

[54] **EXPANDABLE SIDE-HANDLING
CONTAINER ATTACHMENT**

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[52] U.S. Cl. **214/621, 214/730, 294/67 DA**

[51] Int. Cl. **B66f 9/18, B66c 1/42**

[58] Field of Search **214/620, 621, 730; 294/67.4, 67 R, 67 D, 67 DA, 67 DB, 67 BC**

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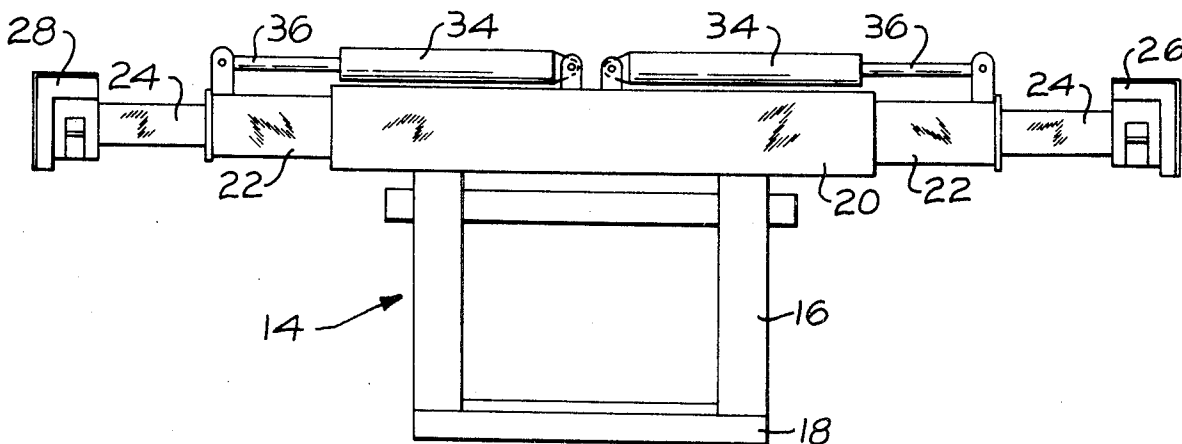
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[57] **ABSTRACT**

An expandable, side-handling container lift frame attachment for lifting and moving empty or lightly loaded cargo containers of various lengths is provided. The lift frame attachment is adapted for attachment to or detachment from a carriage of a fork-lift truck, and includes telescoping, transverse beam members that can be extended or retracted in length to fit intermixed containers of various lengths.

