(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
6 August 2009 (06.08.2009)

PCT

(10) International Publication Number
WO 2009/095533 A1

(51) International Patent Classification:
B21D 1/12 (2006.01) *B66F 7/00* (2006.01)

(21) International Application Number:
PCT/FI2009/050054

(22) International Filing Date: 20 January 2009 (20.01.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
20080065 29 January 2008 (29.01.2008) FI

(71) Applicant and
(72) Inventor: **VENÄLÄINEN, Olavi** [FI/FI]; Kiuruntie 40, FI-70340 Kuopio (FI).

(74) Agent: **PATENTTITOIMISTO PITKÄNEN OY**; PO Box 1188, FI-70211 Kuopio (FI).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(54) **Title:** STRAIGHTENING BENCH FOR VEHICLE

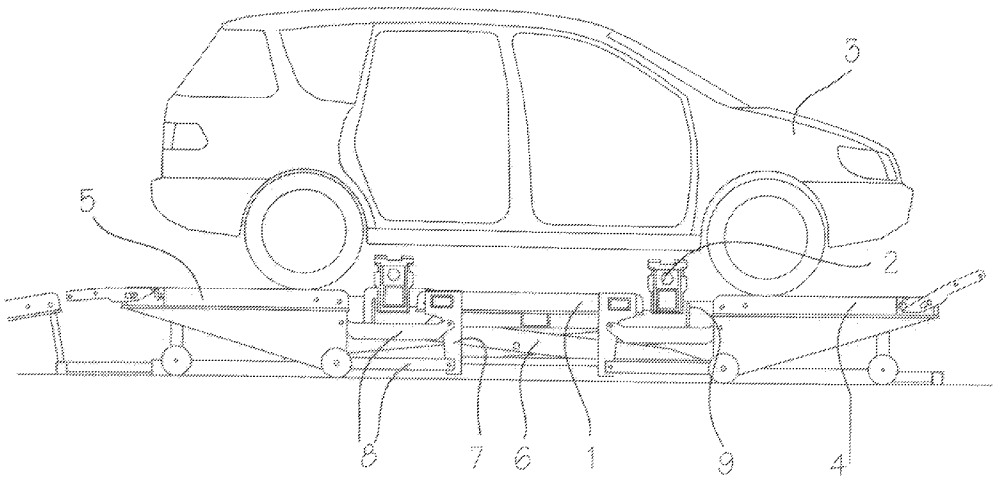


Fig. 2

(57) **Abstract:** The invention relates to a straightening bench (1) for a vehicle, which includes fasteners (2) for fastening the vehicle (3) in it, planes (4, 5) on both sides of the straightening bench and a lifting apparatus (6) for transferring the straightening bench in the height direction. The straightening bench according to the invention includes fastening devices (7, 8, 9) for fastening the planes releasably in the straightening bench, whereby they are transferable in the height direction along with the straightening bench.

WO 2009/095533 A1

STRAIGHTENING BENCH FOR VEHICLE

The invention relates to a straightening bench for a vehicle, which includes fasteners for fastening the vehicle in it, planes on both sides of the straightening bench and a lifting apparatus for transferring the straightening bench in the height direction.

Various straightening apparatuses are used in the collision repairs of vehicles when straightening the panels and other parts of their frames. In these straightening apparatuses, there is a straightening bench or equivalent in which the frame of the vehicle is fastened before starting to straighten the vehicle. In the straightening bench, there are fasteners for fastening the frame of the vehicle in it sturdily.

The straightening bench also includes planes or plates on its both sides. When using the straightening bench, the vehicle is transferred on top of the straightening bench along these planes and so that the front wheels of the vehicle are on top of the planes at the front of the straightening bench and the rear wheels of the vehicle are on top of the planes on the other side of the straightening bench. The straightening bench includes a lifting apparatus, which is used for transferring the straightening bench in the height direction. When the vehicle has been transferred on top of the straightening bench, the fasteners are transferred at the fastening points in the vehicle, the straightening bench is lifted upwards into a suitable height and fastened by means of fastening elements of the vehicle in the straightening bench. After that, the straightening bench with the vehicle is lifted into a desired working height and the straightening of the vehicle is started. Recently, the planes on both sides of the straightening bench are on the platform at the same height for the whole time of the straightening or they can be removed for the time of working.

