(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 034 131 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
24.07.2002 Bulletin 2002/30

(21) Application number: **98952978.9**

(22) Date of filing: **24.11.1998**

(51) Int Cl.[7]: **B66F 7/16**, B66F 7/04, B66F 7/08

(86) International application number:
PCT/IB98/01866

(87) International publication number:
WO 99/28231 (10.06.1999 Gazette 1999/23)

(54) **FOLDAWAY COLUMN VEHICLE LIFT**

UNTERFLURSÄULENHEBEBÜHNE

DISPOSITIF ELEVATEUR DE VEHICULES A COLONNE REPLIABLE

(84) Designated Contracting States:
DE ES FR GB IT NL

(30) Priority: **27.11.1997 IT MI972633**

(43) Date of publication of application:
13.09.2000 Bulletin 2000/37

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EP 1 034 131 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] This invention relates to a foldaway lift for articles and particularly vehicles according to the preamble of claim 1.

[0002] Such a foldaway lift for articles is known from the DE 38 24 563 A and comprises lifting columns and a scissors mechanism. The plane substantially corresponding to the zero lifting is defined by the upper parts of the lift platform. When the platform is in its lowermost position, the parallelogram mechanism is below the above mentioned plane.

[0003] In the mechanical field several types of lifts are known, adapted to lift vehicles up to a desired height so as to carry out easily routine or special maintenance operations. Among the types of vehicle lifts there are the foldaway column lifts. These lifts have two or four columns that when pushed upwardly come out and protrude from the ground level and support a vehicle by means of arms or platforms. In the known lifts the protruding columns consist of the rods of corresponding hydraulic pistons housed in the ground.

[0004] The lifts of this kind have several drawbacks that the present invention proposes to overcome. First of all the known foldaway column lifts have problems of rising parallelism, in other words the columns do not rise in a perfectly identical way. In some cases such a drawback was overcome with the application of expensive racks, sprockets and strong tension shafts, while in other cases with expensive and sophisticated hydraulic pistons.

[0005] Another serious drawback of the known devices of this type is the lack of mechanical safety devices against accidental manoeuvres or leakage, that substantially consists of little loss of fluid throught the seals of the cumbersome oil-pressure hydraulic systems. Thus it it easy to understand that an accidental impact of a tool or a vehicle part on the outer surface of the column or piston rod may often cause a more or less deep scratch on said surface: the repeated rubbing action of such a scratch on the seal wears the latter and causes leakage. The final result might be that a vehicle, possibly of heavy weight, standing on the lift for a long time, descends gradually and dangerously down to ground.

[0006] Moreover the known devices are expensive, cumbersome and must be lodged at a considerable depth in the ground.

[0007] The above mentioned problems, drawbacks and disadvantages are brillantly solved by a lift having the features recited in independent Claim 1. Further features of the invention are indicated in the dependent claims.

[0008] The preferred embodiment of the invention substantially provides for the reverse use of a scissors or double scissors mechanism, said mechanism being known per se in the technical field, for lifting two or more columns, in other words to cause the columns to be extracted to a desired extent from the ground level so as to lift the vehicle to a corresponding height.

[0009] Another embodiment of the invention provides for the use of a single scissors mechanism combined with oil-pressure hydraulic cylinders arranged inside the columns. In this case the pit depth is reduced in comparison with the first embodiment.

[0010] In order that the present invention is fully understood and appreciated, a detailed explanatory and non-limiting description is hereinafter given, reference being had to the accompanying drawings in which:

Fig. 1 is a diagramatic view of a first embodiment of the invention in its configuration of partially closed scissors and partially protruding columns;
Fig. 2 is another view of the first embodiment in its configuration of almost completely extended scissors and fully retracted columns;
Fig. 3 is a diagramatic view of a second embodiment of the invention in its configuration or fully retracted columns; and
Fig. 4 is another view of the second embodiment in its configuration of fully extended columns or maximum lifting.

[0011] Clearly the same reference characters are used in the various views to indicate similar or functionally equivalent parts. Moreover, for sake of clarity and not to unduly limit the scope of the invention, the columns are shown in a bare form, namely without any platform or arm to support the vehicle and any other accessories known per se, that do not fall directly within the claimed invention.

