

- [54] **DEVICES FOR LIFTING AND TRANSPORTING ARTICLES**
- [75] Inventor: **Rolf Stoltz**, Hofer, Germany
- [73] Assignee: **Gewerkschaft Eisenhutte Westfalia**, Westfalia, Germany
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- [58] Field of Search..... 214/130 R, DIG. 10, 332, 214/86 A, 140; 254/3 R, 3 B, 8 R, 8 B

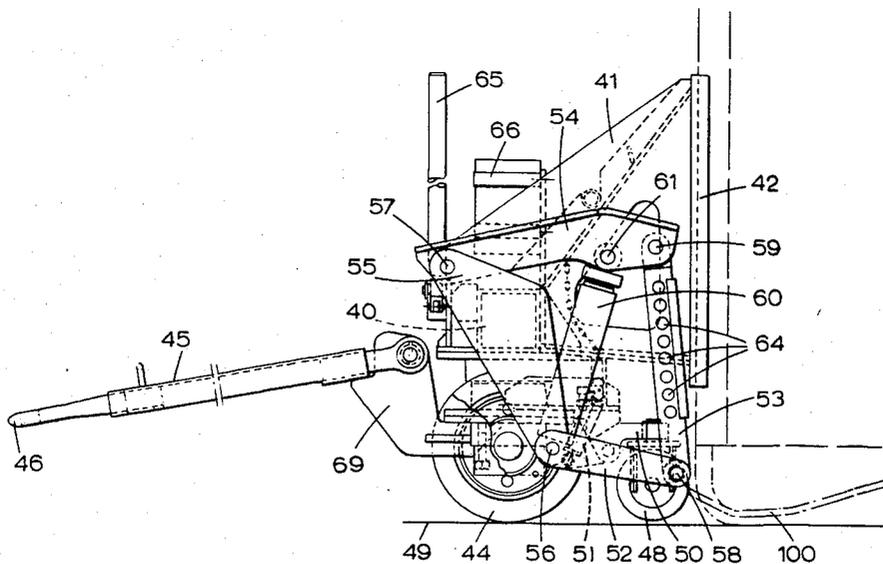
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*Primary Examiner*—Gerald M. Forlenza  
*Assistant Examiner*—Kenneth Noland  
*Attorney, Agent, or Firm*—Sughrue, Rothwell, Mion, Zinn & Macpeak

[57] **ABSTRACT**

A device for lifting and transporting articles which is composed of two pivotably interconnected frames. One of the frames is a support frame which is itself supported by a set of wheels which can be swivelled around relative to the support frame to effect steering. The other of the frames is a lifting frame which serves to lift the article. The other frame may be composed of two spaced-apart systems of pivotably interconnected toggle levers or a unitary structure connected to the support frame so as to move about a single axis. The lifting frame may have forks to engage the article or else chains or cables may be connected between the article and the lifting frame. Hydraulic pistons and cylinders fed by pressure fluid stored on the device are used to move the lifting frame in a pivotal manner in relation to the support frame to thereby raise the article.

