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

(11) EP 1 775 251 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
18.04.2007 Bulletin 2007/16

(51) Int Cl.:
B66C 23/48 *(2006.01)*

(21) Application number: **05022482.3**

(22) Date of filing: **14.10.2005**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(71) Applicant: **Hong, Wen-Cheng**
Tou Chiao Industrial Park
Minhsiung Chiayi Hsien (TW)

(72) Inventor: **Hong, Wen-Cheng**
Tou Chiao Industrial Park
Minhsiung Chiayi Hsien (TW)

(74) Representative: **Reichel, Wolfgang**
Reichel und Reichel Patentanwälte,
Parkstrasse 13
60322 Frankfurt am Main (DE)

(54) Lifter for repairing a vehicle

(57) A lifter for repairing a vehicle has a base (1) having a supporting post (2), an upper arm (3) and a lower arm (4) pivotally attached to the supporting post (2), a jack (5) pivotally connected to the lower arm (4), and an L-shaped rack (6) pivotally attached to distal ends of the upper arm (3) and lower arm (4) and having a top plate (7) and a hook (8) mounted on the L-shaped rack (6). Wherein, the L-shaped rack (6) is adapted to combine a workpiece and enables to change orientations to make operation of the lifter versatile in supporting or hanging state. Additionally, a positioning plate (9) is pivotally attached to a joint of the upper arm (3) and the supporting post (2) and has a channel (911) with multiple dents (91). The lower arm (4) has a penetrating pin (51) received in the channel (911) to operationally engage with a corresponding one of the multiple dents (91) to provide a locking efficiency to keep the lifter stable during operation.

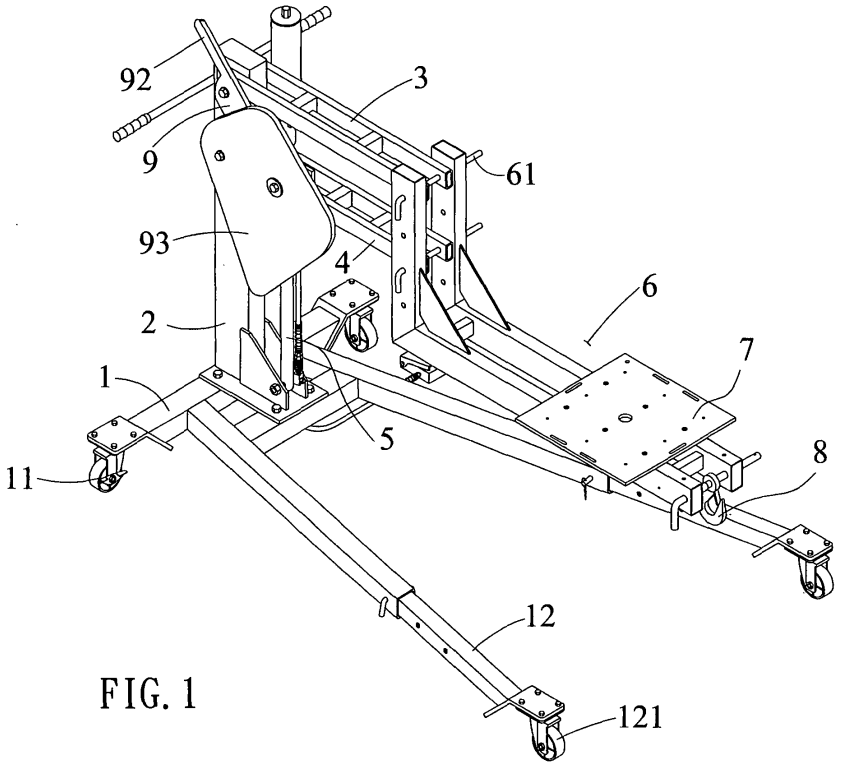

FIG. 1

EP 1 775 251 A1

Description

[0001] The present invention relates to a lifter for repairing a vehicle with the features of preamble part of the independent claim 1.

[0002] With reference to Fig. 7, a conventional lifting device for raising an engine is a hanger with a hook that only has the single hanging function. However, development of the vehicles progresses promptly and trends to obtain a front-wheel drive system attached to the engine in a small-size vehicle. When the engine having the front-wheel drive system is repaired, the small-size vehicle is disassembled at a chassis that is conveniently detached from the start. Therefore, the engine can not be repaired by using the conventional hanger to suspend the vehicle. Although another conventional lifting device, a lifter as shown in Fig. 8, is designed for repairing the vehicle having the front-wheel drive system, to detach the engine, the lifter still has the only lifting efficiency by using a top plate to push the vehicle upward. Additionally, the two conventional lifting devices respectively have the hook and the top plate all stationary mounted thereon and can not meet all engines in different sizes and various combinations in need of repair. Therefore, workplace has to equip more accessory devices for repairing the engines so that the equipment cost is correspondingly increased and changing the accessory devices is inconvenient to a repairman during repair.

[0003] According to above description, the main object of the present invention is to provide a modified lifter to overcome the drawbacks of the conventional lifting devices and to increase repairing and economic efficiency in operation of safety.

[0004] This object is achieved by a lifter for repairing a vehicle comprising the features of the characterizing part of the independent claim 1. In that way a lifter for repairing a vehicle has duplex functions for supporting or hanging operation.

[0005] Further developments of the invention are the subject-matter of the dependent claims.

[0006] In further embodiments of the present invention a lifter for repairing a vehicle provides a secure locking efficiency to make the lifter safe in operation.

[0007] According to a further preferred embodiment of the present invention a lifter for repairing a vehicle enables to change orientations of a rack on the lifter to support or hang a workpiece mounted on the rack so that the lifter is versatile in industrial utility.

[0008] Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description of an embodiment and state of the art with appropriate reference to the accompanying drawings.

