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(54) **STRUT FOR HANDLING OF OBJECTS STANDING ON THE GROUND**

STUTZE ZUR HANDHABUNG VON AUF BÖDEN STEHENDEN GEGENSTÄNDEN

MONTANT PERMETTANT DE MANIPULER DES OBJETS POSES SUR LE SOL

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## Description

**[0001]** The present invention generally relates to an apparatus for handling of objects standing on a support base like on the ground, on a floor, on a transport vehicle platform etc., and the invention is more particularly directed to such an apparatus comprising three, or preferably four, cooperating struts of telescopable type, by means of which said object can be lifted from the ground and put down on a support base located on a higher level, and vice versa, and by means of which the object can also be displaced some distance laterally or longitudinally, or both laterally and longitudinally in connection to lifting or lowering the object.

**[0002]** Apparatus of the described type are commonly used for handling of containers which are to be loaded onto a transport vehicle, or to be unloaded therefrom, or which are to be lifted for being moved to another place on a ship, in docks etc., but such apparatus preferably also can be used for handling of container flats, for handling of work sheds or for other temporarily set up building bodies or building elements, and for many other purposes. For simplifying and for explanatory purposes the invention will, however, in the following be described mainly in connection to handling of containers, for instance for lifting and loading containers onto the platform of a transport vehicle, or lifting of the container from a truck platform and putting same down on the ground after the transport vehicle has been moved off. It is, however, to be understood that the apparatus which is described in the following specification and is shown in the drawings is only an illustrating example which is not restricting the scope of the invention.

**[0003]** A lifting apparatus of the above mentioned type comprising four cooperating struts of telescopable type is known for instance from the European patent No 502.833, from the Swedish patent No 369.293, or from the US patent No 4,045,000. The cylinder part of each telescopable strut is fixed connected adjacent the upper and the lower corner boxes of the container. By expelling the piston parts the container can be lifted from the ground and can thereafter be put down on the platform of a transport vehicle which has been moved into position underneath said container, or it can be lifted from a truck platform and can be lowered and put down on the ground after the truck has been moved off.

**[0004]** A serious problem in loading of a container onto a truck by means of such apparatus is that the container can normally only be lifted straight up and can be lowered straight down, and that the vehicle. When a container is to be loaded on the vehicle, said vehicle has been backed into an accurate position underneath the lifted container for making it possible to place the container, with the corner boxes thereof, on the locking cones which are provided on the vehicle for this purpose. By means of such an apparatus there is no possibility of displacing the container laterally, nor longitudinally, so as to adjust the position thereof to fit an obliquely stand-

ing vehicle. When lifting the struts of one container side only the container is rotated about a horizontal longitudinal axis, but during such a single-sided lifting of the container great bending stresses generally are built up in the system, in particular in the piston rod of the expanded strut, and such lifting may give the operator a feeling that the entire container is about to tilt over.

**[0005]** For making it possible to displace a container longitudinally or laterally, at least to a slight extent, it has been suggested that the struts be placed slightly laterally diverging in the direction outwards-downwards by fixed mounting the upper end of the cylinder directly in the upper corner box of the container, whereas the lower end of said cylinder is connected to the lower corner box of the container via a solid link. Such an apparatus is diagrammatically illustrated in figures 2a and 2b of the accompanying drawings. It is evident from figure 2b that important lateral bending stresses are being built up in the expanded piston rods when the container is lifted straight up. The reason is that the foot of the strut is fixed anchored on the ground, and when the container is lifted the angle ( $\alpha$ ) between the vertical plane and the imaginary line between the upper corner box of the container and the foot of the strut becomes reduced to and angle ( $\beta$ ) which is less than the first mentioned angle ( $\alpha$ ). Since the cylinder part of the strut is fixed connected to the container said reduced angle ( $\alpha \rightarrow \beta$ ) makes a bending stress become built up in the piston rod of the strut, which bending stress makes the piston rod bow, as exaggeratedly illustrated in figure 2b.

**[0006]** An attempt to eliminate said problem is illustrated in the Swedish patent No 461.327, which patent shows a lifting apparatus for containers comprising four lift jacks, and in which each lift jack carries the load only with the upper end thereof. The patent also shows that the above mentioned solid link at the lower corner box of the container has been substituted by a support arm the length of which can be controlled, and by means of which the lower connection point of the lifting yoke can be adjusted following the lifting or lowering of the container. Such a control means is complicated, and it is a time consuming job to handling said control means, in particular since it has to be readjusted continuously following the lifting and the lowering of the container.

**[0007]** The object of the invention therefore is to solve the problem of providing a strut system for handling of objects standing on a support base and comprising a system of telescopable struts which carry the object, for instance the container both at the upper and at the lower corner boxes thereof, and in which each strut, at the upper cylinder end thereof, is arranged to be rotatably connected directly in the upper corner box of the container, and in which the lower end of the strut cylinder is arranged to be connected to the lower corner box of the container by means of a link in such a way that said strut automatically adapts itself to the height position of the container, whereby it has been possible to eliminate practically any appearance of bending stresses in the

strut when the container is lifted or lowered.

**[0008]** At the same time the apparatus is formed so that the foot of each individual strut can be displaced laterally and/or in the longitudinal direction of the vehicle during the lifting or lowering, respectively, of the load, that is, in the illustrated case, the container.