Many vehicle workshops have relatively little space and they try to use the space as effectively as possible. Straightening repairs caused by collisions constitute a sector in the tasks of workshops. Another sector is constituted by repairs caused by the wear of vehicle parts and other mechanical faults. When repairing faults caused by the wear of vehicles or other factors, the vehicles are usually lifted with a crane or equivalent lifting apparatus upwards, whereby it is possible to work under them. Many workshops have several lifters for this purpose. However, recent straightening benches cannot be used when repairing these faults, because the vehicle cannot be lifted in a way required by these purposes.

The object of the invention is to introduce a straightening bench for a vehicle by means of which above disadvantages are eliminated. A particular object of the invention is to introduce a straightening bench for a vehicle which is more versatile and multifunctional than earlier and which can also be used as a lifter.

The object of the invention is achieved with a straightening bench for a vehicle, which is characterised by what is presented in the claims.

The straightening bench according to the invention includes fastening devices for fastening planes releasably in the straightening bench, whereby they are transferable in the height direction along with the straightening bench. Then, the straightening bench can also be used as an ordinary lifter and to lift vehicles when repairing their other faults than those related to straightening. Hence, the same device operates in all tasks of the automobile workshop. Such a multifunctional device saves money and one less lifter is required at the workshop.

In an advantageous embodiment of the invention, the fastening devices include a support fastened in the straightening bench and arms fastened in the support and the planes. Such a fastening device is simple and functional.

In an advantageous additional embodiment of the invention, the fastening devices include two arms being at a distance from each other. When there are such double arms in the fastening device, the planes stay on the same level for the whole time of transferring.

In a further advantageous additional embodiment of the invention, the fastening devices include a locking device for fastening the fastening device releasably in the straightening bench. By means of the locking device, it is possible to fasten the fastening device and the plane in the straightening bench quickly and reliably.

The invention will now be described in more detail with reference to the accompanying drawings in which

Fig. 1 shows a side view of a known straightening bench for a vehicle,

Fig. 2 shows a side view of a straightening bench for a vehicle according to the invention and a vehicle on top of it the straightening bench being in its lower position,

Fig. 3 shows a side view of the straightening bench for a vehicle according to Fig. 2 lifted upwards the vehicle being fastened for straightening work,

Figs. 4 and 5 show a side view of the straightening bench for a vehicle according to Fig. 2 lifted upwards the vehicle being on top of it for other repair work, and

Fig. 6 shows fastening devices in a larger scale and the fastening of the fastening device in the straightening bench in more detail.

Fig. 1 shows a conventional straightening bench 1 which includes fasteners 2 for fastening a vehicle in the straightening bench and a lifting apparatus 6 for lifting the straightening bench from the floor level into the working height. Furthermore, the figure shows planes 4, 5 at the front and back of the straightening bench along which planes the vehicle is transferred on top of the straightening bench. These so-called wheel planes have not been joined in any way in the straightening bench transferable in the height direction. They stay on the floor level during working or they can be moved aside for the time of working.

Also, the straightening bench 1 for a vehicle shown in Fig. 2 includes the fasteners 2 for fastening the vehicle 3 in it, the planes 4, 5 on both sides of the straightening bench and the lifting apparatus 6 for transferring the straightening bench in the height direction. Furthermore, the straightening bench shown in Fig. 2 includes fastening devices 7, 8, 9 for fastening said planes 4, 5 releasably in the straightening bench.

The fastening devices include a support 7 fastened in the straightening bench and arms 8 fastened in the support and the planes. The support extends downwards of the straightening bench. In the support are fastened at a distance from each other two arms 8. The arms have been fastened of their one end in the structure of the plane 4, 5 so that the distance of their fastening points equals the distance of the fastening points in the support. Hence, parallel supports and the so-called double arm structure are provided.

The fastening devices further include a locking device 9 for fastening the fastening device releasably in the straightening bench. Fig. 6 shows an embodiment of the locking device and it's fastening in the plane 4. Furthermore, the small figure of Fig. 6 shows the structure of the locking device in a larger scale seen from the longitudinal direction of the straightening bench i.e. from the plane 4. In this embodiment, the fastening devices include locking means 12, 13 for fastening the plane 4 releasably in the fastening device. The arms 8 of the fastening device have been fastened in a separate vertical bar at the top of which there is a sleeve 12. In the top part of the plane, there is a projecting pin, which is provided with a hole.

