July 18, 1967 R. E. BARLOW 3,331,087

INFLATABLE LIFTING DEVICE

Filed Nov. 20, 1964 2 Sheets-Sheet 1

FIG-1

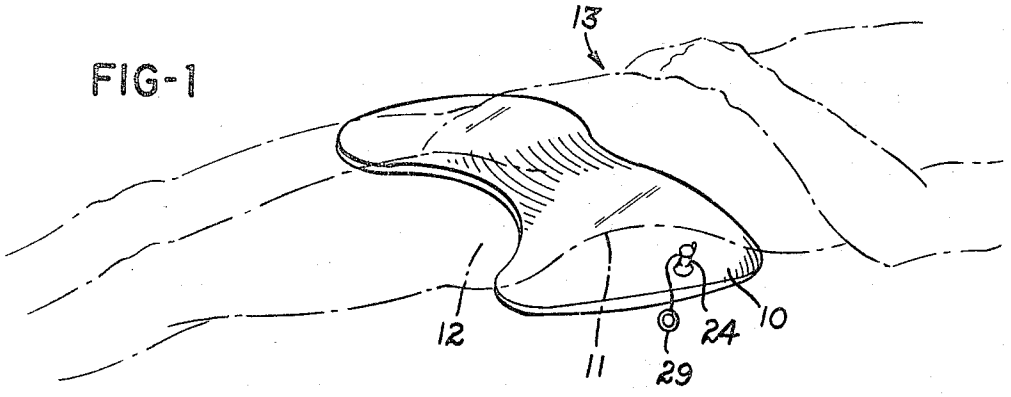


FIG-2

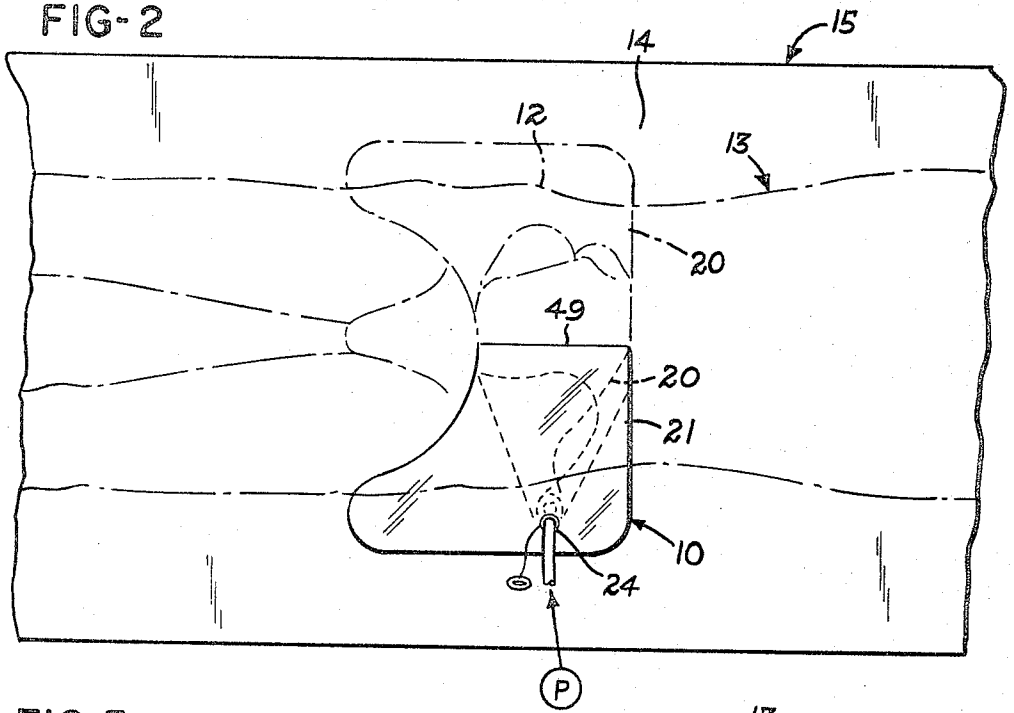
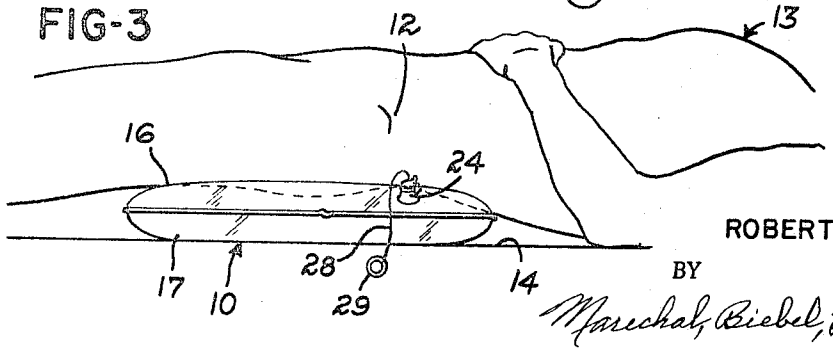