**[0009]** According to the invention the strut cylinder is split in the longitudinal direction and is, adjacent the upper end thereof, formed with a telescopic compensation part which permits the lower part of the telescopic cylinder together with the link connecting same to the lower corner box of the container to become displaced when the load is lifted, whereby the imaginary line between the strut connection point at the upper corner box and the foot of the strut is maintained substantially straight during any lifting or lowering of the load.

**[0010]** Now the invention is to be described more in detail in connection to the embodiment of the apparatus which is shown in the drawings. In the drawings figure 1 is a perspective view of a system comprising four struts according to the invention, each strut of which is connected to one corner of a load unit, for instance a container. Figure 2 diagrammatically illustrates a container strut according the prior art, and the figure illustrates the bending stresses which may appear in the strut when a container is lifted from the position of figure 2a to the position of figure 2b. Figure 3 similarly illustrates, diagrammatically, a lifting of a container by means of struts according to the invention. Figure 4 shows the situation with a maximum lifted load unit. Figure 5 shows a detail of the compensation telescopic unit in the situation when the piston rod of the strut is substantially fully withdrawn into the strut cylinder. Figure 6 is an analogous view showing the compensation telescopic unit in the situation when the load unit is fully lifted and the piston rod of the strut is almost completely expelled. Figure 7 shows the strut with the piston rod completely withdrawn into the cylinder and with the foot removed from the piston, and figure 8 shows a corresponding situation but with the strut fold in to a transport position in relation to the load unit. Figure 9 is a sequence showing a method of side displacing a container using the struts according to the invention.

**[0011]** The apparatus shown in the drawings comprises a strut 1, which, in a combination of three or preferably four telescopatable struts, is useful for handling of a load unit 2 which can be a container, a container flat, a work shed, a movable house body or an equivalent load unit. The struts are intended to lift the load unit from the ground, which position is shown in figure 1, figure 3a, figure 5 and figure 7 to an elevated position which is shown in figure 3b, figure 4 and figure 6, in which position a vehicle can be moved to a position underneath the elevated load unit and can take over the handling of said load after the load has been lowered by means of the struts so that said load unit is standing on the transport vehicle platform.

**[0012]** Each strut is telescopatable and is formed with

a cylinder part 3 and a piston part 4. The telescoping movement, which can be made in one direction only, but which is preferably a double acting movement, can be provided mechanically or pneumatically, but it is preferably made hydraulically and is arranged to be made by means of an external source of hydraulic pressure. Alternatively each strut can be connected to an available hydraulic system of a transport vehicle. At the bottom of the piston 4 there is a foot 5, and at the top of the cylinder part 3 there is a connection hook 6 adapted to be rotatably connected to the upper corner box 7 of the container. At a place relatively close to the lower end of the cylinder 3 there is a connection lug 8 for a rotatably connected link 9 which, with the opposite end thereof, is rotatably connected to the lower corner box 10 of the container. The link 9 is of such length and is formed so that the strut, in its mounted condition, extends obliquely downwards-outwards, and preferably also obliquely downwards-rearwards from the upper corner box 7 of the container.

**[0013]** An important feature of the invention is that the cylinder part 3 is split into two parts in the longitudinal direction, namely a lower part which provides a cylinder chamber part 11, and an upper part which provides a compensation cylinder part 12. The split place of the two cylinder parts 11 and 12 is located rather close to the upper end of the cylinder. The compensation cylinder part 12 is likewise the attachment means for the connection hook 6 which is connected to the upper corner box 7.

**[0014]** The hydraulic chamber part 11 acts as a cylinder for the piston 4 which can be expelled from, or can be retracted into the cylinder part 11, respectively, when the pressure piston (not illustrated) is being pressurized by the hydraulic fluid.

**[0015]** From the upper end of the hydraulic chamber part 11 a compensation piston 13, which is mounted thereto, projects upwardly, and which piston is housed in the compensation cylinder part 12.

**[0016]** The compensation cylinder part 12 also contains a spring mechanism (not shown), which is connected to said compensation piston 13. Said spring mechanism acts with a lifting force on the compensation piston 13 when the piston part 4 has been expelled telescopically some distance out of the hydraulic chamber 11. Said spring mechanism also is connected to a top screw by means of which the stroke of the spring can easily be adjusted. The effective stroke of the spring mechanism is adjusted so that the basic angle  $\beta$  between the cylinder and the vertical line through the upper connection point of the cylinder (see figure 3b) is correctly adapted to the height above the ground of the platform of the transport vehicle.

**[0017]** In figure 1 is indicated that the hydraulic actuation of the four struts can be made from an external source of hydraulic pressure 14 via four conduits 15, each such conduit being connected to one of said struts 1. The struts can be pressurized both in common and

individually, or two or more in combination. This opens the possibility of displacing the container 2 laterally or longitudinally thereby adapting the position of the container to an eventually obliquely standing transport vehicle, or for putting down an obliquely hanging container on locking cones of any optional load plane.

**[0018]** As shown in figure 2 a stiffly connected cylinder, according the prior art type, can not be lifted without bending stresses appearing in the piston rod. This is (exaggeratedly) indicated with the bow formed line 16 of figure 2. In said stiff embodiment the angle  $\alpha$  between the imaginary axial line 17 and the vertical line through the upper connection point is always the same irrespective if the container is standing on the ground or is lifted from the ground. Therefore bending stresses irrevocably appear when the container is lifted from the ground area, as marked with the dotted bow-formed line 16.