Fig. 1 is a perspective view of a lifter for repairing a vehicle in accordance with an embodiment of the present invention;

Fig. 2 is a partially exploded perspective view of the lifter in Fig.1;

Fig. 3 is a partially cross-sectional side view of the lifter in Fig. 1, wherein the lifter is at a retracted station;

Fig. 4 is an operational side view of the lifter in Fig. 3, wherein a rack is lifted;

Fig. 5 is an operational side view of the lifter in Fig. 3, wherein a positioning plate is disengaged;

Fig. 6 is an operational side view of the lifter in Fig. 4, wherein the rack is inverted;

Fig. 7 is a perspective view of a conventional lifting device in accordance with the prior art; and

Fig. 8 is a perspective view of another conventional lifting device in accordance with the prior art.

[0009] A lifter for repairing vehicles in accordance with a preferred embodiment of the present invention comprises a base having a supporting post, an upper arm and a lower arm pivotally attached to the supporting post, a jack pivotally connected to the lower arm, and an L-shaped rack pivotally attached to distal ends of the upper arm and lower arm and having a top plate and a hook mounted on the L-shaped rack. Wherein, the L-shaped rack adapted to combine a workpiece enables to change orientations to make operation of the lifter versatile. Additionally, a positioning plate is pivotally attached to a joint of the upper arm and the supporting post and has a channel with multiple detents. The lower arm has a penetrating rod received in the channel to operationally engage with a corresponding one of the multiple dents to provide a locking efficiency to keep the lifter stable in operation.

[0010] With reference to Fig. 1 and 2, the lifter in the preferred embodiment has a base 1 with multiple wheels 11, 121, a supporting post 2, an upper arm 3 and a lower arm 4 in parallel, a jack 5, an L-shaped rack 6 with a top plate 7 and a hook 8, and a locking device.

[0011] The base 1 is a substantially π-shaped structure composed of a long section with two ends, two retractable legs 12 attached to a side of the long section, and a short section extending between the two retractable legs 12. Four wheels 11, 121 are individually attached to the two ends of the long section and two distal ends of the two retractable legs 12 to make the filter move conveniently.

[0012] The supporting post 2 erects on the base 1 by mounting cross the long section and the short section and has a top end. The upper arm 3 and the lower arm 4 are pivotally attached to the top end of the supporting post 2, wherein each arm 3, 4 is composed of two parallel rods and two transversal rods extending between the two parallel rods. Therefore, the supporting post 2 is clamped between the two parallel rods at one end of each arm 3, 4 by penetrating a pivotal pin 31, 41. The jack 5 is mounted on the base 1 and connects to the lower arm 4 by attaching a penetrating rod 51 to pivotally combine a pushing rod of the jack 5 to a middle section of the lower arm 4, wherein the penetrating rod 51 has a surplus section extending outward at one side of the lower arm 4.

[0013] The L-shaped rack 6 is composed of two L-shaped frames in pair and multiple transversal extensions formed between the two L-shaped frames. The L-shaped rack 6 has a free section and an engaging section attached to the other ends of the upper arm 3 and the lower arm 4 by inserting two detachable pins 61. The top plate 7 is mounted on an inner side of the free section of the L-shaped rack 6 and the hook 8 is attached to a distal end of the free section. In operation, the top plate 7 adapts to engage with a workpiece that needs to be repaired.

[0014] The locking device in the lifter of a preferred embodiment of the present invention has a positioning plate 9 pivotally attached to a pivotal joint of the upper arm 3 and the supporting post 2 by the same pivotal pin 31. The positioning plate 9 has a pressing section 92 formed at one end and an inclined saw-shaped hole defined at the other end of the positioning plate 9 to receive the surplus section of the penetrating rod 51 on the jack 5 and the lower arm 4. The saw-shaped hole is composed of a channel 911 and at least one detent 91 communicating with the channel 911 (there are multiple unidirectional detents 91 in the preferred embodiment in the present invention) at an upper edge so that the penetrating rod 51 enables to slide along the channel 911 and to be retained by a corresponding one detent 91 when the L-shaped rack 6 is kept at a stationary position when the L-shaped rack 6 is completely raised. Particularly, the detent is inclined and unidirectional to keep the penetrating rod 51 from reverse movement. Additionally, the positioning plate 9 further has at least one cover board 93 (there are two cover boards 93 shown in the preferred embodiment in the present invention) attached beside the positioning plate 9 . Each cover board 93 has a first through hole 931 and a second through hole 932 to allow the pivot pin 41 and the penetrating rod 51 respectively penetrating therethrough so that the positioning board 93 is pivotally attached to the supporting post 2 and the middle section of the lower arm 4 as well.

[0015] When the lifter operates (with reference to Figs. 3, 4 and 5), the jack 5 is completely retracted to keep the lifter at an unextended station, wherein the L-shaped rack 6 is pulled by the jack 5 via the upper and lower arms 3, 4 to a lowest position (as shown in Fig. 3) and the penetrating rod 5 is retained at a lowest detent 91. When the jack 5 extends, the upper arm 3 and the lower arm 4 are pushed upward to lift the L-shaped rack 6 (as shown in Fig. 4). Meanwhile, the penetrating rod 51 slides along inclined faces of the detents 91 one by one and is stopped by the at least one detent until the L-shaped rack 6 is located at a proper position. Then, the penetrating rod 51 is retained by a corresponding one of the detents 91 on the positioning plate 9 to avoid the reverse movement so that a locking efficiency is provided to keep the lifter stable and to prevent collapse even when the releasing lever (button) of the jack 5 is inadvertently actuated.

[0016] When the L-shaped rack 6 is lowered, the pressing section 92 is pressed downward to make the opposite end lever up so that the penetrating rod 51 is disengaged from the detent 91 to slide along the channel 911 (as shown in Fig. 5). Thereby, the jack 5 enables to retract to lower the L-shaped rack 6 to the unextended station.