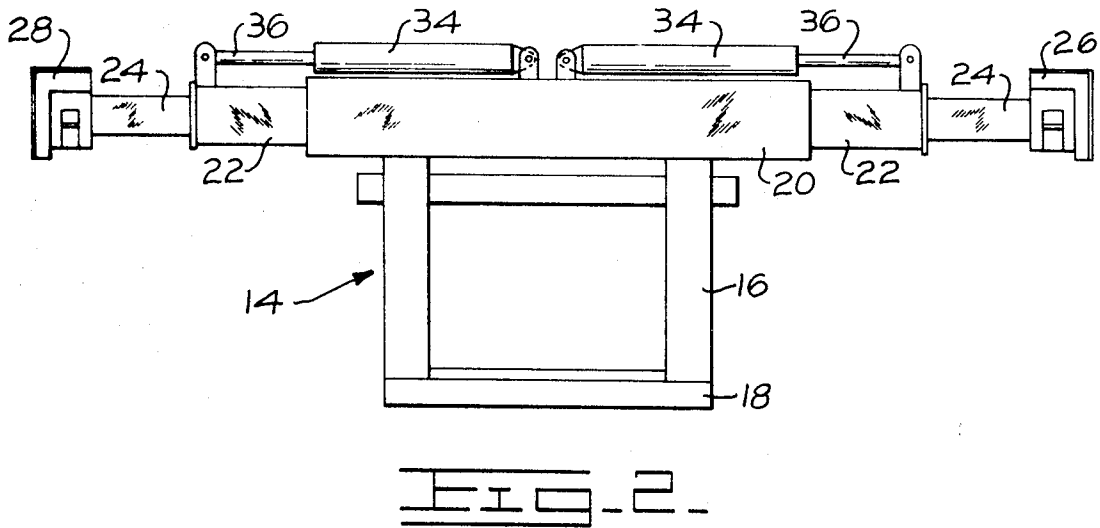
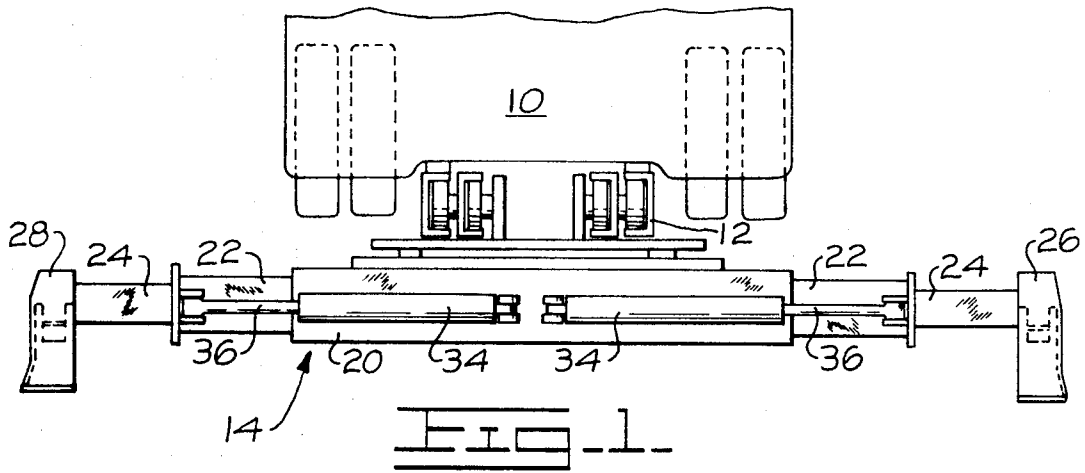
8 Claims, 9 Drawing Figures



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3,752,346

4 Sheets-Sheet 1



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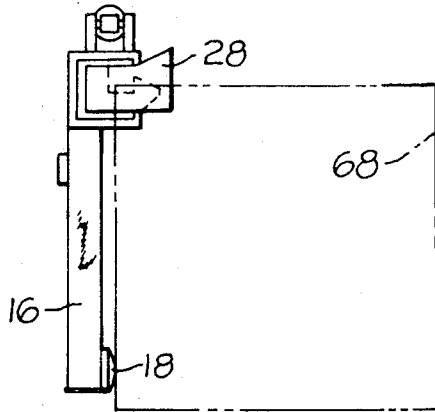


FIG. 3.

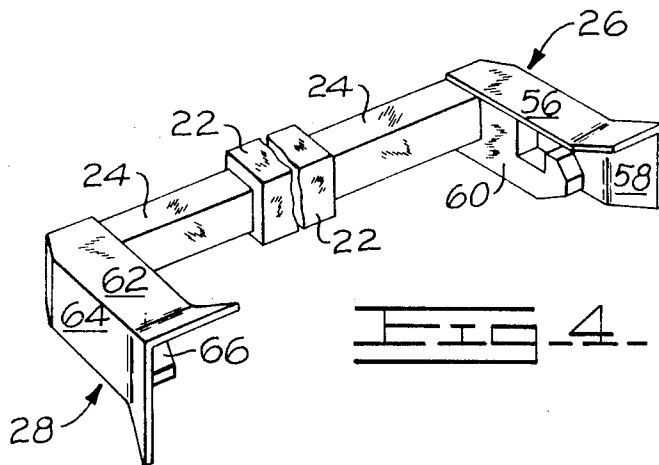


FIG. 4.

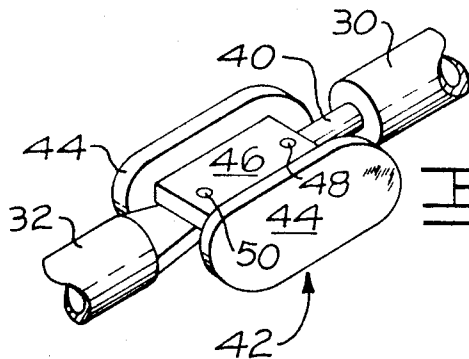


FIG. 5.

