July 7, 1970 R. D. ORENSTEIN 3,519,302

PALLET LIFTING DEVICE

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FIG. 1.

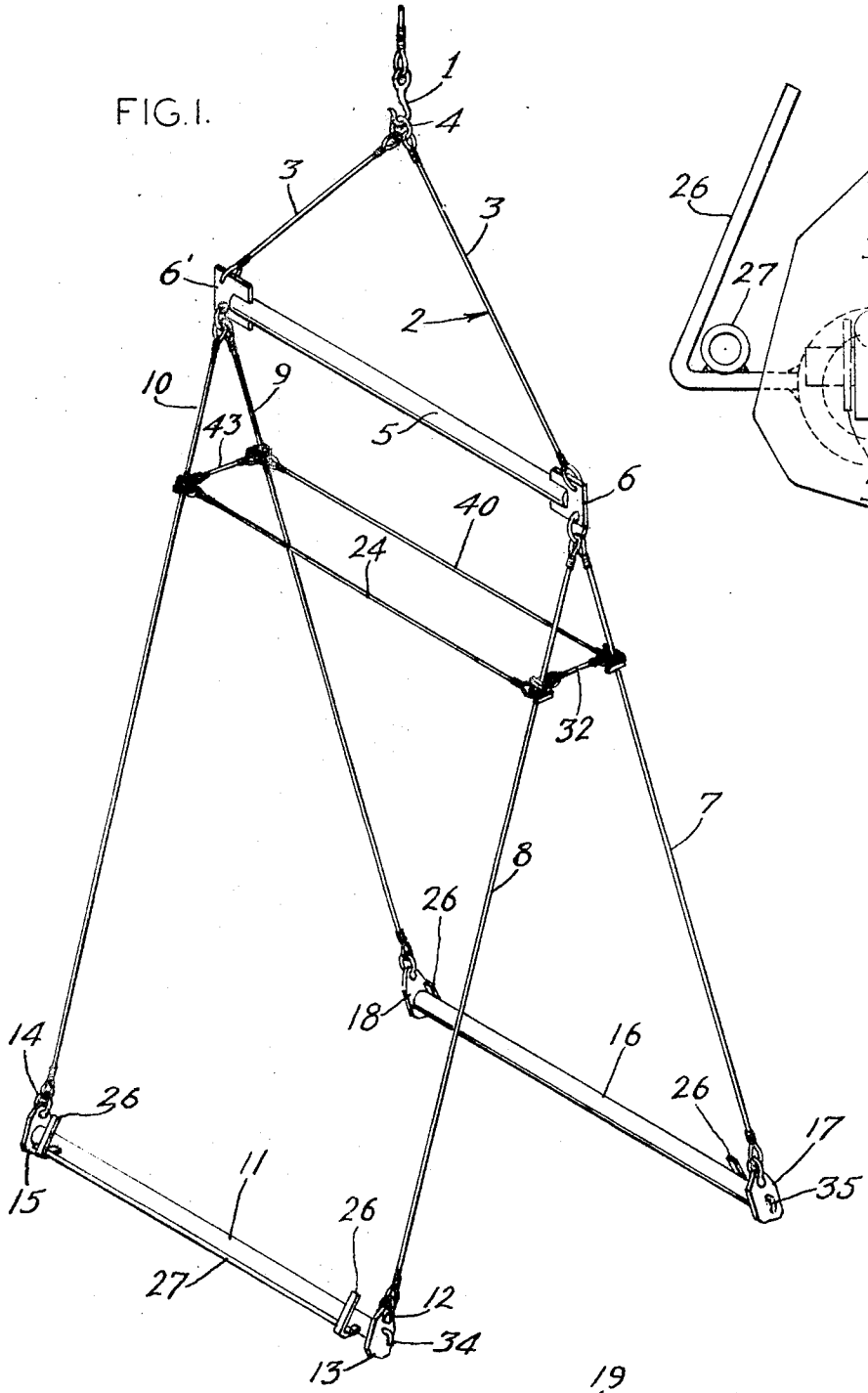
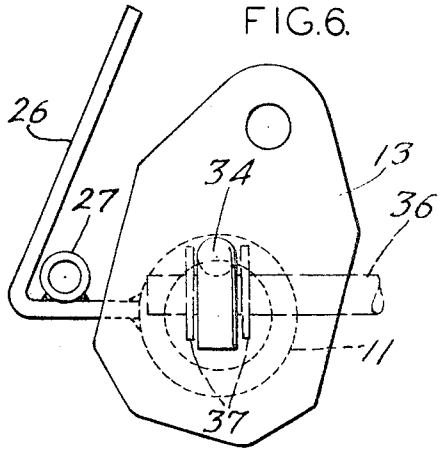


FIG. 6.