**10 Claims, 5 Drawing Figures**



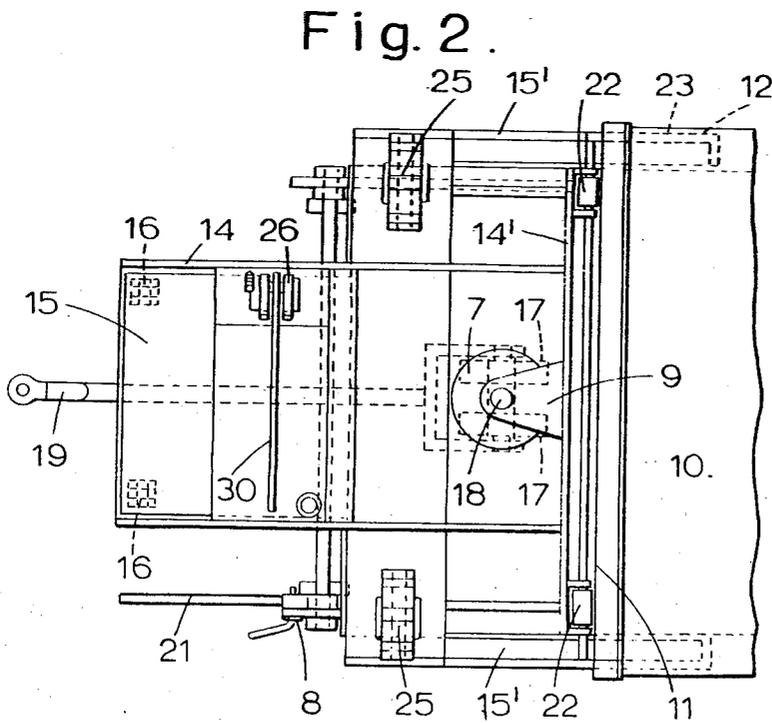
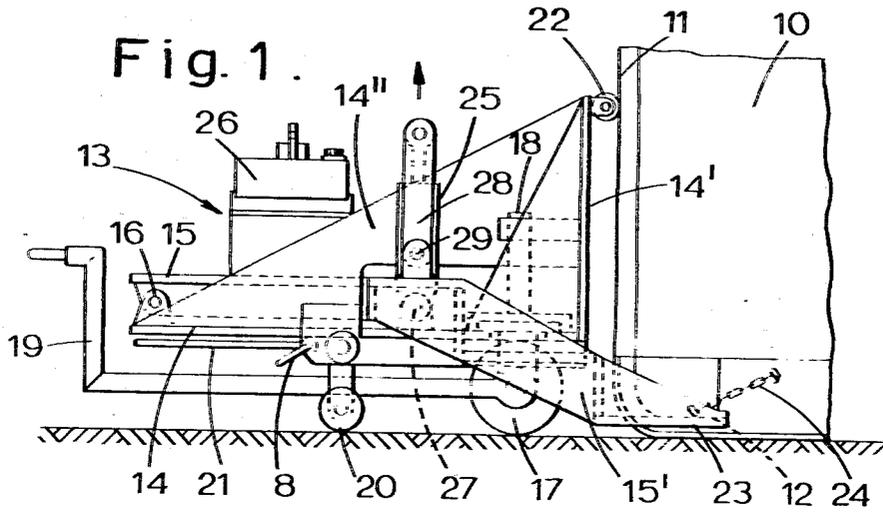
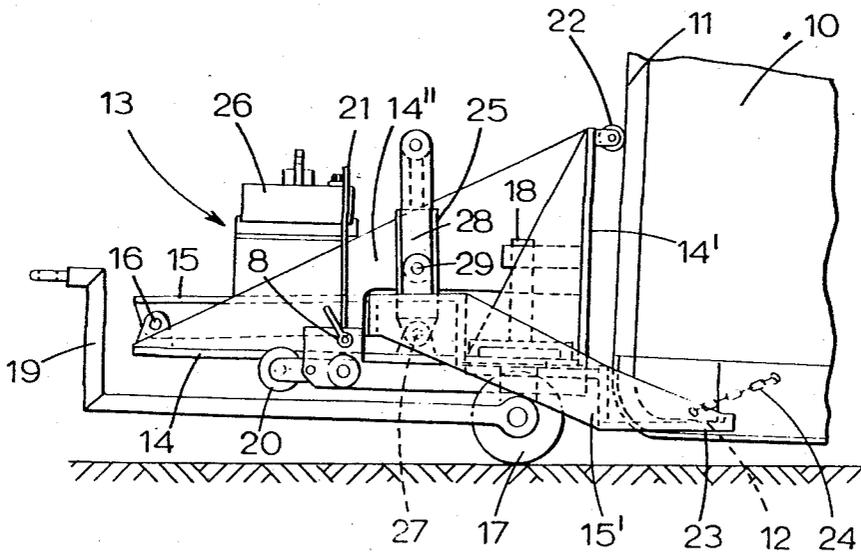


Fig. 3.