[0017] Further refer to Fig. 6, the L-shaped rack 6 can be inverted to correspond to a height of the workpiece by simply withdrawing the pins 61. After the L-shaped rack 6 is inverted, the pins 61 are inserted again to keep the L-shaped rack 6 in position on the upper arm 3 and the lower arm 4 so that the workpiece is conveniently switched between a supporting state and a suspending state.

Claims

1. A lifter for repairing a vehicle, the lifter comprising:

a base (1) having two legs (12) extending outward and multiple wheels (11, 121) attached under the base;
an supporting post (2) erecting on the base and having a top end;
an upper arm (3) and a lower arm (4) pivotally attached to the top end of the supporting post;
a jack (5) mounted on the base and pivotally connected to the lower arm by inserting a penetrating rod (51);

characterized in
the penetrating rod (51) having a surplus section protruding at one side of the lower arm; and
an L-shaped rack (6) detachably mounted to the upper arm and the lower arm and having a top plate (7) located on the L-shaped rack and a hook (8) attached to a free end of the L-shaped rack.

2. The lifter as claimed in claim 1, wherein the lifter further comprises a positioning plate (9) pivotally attached to a joint of the upper arm and the supporting post and having:

two ends;
a pressing section (92) formed at one end of the positioning plate;
a channel (911) defined at the other end of the positioning plate and having at least one detent (91) communicating with the channel at an upper edge of the channel;

wherein, the surplus section of the penetrating rod (51) slides along the channel when the L-shaped rack is lifted by the jack;
wherein, the surplus section is retained by the at least one detent to provide a locking efficiency when the L-shaped rack is positioned.

3. The lifter as claimed in claim 2, wherein the position-

ing plate further has at least one cover board (93) attached beside the positioning plate;
each of the at least one cover board has:

a first through hole (931) receiving a pivotal pin (41) penetrating the lower arm and the supporting post so that the positioning board (93) is pivotally attached to the supporting post; and
a second through hole (932) receiving the surplus section of the penetrating rod so that the positioning board is pivotally attached to the lower arm.

4. The lifter as claimed in claim 2 and 3, wherein the at least one detent is inclined and unidirectional.

5. The lifter as claimed in claim 1, wherein the L-shaped rack is detachably attached to the upper arm and the lower arm by two pins (61).