**[0019]** In the apparatus according to the invention, on the contrary, the angle between the cylinder and the vertical line through the upper connection point of the cylinder becomes reduced when the container is lifted, in relation to the length of the expelled part of the piston 4. In figure 3b said angle for a lifted container is marked the angle  $\beta$ , which angle is always less than the angle  $\alpha$ . It is possible to provide such reduction of the angle  $\beta$  since the compensation part 12, 13 of the cylinder 3 is successively being compressed against the action of the inner (not visible) spring mechanism, whereby, concurrently therewith, the lower cylinder part 11 and thereby the outer connection point 8 for the link 9 is elevated. Thereby it is possible to reduce bending stresses in the piston rod 4. Figures 1, 3a, 5, 7 and 8 show the position of the cylinder 3 with the piston 4 fully retracted into said cylinder, and figures 3b, 4 and 6 show the position of the cylinder with fully expelled piston 4. It is evident that the compensation part 12, 13 is substantially fully compressed when the piston 4 is fully expelled.

**[0020]** The following is the function of the apparatus when a container 2 is lifted from the ground and is put down on a vehicle platform:

**[0021]** All struts 1 are being pressurized at the same time, or stepwise after each other, so that the container 2 is parallel-lifted to a position in which a transport vehicle can be moved to a location underneath the elevated container 2, and the container is put down on the platform of said transport vehicle..

**[0022]** If the transport vehicle should, by accident, happen to be placed slightly offset of the container this problem can be overcome in that the container 2 is displaced laterally. This is done in that the struts on one side, for instance the right side B-C, as shown in figure 1, are raised a further slight distance, which makes the left side A-D of the container become displaced some distance to the left. By lowering the two struts on the left side A-D the container is lowered so that the locking cones of the vehicle engage the lower corner boxes 10 of the container. When the right hand struts B-C are lowered the container is rotated down on the load platform

about the left corner boxes which are already secured on the load platform, and finally the right corner boxes engage the locking cones of the load platform.

**[0023]** If it should be necessary to move an elevated container a relatively long distance laterally in the direction to fit the mounting cones on the vehicle platform, or forwardly or rearwardly, the container can be placed slightly obliquely, rotated about a longitudinal-horizontal axis by lowering the struts on one side of the container (see figure 9c), whereupon the struts on one side, one strut after the other, can be raised so that the foot 5 is lifted from the ground. When the lifting pressure is unloaded the spring mechanism which is connected to the compensation cylinder part 12 pulls up the hydraulic chamber part 11 so as to take the position which is shown in figure 3b, and so that the cylinder 3 takes the above defined angle  $\beta$  depending on the rotation of the link 9. When the piston 4 is thereafter expelled, which is made without changing the angle  $\beta$ , the foot will be put down on the ground a slight distance aside of its original position. The second strut on the same side is thereafter, in the same way as mentioned above, lifted and is laterally displaced. Thereafter the struts on the opposite side are raised, one after the other.

**[0024]** Thanks to the design of the compensation cylinder and the spring mechanism thereof the struts take the angle  $\beta$  with the foot 5 a slight distance aside of its original position.

**[0025]** A further advantage of using the split strut cylinder 11, 12 is that the strut can be fold in and be held adjacent the container after the container has been put down on the load platform, whereby said struts can follow the container to the place of unloading without the need of removing said struts from the container. This is illustrated in figures 7 and 8. In said figures the foot 5 has been removed. The cylinder part 11 thereby can be raised from its position shown in figure 7 and can be rotated past the centre of rotation for the link 9 at the lower corner box 10, whereupon the cylinder part 11 is let down on the opposite side of said point of rotation, as illustrated in figure 8. In this position the strut is locked during transportation and can quickly and easily be put into operation in that said strut is only rotated back to take its outer position, whereupon the foot 5 is mounted, the strut is connected to a source of hydraulic pressure and the unloading is made in the reverse order as described above.

**[0026]** It is even possible to move the entire container 2 slightly transversally in either direction. Figure 9 is a diagrammatical view in a sequence illustrating the method of side displacing a container a slight distance to the left. Figures 9a and 9b shows the basic situation from which a side displacement is started. This is made in six successive steps:

Step 1: Rotate the container 1 about a longitudinal axis by lowering the struts A and D in common; see figure 9c;

Step 2: Raise legs A, B and C a slight distance so that leg D is being unloaded; leg D, which is now "hanging" in the air is expelled down/left depending on its own weight, whereby the foot of said leg has been displaced the distance d; see phantom lines of figure 9d: 5

Step 3: Raise leg D until said leg D once again supports the container; also raise legs B and C so that leg A is being unloaded; leg A is thereby being expelled down/left, like leg D as mentioned under step 2; 10

Step 4: Raise leg A until said leg A once again supports the container, displaced the distance d; thereafter raise also legs C and D so that leg B is being unloaded; leg B is thereby contracted by means of the spring mechanism connected to the compensation cylinder part, whereby the foot of leg B is moved up/left; see phantom lines of figure 9e; 15