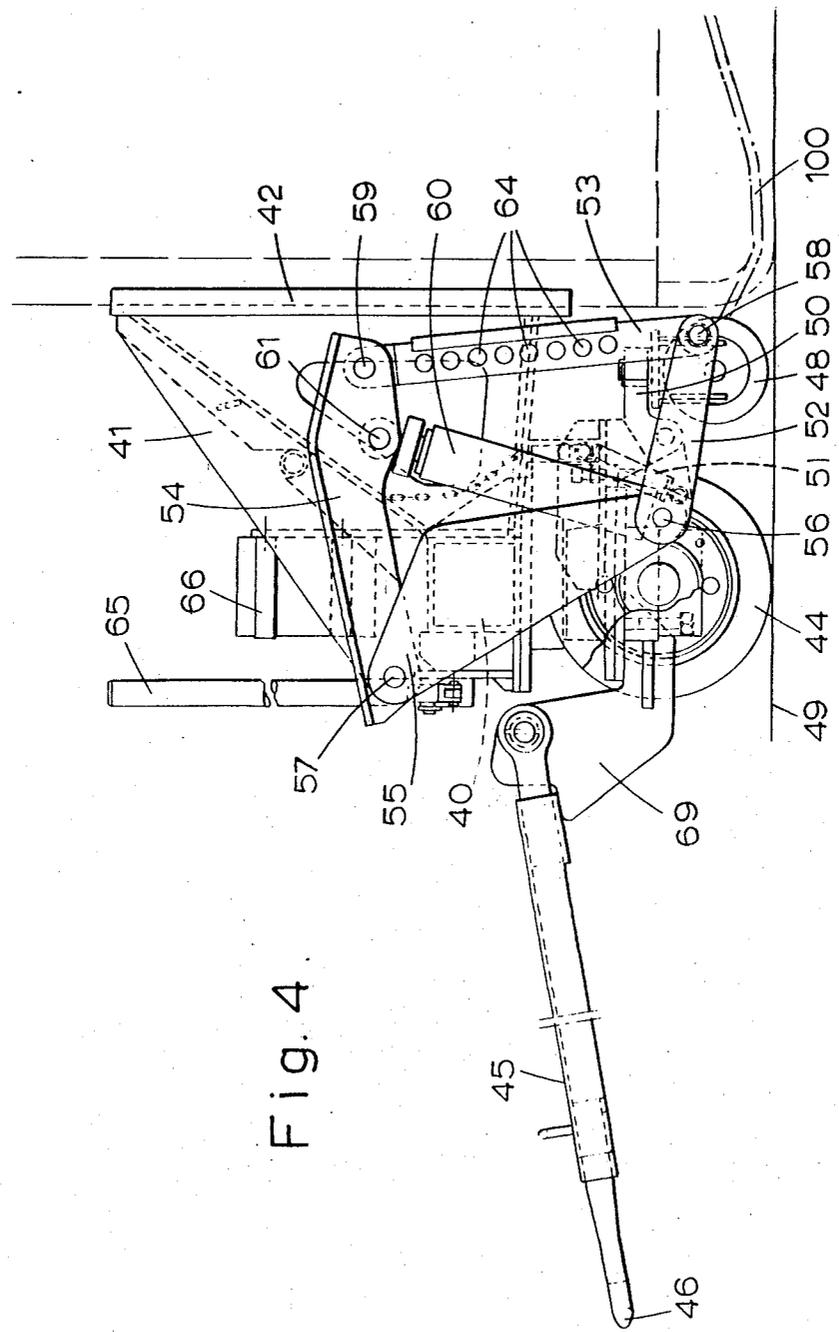


Fig. 4

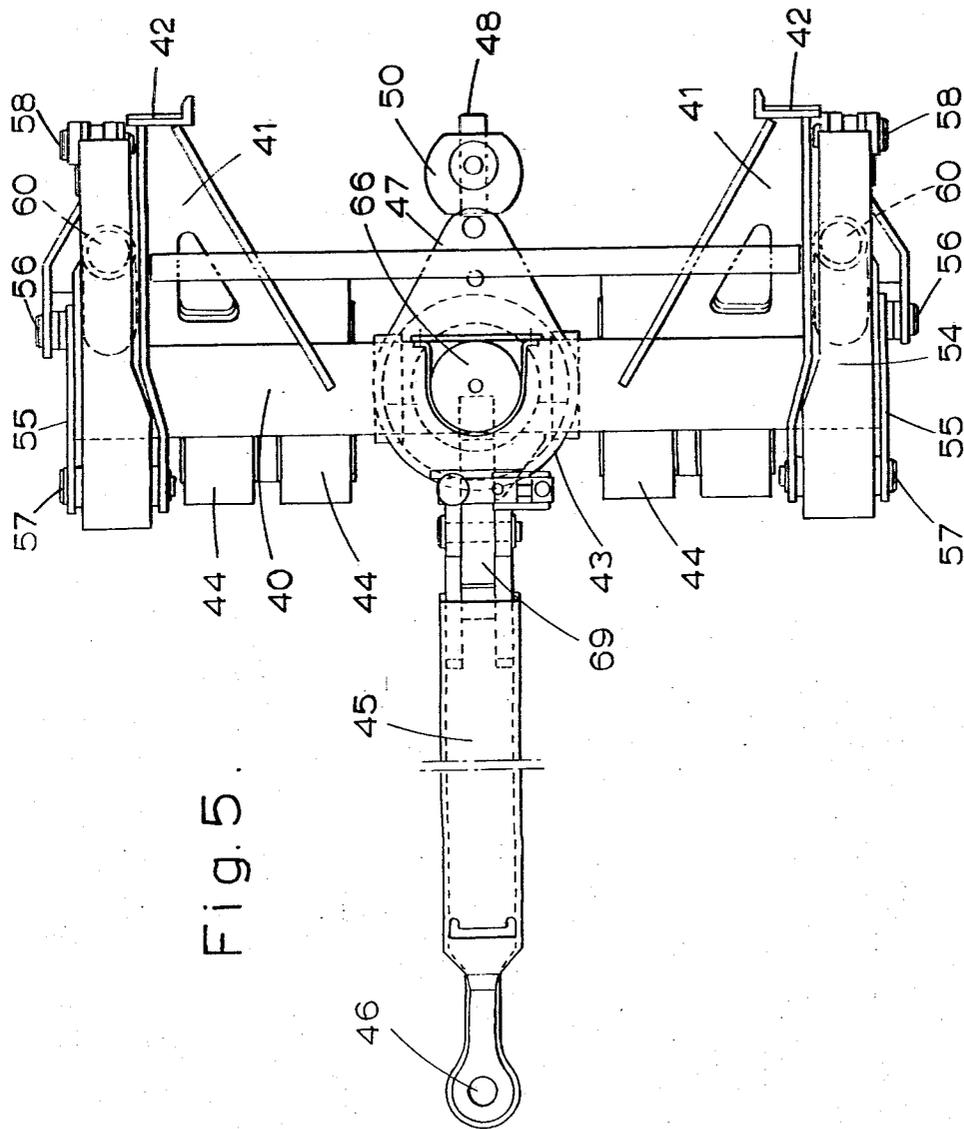


Fig. 5.

## DEVICES FOR LIFTING AND TRANSPORTING ARTICLES

### BACKGROUND TO THE INVENTION

The present invention relates to a device for lifting and transporting articles, particularly articles such as rectangular boxes, containers or vessels.

The invention is particularly but not solely concerned with transporting articles having rollers or wheels at one end so that the articles can be transported merely by raising the end of the article remote from the rollers or wheels.

A general object of the invention is to provide an improved device of the aforementioned kind.

A further object of the invention is to provide a device of comparatively simple structure which is free-standing and of small dimensions and low weight.