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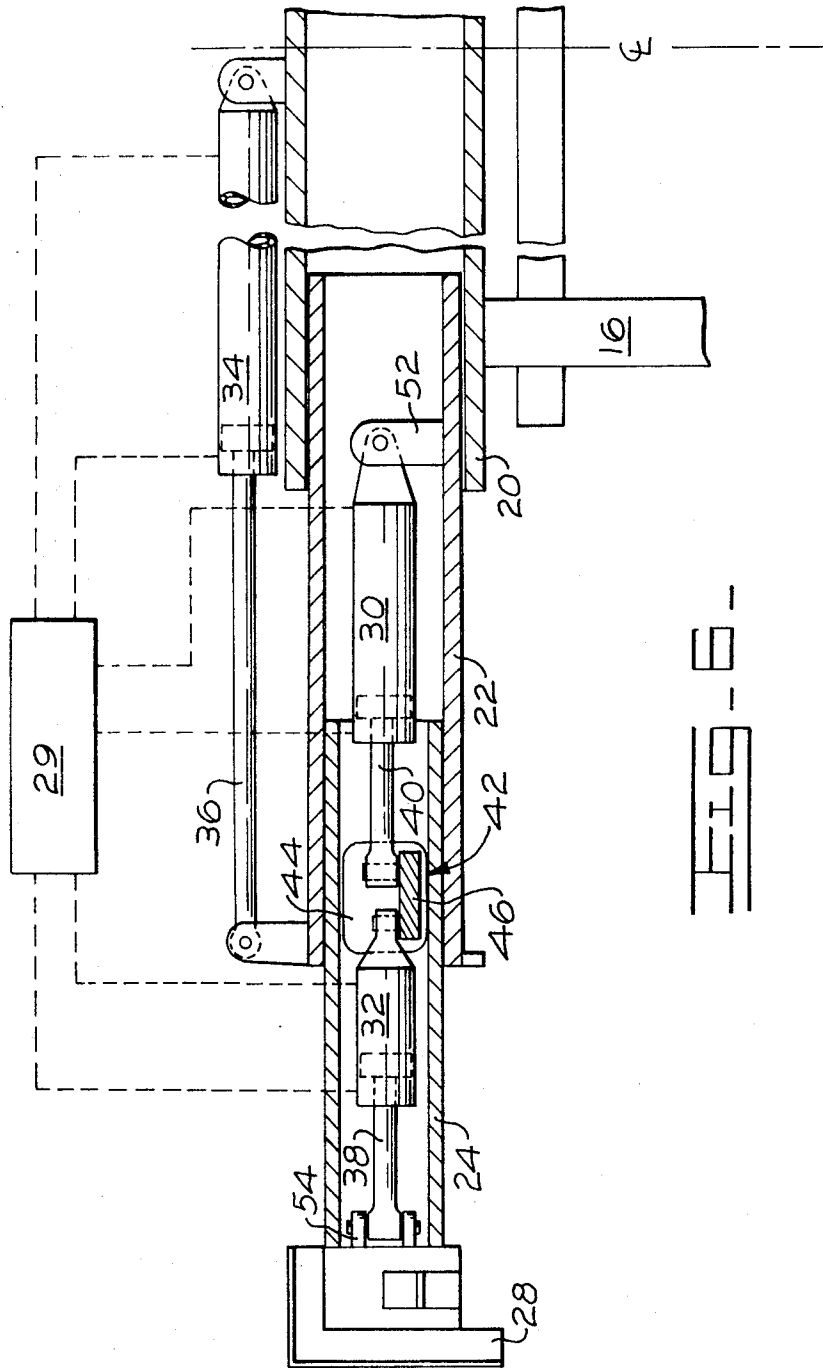