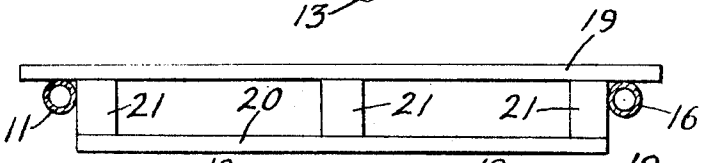


FIG. 2

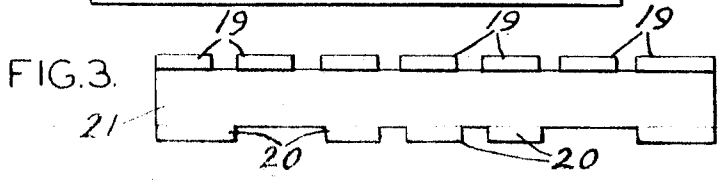


FIG. 3.

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PALLET LIFTING DEVICE

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FIG. 4.

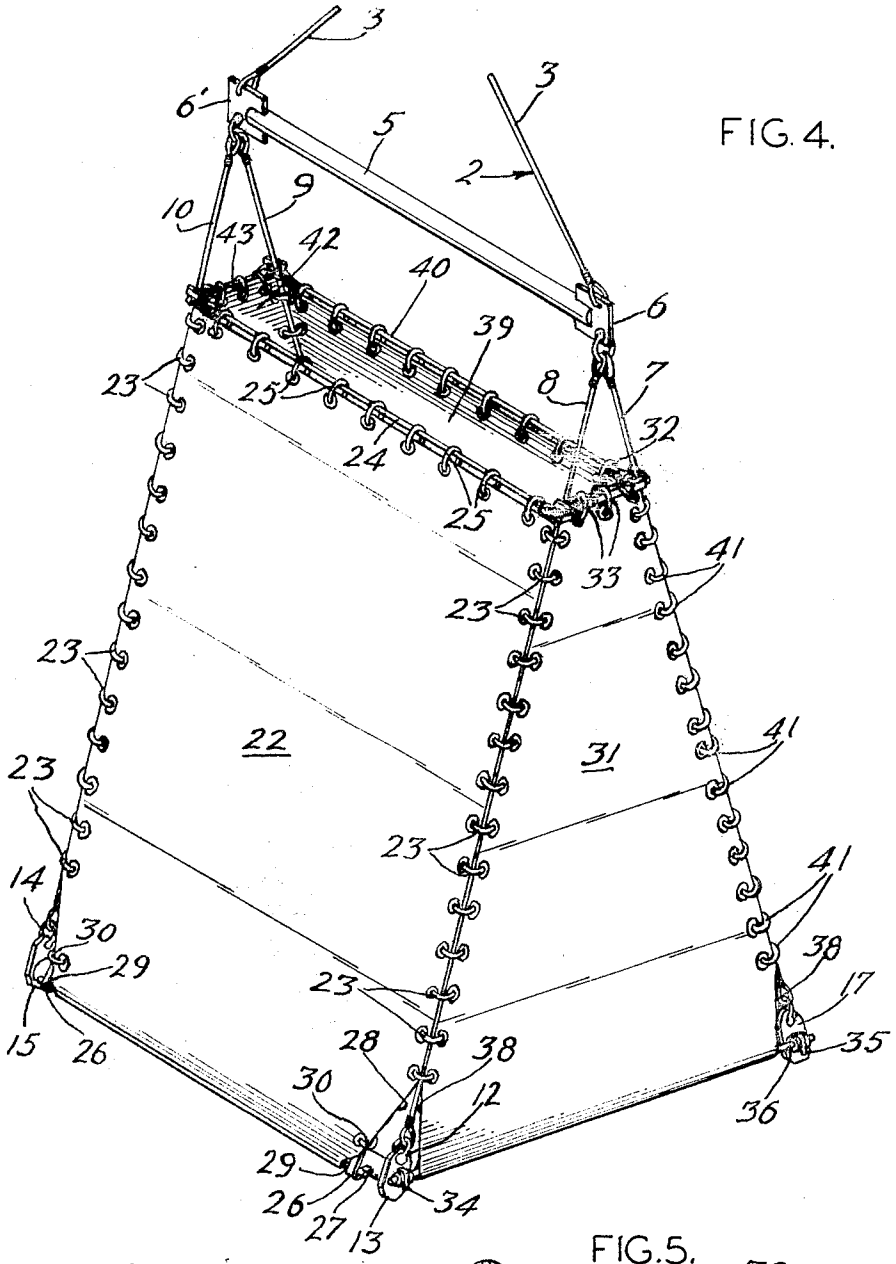
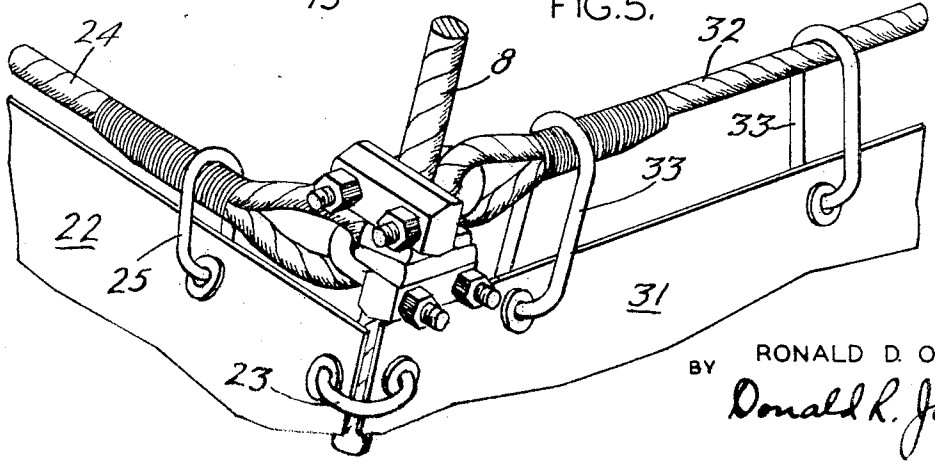