A further object of the invention is to provide a device which can be readily moved around manually or else coupled to another vehicle whether with or without an article.

Another object of the invention is to provide a device which is entirely self-contained carrying only a prime mover for effecting lifting of an article.

### SUMMARY OF THE INVENTION

According to the invention there is provided a device for use in lifting and transporting an article, said device comprising a first frame, a second frame pivotably connected to said first frame and capable of acting upon an article to be transported and means for moving the frames relative to one another to effect raising of the article.

The first frame is preferably supported by one or more sets of wheels mounted on a single common shaft, or some other mobile support means, which can be swivelled around to steer the device. A bar projecting from a rear end of the device and coupled to the support means can be provided to enable an operator to move the device around. The bar may also be attached to some other vehicle for towing purposes.

Preferably some form of guide means such as rollers or skids is provided to engage the article and support the latter during the raising operation. This is advantageous since the pivotal movement of one frame relative to the other generally results in movement between the first frame, acting as a support frame, and the article.

The second frame may have forks which project beneath the article to effect the lifting but the invention also provides that traction means such as cables or chains may be coupled between the article and the second or lifting frame.

As the means for moving the frames it is preferred to utilize one or more hydraulic piston and cylinder units. To render the device self-contained the device preferably carries its own pressure fluid storage vessel and pump for supplying the hydraulic unit or units.

In addition to a set of wheels the first frame may also be supported by rollers which may be raised to an inoperative position when an article is in place. These support rollers may be lowered and operative, therefore, when the device is moved around without an article. In another construction a resiliently mounted support roller may be provided.

In one construction the frames are unitary structures pivoted together at a rear end of the device. In another construction the second frame is composed of systems of pivotably interconnected levers linked to the first frame. In the latter case the first frame may include a transverse girder with support plates at its ends to which the systems of levers are connected. Each system of levers may be composed of three levers namely an upper lever pivoted at one end to the upper end of the support plate, a lower lever pivoted at one end to the lower end of the support plate and a third generally upright lever pivoted to the other ends of the upper and lower levers. The third lever may be provided with a series of holes for enabling attachment to be made to a cable or chain linked to the article at various positions. A piston and cylinder unit is preferably connected between each support plate and the upper lever of each system of levers.

The invention may be understood more readily and various other features of the invention may become more apparent from consideration of the following description.

### BRIEF DESCRIPTION OF DRAWINGS

Embodiments of the invention will now be described, by way of examples only, with reference to the accompanying drawings, wherein:

FIG. 1 is a schematic side view of a device made in accordance with the invention;

FIG. 2 is a plan view of the device shown in FIG. 1;

FIG. 3 is a side view of the device shown in FIGS. 1 and 2 but depicting the device in a different operating position;

FIG. 4 is a schematic side view of a further form of device made in accordance with the invention; and

FIG. 5 is a plan view of the device shown in FIG. 4.

### DESCRIPTION OF PREFERRED EMBODIMENTS

As shown in FIGS. 1 to 3, a device for lifting and transporting an article is generally designated 13 whilst the article itself is designated 10. The device 13 is composed of a first or support frame 14 and a second or lifting frame 15. The frames 14, 15 are pivotably interconnected at the rear end of the device by means of horizontal pins 16. The frame 14 has parallel side walls 14'' of triangular shape with inclined upper edges which walls 14'' are adjoined to a front upright wall 14'. Rollers 22 are supported by the wall 14' and serve to engage and guide a rear wall 11 of the article 10. The frame 14 is supported on the floor through wheels 17 and rollers 20. The wheels 17 are in the form of a pair of wheels 17 rotatably supported on a common horizontal shaft. This shaft is in turn connected to a turntable 7 or the like which is pivotable about a vertical shaft 18 located on a base 9 of the frame 14. The wheels 17 can thus be swivelled around to effect steering of the device.