Step 5: Raise leg B until said leg once again supports the container, offset to the left the distance d; also raise legs A and D, whereby leg C is being unloaded and is pulled up/left by the spring mechanism connected to the compensation cylinder; 20

Step 6: the entire container now has been side offset the distance d; finally raise legs A and D, as illustrated in figure 9f, so that the container once again takes a vertical/horizontal position. 25

#### Reference numerals

[0027]

1	strut	
2	load unit	
3	cylinder	
4	piston	
5	foot	
6	connection hook	
7	upper corner box	
8	connection lug	40
9	link	
10	lower corner box	
11	cylinder chamber part	
12	compensation cylinder part	
13	compensation piston	45
14	source of hydraulic pressure	
15	hydraulic conduit	
16	bending stress (prior art, figure 2)	
17	imaginary axial line (prior art, figure 2)	50

#### Claims

1. Apparatus for handling of objects (2) standing on a support base, and comprising a telescopatable strut (1) having a cylinder part (3), a piston part (4) and a foot (5), which strut, in combination with two or preferably three further struts of said telescopatable 55

type can lift the object (2) from the ground and put same down on a support base on a higher level, and vice versa, said cylinder part having a first end distal from the piston and a second end near the piston, said strut (1) being, at the first end of the cylinder (3), adapted to be rotatably anchored directly in an upper corner box (7) or a similar means of the object (2), and being, at the second end of the cylinder formed for being rotatably connected to a lower corner box (10) or a similar means of the object (2) by means of a link (9), **characterized in that** the cylinder (3) of the strut (1) is longitudinally split at or close to its first end, and **in that** the outermost part of the split cylinder is adapted to be connected to said upper corner box (7) and is formed as a telescopic compensation part (12, 13) permitting the innermost part (11) of the split telescopic cylinder (3) with the link (9) connecting same to the lower corner box (10) of the object (2) to become displaced longitudinally thereby reducing the length of the cylinder (3) when the object (2) is being lifted, and extending the length thereof, respectively, when the object (2) is being lowered, whereby the imaginary line between the connection point of the strut (1) at the upper corner box (7) of the object (2) and the foot (5) of the strut (1) is maintained substantially rectilinear while the object is being lifted or lowered.

2. Apparatus according to claim 1, **characterized in that** the strut, in the basic position thereof, is arranged to extend obliquely downwards-outwards, and preferably also obliquely downwards-forwards or downwards-rearwards from the upper connection point (7) of the strut. 30

3. Apparatus according to claim 1 or 2, **characterized in that** the upper compensation part is a compensation cylinder part (12) having a compensation piston part (13) telescopically housed therein, and in which the compensation piston part (13) is a pin type part projecting from the innermost cylinder part (11). 35

4. Apparatus according to claim 3, **characterized in that** the compensation piston part (13) is spring biased by a spring mechanism so as to strive to move upwardly, which spring mechanism is connected to the compensation piston part (13) and which is housed in the compensation cylinder part (12). 40

5. Apparatus according to claim 4, **characterized in that** the spring mechanism, which is housed in the compensation cylinder part (12), has an adjustable stroke action and is arranged so as to easily be adjusted to provide such shortening of the cylinder (3) that all bending stresses of the piston rod are reduced to a minimum in all expelled positions be- 50

tween the cylinder (3) and the piston (4).

6. Apparatus according to any of the preceding claims, **characterized in that** the strut (1), or each strut included in a combined strut system, is connected to an external source of pressure (14) or to an available pressure system of a transport vehicle. 5
7. Apparatus according to any of the preceding claims, **characterized in that** each strut (1) included in a combined strut system, is of hydraulically actuatable type, and **in that** all struts included in a strut system are connected to a common hydraulic pressure system (14), by means of which the struts can be operated individually or two or more struts in common. 10
8. Apparatus according to any of the preceding claims, **characterized in that** the telescopic compensation part (12, 13) is formed so that the strut, by reducing the length the cylinder part (3) after the object (2) has been finally handled, can be rotated up-in-down about the pivot axis of the lower link (9) at the lower corner box (10), so that the strut, in its resting position, is located locked adjacent the object (2) inside of the plane of the outer sides of the object. 15 20 25

#### Patentansprüche

1. Vorrichtung zur Handhabung von Gegenständen (2), die auf einer Trägerbasis stehen, mit einer ausziehbaren Stütze (1), die einen Zylinderteil (3), einen Kolbenteil (4) und einen Fuß (5) aufweist und die in Verbindung mit zwei oder vorzugsweise drei weiteren ausziehbaren Stützen den Gegenstand (2) vom Boden anheben und selbigen auf einer Trägerbasis auf einem höheren Niveau absetzen kann und umgekehrt, wobei der Zylinderteil ein von dem Kolben entferntes erstes Ende und ein zweites Ende nahe dem Kolben aufweist, und wobei die Stütze (1) an dem ersten Ende des Zylinders (3) unmittelbar in einem oberen Eckstück (7) oder einer ähnlichen Einrichtung des Gegenstandes (2) schwenkbar befestigbar und an dem zweiten Ende des Zylinders so ausgebildet ist, daß sie mittels eines Verbindungsgliedes (9) schwenkbar mit einem unteren Eckstück (10) oder einer ähnlichen Einrichtung des Gegenstandes (2) verbunden ist, **dadurch gekennzeichnet, daß** der Zylinder (3) der Stütze (1) an oder nahe seinem ersten Ende in Längsrichtung geteilt ist und der obere Teil des geteilten Zylinders mit dem oberen Eckstück (7) verbindbar und als ein ausziehbares Ausgleichsteil (12, 13) ausgebildet ist, das dem unteren Teil (11) des geteilten teleskopischen Zylinders (3) mit dem Verbindungsglied (9), das das Teil (11) mit dem unteren Eckstück (10) des Gegenstandes (2) verbindet, einen Versatz in 30 35 40 45 50

