United States Patent [19]

Berends

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[54] **CONTAINER LIFT**

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[21] Appl. No.: **103,576**

[52] **U.S. Cl.**.....**214/512,** 254/93 HP

[51] **Int. Cl.** **B60p 1/02**

[58] **Field of Search**.....214/512, 515; 254/93 HP

[56] **References Cited**

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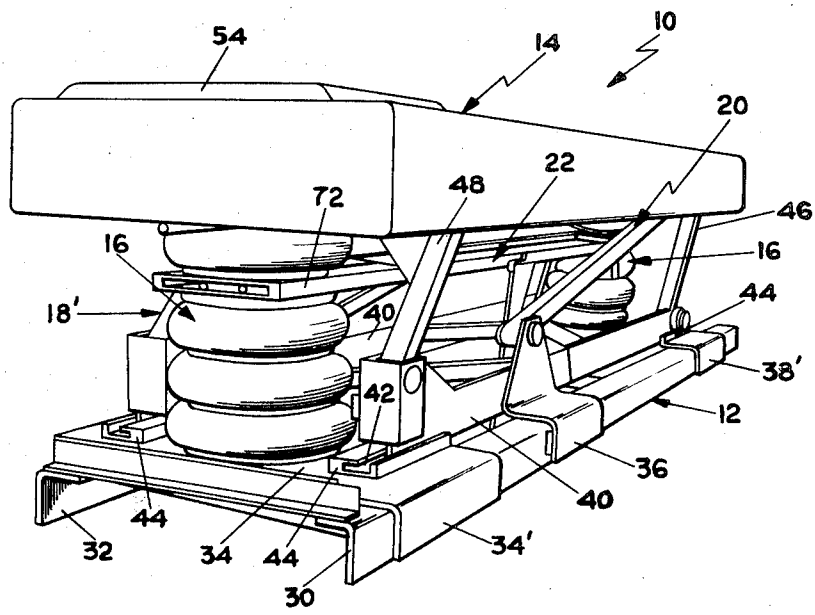
[57] **ABSTRACT**

A vehicular haulage apparatus having an elevator load platform vertically shiftable on a wheeled support frame by a plurality of fore to aft spaced inflatable, deflatable bellows units, the bellows units being joined at the vertically intermediate portions thereof by distortion preventing tie means. A parallelogram linkage as well as stabilizer and position controlling linkage, joins the load platform with the underlying frame. The tie means is interrelated with the stabilizer linkage.