A shaped bar 19 having a bi-furcated end connected to the support shaft for the wheels 17 projects outwardly from the rear end of the device. The bar 19 can be coupled to a vehicle or else the bar 19 can be used by an operator to manually move and steer the device.

The rollers 20 are disposed rearwardly of the wheels 17. The rollers 20 are carried by a support structure

pivotably attached to the frame 14. This support structure can be moved into one of two predetermined positions shown respectively in FIGS. 1 and 3. The structure is moved with the aid of a projecting lever 21 and the structure can be clamped in the operating positions with the aid of a locking mechanism 8. With the support structure in the position illustrated in FIG. 1 the frame 14 is supported on the rollers 20 and can be moved around as desired. When an article is carried by the device the rollers 20 would adopt the inoperative position illustrated in FIG. 3.

The frame 15 has laterally projecting parts which extend through apertures in the side walls 14' and adjoin forwardly projecting forks 15' with end portions 23 extending beyond the wall 14' and serving to operably engage the article 10 to be lifted.

Means is provided to effect relative movement between the frames 14, 15. This means is in the form of two hydraulic piston and cylinder units 25. Each unit 25 has its cylinder articulated at a joint 27 to a bracket attached to the frame 14 and its piston rod articulated at a joint 29 to a plate 28 attached to the frame 15. By charging the units 25 with pressure fluid the frames 14, 15 can move relative to one another and about the pins 16. It is possible to connect pressure fluid conduits from an external source of fluid to the units 25 but it is preferred to provide a self-contained pump 26 and a fluid storage vessel on the device. The pump 26 is provided with a manually operable control lever 30.

The operation of the device is as follows:

The article 10 to be lifted by the device may be supported on a pallet formed with recesses 12 for receiving the arms 15' of the device. The article 10 can however be a container or the like itself formed with ribs at the bottom to produce the recesses 15. The article 10 may be transported along a roller conveyor for delivery to the device. The article 10, or the pallet, is preferably provided with integral or attached rollers (not shown) at the opposite end to the device so that the article 10 can be supported by these rollers when the device raises the adjacent end of the article 10. The device would normally be supported on the wheels 17 and the rollers 20 and the latter would only be raised to the inoperative position (FIG. 3) when the article 10 is to be transported by the device. Assuming the article 10 is to be raised and transported by the device the latter would be moved up so that the end portions 23 of the arms 15' engage in the recesses 12. Connecting means, such as short lengths of chain 28, would be attached between the article 10 and the arms 15'. The units 25 are now operated so that the frame 13 tends to move in a clockwise direction about the pins 16 whilst the frame 15 tends to move in an anti-clockwise direction about the pins 16. The rollers 22 are thus brought into contact with the wall 11 of the article 10 and the article 10 is lifted by the arms 15' so that the wall 11 runs over the rollers 22. The weight of the article 10 is now borne by the wheels 17 and the article can be transported.

In a modified version of the device (not illustrated) the pins 16 are disposed at the underside of the frame 14 and the frame 15 has at least part of its structure disposed beneath the frame 14 in the vicinity of the pins 16. The rollers 20 may thus be connected to the frame 15 instead of to the frame 14. The operation of this modified device is analogous to that described.

Referring now to FIGS. 4 and 5, a further form of device has a first frame composed of a transverse hollow

girder 40 of square or rectangular cross-section connected near its ends to upstanding parallel side bracket assemblies 41. These assemblies 41 are formed with outwardly-facing skids 42 which can engage a rear wall of an article in an analogous manner to the rollers 22 in the device depicted in FIGS. 1 to 3. At the outer ends of the girder 40 there are provided upstanding support plates 55. The girder 40 is pivotably supported on a chassis composed of a turntable 43 attached to a shaft bearing two pairs of axially-spaced wheels 44. A bracket 69 is connected to the chassis and a bar 45 is articulated to the brackets 69. The free end 46 of the bar 45 can be coupled to a vehicle or the bar 45 can be manipulated by an operator to steer and move the device. A stabilizing arm 47 is attached to the chassis and the arm 47 bears a rocker arm 50 carrying a roller 48. A spring 51 biases the rocker arm 50 towards the floor 49. The roller 48 is thus resiliently mounted. A stop member serves to limit the downward movement of the roller 48. The roller 48 may engage the floor 49 when the device is not used to lift an article 10.