Längsrichtung gestattet und dadurch die Länge des Zylinders verringert, wenn der Gegenstand (2) angehoben wird, und entsprechend die Länge vergrößert wird, wenn der Gegenstand (2) abgesenkt wird, wobei die imaginäre Linie zwischen dem Verbindungspunkt der Stütze (1) an dem oberen Eckstück (7) des Gegenstandes (2) und dem Fuß (5) der Stütze (1) im wesentlichen gerade bleibt, während der Gegenstand angehoben oder abgesenkt wird.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** sich die Stütze in ihrer Grundstellung von dem oberen Verbindungspunkt (7) der Stütze schräg nach unten und außen erstreckt und vorzugsweise ferner nach unten und vorne oder unten und hinten.
3. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, daß** der obere Ausgleichsteil ein Ausgleichs-Zylinderteil (12) ist, der einen ausziehbar darin aufgenommenen Ausgleichs-Kolbenteil (13) aufweist, wobei der Ausgleichs-Kolbenteil (13) ein zapfenartiger Teil ist, der aus dem unteren Zylinderteil (11) herausragt.
4. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, daß** der Ausgleichs-Kolbenteil (13) durch einen Federmechanismus derart vorgespannt ist, daß er bestrebt ist, sich nach oben zu bewegen, wobei der Federmechanismus mit dem Ausgleichs-Zapfenteil (13) verbunden und in dem Ausgleichs-Zylinderteil (12) aufgenommen ist.
5. Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet, daß** der in dem Ausgleichs-Zylinderteil (12) aufgenommene Federmechanismus eine einstellbare Hubbewegung hat und derart angeordnet ist, daß er für eine solche Verkürzung des Zylinders (3) leicht einstellbar ist, daß alle Biegespannungen der Kolbenstange auf ein Minimum in allen Positionen zwischen dem Zylinder (3) und Kolben (4) reduziert sind.
6. Vorrichtung nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, daß** die Stütze (1) oder jede Stütze in einem kombinierten Stützen-System an eine externe Druckquelle (14) oder an ein verfügbares Drucksystem eines Transportfahrzeugs angeschlossen ist.
7. Vorrichtung nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, daß** jede Stütze (1) in einem kombinierten Stützen-System hydraulisch betätigbar ist und daß alle Stützen in einem Stützen-System an ein gemeinsames hydraulisches Drucksystem (14) angeschlossen sind, durch das die Stützen individuell oder zwei oder mehr Stützen

gemeinsam betätigt werden können.

8. Vorrichtung nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, daß** der ausziehbare Ausgleichsteil (12, 13) derart ausgebildet ist, daß die Stütze bei Verringerung der Länge des Zylindertails (3) nach abschließender Handhabung des Gegenstandes (2) um die Drehachse des unteren Verbindungsgliedes (9) an dem unteren Eckstück (10) hoch- nach innen-heruntergeschwenkt werden kann, so daß die Stütze in ihrer Ruhestellung verriegelt nahe dem Gegenstand (2) innerhalb der Ebene der Außenseiten des Gegenstands angeordnet ist.

## Revendications

1. Appareil pour la manipulation d'objets (2) reposant sur une base d'appui et comprenant un montant télescopique (1) comportant une partie de cylindre (3), une partie de piston (4) et un pied (5), lequel montant, en combinaison avec deux, ou de manière préférée trois, montants supplémentaires dudit type télescopique peut soulever l'objet (2) au-dessus du sol et le redescendre sur une base d'appui à un niveau plus élevé, et inversement, ladite partie de cylindre comprenant une première extrémité éloignée du piston et une seconde extrémité voisine du piston, ledit montant (1) étant, au niveau de la première extrémité du cylindre (3), conçu pour être ancré avec faculté de rotation directement dans un boîtier angulaire supérieur (7) ou dans un moyen similaire de l'objet (2), et étant, au niveau de la seconde extrémité du cylindre, formé pour être connecté avec faculté de rotation à un boîtier angulaire inférieur (10) ou à un moyen similaire de l'objet (2) au moyen d'un élément de raccord (9), **caractérisé en ce que** le cylindre (3) du montant (1) est divisé longitudinalement au niveau, ou près, de sa première extrémité, et **en ce que** la partie la plus externe du cylindre divisé est conçue pour être connectée audit boîtier angulaire supérieur (7) et est formée comme une partie de compensation télescopique (12, 13) permettant que la partie la plus interne (11) du cylindre télescopique divisé (3), muni de l'élément de raccord (9) le connectant au boîtier angulaire inférieur (10) de l'objet (2), soit déplacée longitudinalement avec pour effet de réduire la longueur du cylindre (3) lorsque l'objet (2) est soulevé et d'en étendre la longueur, respectivement, lorsque l'objet (2) est abaissé, avec pour effet que la ligne imaginaire entre le point de connexion du montant (1) au niveau du boîtier angulaire supérieur (7) de l'objet (2) et le pied (5) du montant (1) est maintenue sensiblement rectilinéaire tandis que l'objet, est soulevé ou abaissé.