FIG-3



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FIG-4

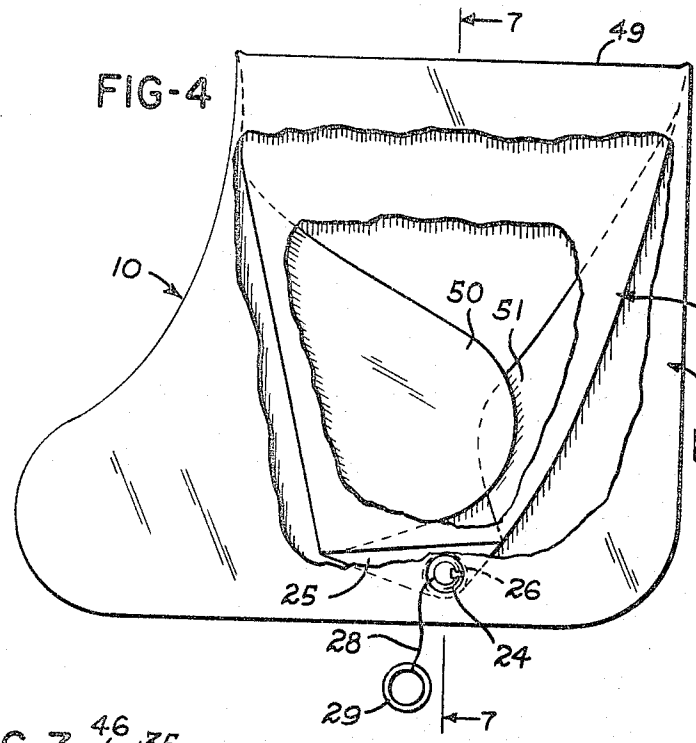


FIG-5

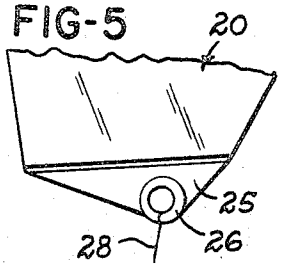


FIG-6

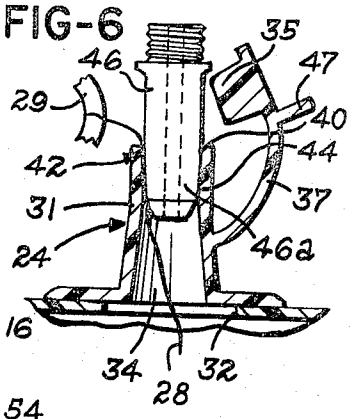


FIG-7

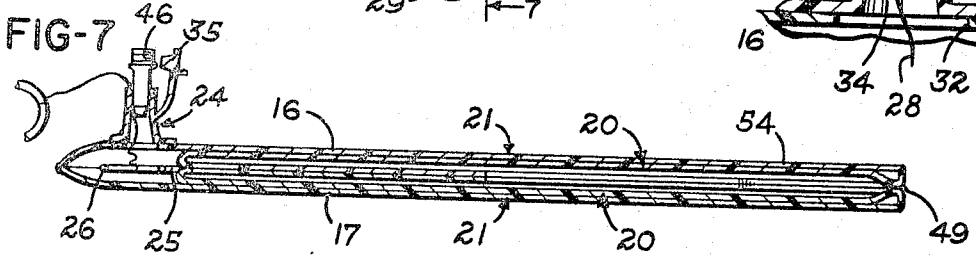


FIG-8

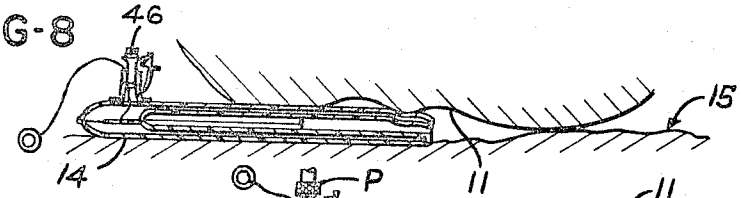


FIG-9

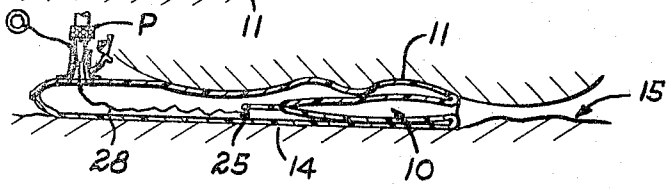
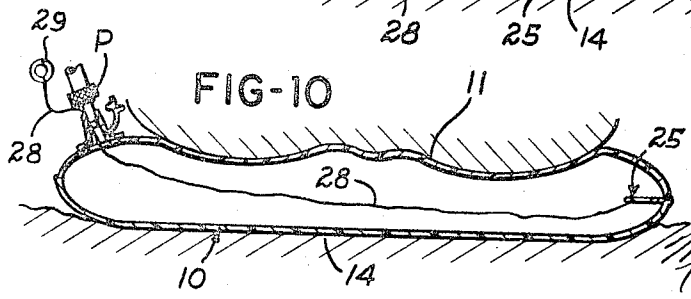


FIG-10



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3,331,087

INFLATABLE LIFTING DEVICE

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Filed Nov. 20, 1964, Ser. No. 412,775
1 Claim. (Cl. 5—81)

This invention relates to an inflatable device for lifting objects, such as a bed patient.

An important object of this invention is to provide a method and an inflatable device for automatically extending beneath a bed patient or the like without requiring that the patient be manually moved thus enabling such patient to be lifted for use of a bed pan or the like without manual effort.

Another object of this invention is to provide an inflatable lifting device which, as a result of its design, creeps beneath the object to be lifted as it is inflated so that the object need not be lifted manually, and further to provide such a lifting device which can also be removed from beneath the object without manual lifting of such object.

A further object of this invention is to provide an inflatable lifting device of the aforesaid type which can be easily and inexpensively manufactured because of its simple but dependable design, and further to provide such a device which can be used indefinitely without failure.

Additional objects and advantages of the invention will be apparent from the following description, the accompanying drawing and the appended claim.

In the drawing:

FIG. 1 is a perspective view showing the invention in use;

FIG. 2 is a plan view showing the manner in which the lift device conforms to a bed patient;

FIG. 3 is a side elevation view of FIG. 2;

FIG. 4 is a plan view of the lifting device partially broken away to show the manner in which it telescopes together;

FIG. 5 is an enlarged fragmentary view of one end of the device;

FIG. 6 is a sectional view of the valve assembly;

FIG. 7 is a sectional view taken along the line 7—7 of FIG. 4; and

FIGS. 8–10 show the various steps in inflating the lifting device.