FIG. 6

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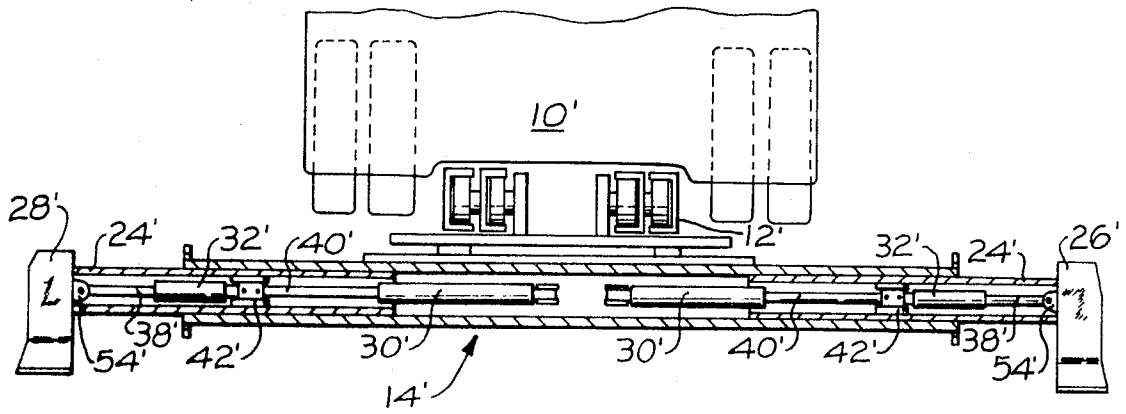


FIG. 7.

FIG. 8.

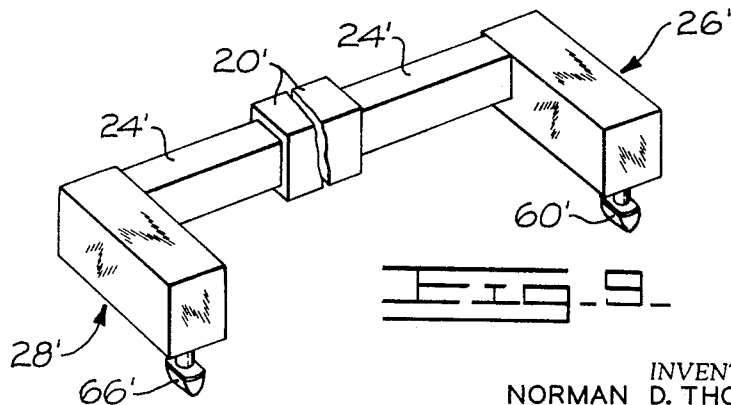
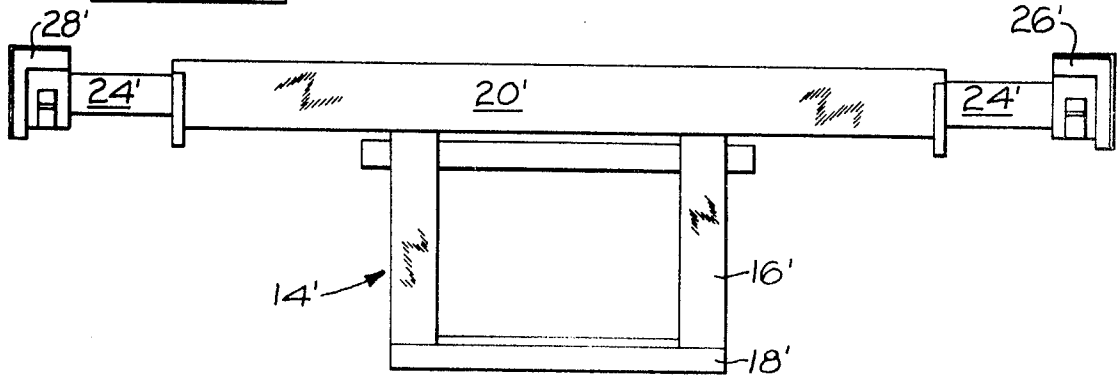


FIG. 9.

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EXPANDABLE SIDE-HANDLING CONTAINER ATTACHMENT

CROSS-REFERENCE TO RELATED APPLICATION

Reference is made to related copending application 5 Ser. No. 185,698, filed Oct. 1, 1971, which discloses an expandable, top-handling as opposed to side-handling lift frame for containers.

BACKGROUND OF THE INVENTION

This invention relates to an expandable, side-handling container lift frame attachment for lifting and moving containers of various lengths. More particularly, this invention relates to lift frames adapted for attachment to fork-lift trucks and which have provision 10 for varying their length to accommodate different length containers.