2. Appareil selon la revendication 1, **caractérisé en ce que** le montant, dans sa position de base, est agencé pour s'étendre obliquement vers le bas en direction de l'extérieur et, de préférence, également obliquement vers le bas dans la direction avant ou vers le bas dans la direction arrière à partir du point de connexion supérieur (7) du montant.
3. Appareil selon la revendication 1 ou 2, **caractérisé en ce que** la partie de compensation supérieure est une partie de cylindre de compensation (12) comprenant une partie de piston de compensation (13) qui y est logée en mode télescopique, et **en ce que** la partie de piston de compensation (13) est une partie du type broche dépassant de la partie de cylindre la plus interne (11).
4. Appareil selon la revendication 3, **caractérisé en ce que** la partie de piston de compensation (13) est sollicitée élastiquement par un mécanisme de ressort de manière à être forcée à se déplacer vers le haut, lequel mécanisme de ressort est connecté à la partie de piston de compensation (13) et lequel est logé dans la partie de cylindre de compensation (12).
5. Appareil selon la revendication 4, **caractérisé en ce que** le mécanisme de ressort, qui est logé dans la partie de cylindre de compensation (12), exerce une action à course ajustable et est agencé de sorte à être facilement ajusté pour opérer un raccourcissement du cylindre (3) tel que toutes les contraintes de flexion s'exerçant sur la tige de piston soient réduites à un minimum dans toutes les positions expulsées entre le cylindre (3) et le piston (4).
6. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le montant (1), ou chaque montant inclus dans un système à montants combinés, est connecté à une source externe de pression (14) ou à un système de pression disponible d'un véhicule de transport.
7. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** chaque montant (1) inclus dans un système à montants combinés, est du type pouvant être actionné par une force hydraulique et **en ce que** tous les montants inclus dans un système de montants sont connectés à un système de pression hydraulique commune (14), au moyen duquel les montants peuvent être actionnés individuellement ou au moyen duquel deux, ou plus, montants peuvent être actionnés en commun.
8. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la partie de compensation télescopique (12, 13) est formée de sorte que le montant, en réduisant la longueur de

la partie de cylindre (3) après que l'objet (2) ait été manipulé lors d'une manipulation finale, peut être entraîné en rotation de haut en bas ou autour de l'axe pivot de l'élément de raccord inférieur (9) au niveau du boîtier angulaire inférieur (10), de sorte 5 que le montant, dans cette position de repos, soit positionné à l'état bloqué adjacent à l'objet (2) à l'intérieur du plan des côtés extérieurs de l'objet.

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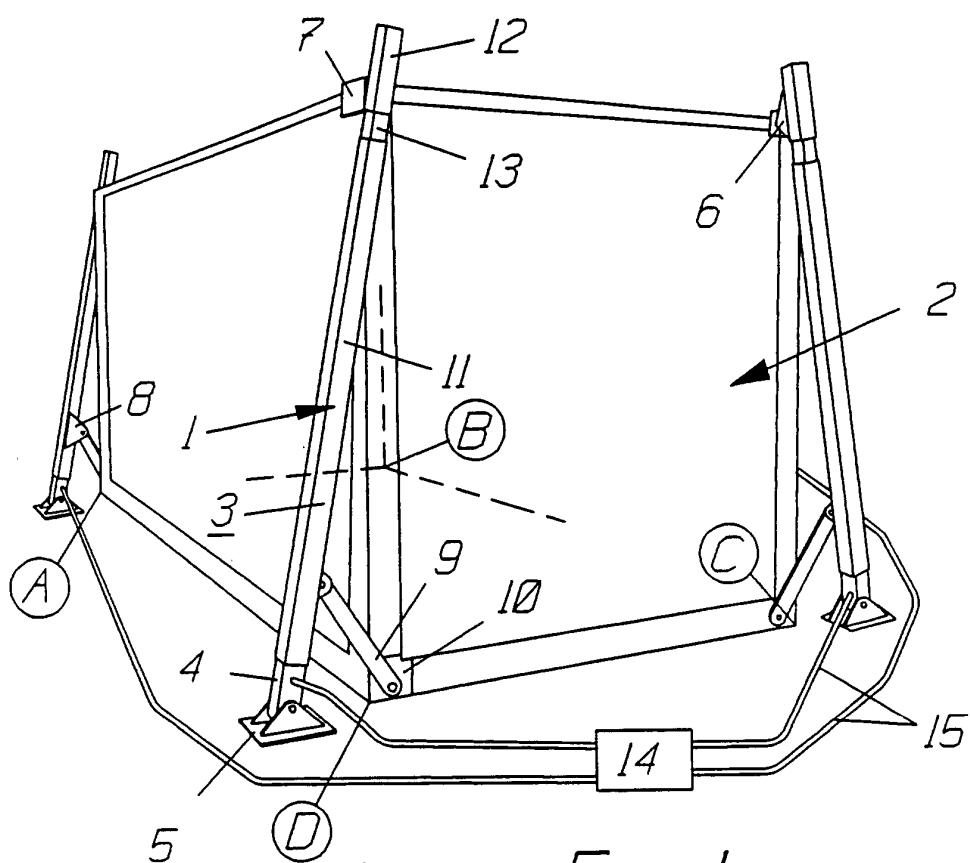