FIG. 5.



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FIG. 7.

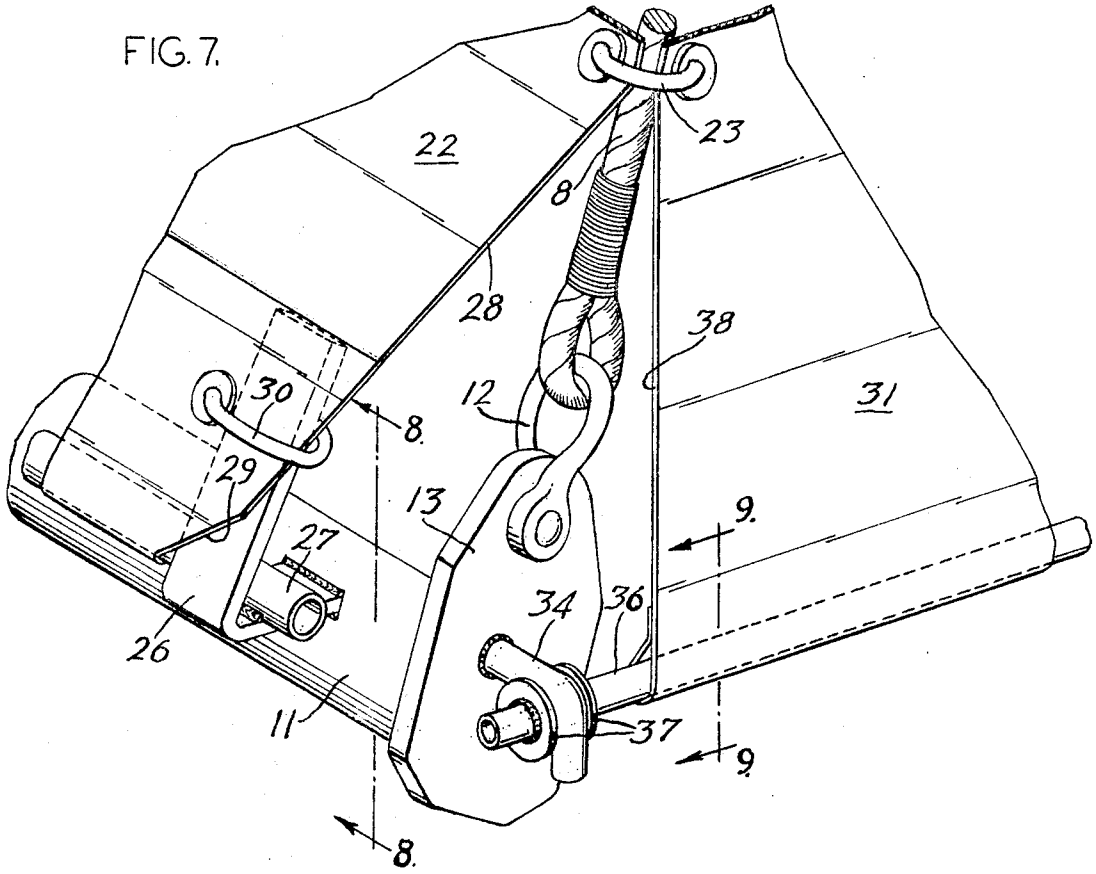


FIG. 8.

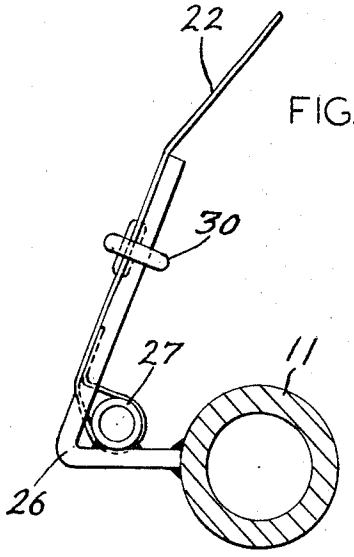
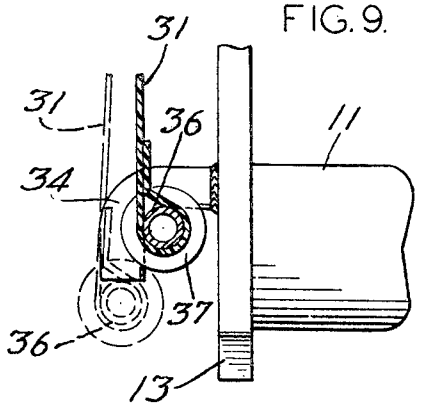


FIG. 9.



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3,519,302

PALLET LIFTING DEVICE

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Int. Cl. B66c 1/12
U.S. Cl. 294—74 8 Claims

ABSTRACT OF THE DISCLOSURE

For crane handling of palletized cargo, a lifting device employs lifting bars which slip under the "wings" of the pallet. The lifting device includes an enclosure which surrounds the pallet and prevents the cargo from accidentally falling off the pallet while it is being handled.

This invention relates to a pallet lifting device, and more particularly to a device useful in connection with the crane handling of palletized material such as ship's cargo.

A common prior practice for handling of palletized cargo involved the manual transfer of the cargo or material from the pallet to a three or four sided box, then the crane lifting of this box aboard the ship, shipway etc., followed by the manual unloading of the box. It should be apparent that this practice requires extra, non-productive handling.

An object of this invention is to provide a novel device for handling palletized cargo.

Another object is to provide a pallet lifting device which enables palletized cargo to be handled as a unit by a crane, thus eliminating any manual unloading of the pallet or manual handling of the cargo.

When a loaded pallet is being handled by a crane from above the pallet, there is a tendency for the material constituting the load to accidentally slip or fall off the pallet.

Therefore, a further object of this invention is to provide a pallet lifting device, for use with a crane, which will positively prevent the load from accidentally falling off the pallet while it is being handled with the device.