6 Claims, 8 Drawing Figures



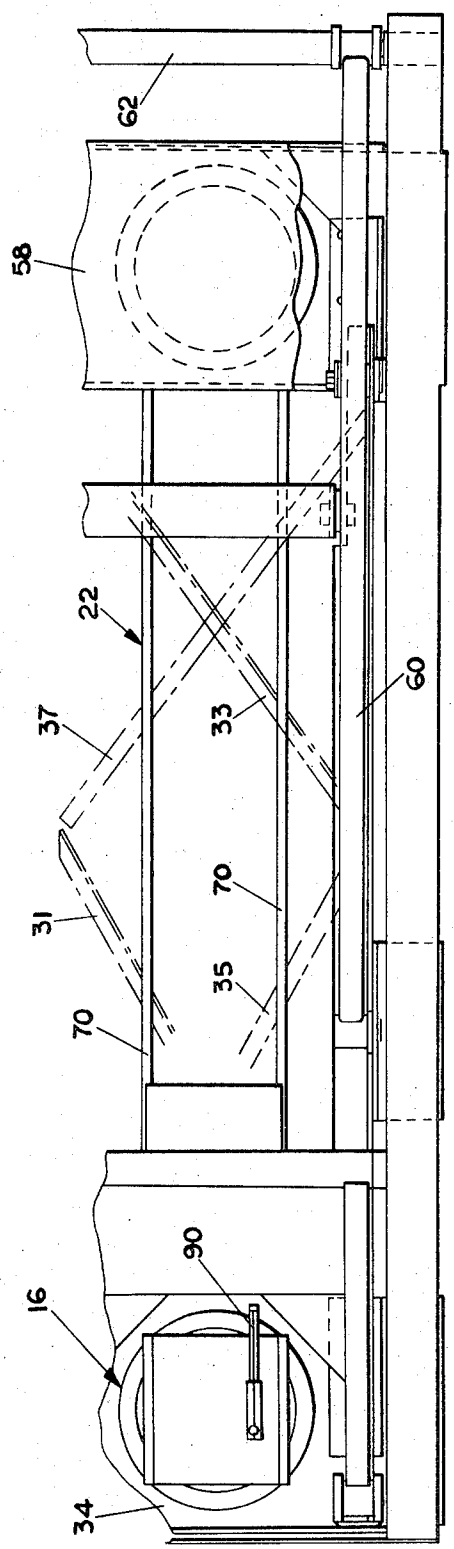


FIG. 2

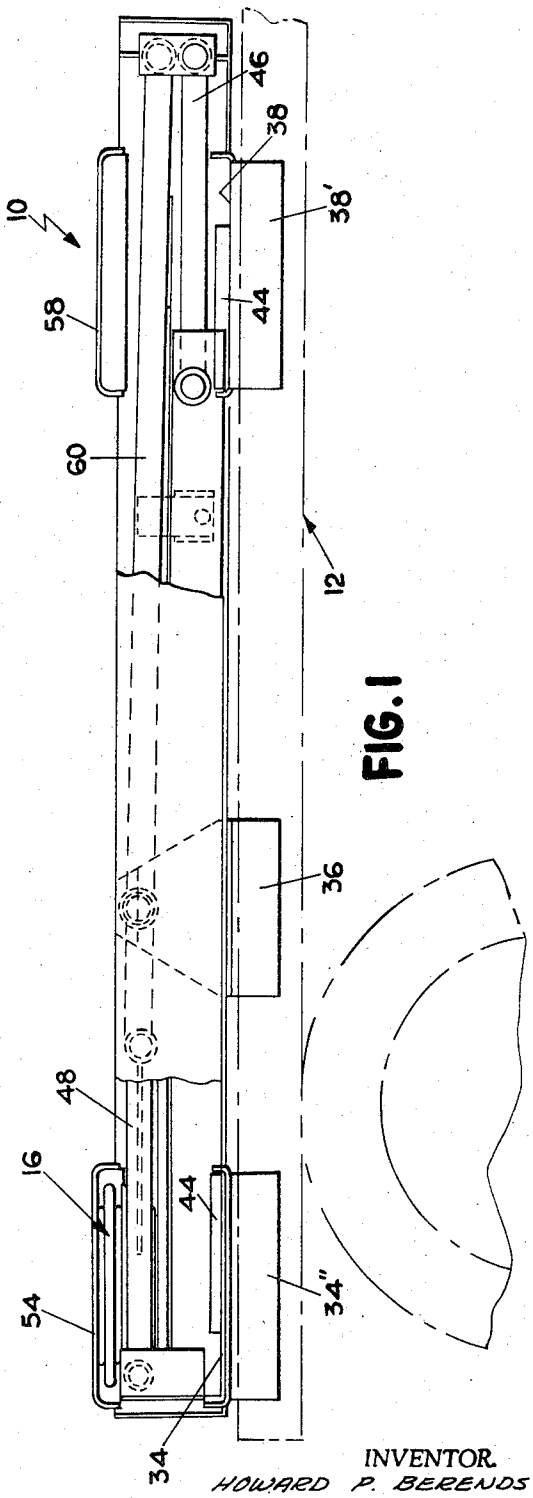