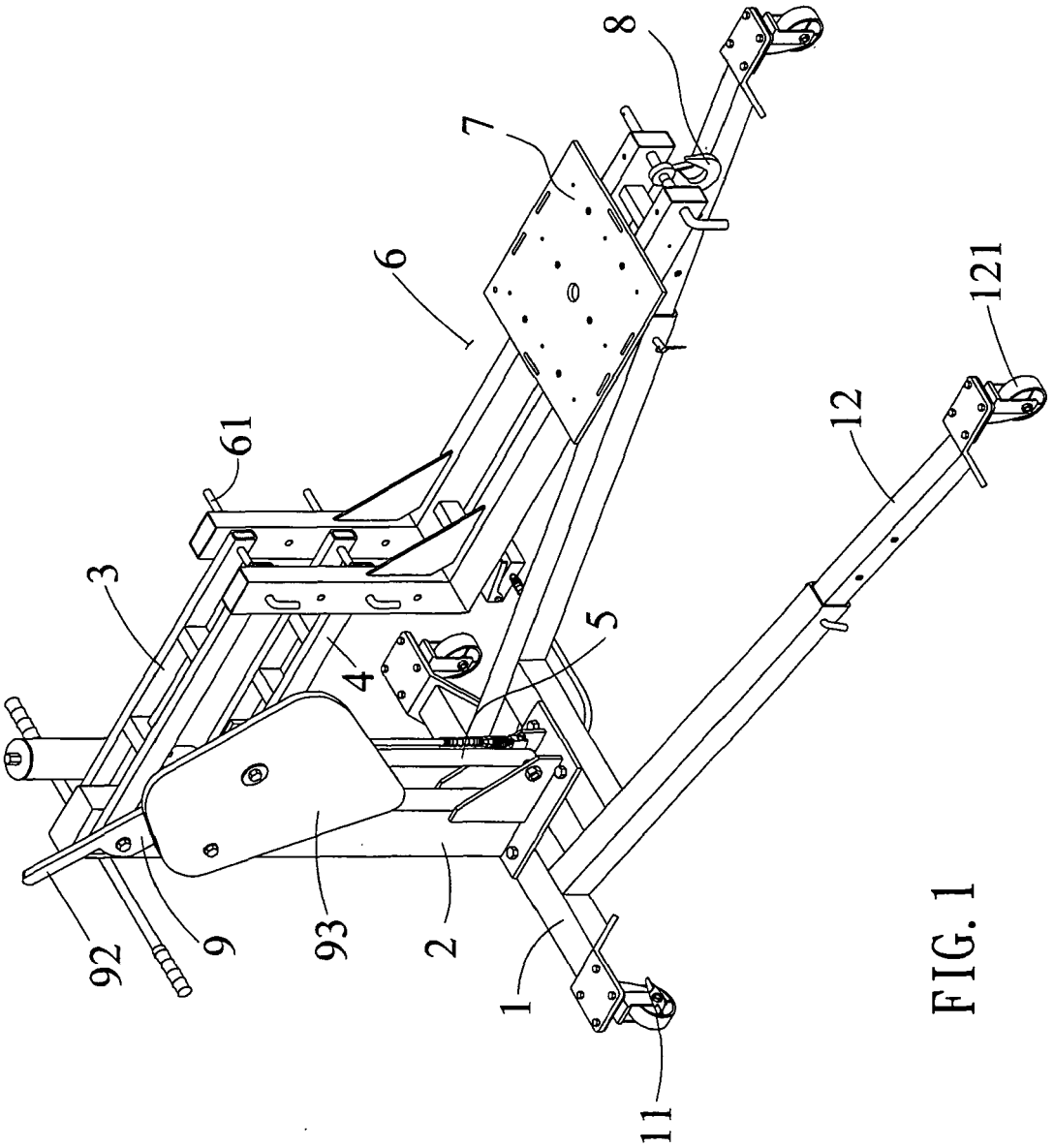

FIG. 1

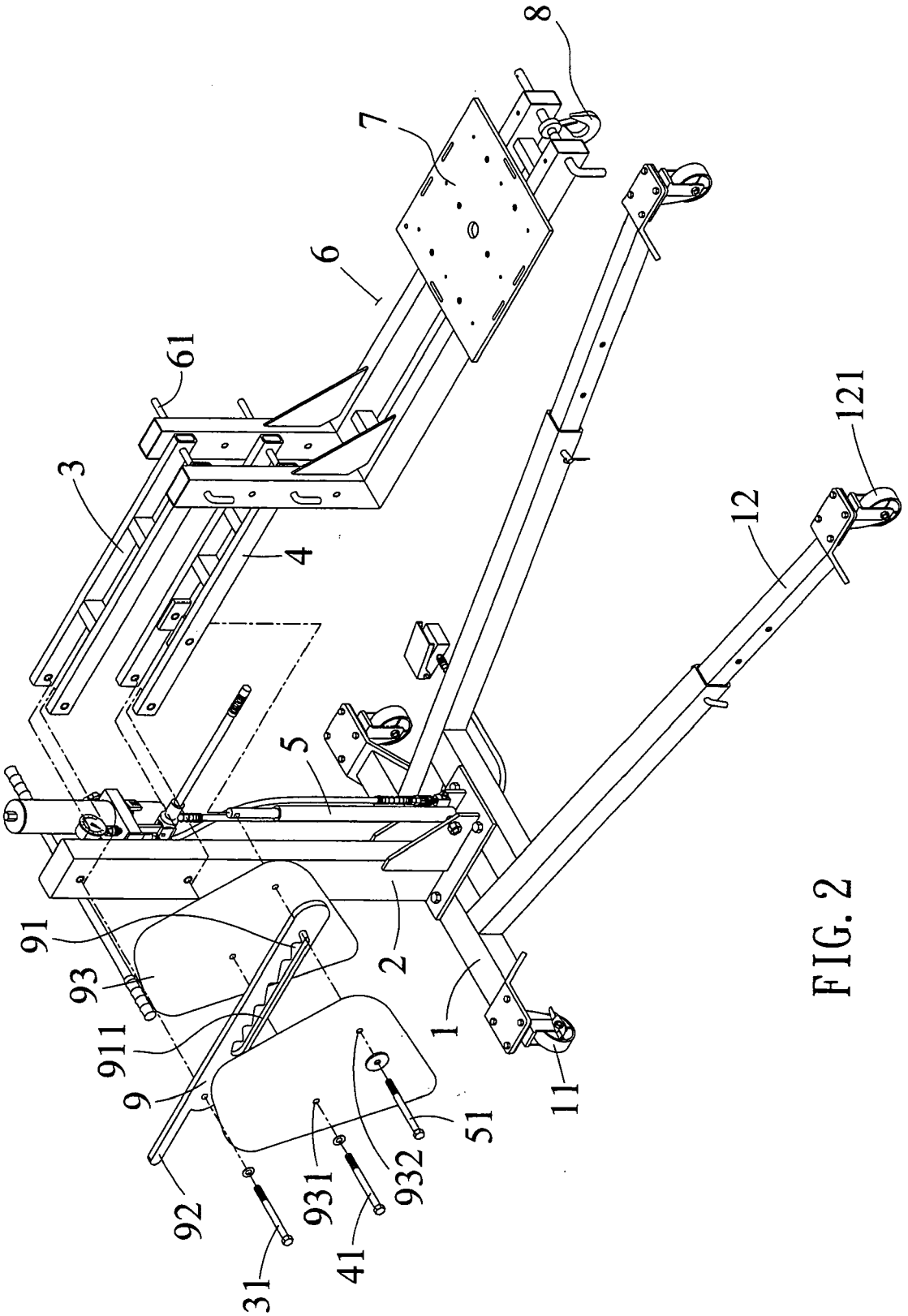

FIG. 2

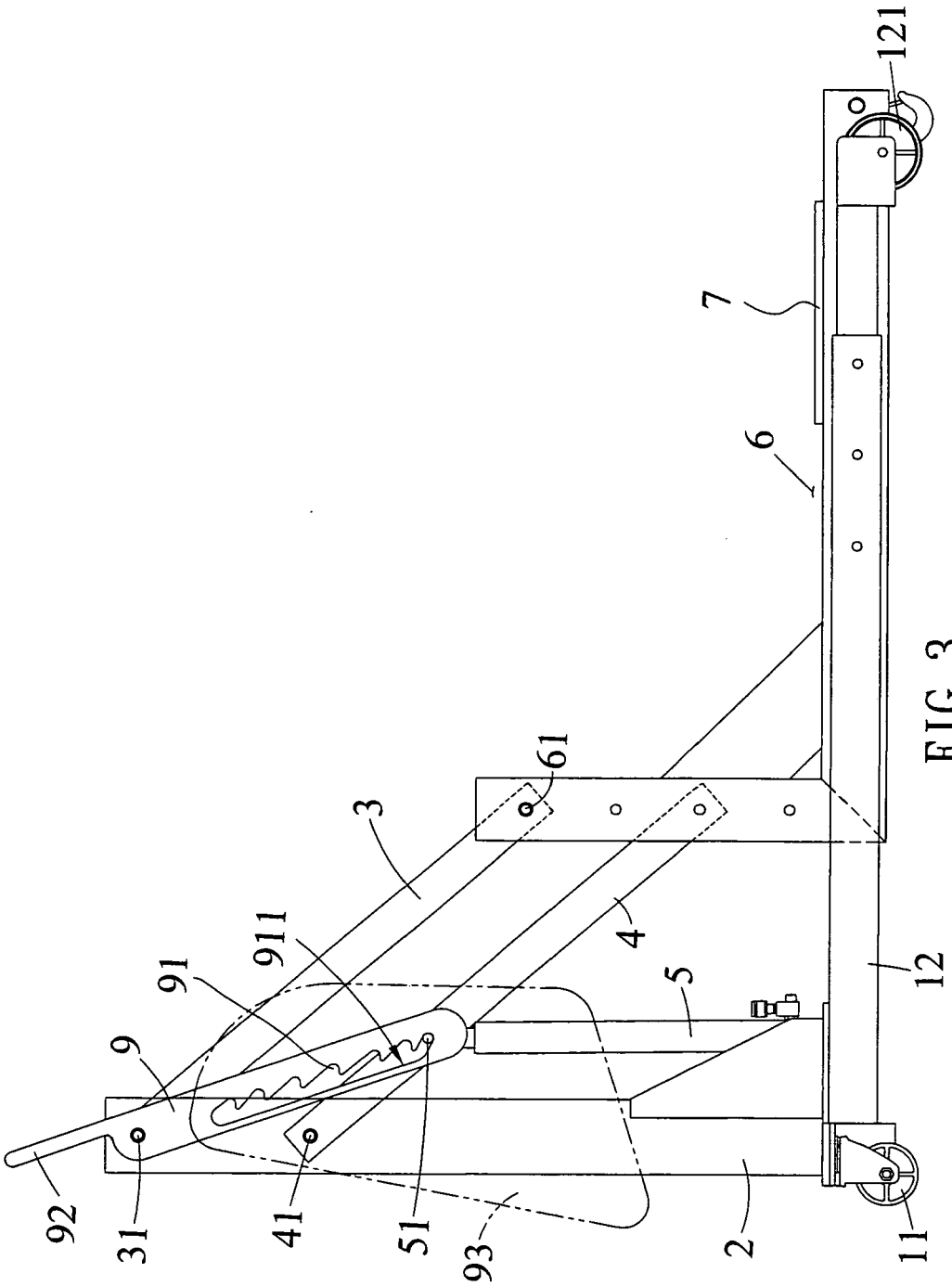

FIG. 3

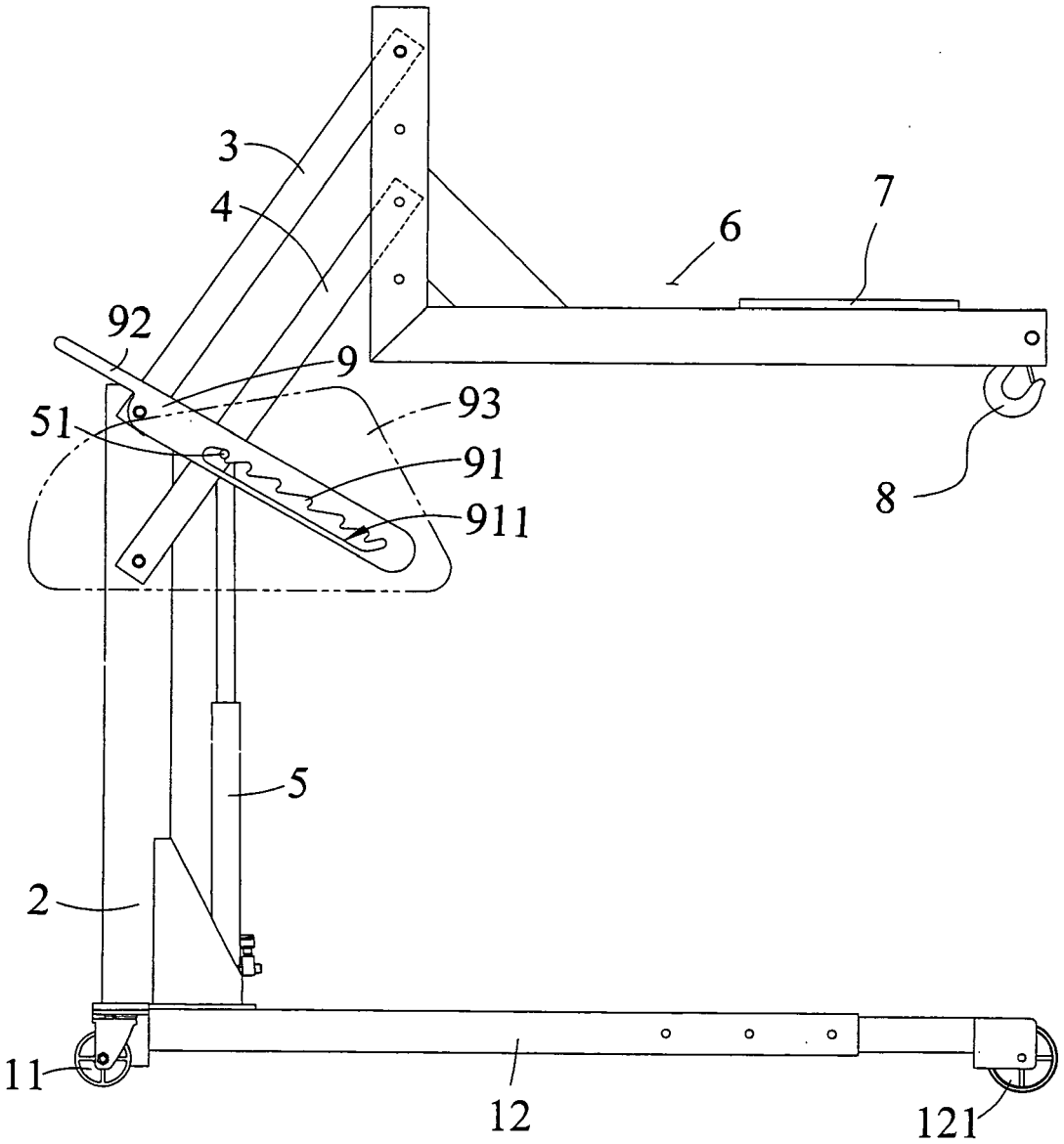

FIG. 4

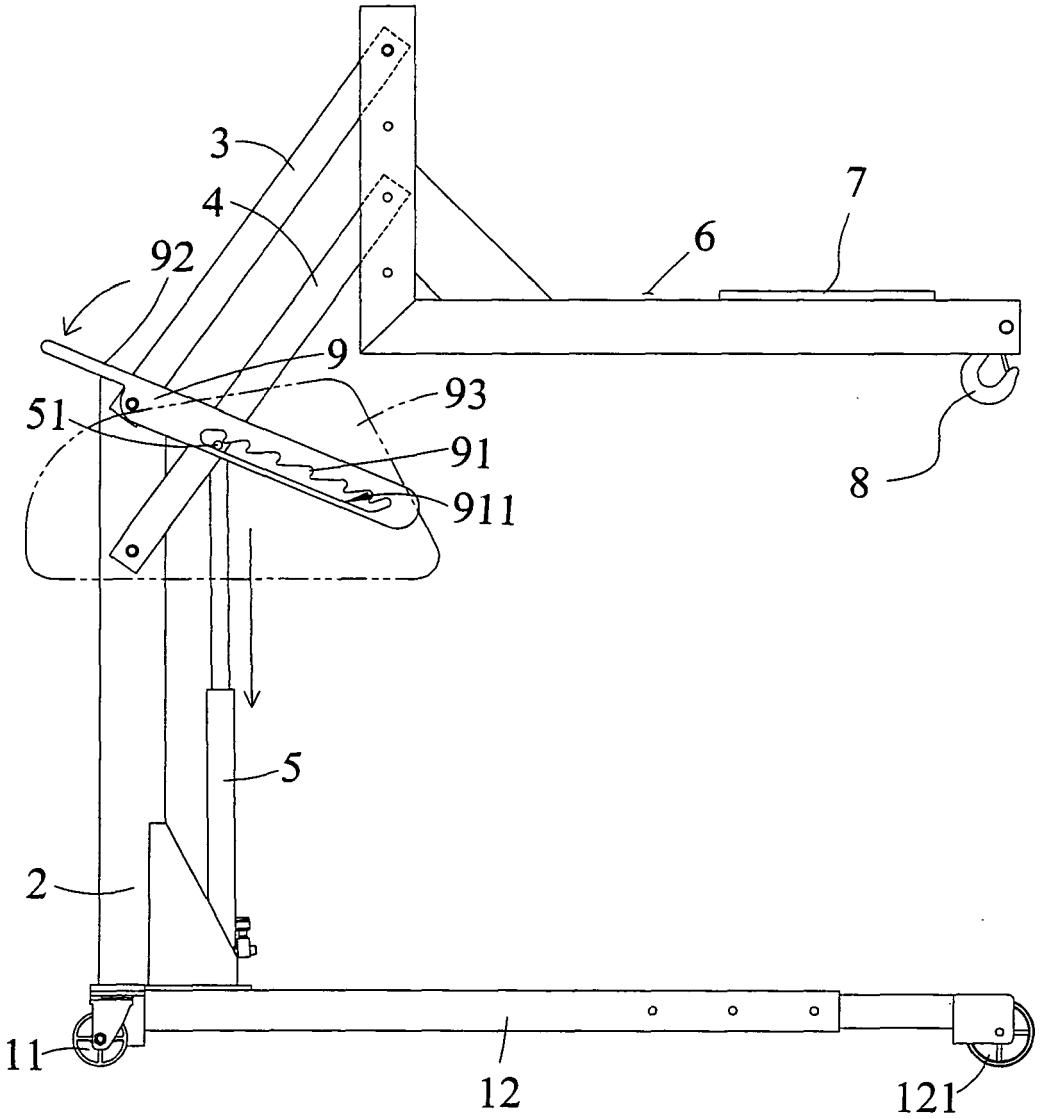

FIG. 5

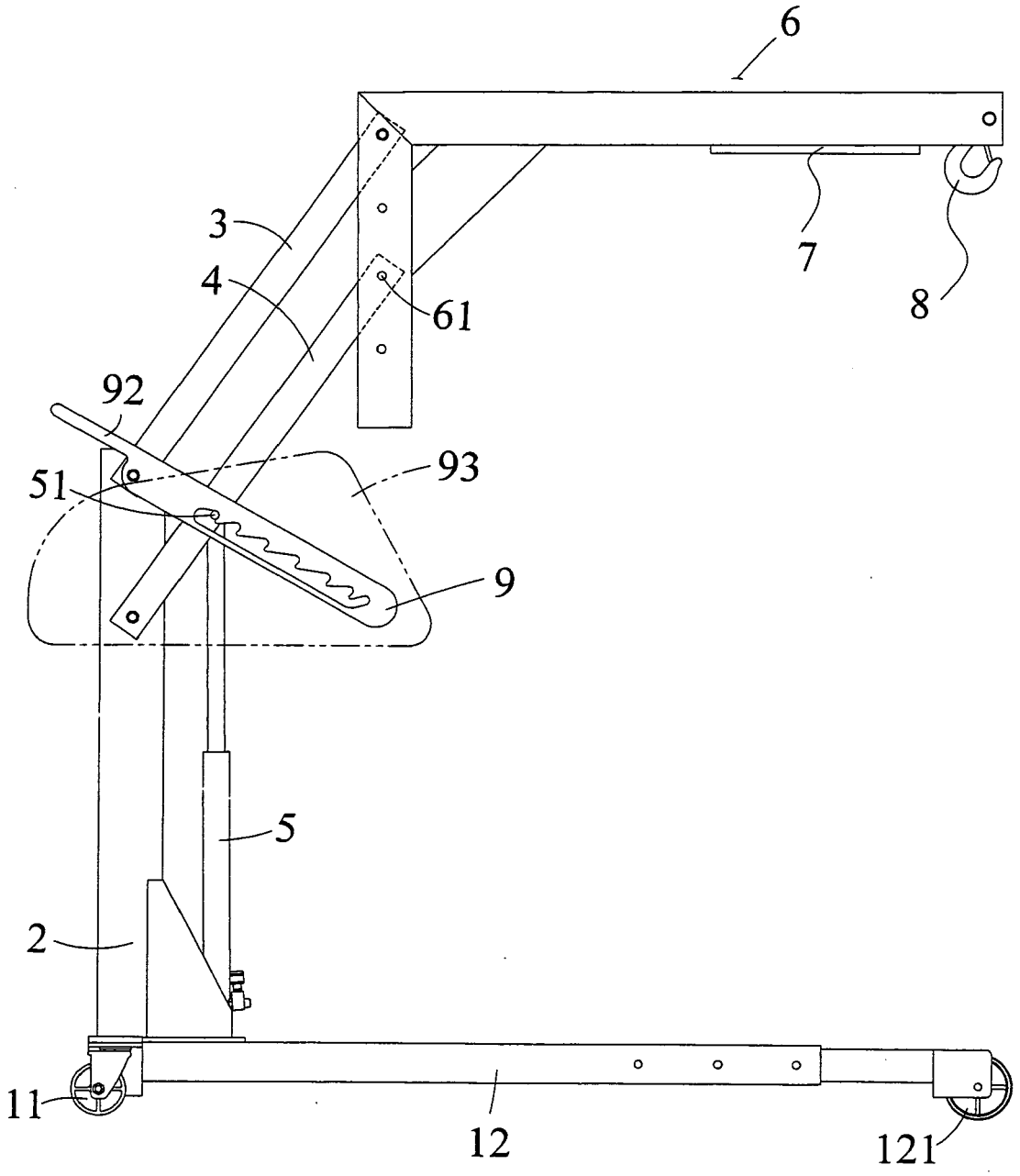

FIG. 6

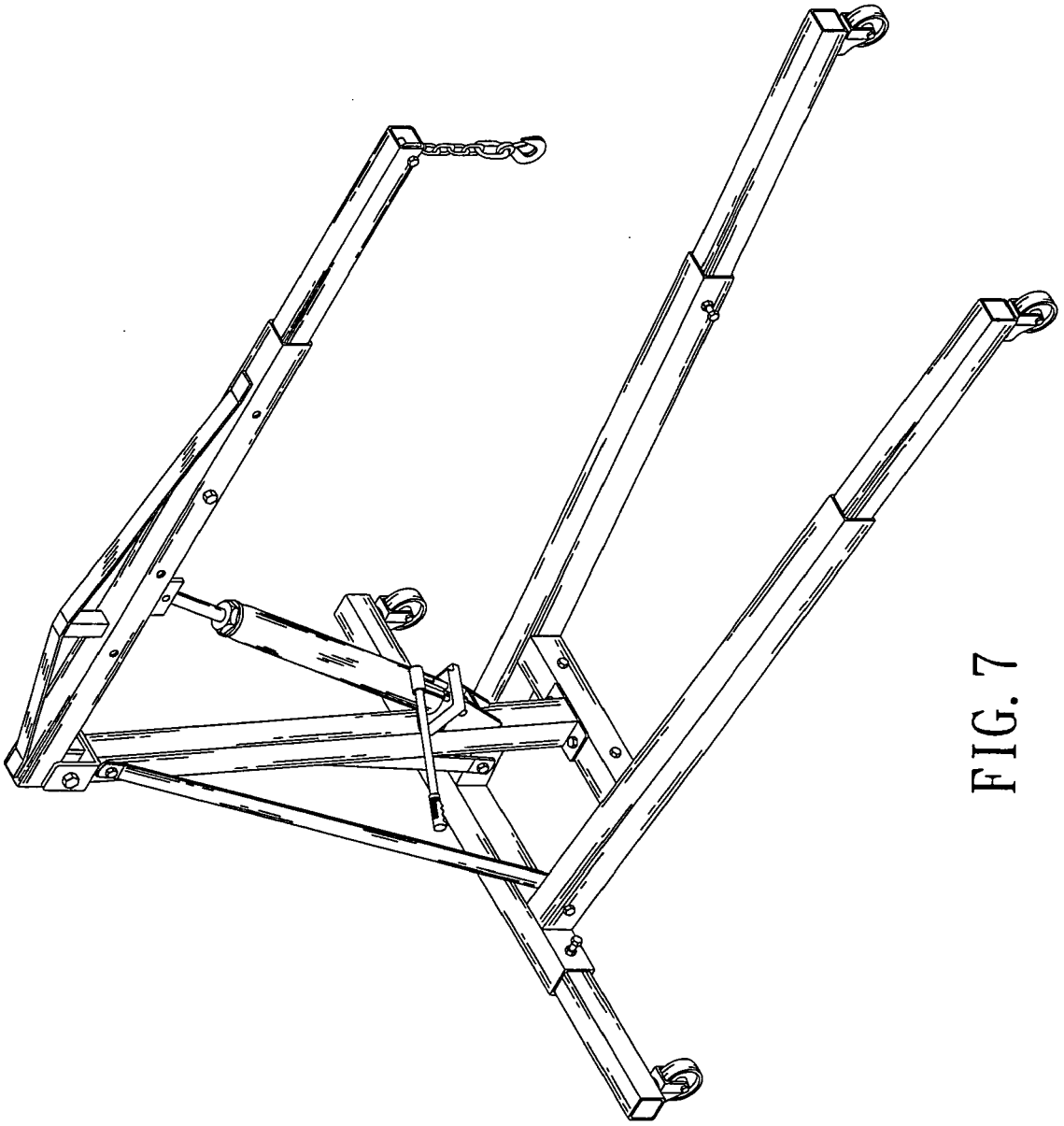