A still further object is to provide a pallet lifting device having an enclosure or barrier which surrounds the pallet, for preventing the load from falling off the same.

The objects of this invention are accomplished, briefly, in the following manner: Two parallel rigid lifting elements, which are adapted to slip under the "wings" of a loaded pallet, are suspended by means of two pairs of flexible pendants below a spreader member which is adapted to be suspended in turn from a crane. Two substantially rectangular imperforate sheets of fabric are attached at their edges to respective ones of the lifting elements and to the corresponding pendants, thereby to enclose respective areas at the two sides of the lifting device. Enclosed areas at the two respective ends of the lifting device are provided by means of two more or less triangular imperforate sheets of fabric which are attached at their edges to the respective paired end pendants and to respective rigid link members which are releasably coupled respectively to the paired ends of the lifting elements.

A detailed description of the invention follows, taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a perspective view of the pallet lifting device of this invention, the fabric enclosure or barrier means being omitted;

FIG. 2 is an end elevation of a pallet;

FIG. 3 is a side elevation of a pallet;

FIG. 4 is a perspective view of the complete pallet lifting device;

FIG. 5 is a fragmentary view, on an enlarged scale, of a detail of the enclosure;

FIG. 6 is an elevational view, on an enlarged scale, of a detail;

FIG. 7 is a fragmentary elevational view, on an enlarged scale, of another detail;

FIG. 8 is a sectional view taken on line 8—8 of FIG. 7; and

FIG. 9 is a sectional view taken on line 9—9 of FIG. 7.

First referring to FIG. 1, there is illustrated a pallet lifting device wherein the steel cargo hook **1** which is used in hoisting or lifting (and which is suspended from a crane, not shown, in the conventional manner) is connected to a lifting or suspending bridle **2** comprising two crane lifting pendants **3** whose upper ends are spliced to the ring **4** in a conventional manner. The crane lifting pendants **3** are formed of manila or wire rope, or other flexible means. The lower ends of the pendants **3** are connected to respective opposite ends of a rigid (steel) spreader member **5** (which may be termed a spreader bar), the spreader member thus being suspended from its two opposite ends by the crane, by way of the bridle **2**. The connection of the pendants **3** to the member **5** may be by way of plate members **6** and **6'** which are welded or otherwise secured respectively to the ends of member **5**, these plate members being provided with apertures for the connection thereto of the ends of the respective pendants **3**.

A pair of flexible pendants **7** and **8** (made of one-half-inch wire rope, for example) are secured at their upper ends to plate **6** at one end of spreader **5**, and a similar pair of flexible pendants **9** and **10** are secured at their upper ends to plate **6'** at the other end of spreader **5**. By way of example, pendants **7–10** may each be about seven feet long. It may be seen that four depending pendant ends (to wit, the lower ends of pendants **7**, **8**, **9** and **10**) are provided, two at each end of the member **5**.

A rigid lifting element **11**, which is preferably a piece of thick-walled aluminum pipe, is carried by the lower ends of pendants **8** and **10**. The lower end of pendant **8** is attached by means of a shackle **12** to an apertured upstanding lug **13** one face of which is welded or otherwise rigidly secured to one end of element **11**; the lower end of pendant **10** is attached by means of a shackle **14** to an apertured upstanding lug **15** one face of which is rigidly secured to the other end of element **11**. Another rigid lifting element **16**, similar to element **11**, is carried by the lower ends of pendants **7** and **9**. The coupling of pendants **7** and **9** to element **16** is done similarly to the coupling of pendants **8** and **10** to element **11**. One face of a lug **17** is secured to one end of element **16** and this lug is attached to the lower end of pendant **7**, while one face of a lug **18** is secured to the other end of element **16** and this lug is attached to the lower end of pendant **9**. It may be seen that the lifting elements **11** and **16** extend substantially parallel to the spreader member **5**, and each of these lifting elements is fastened at its ends to respective ones of the depending pendant ends as previously described.