FIG. 1

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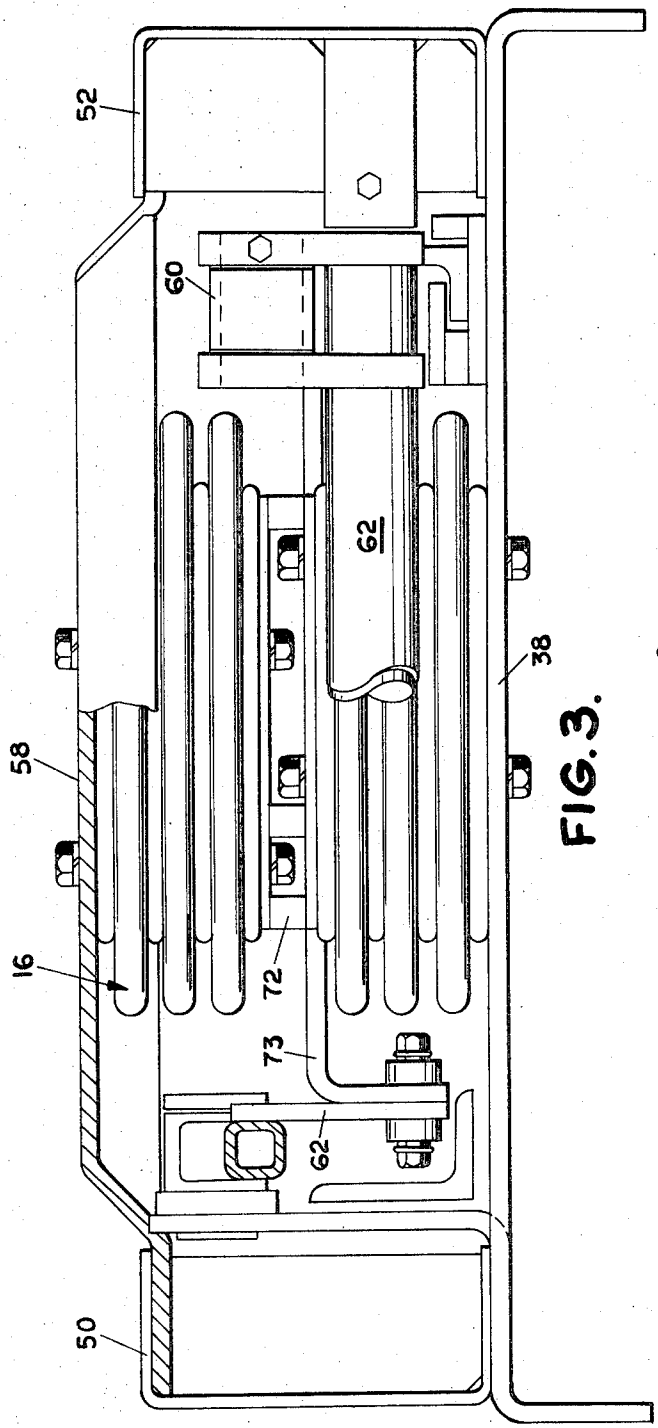

FIG. 3.