[0012] The lift 10 according to the first embodiment of the invention comprises at least one parallelogram mechanism 12, also called scissors or double scissors, and at least one column 14, but generally two or four columns 14. The base of each column 14 is fixed to a bar or horizontal plane 16 with which one end of the mechanism 12, hereinafter the lower end 18, is hinged. The other end or upper end 20 of the mechanism 12 is hinged to a support structure 26 substantially arranged at the ground level. A sliding guide 32 is preferably provided for each column 14 at the ground level of said structure 26.

[0013] The extension and retraction movement of the mechanism 12 is carried out by means of electro-hydraulic devices 22 in the form of one, two or more pistons 22.

[0014] Mechanical safety devices 24, for instance like racks, and devices acting on the pneumatic elements, such as the so-called parachutes or safety valves against overloads, failure of hydraulic pipes or excessive descent speed, are also provided.

[0015] In any case, as a man skilled in the art will easily notice, with the present invention, briefly defined as reverse scissors, all the hydraulic and mechanical safety elements are lodged underground.

[0016] Clearly the depth L of the pit will be equal to the maximum extension above the ground of the columns plus the size of the closed or retracted mechanism. Indeed, just as an example, with a piston having a stroke of 50-60 cm, one can easily obtain an extension of the columns of about 180 cm above the ground level.

[0017] Among the other clear advantages of the present invention there is also the fact that the columns may be made of any suitable material, do not necessarily require an accurate surface treatment and may have practically any desired cross-sectional shape, and not only the circular one. Finally, the piston rod is always operating under traction which is clearly preferably to compression.

[0018] The second embodiment 10' of the invention is shown in Figs. 3 and 4 and will be described in detail hereinafter making reference to these figures. A scissors mechanism 12 is still present under the level of the zero lifting but besides this feature, in each of the lifting columns 14 there is at least one oil-pressure hydraulic cylinder 34 allowing to reach through its rod 36, the desired height so as to attain substantially the function of a telescopic hydraulic cylinder. This embodiment is particularly suitable when it is not possible to make a pit 30 having a depth equal to the maximum lift extension above the ground level or when there is no need to lift the vehicle to a height greater than about 1000 mm.

[0019] With the second embodiment now described it is therefore possible to attain a lifting of about 1850 mm with a pit depth substantially being the half of that required by the first embodiment.

[0020] The above described and illustrated presently preferred embodiments are those in which the lift is lying on a pit 30 digged in the ground 28, with the support structure 26 at the ground level or zero lifting. It is however clear that it is possible that the lift is only partially or not at all sunk in the ground and is supplied in a box-like structure or frame without departing from the scope of the present invention. It is also possible to add cushioning systems of the kind used in the pits for elevators or hoists, this contrivance too falling within the scope of a preferred embodiment of the present invention.

[0021] Finally, it is apparent that several modifications may be made to the embodiments hereinbefore described in detail and shown in the accompanying sheets of illustrative drawings, without departing however from the scope of protection as defined in the appended claims.

Claims

1. Foldaway lift for articles and particularly vehicles, comprising one or more lifting columns (14) having a vertical translation motion from a zero lifting position to a maximum lifting position, and at least one scissors mechanism (12) being arranged below the plane substantially corresponding to the zero lifting, **characterized in that** said at least one scissors mechanism (12) is carrying out at least a portion of the translation motion of said one or more columns (14) and **in that** in the fully retracted position of said scissors mechanism (12), said one or more lifting columns (14) are in the position of maximum lifting.

2. Foldaway lift according to claim 1, **characterized in that** in the fully extended position of said scissors mechanism (12), said one or more lifting columns (14) are in a position of minimum or zero lifting or minimum extension above the ground level.

3. Foldaway lift according to claim 1 or 2, **characterized in that** one end of said scissors mechanism (12) is hinged to a support structure (16) to which the base of said one or more columns is fixed, and the other end is hinged to a support structure (26) substantially arranged at the ground level.