FIGS. 2 and 3 illustrate a pallet of the type which when loaded is adapted to be lifted by the pallet lifting device of the invention. An upper parallel series of planks **19** constitute the load-engaging portion of the pallet, these planks being spaced from a lower parallel series of planks **20**. Transversely-extending bracers or stringers **21** constituting spacers are interposed between the upper series of planks **19** and the lower series of planks **20** for holding the planks **19** and **20** in vertically spaced relation. As shown in FIG. 2, the upper planks **19** may be longer than the lower planks **20** (by way of example, forty-eight inches as compared to forty inches) to provide a pair of "wings," one at each end of the planks **19**. The

items 19–21 form a pallet which is designed to carry a load (ship's cargo, for example); this pallet may be made of any suitable material without departing from the spirit of the invention. The lifting elements 11 and 16 (which might be termed lifting bars) are adapted to fit under the "wings" provided at the upper side of the pallet 19–21 as shown in FIG. 2, thus enabling the crane (by way of crane hook 1) to lift the loaded pallet as a unit. The actual length of the pipes 11 and 16 is determined by the dimensions of the pallet to be lifted. If a 42" x 48"/40" wing pallet is being used, the pipes 11 and 16 would be 46" long. The use of aluminum pipe at 11 and 16 reduces the weight of the lifting device, for ease of handling.

It may be seen that two opposite quadrilateral side spaces are formed in the device as so far described, one of these being bounded by lifting element 11, pendants 8 and 10, and spreader member 5, and the other of these being bounded by lifting element 16, pendants 7 and 9, and spreader member 5. In addition, two opposite triangular end spaces are formed in the device, one of these being bounded by pandants 7 and 8 and by a cross-member, to be later described, and the other of these being bounded by pandants 9 and 10 and by another cross-member, to be later described.

According to this invention, barriers are provided in the two side spaces described, and also in the two end spaces described, for preventing the material (load) from falling off the pallet, during handling by the crane. These barriers are formed by separate imperforate sheets of a suitable fabric, which are fastened in place in the several spaces. A material which is suitable for the purpose just described is the vinyl-acetate-coated nylon fabric known as "Herculite 80." This material is both flexible (for ease of handling) and strong (for use as a barrier, to prevent the palletized material from falling off the pallet). Generally it may be said that the four spaces previously referred to (to wit, the two quadrilateral side spaces, and the two triangular end spaces) are enclosed with separate respective sheets of the fabric, which are cut to size to fit between the various pendants 7–10; this enclosure by the strong material provides the barriers previously mentioned.

For one of the quadrilateral side sapces, a piece 22 of the "Herculite 80" fabric is cut to fit between the pendants 8 and 10. The two side edges of this fabric panel 22 are attached to the respective adjacent pendants 8 and 10 by means of chain repair links 23 (FIG. 4) which pass through metal eyelets provided along the side edges of this panel.

A short length 24 of wire rope (see FIGS. 1 and 4) is connected between the pendants 8 and 10, in the manner illustrated in FIG. 5, at a location about five feet up from the lifting element 11. The upper edge of panel 22 is attached to the wire rope 24 by means of chain repair links 25 which pass through metal eyelets provided along the upper edge of this panel.

A pair of generally L-shaped brackets 26 are welded to the outer surface of the pipe 11, one near each respective end of this pipe. These brackets may be formed from 1" x ¼" flat bar stock, and the ends of the shorter legs of the "L" are welded to the pipe 11, so that the brackets extend outwardly and thence upwardly from this pipe (see FIGS. 6–8). A length of small-diameter tubing 27 is welded at its ends to respective ones of the brackets 26, at locations near the corners of the L, this tubing lying parallel to pipe 11 and spaced outwardly therefrom.

At both sides, the lower portions of the side edges of panel 22 are cut away at an angle (thereby to narrow this panel), as at 28 and 29 (FIG. 7), to provide clearance for lugs 13 and 15 and to allow the lower edge of panel 22 to be hemmed around the small tubing 27, between the two brackets 26. The lower edge of panel 22 is hemmed around the small tubing 27, the hem being held by a suitable adhesive such as that known as "Herculite CVV." See FIG. 8. Above this hem, each side edge of panel 22 is attached (in the cut-away portion 28) to its respective bracket 26 by means of a chain repair link 30 which passes through a suitable eyelet provided in the panel.