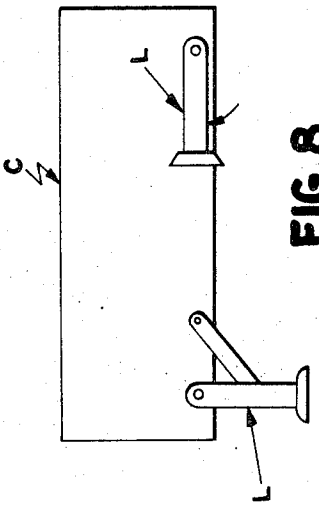

FIG. 8

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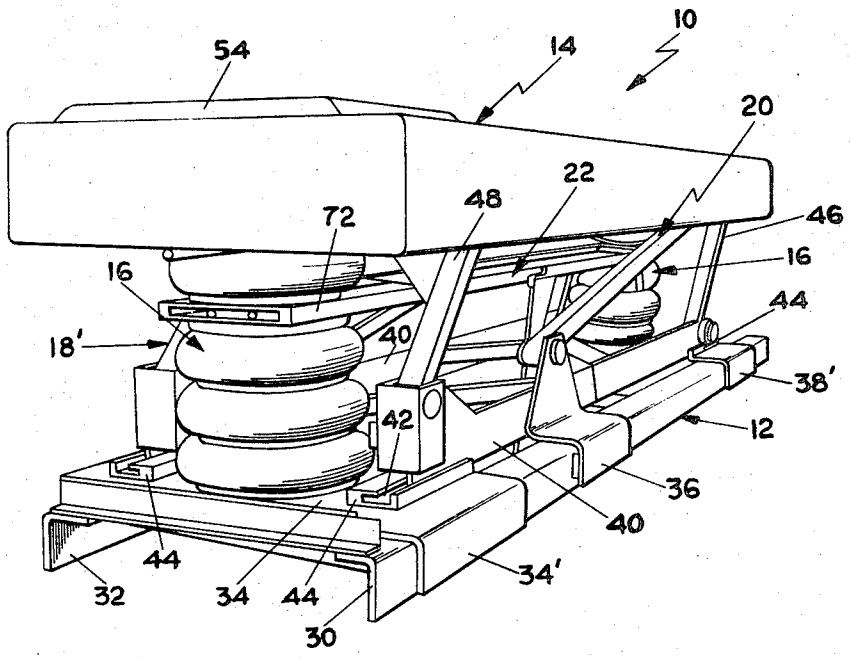