4. Foldaway lift according to any one of the preceding claims, **characterized in that** for each column (14) at least a sliding guide (32) is provided.

5. Foldaway lift according to any one of the preceding claims, **characterized by** electro-hydraulic devices (22), preferably in the form of one or more pistons carrying out extension or retraction of the scissors mechanism (12).

6. Foldaway lift according to any one of the preceding claims, **characterized in that** mechanical safety devices (24) are provided.

7. Foldaway lift according to Claim 5 or 6, **characterized in that** safety devices (24) acting on the electro-hydraulic devices (22) are provided.

8. Foldaway lift according to Claim 1 to 8, **characterized in that** in said one or more columns (14) a corresponding oil-pressure hydraulic cylinder (34) increasing the lifting height is arranged.

9. Foldaway lift according to any of the preceding claims, **characterized by** comprising also a container body forming a pit (30) inside which the at least one scissors mechanism operates and the at least one lifting column (14) is retracted.

10. Foldaway lift according to any of the preceding claims, **characterized in that** each column (14) is provided with platforms or arms adapted to support an article or a vehicle.

Patentansprüche

1. Zusammenklappbare Hubeinrichtung für Gegen-

stände, insbesondere Fahrzeuge mit einer oder mehreren Hubsäulen (14) ausführend eine vertikale Translationsbewegung aus einer Nullhubposition in eine Maximum-Hubposition und wenigstens einem Scherenmechanismus (12), welcher unter der Ebene angeordnet ist, die im wesentlichen der Nullhubposition entspricht,
dadurch gekennzeichnet, dass
der wenigstens eine Scherenmechanismus (12) wenigstens einen Teil der Translationsbewegung der einen oder mehreren Hubsäulen (14) ausführt und dass in der vollständig zurückgezogenen Stellung des Scherenmechanismus (12) die eine oder mehreren Hubsäulen (14) in der Maximumhubposition sind.

2. Zusammenklappbare Hubeinrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** in der vollständig ausgefahreren Stellung des Scherenmechanismus (12) die eine oder mehreren Hubsäulen (14) in einer Position eines minimalen oder Nullhubes bzw. einer minimalen Ausdehnung über der Flurebene sind.

3. Zusammenklappbare Hubeinrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** ein Ende des Scherenmechanismus (12) an eine Tragkonstruktion (16) angelenkt ist, an welcher die Basis der einen oder mehreren Säulen befestigt ist, und das andere Ende an eine Tragkonstruktion (26) angelenkt ist, die im wesentlichen in der Flurebene angeordnet ist.

4. Zusammenklappbare Hubeinrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** für jede Säule (14) wenigstens eine Gleitführung (32) vorgesehen ist.

5. Zusammenklappbare Hubeinrichtung nach einem der vorhergehenden Ansprüche, **gekennzeichnet durch** elektrohydraulische Einrichtungen (22), insbesondere in Form eines oder mehrerer Kolben, welche ein Ausfahren oder Einziehen des Scherenmechanismus (12) durchführen.

6. Zusammenklappbare Hubeinrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** mechanische Sicherheitseinrichtungen (24) vorgesehen sind.

7. Zusammenklappbare Hubeinrichtung nach Anspruch 5 oder 6, **dadurch gekennzeichnet, dass** Sicherheitseinrichtungen (24), welche auf die elektro-hydraulischen Einrichtungen (22) wirken, vorgesehen sind.

8. Zusammenklappbare Hubeinrichtung nach Anspruch 1 bis 8, **dadurch gekennzeichnet, dass** in einer oder mehreren Säulen (14) ein entsprechender Öldruck-Hydraulikzylinder (34) zur Vergrößerung der Hubhöhe angeordnet ist.

9. Zusammenklappbare Hubeinrichtung nach einem der vorhergehenden Ansprüche, **gekennzeichnet** ferner durch einen Behälterkörper, welcher eine Grube (30) bildet, in welcher wenigstens ein Scherenmechanismus arbeitet und die wenigstens eine Hubsäule (14) eingezogen ist.