The tubing 27 and brackets 26 hold the fabric panel 22 a little distance away from the pallet when the lifting element 11 is under one of the "wings" thereof (thus protecting this panel from chafing on the edge of the pallet), while yet providing a good enclosure or barrier for the material on the pallet.

A fabric panel 39 (FIG. 4), exactly similar to panel 22 just described, is utilized to provide a barrier in the other quadrilateral side space—to wit, the space bounded by lifting element 16, pendants 7 and 9, and spreader 5. Panel 39 is attached at its side edges to the pendants 7 and 9, at its upper edge to a length of wire rope 40 (similar to wire rope 24) which is connected between pendants 7 and 9, and at its lower edge to a piece of small-diameter tubing (similar to tubing 27) which is welded to brackets 26 which are in turn welded to pipe 16; the modes of attachment of panel 39 at its edges to the various elements recited are exactly similar to those previously described in connection with panel 22.

For one of the triangular end spaces, a piece 31 of the "Herculite 80" fabric is cut to fit between the pendants 7 and 8. The two side edges of this fabric panel 31 are attached to the respective adjacent pendants 7 and 8 by means of chain repair links which pass through metal eyelets provided along the side edges of this planel, the chain repair links used for attachement of this panel to pendant 8 being the same links 23 which are used for attaching one side edge of panel 22 to the same pendant 8 (see FIG. 4). Common chain repair links 41 are used for the attachment of panel 31 and of the rear side panel 29 to pendant 7.

A short length of wire rope 32 (FIG. 5) is connected between the pendants 8 and 7, at substantially the same level as wire rope 24 previously mentioned. The upper edge of panel 31 is attached to the wire rope 32 by means of chain repair links 33 which pass through metal eyelets provided along the upper edge of this panel.

A fabric panel 42 (FIG. 4), exactly similar to panel 31 just described, is utilized to provide a barrier in the other triangular end space—to wit, the space bounded by pendants 9 and 10. Panel 42 is attached at its side edges to the pendants 9 and 10, and at its upper edge to a length of wire rope 43 (similar to wire rope 32) which is connected between pendants 9 and 10; the modes of attachment of panel 42 at its edges to the various elements recited are exactly similar to those previously described in connection with panel 31. Common chain repair links 23 are used for the attachment of panel 42 and panel 22 to pendant 10, and common chain repair links are used for the attachment of panel 42 and panel 39 to pendant 9.

The barriers or enclosures in the "open" or triangular end spaces ("open" because there are no lifting elements on these ends) are left loose at the bottom, to enable the lifting elements or bars 11 and 16 to spread sufficiently to envelop the pallet. In order to prevent material from slipping off the pallet and through these openings, it is necessary to secure the bottoms of the sheet 31 and of the sheet 42. The arrangement for one of these sheets or panels (sheet 31) will be described in detail, referring particularly to FIGS. 4, 7, and 9.

An L-shaped element 34 (formed for example from ½" round stock) is welded at one end and in inverted fashion to the outer face of lug 13, thereby to provide (at lug 13, or pipe 11) a hook-like projection which opens downwardly; a similar L-shaped element 35 is welded to the outer face of lug 17, thereby to provide (at lug 17, or pipe 16) a hook-like projection which opens downwardly. A length of tubing 36 has a pair of spaced washers 37 welded thereon near each end; only one end

of this tubing is shown in FIG. 7. The ends of the tubing **36** are adapted to slip under the respective hook-like projections provided by the elements **34** and **35**; each pair of washers **37** spans its respective element (**34** or **35**) and prevents longitudinal displacement of tubing **36** when it has been slipped under the hook-like projections.

At both sides, the lower portions of the side edges of panel **31** are cut away at an angle (thereby to narrow this panel), as at **38**, to provide clearance for lugs **13** and **17** and for items **34**, **35**, and **37**. The lower edge of panel **31** is hemmed around the tubing **36**, the hem being held by a suitable adhesive such as "Herculite CVV." See FIGS. 7 and 9.

Panel **42** is attached at its lower edge (by hemming) to a piece of tubing exactly like tubing **36**, the ends of the tubing for panel **42** being adapted to slip under hook-like projections provided on lugs **15** and **18**.