FIG. 5

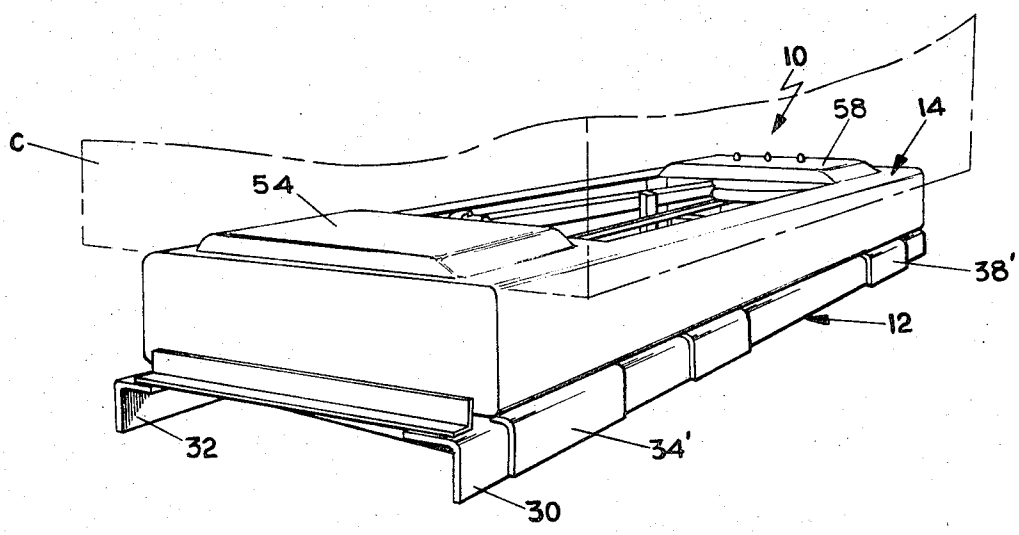

FIG. 4

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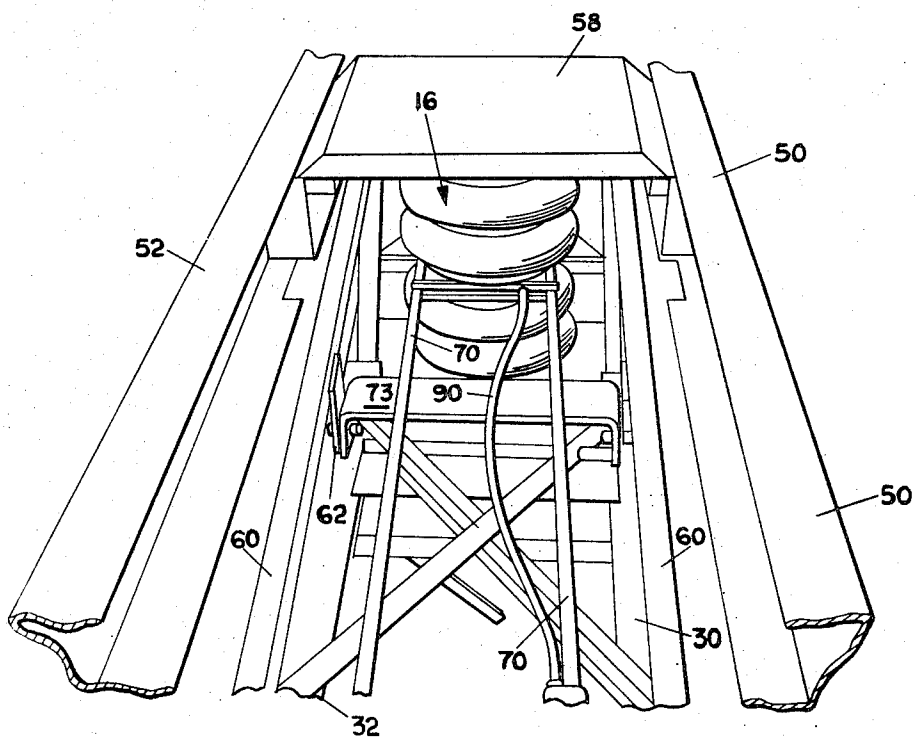

FIG. 6

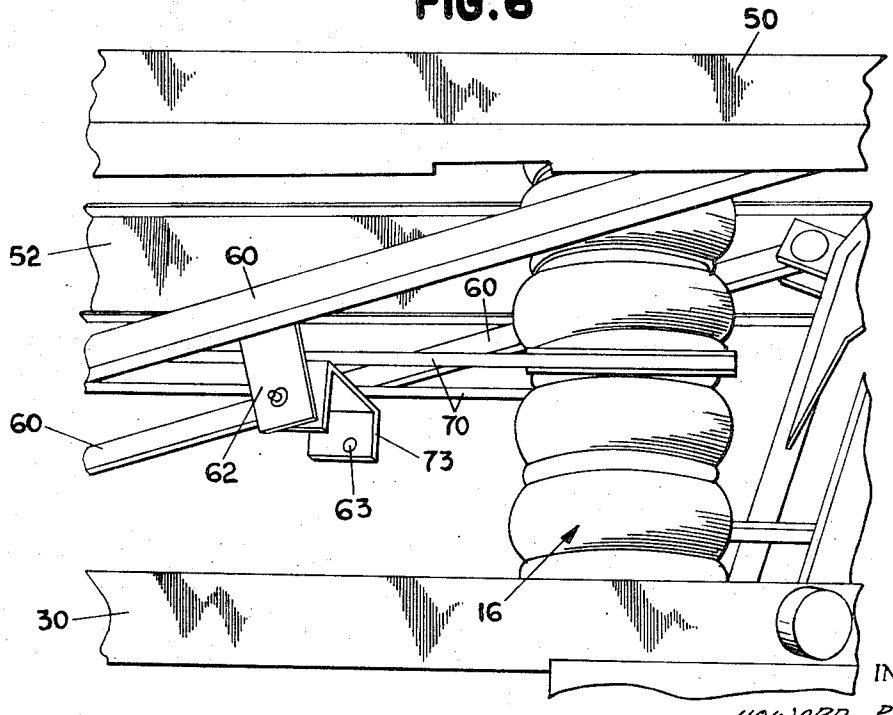

FIG. 7

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CONTAINER LIFT

BACKGROUND OF THE INVENTION

This invention relates to haulage vehicles, and more particularly to a load elevating vehicle assembly employing a plurality of spaced hoisting bellows.

Most transportation demands of recent times cause (1) efficient usage of vehicular haulage power plants, such as truck tractors, and (2) maximum versatility and interchangeability of haulage vehicles and load platforms, such as wheeled trailers and trailer beds, to be of paramount importance. Previous efforts have been directed, for example, toward rapid trailer unloading and simplified load hauling as by palletizing of loads. While these efforts have effected substantial improvements in materials handling, more is needed.