Fig. 1

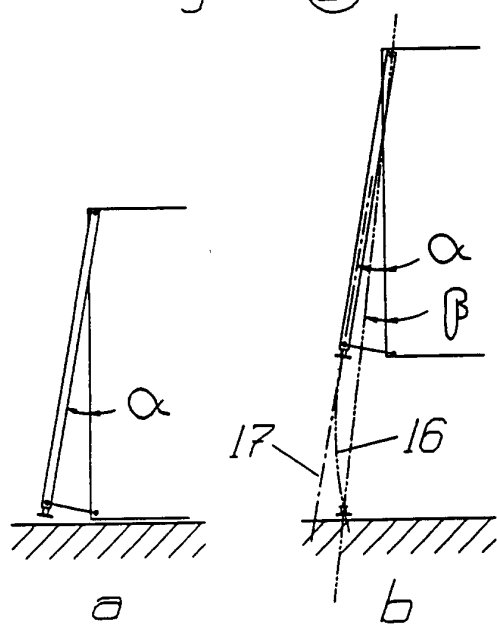


Fig. 2  
(prior art)

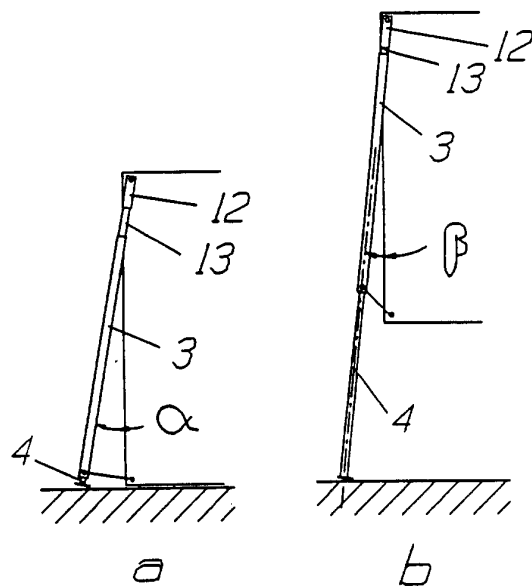
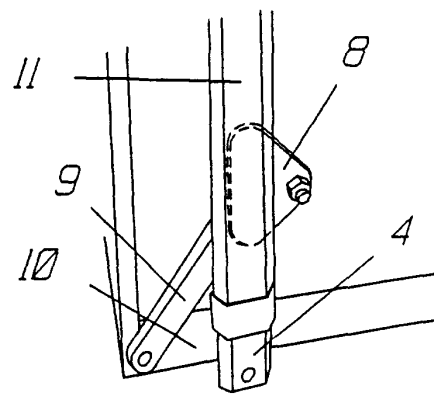
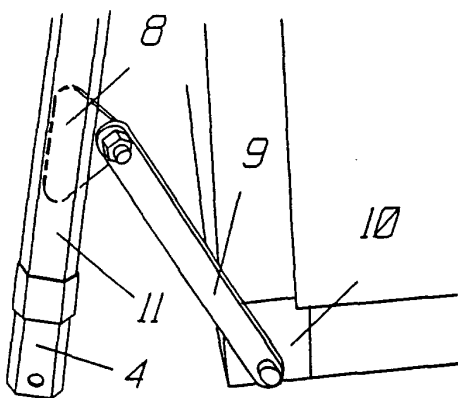
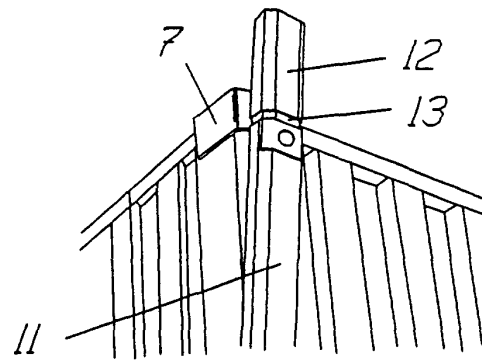
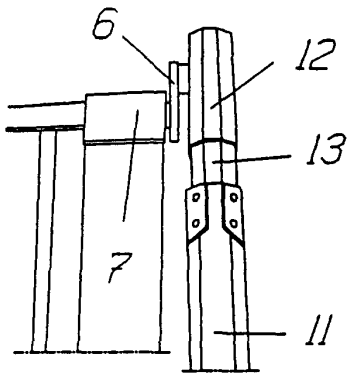
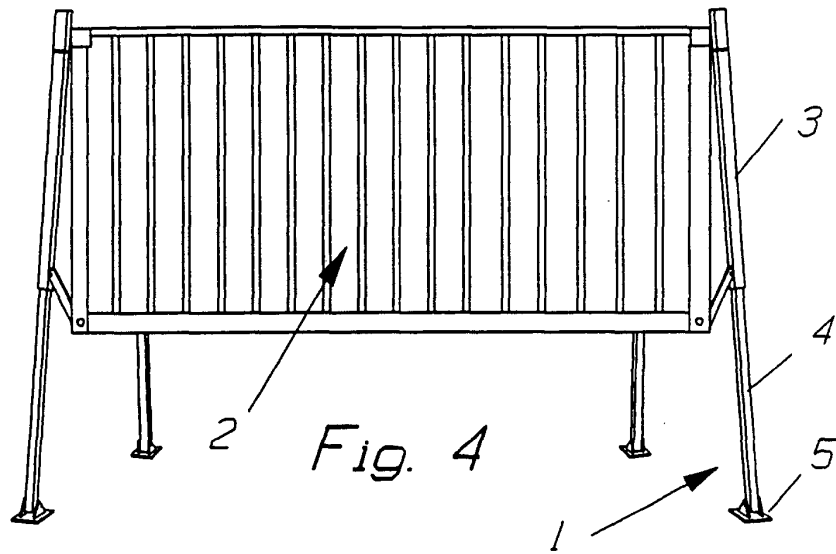
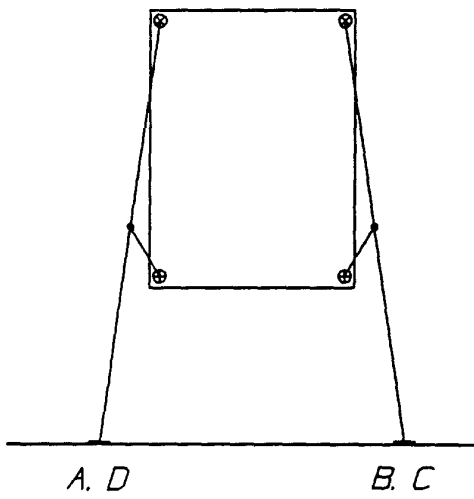
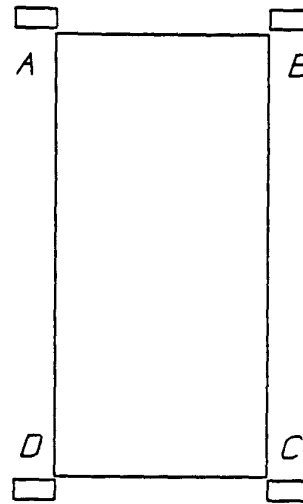