10. Zusammenklappbare Hubeinrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** jede Säule (14) mit Plattformen oder Armen ausgestattet ist, die geeignet sind, einen Gegenstand oder ein Fahrzeug zu tragen.

Revendications

1. Dispositif élévateur repliable pour des articles et notamment des véhicules, comportant une ou plusieurs colonnes (14) de soulèvement ayant un déplacement en translation verticale à partir d'une position d'élévation zéro jusqu'à une position d'élévation maximum, et au moins un mécanisme (12) à ciseaux qui est disposé en dessous du plan correspondant sensiblement à l'élévation zéro, **caractérisé en ce que** le dit au moins un mécanisme (12) à ciseaux effectue au moins une partie du déplacement en translation desdites une ou plusieurs colonnes (14) et **en ce que**, dans la position entièrement rétractée du mécanisme (12) à ciseaux, ladite une ou plusieurs colonnes (14) d'élévation se trouvent dans la position d'élévation maximum.

2. Dispositif élévateur repliable suivant la revendication 1, **caractérisé en ce que**, dans la position complètement étendue du mécanisme (12) à ciseaux, lesdites une ou plusieurs colonnes (14) d'élévation sont dans une position d'élévation minimum ou nulle ou dans une position d'extension minimum au-dessus du niveau du sol.

3. Dispositif élévateur repliable suivant la revendication 1 ou 2, **caractérisé en ce qu'**une extrémité du mécanisme (12) à ciseaux est articulée à une structure (16) de support à laquelle la base desdites une ou plusieurs colonnes est fixée, et l'autre extrémité est articulée à une structure (26) de support disposée sensiblement au niveau du sol.

4. Dispositif élévateur repliable suivant l'une quelconque des revendications précédentes, **caractérisé en ce que** pour chaque colonne (14) au moins un guide (32) de coulissant est prévu.

5. Dispositif élévateur repliable suivant l'une quelcon-

que des revendications précédentes, **caractérisé par** des dispositifs (22) électro-hydrauliques, de préférence sous la forme de un ou plusieurs pistons qui effectuent une extension ou une rétraction du mécanisme (12) à ciseaux.

6. Dispositif élévateur repliable suivant l'une quelconque des revendications précédentes, **caractérisé en ce que** sont prévus des dispositifs (24) de sécurité mécanique.

7. Dispositif élévateur repliable suivant la revendication 5 ou 6, **caractérisé en ce que** des dispositifs (24) de sécurité agissant sur les dispositifs (22) électro-hydrauliques sont prévus.

8. Dispositif élévateur repliable suivant l'une quelconque des revendications 1 à 8, **caractérisé en ce qu'**un vérin (34) hydraulique à pression d'huile augmentant la hauteur d'élévation est disposé dans lesdites une ou plusieurs colonnes (14).

9. Dispositif élévateur repliable suivant l'une quelconque des revendications précédentes, **caractérisé par** le fait de comporter également un corps formant conteneur formant un trou (30) à l'intérieur duquel ledit au moins un mécanisme à ciseaux fonctionne et ladite au moins une colonne (14) de soulèvement est rétractée.

10. Dispositif élévateur repliable suivant l'une quelconque des revendications précédentes, **caractérisé en ce que** chaque colonne (14) est munie de plates-formes ou de bras conçus pour supporter un article ou un véhicule.