SUMMARY OF THE INVENTION

This invention enables momentary transfer of an entire load to or from a haulage vehicle bed. A unitary container of goods such as grocery items, can be placed on a truck semi-trailer for haulage retention thereof and unloaded as a unit at the destination, e.g. the unloading zone of a store, at any desired time of day or night, with subsequent unloading of the goods from the container being conveniently scheduled at a desired time by the receiver.

The container is hoistable above the trailer it is on by a special stabilized elevator platform on the truck trailer. The platform itself is elevated by a plurality of spaced hoisting bellows interconnected by tie means, and cooperative with two sets of parallelogram linkage and also fore and aft stabilizers. The container, loaded or unloaded, is elevatable to a substantial height, where support legs on it can be lowered. The truck trailer platform is then lowered away from the container to leave it standing on its legs.

The container can actually be elevated sufficiently to later enable a conventional truck bed, which is lower than a semi-trailer bed, to be positioned beneath it for short distance haulage if desired. The truck bed is equipped with a hoist platform of the same type to engage, support, and lower the container. Later, the container can be removed from the truck bed in the same fashion.

These and several other objects, advantages, and features of the invention will be apparent from the following specification in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of the novel container supporting and hoist apparatus shown as an attachment for a haulage vehicle which is shown partially in phantom lines;

FIG. 2 is a partial plan view of the apparatus in FIG. 1;

FIG. 3 is an end elevational view of the apparatus in FIGS. 1 and 2, with portions being broken away;

FIG. 4 is a perspective view of the apparatus in FIGS. 1–3, shown mounted on the frame of a trailer;

FIG. 5 is a perspective view of the apparatus in FIG. 4, shown in its hoisted position;

FIG. 6 is a perspective view looking down toward one end of the apparatus in FIG. 5;

FIG. 7 is a fragmentary perspective view toward the side of the apparatus in FIG. 5; and

FIG. 8 is an elevational view of a container to be used with the apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now specifically to the drawings, the vehicular haulage apparatus 10 (FIGS. 1 and 4) illustrated includes a wheeled support frame 12 forming part of a conventional semi-trailer bed, mount connectors 34, 36 and 38 for attaching stabilizing mechanism to frame 12, an elevator load platform 14, a plurality of bellows units 16 spaced fore-to-aft along the elongated structure, two sets of bellows straddling parallelogram linkage 18 vertically between the support frame and elevator load platform, stabilizer and position control linkage 20, and tie means 22 between the vertically intermediate portions of the bellows units 16.

Referring now particularly to each of these above sub-assemblies in succession, the wheeled support frame is shown to include a pair of interconnected, laterally spaced, elongated rigid frame beams 30 and 32 which would normally form part of a semi-trailer assembly or a truck bed assembly, or can be added thereto if necessary. Criss-cross diagonal bracing 31, 33, 35 and 37 (FIGS. 2 and 6) normally is secured between these beams. These frame members are mounted on the conventional trailer or truck suspension including springs and shocks, which in turn are supported by conventional wheel and axle assemblies. Since these are all conventional and well-known, details thereof are omitted.

The novel apparatus can be easily mounted upon this generally conventional frame structure. Extending between and over beams 30 and 32 is a pair of inverted, U-shaped members 34 and 36 which are securely attached as by welding, bolting, or the like to the vehicle frame structure. Also attached to beams 30 and 32 is a pair of brackets 38 on opposite sides of the frame. The front and rear brackets 34 and 38 are attached to the parallelogram linkage 18, while the middle brackets 36 on each side form the lower support for fore-to-aft stabilizer and position control linkage 20. Members 34 and 38 also constitute the supports upon which bellows units 16 are mounted. The ends of plates 34 and 38 extend out over frame elements 30 and 32, and have depending flanges 34′ and 38′ secured to the outer sides of members 30 and 32.

