ends of each section provided with dovetail ground flanges **18** and **20** for an O-ring seal **22.** The O-ring is positioned in groove **24** as shown in FIGS. **4** and **5** which not only protects the O-ring but renders it readily accessible for securing a replacement.

It will be noted that Teflon (polymerized tetrafluoroethylene) guides **34** are mounted on flanges **18** and **20** of each telescoping section to provide ease in sliding movement and to prevent the sections from chaffing or cocking. While the guides are preferably of the sliding type and are manufactured from Teflon, they may comprise a roller bearing arrangement if desirable.

A pair of telescoping side rails designated as **26, 28** and **30** are attached to opposite sides of the individual sections **12, 14** and **16** by the links **19** substantially as shown. The rails are equipped with pin holes **32** at each end thereof to allow insertion of release pins **35** which hold the sections in either an expanded or telescoped condition. The pin storage rack **33** located in the inner curve of rail **30** is adapted to hold several pins **35** while the chamber **10** is in the stowed position. The pins are also designed to prevent unnecessary movement of sections **12, 14** and **16** because of their attachment to the side rails thus further decreasing the possibility of damage to the O-ring seals **22.** As shown in FIGS. **6** and **7** the pins **35** are attached to a corresponding side rail by the flexible wire **41.** This arrangement obviates loss or misplacement of the pins. The telescoping side rails being attached to a corresponding body section serve as an expansion bar to preseal the recompression chamber and to provide a means of lifting the device.

The hatch cover **36** is provided with the double machined flanges **38** and **40.** A V-band **42** and ring clamp **44** with an over-center handle **46** seals the hatch cover to the forward chamber section **12.** The hatch cover **36** contains all necessary equipment indicated generally as **48** to treat a stricken individual. A guard framework, not illustrated, may protect the delicate equipment **48** if required and the handles **50** and **52** assist in removal and implacement of the cover. It is emphasized that the hatch cover is reversible which allows the treating

equipment **48** to be protected within the interior of the recompression chamber **10** when not in use. However, it is within the concept of this invention to render the hatch cover non-reversible with only a protective guard framework over the protruding sensitive equipment **48.** Another type of reversible hatch closure, not illustrated, but which could be used in the present invention is a semielliptical hatch cover which is manually inserted into chamber body **12,** rotated into position and then sealed by the internal pressure.

The top of chamber body section **12** is provided with a viewing window **54** fabricated preferably from a suitable acrylic plastic material. However, it may also be a suitable glass capable of withstanding not less than 125 psig. A gasket **56** may be placed on each side of the window and a clamp ring **58** secures the window and gaskets to section **12** with a plurality of bolts **60.**

It will be noted that a presealing wheel **62** is mounted for rotational movement on the bracket **64** attached to the aft end of telescoping section **16** by bolt **66.** The preseal wheel **62** is adapted to thread into the aft rail section **30** as shown in FIG. **3.** Thus by rotating the wheel **62** the chamber sections **12, 14** and **16** are pulled taut allowing the O-ring seals **22** to initially seal the chamber **10.**

While not considered as part of the invention, a lightweight collapsible stretcher **68** should be provided with the recompression chamber **10** to ensure that a means of carrying the patient will always be available. It should be collapsible in order to fit inside the stowed chamber thereby decreasing the chance of being misplaced.

Thus in operation the stowed recompression chamber **10** is laid horizontally with the viewing window **54** facing up. The clamp ring holding the hatch cover **36** is loosened and the hatch cover is removed. The stretcher **68** is removed from the interior of chamber **10** and unfolded.

The release pins **35** are removed from pin holes **32** in the forward rail **26** and in the storage rack **33** mounted on aft side rail **30.**

The aft rail **30** is pulled to extend the center and aft sections **14** and **16** of chamber **10** and the release pins **35** are reinserted. The wheel **62** is turned so as to preseal chamber **10.**

The patient is fitted with an inhalator mask **70** which is attached to the equipment **48.** The patient now positioned on stretcher **68** is placed inside the chamber **10** and the hatch cover **36** is replaced and latched.

The chamber **10** with the patient is then transported to a hospital.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced othewise than as specifically described.

I claim:

1. In a portable recompression device adapted to enclose a patient's body, said device being a hermetically sealed elongated casing with a viewing window in the wall thereof and means attached to said device for treating the patient, the improvement comprising:

a series of telescoping sections forming the casing, said sections being in the telescoped condition when the recompression device is not in use and in the extended condition during use, said sections having dovetail flanges;

an O-ring positioned in a groove in one of said flanges and adapted to seal said sections when in the extended condition;

plastic guides mounted on opposite flanges of each telescoping section to prevent chaffing;

telescoping side rails mounted on opposite sides of each telescoping section, said side rails serving as an expansion bar to assist in presealing the recompression device and to act as a lifting bar;

means for holding said side rails in an extended position to prevent undue movement thereof prior to sealing of the recompression device;

adjustable presealing means adpated to properly position said sections prior to actual sealing, and;

a hatch cover means adapted to afford an entrance for a patient to said recompression device and to seal the same after a patient has been placed therein, wherein the rim of the hatch cover consists of two parallel identical flanges whereby the hatch cover may be reversed during storage to protect sensitive instruments attached thereto.

2. The portable recompression device as defined in claim **1** wherein:

three telescoping sections form said casing thus reducing the maintenance of O-ring seals between said sections.

3. The portable recompression device as defined in claim **1** wherein:

said guides mounted on the flanges of each section are manufactured from polymerized tetrafluoroethylene.

4. The portable recompression of claim **1** wherein said hatch cover means includes;

an inhalator mask attached to the inside of the hatch cover;

a ring clamp to seal said hatch cover to the forward telescoping section of said recompression device.

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