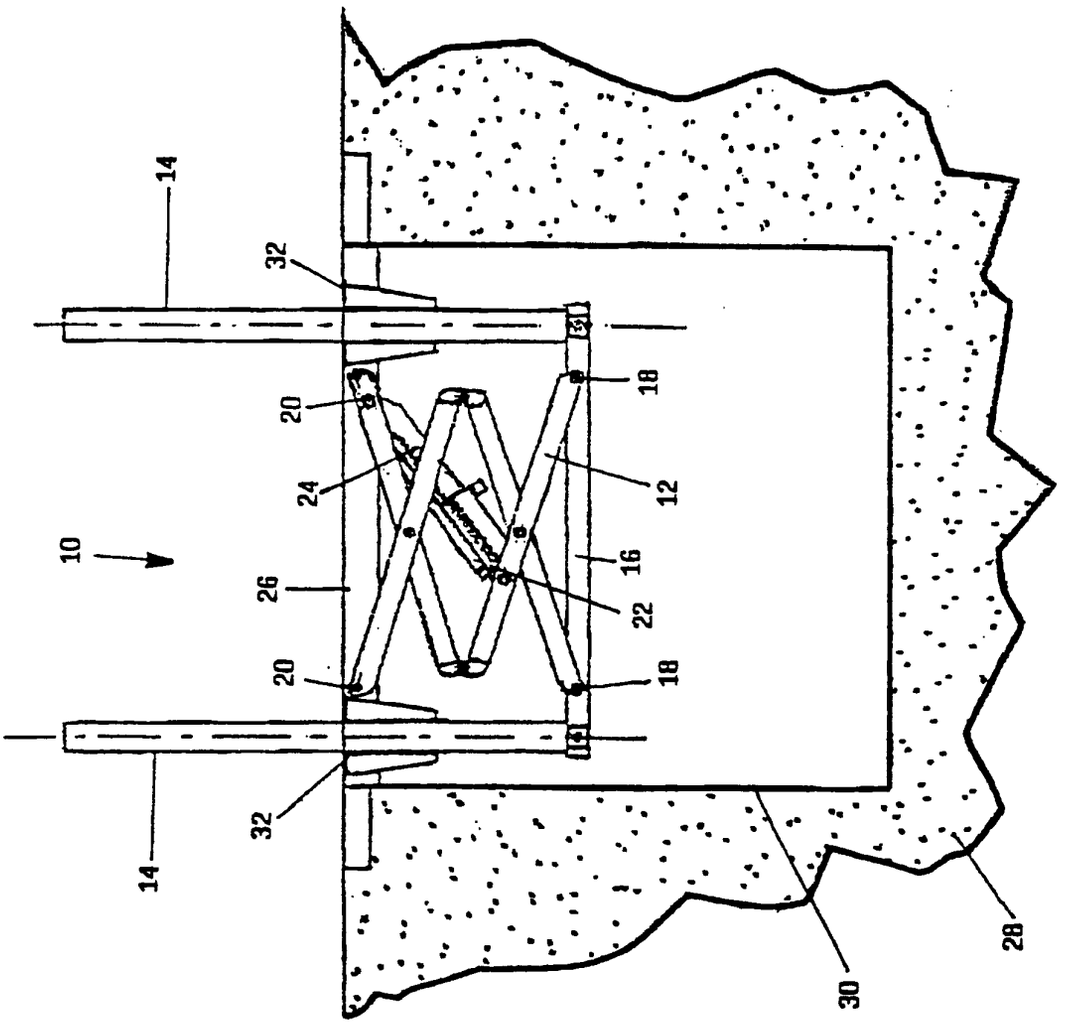

FIG. 1