Fig. 3

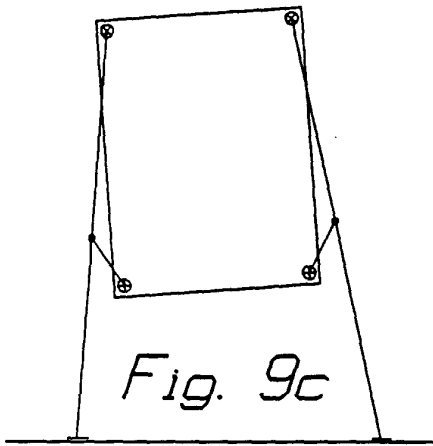




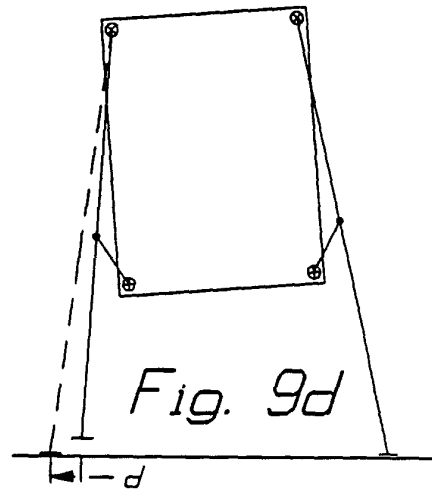
*Fig. 9a*



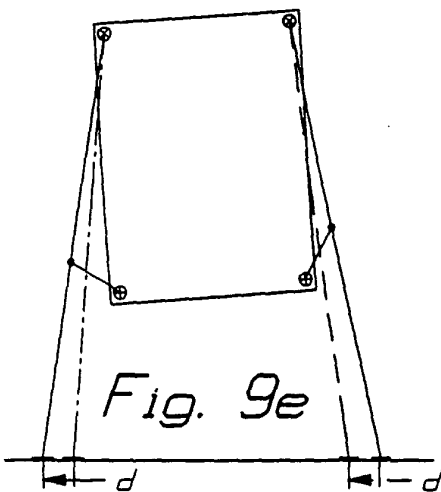
*Fig. 9b*



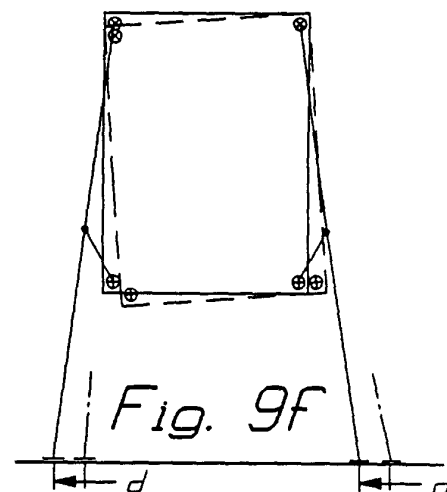
*Fig. 9c*



*Fig. 9d*



*Fig. 9e*



*Fig. 9f*