A second frame, movable in relation to the girder 40, is composed of two systems of levers 52, 53 and 54 pivotably interconnected in the manner of toggle linkages and disposed at the ends of the girder 40. More particularly, each of the levers 54 is pivotably connected by a joint 57 to the associated plate 55 at the upper end of the latter. Similarly, each of the levers 52 is pivotably connected to a joint 56 to the lower end of the associated plate 55. Each lever 54 is pivotably connected to the upper end of the lever 53 at the associated end of the girder 40 by means of a pivot joint 59 and each lever 52 is pivotably connected to the lower end of the lever at the associated end of the girder 40 by means of a pivot joint 58.

Each system of levers 52, 53, 54 is operably connected to a hydraulic piston and cylinder unit 60. The cylinder of each unit 60 is in fact connected to the joint 56 at the associated end of the girder 40 and to a further pivot joint 61 carried by the lever 54. The units 60 are supplied with pressure fluid from a pump having a manually operable control lever 65 and fed with fluid from a storage vessel 66.

The levers 53 are provided with a series of spaced-apart holes 64 which can receive an attachment at the end of a cable or chain attachable to the article 10. Cotter pins can be used to secure these attachments to the levers 53. Forks denoted 100 may be attached to the levers 52, 53, 54 to engage the article in a similar manner to the forks 15' in the device previously described.

During operation, the article 10 is attached to the levers 53 with the cables or chains by locating the attachments in the appropriate holes 64. The units 60 are then operated to pivot the levers 52, 54 about the joints 56 and 57 and raise the levers 53 and hence the article 10. The skids 42 engage the rear wall 11 of the article 10 to guide the latter as it is lifted. When the article 10 is lifted in this fashion it may be transported as desired.

I claim:

1. A device for use in lifting and transporting an article; said device comprising a support frame having a transverse girder with upstanding support plates at its ends and guide means engageable with the article; a lifting frame in the form of a system of pivota-

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bly interconnected levers pivoted to each support plate;

means for pivoting the lifting frame in relation to said support frame and mobile support means for carrying the support and lifting frames.

2. A device according to claim 1, wherein the support means at least includes wheels which are adapted to swivel in relation to said support frame to effect steering of the device.

3. A device according to claim 1, wherein projecting forks are attached to the lifting frame and serve to locate underneath an article to be lifted.

4. A device according to claim 1, wherein the means for relatively moving the frames is in the form of at least one hydraulic piston and cylinder unit.

5. A device according to claim 4, wherein there is also provided a pump and a vessel for storing pressure fluid, the pump and vessel being carried by the device and operable to supply said unit with pressure fluid.

6. A device according to claim 1, wherein the support frame is pivotably connected to a chassis with a set of wheels, constituting said mobile support means, the chassis being connected to a bar projecting outwardly from a rear end of the device whereby the device can

be towed and/or steered through said bar.

7. A device according to claim 6, and further comprising a support roller carried by a rocker arm pivoted to a stabilizing arm projecting forwardly from and attached to the chassis, the rocker arm being biased by a spring to allow the roller to move in a resilient manner.

8. A device according to claim 1, wherein each system of levers is composed of an upper lever pivotably connected at one end to an upper end of the associated support plate, a lower lever pivotably connected at one end to a lower end of said support plate, and a third generally upright lever pivotably connected to the other ends of said upper and lower levers.

9. A device according to claim 8, wherein the third lever of each system of levers is provided with a series of holes for enabling attachment to traction means connectible to the article.

10. A device according to claim 4, wherein the hydraulic piston and cylinder units for pivoting the lifting frame in relation to the support frame are operably connected between an associated support plate and an upper lever of an associated system of levers.

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