The lower leg 40 of each of the pair of the pair of parallelogram linkages 18 have a sliding attachment to members 34 and 36. This sliding connection allows fore-to-aft movement of the linkages. The front and rear ends of lower leg 40 of each linkage has L-shaped slide shoes fitting slidably within the front-to-rear oriented elongated slots 42 of guide tracks 44. The four guide tracks 44 are secured to members 34 and 36. Each of the parallelogram linkages has a pair of parallel legs 46 and 48, the lower ends of which are pivotally attached to the front and rear ends respectively of the lower parallelogram leg 40. These legs 46 and 48 are shifted from a generally horizontal position when the unit is in a lowered condition, to a diagonal, generally vertical, forwardly tilted position as illustrated in FIG. 5 when the unit is elevated. The upper ends of these legs 46 and 48 are pivotally attached to the opposite sides of the elevator load platform 14 which in effect forms the fourth and upper leg of the parallelogram. This plat-

form 14 includes a generally rectangularly shaped outer peripheral construction including a pair of elongated generally channel shaped side beams 50 and 52. These side beams are interconnected by a pair of transversely extending bellow retention elements 54 and 58 at the rear and front of the structure respectively. These members 54 and 58 are preferably somewhat convexly configurated on the top surface, to protrude upwardly, thereby enabling them to be interfitted with a container place thereon. The concave underside cradles the top of the bellows.

Also extending between the underlying frame structure, and specifically the upwardly extending ends of brackets 36 and the forward ends of load elevator platform 14 are the links 60 of the stabilizer and position control linkage 20. The lower end of the links are pivotally attached to brackets 36, while the upper ends are pivotally attached to a crossbar 62 (FIG. 2) which is pivotally connected between the opposite side members 50 and 52 of platform 14. When the structure is in the lowered position, links 60 are generally horizontal. They are raised to a forwardly-diagonal, generally vertical relationship when the structure is hoisted. These links are of substantial length, extending from near the rear bellows unit to a position forwardly of the front bellows units.

Interconnecting the vertically intermediate portions of expandable bellow units 16 is rigid tie means 22. Specifically, this tie means includes elongated forwardly to rearwardly extending rods 70 (FIG. 2) interconnected with flat plates 72, one plate in the center of each bellows unit, i.e. having approximately an equal number of bellows above it and below it. Further, tie means 22 is pivotally interconnected in a specially controlled fashion with the stabilizer and position control links 60 (FIG. 7). Specifically, a pair of brackets 62 depending from members 60 pivotally interconnect with the ends of a generally U-shaped inverted saddle 73 mounted to the underside of rods 70. The transverse axis upon which these pivots 63 lie is positioned to move one-half the vertical distance of the load platform movement.

In operation, bellows units 16 are vertically expanded to hoist the load elevator platform, by compressed air or the like through suitable conduits 90 (FIGS. 2 and 6) from a conventional compressor on the truck (not shown). Expansion of bellows units 16 elevates load platform 14 substantially above the underlying frame structure, with simultaneous raising of parallelogram legs 46 and 48 on opposite sides of the apparatus as well as stabilizer linkage 20. Links 60 of linkage 20 are interconnected and dimensioned to cause load platform 14 to move substantially directly upwardly above the frame as it elevates, so that no significant forward or rearward movement occurs in the load platform, in spite of the fact that the unit is being raised on a parallelogram linkage. To enable this to be done, lower legs 40 of the linkage slide in guides 44, forwardly as the unit elevates, and rearwardly as the unit lowers. Further, bellows units 16 are prevented from "squirting," i.e. distortionally moving apart or toward each other, i.e. by loss of vertical alignment of the individual bellows units above each other, even though they are expanded to a very substantial elevation or height. Distortion away from each other or toward each other is prevented by tie means 22. Interconnection of the tie means with the diagonal legs 60 of the stabilizer means 20 prevents distortion of both bellows forwardly or rearwardly. The pivotal connection between ties 70 and legs 60 (FIG. 7) is particularly selected to be at a point such that, with elevation and lowering of the unit, the pivot connection remains in the same vertical plane to thereby prevent the springs or bellows units from being distorted and also prevent the load platform from being shifted forwardly or rearwardly.