At the present time, large cargo containers are handled by various means including: lift cranes; fork-lift trucks when the containers are equipped with fork-lift pockets; straddle carriers; straddle cranes; and a proliferation of U-frame or sliding-bed devices, all of which do not achieve the most efficient handling of containers.

Attachments that are adaptable to fork-lift truck carriages are also being used, but lack versatility in handling containers of intermixed sizes without removing one attachment and replacing it with another one of a size suitable for the container to be handled. This has posed serious limitations on their acceptance by industry. It can be understood that the need to change attachments to accommodate different length containers is expensive from the standpoint of equipment investment, the cost of labor to accomplish the changeover, and the loss of production that is caused by having the vehicle idle during the changeover of attachments.

SUMMARY OF THE INVENTION

The instant invention provides a side-handling cargo container lift frame attachment for a fork-lift truck that is operator-controlled to adjust itself to lift and move intermixed, empty, or lightly loaded cargo containers of various lengths with little or no loss of vehicle operation time. The subject lift frame is easily attached to or detached from a standard fork-lift truck carriage. This has the benefit of having the economic advantages of a truly versatile lift truck that can function either as a fork-lift truck or as a cargo container carrier.

By use of a hydraulic control means and hydraulic lines connected to hydraulic cylinder means, which can be located either inside or outside of telescoping, transverse beam members, the adjustment of the load-supporting beams and the associated container lift-guide and coupling means to various length cargo containers is achieved.

Accordingly, it is a primary object of this invention to provide a side-handling container, lift frame attachment for industrial fork-lift trucks.

It is another object to provide an attachment for fork-lift trucks that will lift and move empty or lightly loaded cargo containers of various lengths.

It is a further object of this invention to provide an attachment for fork-lift trucks by which intermixed, empty, or lightly loaded cargo containers of various lengths can be lifted and moved.

It is a further object to provide a fork-lift truck, lift frame attachment having means adjustable by the vehi-

cle operator to fit cargo containers of various lengths.

A further object is to provide a lift frame which is adjustable as to length by means of an operator-controlled adjustment system that requires no removal or addition of parts to accommodate itself to different length cargo containers.

Another object of this invention is to provide a lift frame attachment that can be easily mounted to or removed from a standard fork-lift truck carriage.

Additional advantages and features of the present invention are made apparent in the following description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of the container lift frame according to the present invention, mounted on a suitable fork-lift truck;

FIG. 2 is a front elevation of the container lift frame of FIG. 1;

FIG. 3 is an end view of the container lift frame of FIG. 1;

FIG. 4 is an illustration of the means on the device for coupling the frame to a container;

FIG. 5 is an enlarged view of the slide member located between each pair of inner and outer cylinders;

FIG. 6 is an enlarged, partial, front-sectional view of the expandable beam members comprising a part of the instant invention;

FIG. 7 is a plan view, partially cut away, of another embodiment of the present invention, similar to FIG. 1; FIG. 8 is a front elevation of the embodiment of FIG. 7; and

FIG. 9 is an illustration, similar to FIG. 4, of an alternate means for coupling the frame to the container.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the embodiment of the invention shown in FIGS. 1-6, there is illustrated a partial view of a lift truck 10, which includes a standard fork-lift truck mast, and fork carriage 12 (with forks removed), upon which is mounted the cargo container lift frame 14 comprising the instant invention. A suitable attaching and retaining means such as described in U.S. Pat. No. 3,499,563 to J.E. Forry, et al., may be used to attach the frame to the carriage. The lift frame of this invention comprises a vertical frame assembly 16, a transverse box-beam member 20 that is rigidly attached, such as by welding, to the top of the vertical frame assembly 16, and a transverse member 18 on the bottom of the vertical frame assembly 16 that serves as a cushion between the lift frame 14 and the cargo container 68, as seen in FIG. 3.

The lift frame comprises a transverse beam member 20 in the form of a hollow box-beam within which telescoping extensible beam members 22, 24 of a similar shape are supported and also adapted for slidably travel both outwardly and inwardly. As seen in FIG. 3, the load guide and coupling member assemblies 26 and 28, attached to the ends of members 24, can thus be positioned to couple with the top, rear corner castings of a cargo container 68, while the bottom of the container rests against cushioning member 18.