When the hemmed tube **36** is hooked under the retaining hooks **34** and **35**, the lifting action of the crane will exert a pulling force on the nylon panel **31**, transferring the pull to the tubing **36** and locking it in place under the hooks. The tubing **36**, together with the associated fabric **31**, provides a rigid barrier for any material which might try to slip off the pallet being lifted. The same statement applies to panel **42** and its associated bottom tubing.

When the lifting force of the crane is released, the tubing **36** may be removed from under the retaining hooks **34** and **35** (and similarly at the oposite end of the lifting device), releasing the lifting bars **11** and **16** so that they can then be moved with respect to the pallet (e.g., for removing the pallet lifting device of the invention from the pallet). The removal of the tubing **36** from under the retaining hook **34** is illustrated in dot-dash lines in FIG. 9. It may be seen that the coupling between the rigid link member **36** and the lifting elements **11** and **16** (via the hooks **34** and **35**) is releasable.

The invention claimed is:

1. A pallet lifting device comprising a single elongated spreader member, means coupled to the two opposite ends of said member for suspending said member from a crane, a pair of flexible pendants secured at their upper ends to each end of said member, thereby to provide four depending pendant ends, two at each end of said member, a pair of rigid lifting elements carried by the lower ends of said pendants, said lifting elements extending substantially parallel to said spreader member and each lifting element being fastened at its ends to respective ones of said depending pendant ends, said lifting elements being arranged to engage the underside of a pallet for lifting the same; first means securely attached to one of said lifting elements and to the two pendants fastened thereto for providing a barrier in the space bounded by said one lifting element, its two associated pendants, and said spreader member, and second means securely attached to the other of said lifting elements and to the two pendants fastened thereto for providing a barrier in the space bounded by said other lifting element, its two associated pendants, and said spreader member.

2. Device in accordance with claim **1**, wherein each of said first and second means comprises an imperforate sheet of material, the first sheet being securely attached at its lower edge to said one lifting element and at its side edges to its two associated pendants, and the second side being securely attached at its lower edge to said other lifting element and at its side edges to its two associated pendants.

3. Device as defined in claim **1**, including also a first rigid link member releasably coupled between the ends of said lifting elements at one end of said spreader member, and a second rigid link member releasably coupled between the ends of said lifting elements at the other end of said spreader member.

4. Device as defined in claim **1**, including also a first rigid link member releasably coupled between the ends of said lifting elements at one end of said spreader member, third means attached to said first link member and to the two pendants at said one end of said spreader member for providing a barrier in the space bounded by said first link member and said last-mentioned two pendants, a second rigid link member releasably coupled between the ends of said lifting elements at the other end of said spreader member, and fourth means attached to said second link member and to the two pendants at said other end of said spreader member for providing a barrier in the space bounded by said second link member and said last-mentioned two pendants.

5. Device in accordance with claim **4**, wherein each of said third and fourth means comprises an imperforate sheet of material, the third sheet being attached at its lower edge to said first link member and at its side edges to the two pendants at said one end of said spreader member, and the fourth sheet being attached at its lower edge to said second link member and at its side edges to the two pendants at said other end of said spreader member.

6. Device in accordance with claim **1**, wherein each of said first and second means comprises an imperforate sheet of material, the first sheet being securely attached at its lower edge to said one lifting element and at its side edges to its two associated pendants, and the second sheet being securely attached at its lower edge to said other lifting element and at its side edges to its two associated pendants; said device including also a first rigid link member releasably coupled between the ends of said lifting elements at one end of said spreader member, and a second rigid link member releasably coupled between the ends of said lifting elements at the other end of said spreader member.

7. Device as defined in claim **6**, including also third means attached to said first link member and to the two pendants at said one end of said spreader member for providing a barrier in the space bounded by said first link member and said last-mentioned two pendants, and fourth means attached to said second link member and to the two pendants at said other end of said spreader member for providing a barrier in the space bounded by said second link member and said last-mentioned two pendants.

8. Device in accordance with claim **7**, wherein each of said third and fourth means comprises an imperforate sheet of material, the third sheet being attached at its lower edge to said first link member and at its side edges to the two pendants at said one end of said spreader member, and the fourth sheet being attached at its lower edge to said second link member and at its side edges to the two pendants at said other end of said spreader member.

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