Consequently, the unit can be employed to raise a substantial load directly up to a significant height yet with complete stability of the load and structure. The parallelogram linkage prevents any lateral side sway. The stabilizer linkage prevents significant front or rearward movement of the load platform. The tie means prevents the bellows units from distorting relative to each other, and as interconnected to the stabilizer linkage, prevents the plurality of bellows from distorting relative to the remainder of the structure.

The structure is particularly advantageous in enabling a large semi-trailer type container, e.g. container C (FIGS. 4 and 8) to be quickly loaded, readily hauled, and quickly unloaded from this structure, and also to be loaded onto a truck bed if desired. More specifically, the container may be filled while resting upon its own support legs, which are retractable when desired. Then, when the unit is ready to be loaded and hauled, the trailer bed of a semi-trailer can be placed beneath it in the lowered condition, elevated to the position illustrated in FIG. 5 for engaging and lifting the container off its support legs L, at which time the support legs are retracted. Then, the unit is lowered with the load and container thereon to the position illustrated in FIG. 4 for hauling. Suitable fastening means (not shown) are employed between the hauling vehicle bed and the container. When the hauling vehicle reaches its destination, the expansion units may again be activated to the position illustrated in FIG. 5, enabling the support legs on the container to be lowered and locked, at which time the hoist unit is lowered to allow the container to rest upon its legs L on the ground or other support surface. The semi-trailer is then removed from beneath it.

The bed of a truck can be backed beneath the elevated container. By having one of the novel units on this truck, it can be activated to hoist and haul the container in the manner previously described.

It is entirely conceivable that certain details of this specific embodiment set forth as illustrative may be modified to suit any particular type of situation. For example, the number of bellows units can be increased, the specific load platform configuration can be varied, the container can vary from a completely enclosed structure to simple article retaining structure, and the like. Hence, it is considered that this invention is to be limited only to the scope of the appended claims and the reasonably equivalent structures to those defined therein rather than to the details of this embodiment set forth as illustrative of the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows.

1. A vehicular hauling apparatus comprising: a fore-to-aft elongated wheeled hauling bed including a support frame mounted on wheels, an elevator platform above said support frame, inflatable-deflatable elevator bellows attached between said support frame and said elevator platform to raise and lower said elevator platform relative to said support frame, said elevator platform being configurated to receive and support a hauling container thereon and including means to position the hauling container thereon; said elevator bellows comprising a plurality of at least two inflatable bellows units spaced along said elongated hauling bed, and distortion-preventing tie means joining said inflatable bellows units at vertically intermediate portions thereof.

2. The apparatus in claim 1 including elevator platform position and orientation control means between said elevator platform and said support frame, arranged to keep said elevator platform basically vertically aligned with and parallel to said support frame during raising and lowering of said elevator platform.

3. The apparatus in claim 2 wherein said position and orientation control means comprises diagonally oriented pivotally mounted links between said elevator platform and said support frame.

4. The apparatus in claim 3 wherein said links are pivotally connected to said distortion-preventing tie means.

5. The apparatus in claim 1 wherein said tie means include plates anchored in said bellows units and tie rods connecting said plates.

6. A vehicular hauling apparatus comprising: a fore-to-aft elongated wheeled hauling bed including a support frame mounted on wheels, an elevator platform above said support frame, parallelogram linkage means interconnected between said support frame and said elevator platform to be expandable and contractible, allowing raising and lowering of said elevator platform relative to said support frame, inflatable-deflatable elevator bellows attached between said support frame and said elevator platform to raise and lower said elevator platform relative to said support frame, distortion-preventing tie means between said bellows, elevator platform position and orientation control means between said elevator platform and said support frame, arranged to keep said elevator platform basically vertically aligned with and parallel to said support frame during raising and lowering of said elevator platform, and said position and orientation control means being pivotally connected to said distortion-preventing tie means.

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