The end of the pin is settable through the sleeve and the plane is lockable in place by means of a locking pin 13. Thus, the plane can be easily and simply joined in the fastening device and equivalently released from it. The locking device 9, again, is fastened in the upper arm of the fastening device and extends in the cross direction of the straightening bench. In a cross beam of the straightening bench is fastened transferable in its longitudinal direction a support part 11 being around the beam which part has a pin in the longitudinal direction of the straightening bench. The locking device and the fastening device are fastened in the straightening bench by transferring the support part and the pin so that the pin goes in a groove in the locking device, whereby the pin locks the locking device in place in a way shown by the enlargement of Fig. 2.

Said fastening devices are between each plane and the straightening bench. There are four planes i.e. two at the front and two at the back.

When using the straightening bench according to the invention in repairs related to the straightening of a vehicle, the vehicle 3 is first transferred on top of the straightening bench 1 in a way shown in Fig. 2. Then, the wheels of the vehicle are on top of the planes 4 at the front and the planes 5 at the back of the straightening bench. The locking device 9 is not in the locked position. After that, the straightening bench is lifted so that the vehicle can be fastened by means of the fasteners 2 in the straightening bench. After that, the straightening bench is lifted into the working position shown in Fig. 3. The planes stay in place against the platform and are not lifted with the straightening bench.

Fig. 4 shows the vehicle 3 lifted up by means of the straightening bench 1 for other repair work. The vehicle has been transferred on top of the straightening bench so that the wheels are on top of the planes 4, 5. The planes have been locked fast in the straightening bench by means of the fastening devices and locking devices. The fasteners have been removed. When the straightening bench is lifted upwards, the planes also transfer upwards and the vehicle is lifted supported by its wheels into the working height. In other words, the straightening bench operates as a conventional lifter.

In the embodiment according to Fig. 5, the vehicle 3 has been lifted into the working height and it is supported by the beams of the straightening bench and by lifter supports 10 installed between the support points of the vehicle.

The invention is not limited to the described advantageous embodiment, but it can vary within the scope of the inventive idea presented in the claims.

CLAIMS

1. A straightening bench (1) for a vehicle, which includes fasteners (2) for fastening the vehicle (3) in it, planes (4, 5) on both sides of the straightening bench and a lifting apparatus (6) for transferring the straightening bench in the height direction, *characterised* in that the straightening bench includes fastening devices (7, 8, 9) for fastening the planes releasably in the straightening bench, whereby they are transferable in the height direction along with the straightening bench.

2. A straightening bench according to claim 1, *characterised* in that the fastening devices include a support (7) fastened in the straightening bench and arms (8) fastened in the support and the planes.

3. A straightening bench according to claim 2, *characterised* in that the fastening devices include two arms (8) being at a distance from each other.

4. A straightening bench according to any one of claims 1–3, *characterised* in that the fastening devices include a locking device (9) for fastening the fastening device releasably in the straightening bench.

5. A straightening bench according to any one of claims 1–3, *characterised* in that the fastening devices include locking means (12, 13) for fastening the plane (4) releasably in the fastening device.