The cargo container guide and coupling means 26 and 28 provide for coupling the lift frame to standard corner fittings of a cargo container 68 and for lifting same. As seen in FIG. 4, the aforesaid container cou-

pling means 26 consists of a flared-mouth upper plate 56, a flared-mouth side plate 58 and a container hook and lift member 60 with said coupling assembly 26 attached to the outer end of one beam member 24. A second container coupling means 28 is similarly attached to the outer end of the second beam member 24 and consists of a flared-mouth upper plate 62, a flared-mouth side plate 64, and a container hook and lift member 66. In operation, the lift truck operator positions the attachment 14 in a manner that will allow the container hook and lift members 60 and 66 to enter the top, rear corner castings of the cargo container; at which time the operator can actuate the attachment lift circuit causing it to raise the cargo container upward. The bottom portion of the container 68 will automatically be positioned against the attachment frame lower transverse member 18 by this aforementioned attachment raising action as seen in FIG. 3.

Typically, the beams are dimensioned so that when transverse beam members 22 and 24 are fully retracted to provide a minimum-length transverse beam, a standard 20-foot long, minimum-length cargo container can be accommodated. When a container of greater length is to be lifted and moved, the lift truck operator can actuate a hydraulic control valve means 29 of known construction to introduce hydraulic fluid under pressure to a plurality of hydraulic cylinder means 34, which will, in turn, cause beam members 22 to slidably travel in a transverse, outward direction by means of rods 36 attached thereto.

When it is desired to accommodate very long containers, hydraulic cylinder means contained within beams 22, 24 may be actuated. As seen in FIG. 6, hydraulic cylinder means 30 and 32 having rods 40 and 38, respectively, are interconnected by means of a sliding link assembly. The head end of inner hydraulic cylinder 30 is pivotally attached to a plurality of brackets 52 fixed to the inner wall of beam 22. The rod 40 of jack 30 is pivotally attached to link assembly 42 as will be hereinafter described.

Similarly, the head end of outer hydraulic cylinder 32 is pivotally connected to link means 42 while the rod 38 is pivotally connected to a plurality of brackets 54 fixed to the outer end of transverse beam member 24.

Link assembly 42 comprises a plate 46 having fixed thereto a pair of slider plates 44, as best seen in FIG. 5. Rod 40 of hydraulic cylinder 30 is pivotally secured to plate 46 by pivot pin 48 while the head end of hydraulic cylinder 32 is pivotally secured to plate 46 by pivot pin 50.

The operation of adjusting the instant invention's transverse beam members from the minimum length to a predetermined greater length that will accommodate standard cargo containers of 20-, 24-, 27-, 30- and 40-foot (or any intermediate dimension) will be hereinbelow described.

With the lift-frame, transverse beam assembly at its minimum length (all beams 22 and 24 fully retracted), the operator will actuate the aforementioned hydraulic valve means. This will introduce hydraulic fluid under pressure into the two hydraulic cylinders 30, which will, in turn, extend cylinder rods 40, and move the two slide assemblies 42 together with the two associated transverse beams 24 and container coupling means 26 and 28 outwardly for attachment to a 24-foot long container.

When a 27-foot long container is to be accommodated and the attachment 14 is at its aforementioned basic minimum length, the operator actuates the hydraulic control valve 29 to provide fluid pressure to the hydraulic cylinders 30 and 32. This causes the cylinder rods 40 and 38 to be fully extended and moves the transverse beams 24 to their maximum extended position relative to the fully retracted beams 22.

When a 30-foot long container is to be handled and the attachment 14 is at its basic minimum length, the operator actuates the hydraulic control valve 29 to provide fluid pressure to the hydraulic cylinders 34. This action extends cylinder rods 36 and transverse beams 22 to their maximum extended position relative to the beam 20. The container coupling members 26 and 28, being attached to the outer ends of the fully retracted beams 24, are thus positioned for coupling to the 30-foot long container.

When it is desired to couple the attachment 14 to a 40-foot long container, the hydraulic control valve 29 is actuated to provide hydraulic fluid under pressure to all cylinders 30, 32 and 34, thus fully extending all transverse beam members 22 and 24, as best seen in FIG. 6.