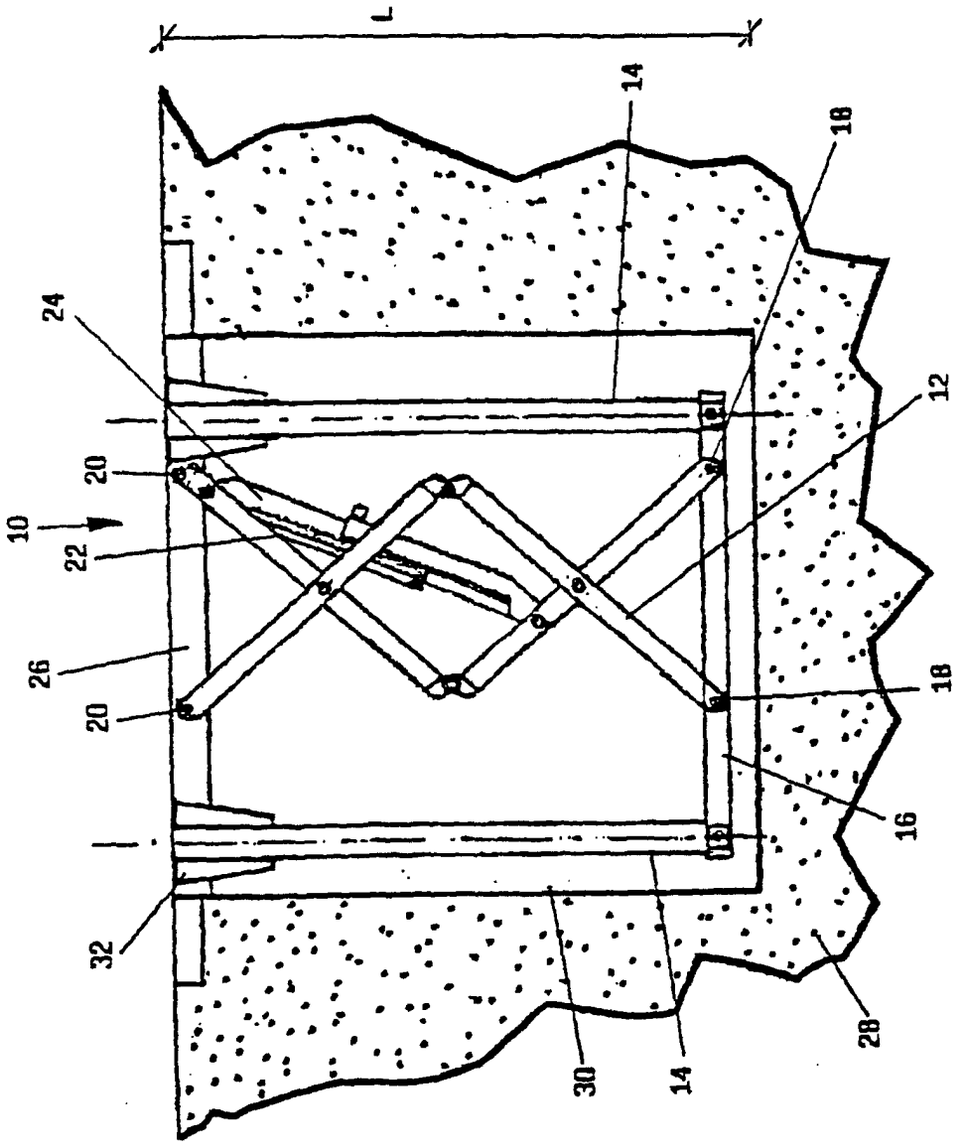

FIG. 2

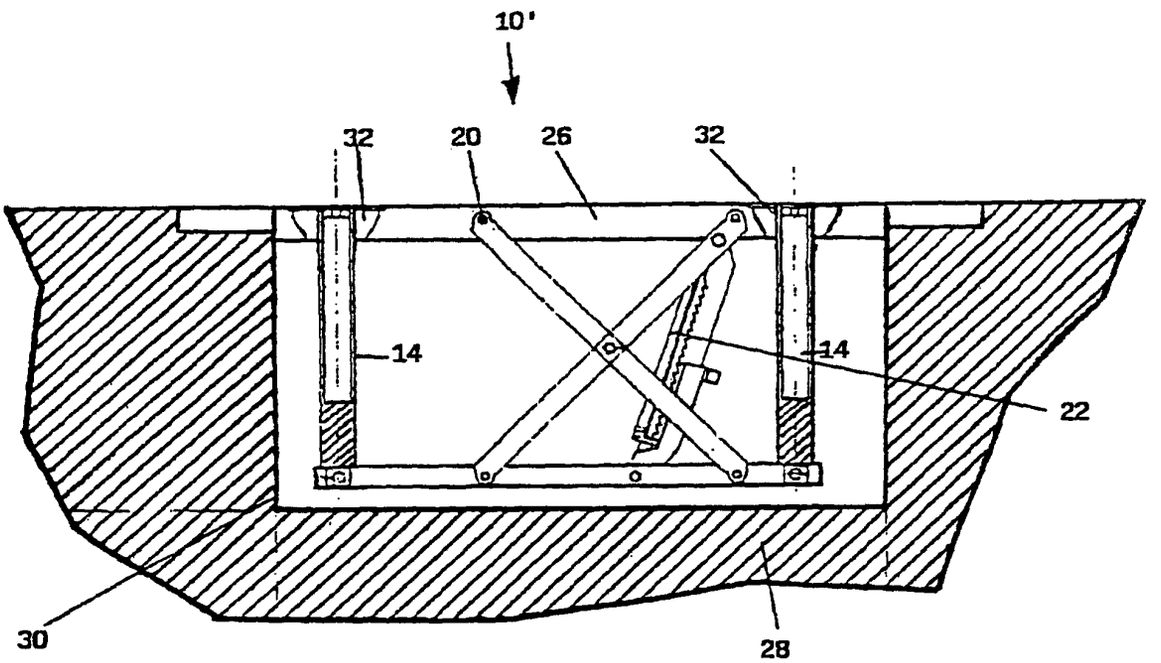