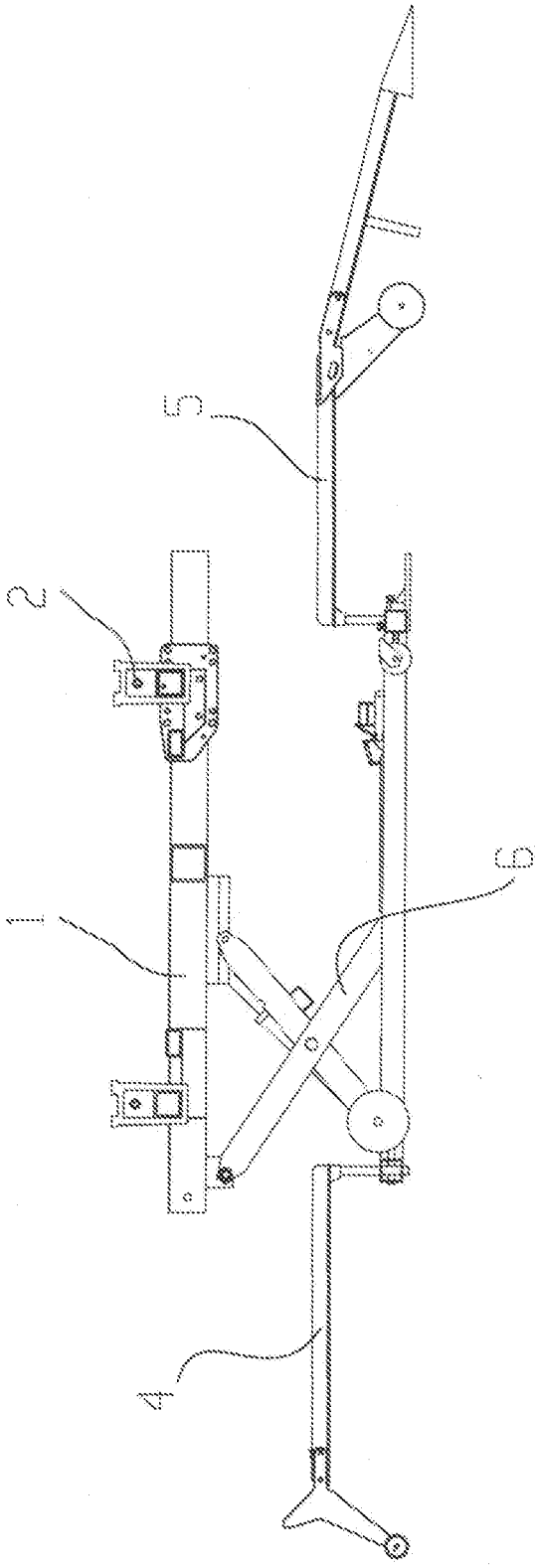


Fig. 1

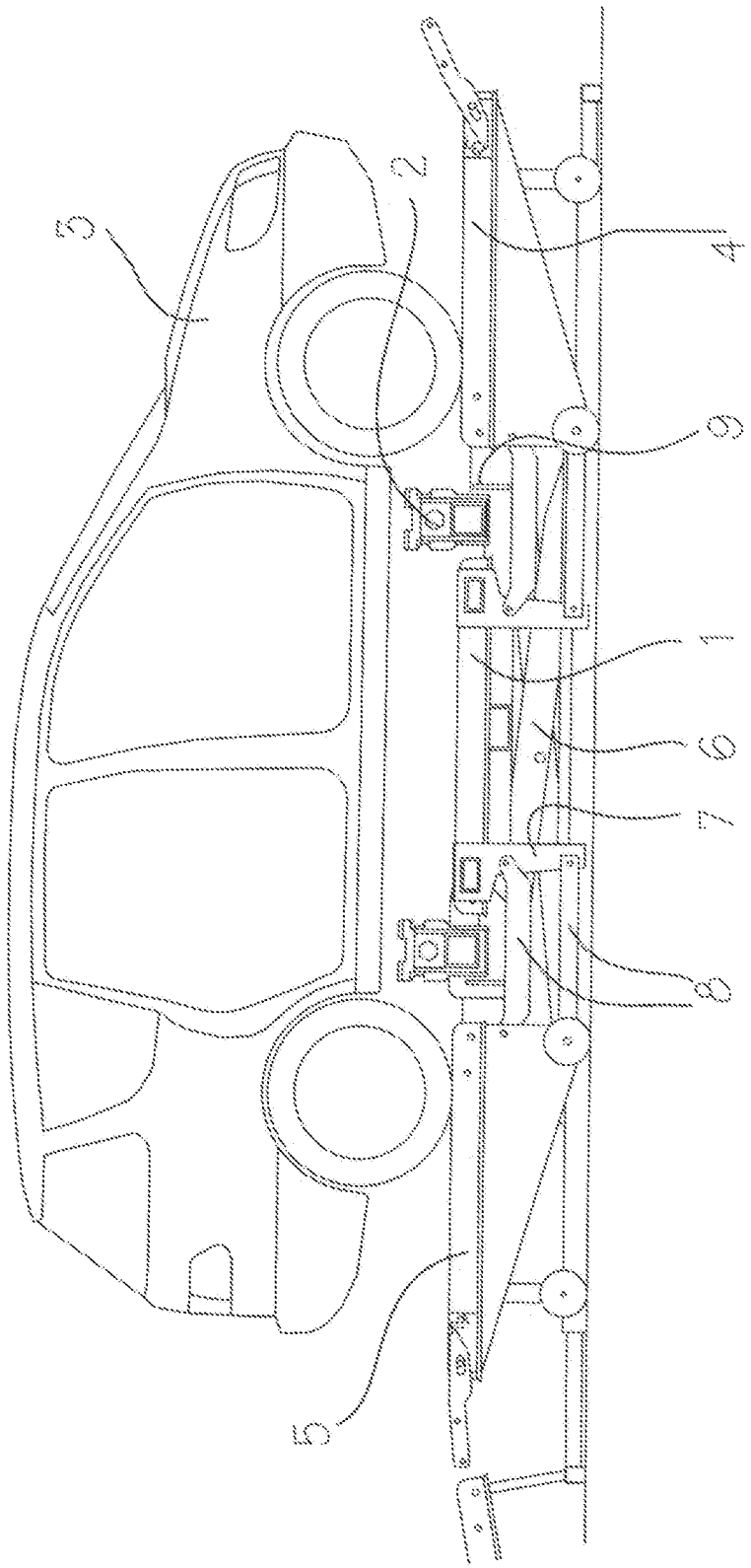