Referring to the drawings wherein a preferred embodiment of the invention is shown, FIGS. 1–3 illustrate the lifting device or inflatable member **10** as it is inserted beneath the small of the back **11** and the hips **12** of the bed patient **13** to raise him from the surface **14** of the bed **15** without requiring the usual lifting by nurses and for insertion of a bed pan. The lift device **10** comprises upper and lower U-shaped layers **16** and **17** of flexible material which are sealed around their perimeter to form an inflatable member **10** having the configuration generally shown in FIG. 2. These layers are U-shaped as seen in FIG. 2 so that they are particularly suitable for use in lifting a person for using a bed pan. Materials which have been found satisfactory include vinyl and polyethylene films which are heat sealed around their perimeter to form an air tight member. It is however within the scope of the invention to form the inflatable member **10** of any known material. The specific outer configuration of the layers **16** and **17** shown is not a limitation on the scope of the invention, although it has been found that this shape is particularly well suited for use in raising a bed patient for using a bed pan.

The inflatable member **10** has right and left-hand end portions **20** and **21**, and the left end portion **21** has a valve assembly **24** mounted therein for use in filling the

inflated member **10** with air or other gas, and for subsequently sealing the same to hold the air therein. The right-hand portion **20** of the member **10** has a flap **25** with a reinforced ring **26** secured internally therein, as shown in FIG. 5, so that the string **28** can be attached thereto for use in retelescoping the inflatable member **10** during deflation, as will be described. The string **28** extends internally through the inflatable member **10** and through the valve assembly **24** to the exterior of the device, as shown in FIGS. 7–8. The plastic ring **29** is secured to the end of the string **28** so that it can be easily grasped and so that it will not pass through the valve assembly **24** and become inaccessibly contained within the inflatable member **10**.

The valve assembly **24** is typical of the type which can be used with the inflatable member **10** without departing from the scope of the invention. The assembly includes a tubular housing **31** which is sealed in an air tight manner to an opening **32** in the layer **16**. The housing has the passageway **34** extending therethrough with the valve member or plug **35** secured thereto by the flexible arm **37** which has an integral connection with the housing **31**. The plug **35** is frustoconical in configuration and can be forced into the cylindrical inlet **40** at the top portion **42** of the valve housing **31** to block the flow of air therethrough. The inner surface **44** of the upper portion **42** of the valve housing **31** is smooth for receiving a complementary air hose coupling **46** whose tapered outer surface **46***a* engages the surface **44** to provide a connection to the air supply P. A flap **47** projects above the plug **35** and provides for easy gripping thereof.

In the position shown in FIG. 6, the string **28** and air pass readily through the inlet **40** of the passage **34** and into the interior of the member **10**. In the closed position, the string **28** is locked against movement by the resilient plastic material of the housing **31** and plug **35** which seal around the string so that air flow is blocked.

In its deflated condition, the inflatable member **10** has the right-hand end portion **20** folded along the center fold line **49** telescoped or folded between the upper and lower layers **16** and **17** of the left-hand end portion **21** as shown in FIGS. 4 and 7. The corner portions **50** and **51** of the right-hand portion **20** are folded upon one another so that the member **10** lays flat as shown clearly in FIG. 7. The string **28** can be substantially entirely within the inflatable member, or the majority of it can be on the exterior thereof.

In operation, the portion **54** adjacent the fold line **49** of the deflated member **10** is inserted a short distance (several inches) under the small **11** of the back of the person **13** to be raised. This can be easily done due to the configuration of the human anatomy, without rolling the patient over or in any way moving the patient. The device is inserted only insofar as convenient without moving or disturbing the patient.

A source P of pressurized air or other gas is then connected to the valve assembly **24** and allowed to flow slowly through an open passage **34** into the inflatable member **10** in order not to annoy or otherwise disturb the patient. As the air flows into the device, the left-hand portion **21** is initially inflated to a limited extent, as seen in FIG. 8, at which time the air pressure begins to force the right-hand portion **20** to the right, as shown in FIGS. 8 and 9 beneath the patient **13**. The force of reaction which tends to push the left-hand portion **21** from beneath the patient, is resisted by the frictional contact with both the patient and the bed surface **14** so that the member **10** remains in place.