FIG. 3

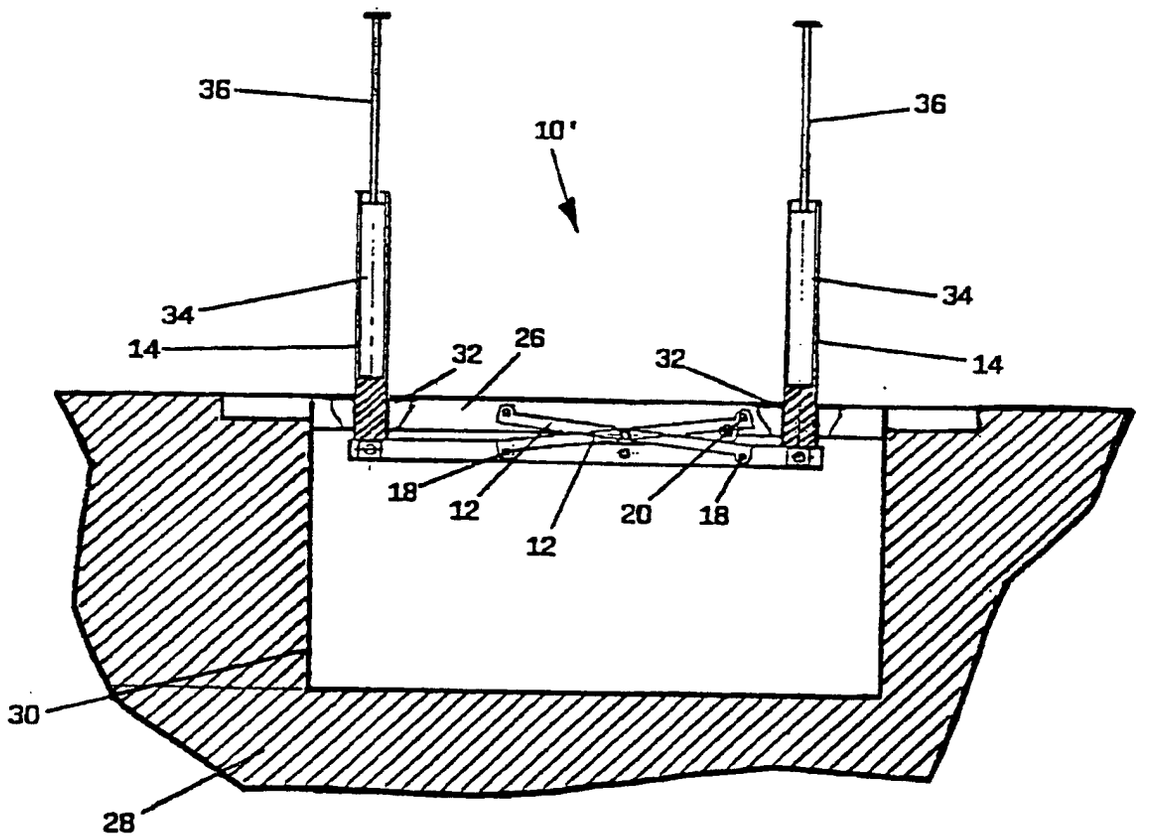

FIG. 4