FIG. 7

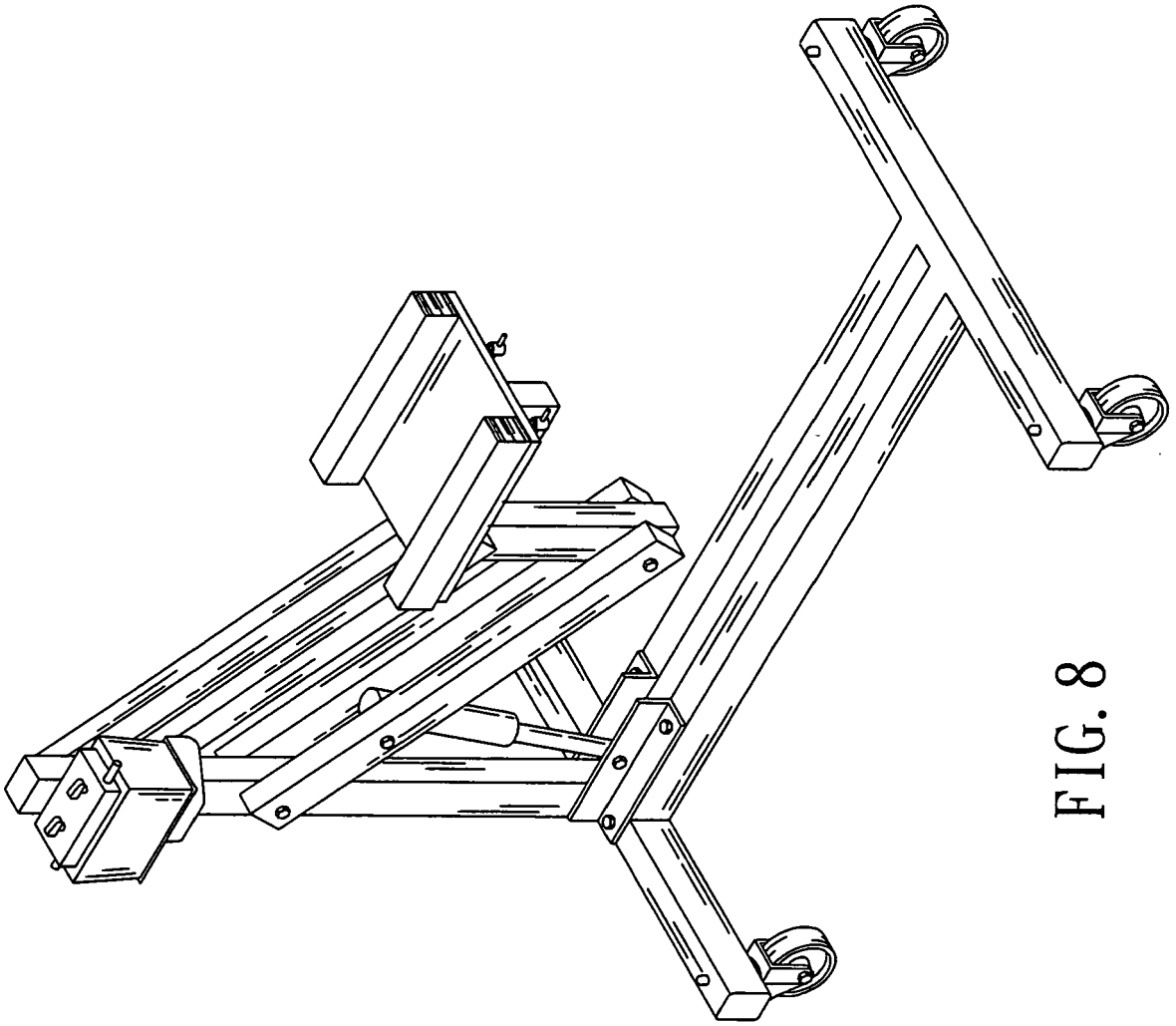

FIG. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 02 2482

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 6 457 700 B1 (HONG WEN-CHENG) 1 October 2002 (2002-10-01) * figures *	1,5	B66C23/48
X	US 3 848 749 A (ANDERSON R,US ET AL) 19 November 1974 (1974-11-19) * figures 2,3,5 *	1,5	
A	GB 2 034 408 A (RIGANTI L) 4 June 1980 (1980-06-04) * abstract; compounds 51,60 *	1	
A	US 6 296 239 B1 (SAWYER JOHN LISTER) 2 October 2001 (2001-10-02) * compound 43 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

B66C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	10 January 2006	Masset, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 02 2482

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

10-01-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6457700 B1	01-10-2002	DE 20106949 U1	25-10-2001
US 3848749 A	19-11-1974	CA 1008813 A1	19-04-1977
GB 2034408 A	04-06-1980	BE 879439 A1	15-02-1980
		DE 2941875 A1	17-04-1980
		ES 485035 A1	16-04-1980
		FR 2439159 A1	16-05-1980
US 6296239 B1	02-10-2001	AT 222524 T	15-09-2002
		AU 9176498 A	23-04-1999
		DE 69807346 D1	26-09-2002
		DE 69807346 T2	15-05-2003
		EP 1015191 A1	05-07-2000
		GB 2329613 A	31-03-1999
		WO 9916589 A1	08-04-1999

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82