The control valve means 29 previously mentioned is understood to be such that either one valve control lever or pedal actuates cylinders 30 and a similar lever or pedal actuates cylinders 32, or a single valve and control means actuates both cylinders 30 and 32.

An alternate means 29 is presented in which the hydraulic control valve means initially actuates the hydraulic cylinders 30 and when greater extension of the transverse beam is desired, it then actuates the hydraulic cylinders 32.

The aforementioned control valve means 29 of known construction is understood to be such that either one valve control lever or pedal actuates cylinders 32, while a third lever or pedal actuates cylinders 36; or one spool valve and control means actuates cylinders 30 and 32, while a second spool valve and control means actuates cylinders 34.

An alternate embodiment is shown in FIGS. 7 and 8 which would accommodate shorter containers of 20-, 24-, or 27-foot lengths. While not as versatile, the subject embodiment would have fewer parts and would, therefore, be less costly.

It may be parenthetically noted that primes are used throughout the following discussion and in the drawings to denote structure having its analogous numerical counterpart in the primary embodiment. With this embodiment, a central transverse beam member 20' has slidable beam members 24' extending from both ends thereof. Operation of this embodiment is in a manner which is identical with the operation of analogous structure in the primary embodiment.

An alternate embodiment of container coupling means is shown in FIG. 9 wherein standard twist locks 60', 66' are shown. Means as described in U.S. Pat. No. 3,499,563 to J.E. Forry et al., could be used to actuate said twist locks and that disclosure is expressly incorporated by reference herein.

While preferred embodiments of the invention have been shown and described, it is readily apparent to anyone skilled in the art that various other forms would be possible without departing from the spirit of the invention or the scope of the following claims. It is further understood that the scope of the invention is not to be

limited to the thus-illustrated embodiments, but is to be determined by the scope of the appended claims.

What is claimed is:

1. A cargo container lift frame comprising
 an upright frame, 5
 extensible transverse beam means mounted on said upright frame,
 container engaging means mounted on said transverse beam means for mating with corner fittings formed into containers, wherein said transverse beam means comprise, 10
 a plurality of extensible beams, wherein said plurality of beams comprise,
 a first transverse beam member having means associated therewith slidably securing 15
 a second transverse beam member, and
 a third transverse beam member to opposite ends of said first transverse beam member, wherein said means slidably securing said beam members comprise, 20
 means defining a transverse opening in each end of said first beam member slidably receiving said second and said third beam member in opposite ends of said first beam member,
 power means for extending and retracting said transverse beam means whereby said lift frame may accommodate containers of various lengths, wherein said power means comprise, 25
 hydraulic cylinder means associated with said beams for extending and retracting said beams, and
 control valve means for controlling said hydraulic cylinder means, wherein said hydraulic cylinder means comprise, 30
 a first hydraulic cylinder means operatively connected between said first and second transverse beam members, and 35
 a second hydraulic cylinder means operatively connected between said first and third transverse beam

members, and
 wherein said first hydraulic cylinder means comprises,
 first and second hydraulic cylinders, said first and second cylinders being operatively connected by first slidable link means, and wherein said second hydraulic cylinder means comprise,
 third and fourth hydraulic cylinders, said third and fourth cylinders being operatively connected by second slidable link means.

2. The lift frame of claim 1 wherein said container engaging means comprises
 a first and a second container coupling means, each of said means comprising hook means for engaging a container corner casting and flared plate means for guiding said hook means.

3. The lift frame of claim 1 wherein said control valve means comprise, control valves for selectively actuating said first and second, and said third and fourth hydraulic cylinders, respectively.

4. The lift frame of claim 1 further including a cushioning member on said upright frame.

5. The lift frame of claim 4 wherein said cushioning member is mounted in a transverse direction on the lower portion of said upright frame.

6. The lift frame of claim 1 wherein said container engaging means comprises hook means.

7. The lift frame of claim 6 wherein said container engaging means further comprises flared plate means for directing said hook means into container corner castings.

8. The lift frame of claim 1 wherein said container engaging means comprises twist locks adapted for engagement into container corner castings and means for locking and unlocking said twist locks from container corner castings.

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