As air continues to be supplied to the member **10**, the right-hand portion **20** continues to move to the right (as viewed in FIG. 9) until it is completely extended beneath

the patient (FIGS. 1 and 10) and so that the string **28** extends through the valve assembly **24** and through the entire center of the inflated member **10**. Once completely extended the flow of air inflates the member **10** to extend the same in a vertical direction so that the patient **13** is raised the desired distance from the bed surface **10** to enable a bed pan to be subsequently inserted. Thus it has been found that the operation of the device is such that the right-hand portion **20** extends beneath the patient prior to any substantial lifting thereof so that the patient is not tilted or rolled at any time during inflation of the member **10**.

When it is desired to remove the member **10**, the valve assembly **24** is opened by withdrawing the valve member **35** from the valve housing **31** to permit the air to be exhausted. During deflation a predetermined amount of tension is applied and mounted on the string **28** through the ring **29** so that, as the air is removed from the device, the right-hand portion **20** is drawn to the left and reinserted within the left-hand portion **21**, in substantially the reverse of the procedure accomplished during inflation thereof. The member **10** thus deflates until it decreases its vertical dimension and then the constant tension on the string **28** will cause the right-hand portion **20** to be drawn into the left-hand portion. When completely deflated, the member **10** can be easily removed from beneath the patient with no more difficulty than was required to initially insert it thereunder.

While the invention has been described in connection with lifting of a bed patient, it is within the scope of the invention to use the device to lift all types of objects having varying configurations. Moreover, the specific valve assembly structure and the string can be replaced with equivalent structure without departing from the essence of the invention herein described.

The specific type of air supply means used is not a limitation on this invention, and may take any of the well known forms. For example, the air supply may be a hand or foot operated pump, a positive displacement electric pump, or a pressurized tank or aerosol type can. Moreover, the source of air pressure may or may not be disconnected from the valve assembly after the device has been inflated, and the specific valve assembly may be modified to accommodate the air supply means used.

It is also within the scope of the invention to use a flat rigid member to cover the member **10** in its deflated folded condition so that it may be easily inserted under the person or object to be lifted, and so that the horizontal movement of the right-hand portion is facilitated. This expedient is useful especially when the person or object being lifted is of considerable weight.

It is thus apparent that the invention has provided a lifting device which can be easily inserted under and removed from beneath a patient or object and which will automatically extend and retract itself while under such a patient or object. Moreover, the entire device can be manufactured in quantities at a relatively low cost so that the device is expendable for sanitary reasons when used in hospitals and the like.

While the method and form of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to this precise method and form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claim.

What is claimed is:

An inflatable bed lift device for raising a patient from the surface of a bed without manually lifting the patient comprising, a hollow inflatable member having L-shaped first and second end portions connected along a central fold line to provide a central section which is smaller than the outermost sections thereof, both said end portions being made of a flexible material and being substantially identical in configuration, said second end portion being telescoped within said first end portion in the deflated position, said first end portion adapted to be placed beneath said patient when said inflatable member is deflated with said fold line being disposed to allow said second end portion to extend under the patient, a valve in said first end portion for admitting gas to cause said second end portion to move from said first end portion as said inflatable member is inflated to creep beneath a patient and to raise the patient above the surface on which he is resting, a string member inside said inflatable member and having one end attached to said second end portion and extending through said inflatable member with the other end associated with said first end portion, said string member adapted to have pressure applied thereto during deflation of said inflatable end portion so that said second end portion is telescoped and folded within said first end portion for easy removal of the bed lift device from beneath the patient and said inflatable member is telescoped together and ready for reuse, said L-shaped end portion causing the device when inflated to be generally kidney-shaped with said smaller central section thereof adapted to engage the small of the back of the patient and said larger outermost sections adapted to provide stability against the patient rolling from one side or the other during inflation of the lifting device, said larger outermost section of said second end portion being folded when in said deflated condition so that it is stored internally of said first end portion.

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