Fig. 2

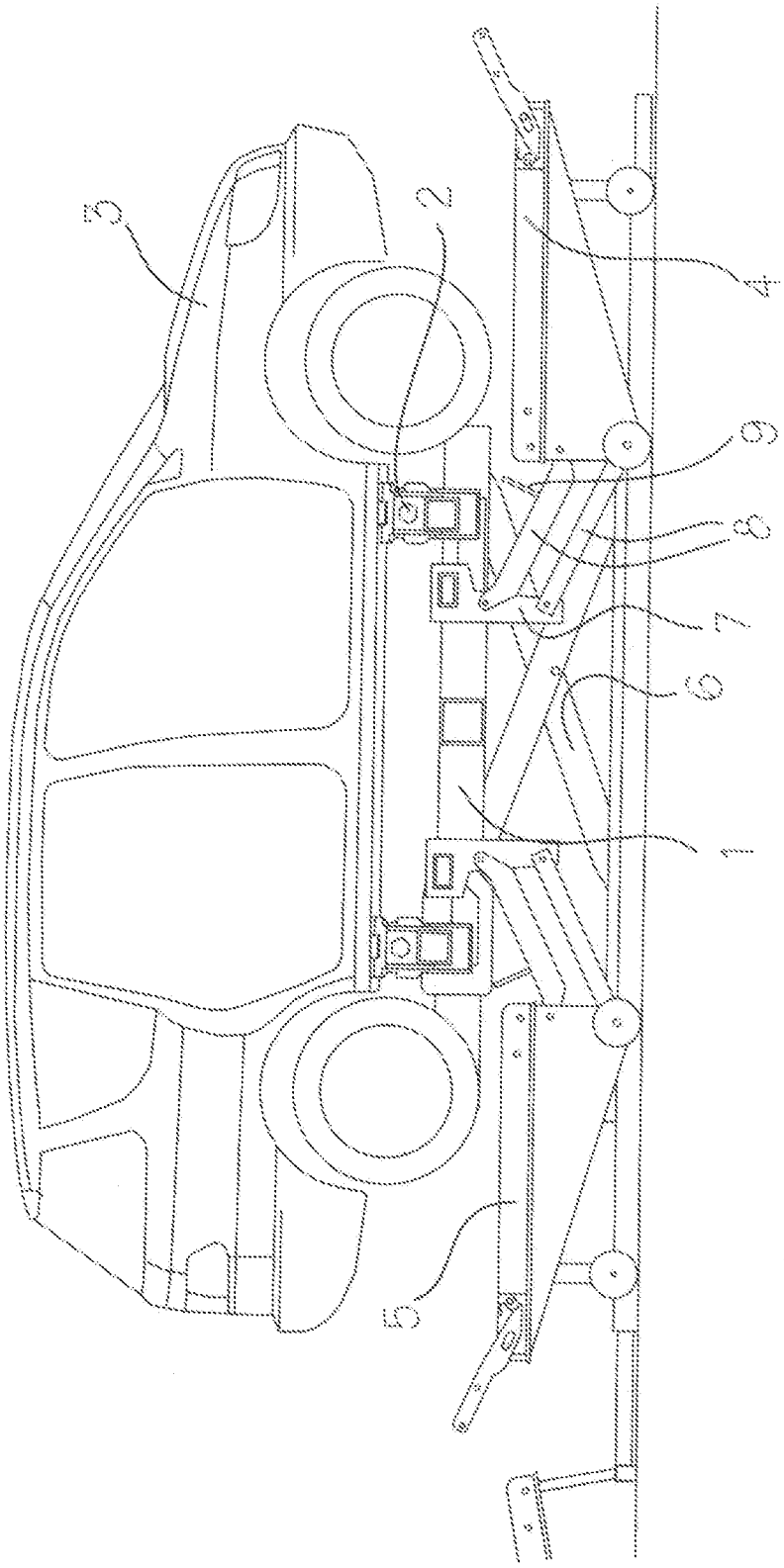


Fig. 3

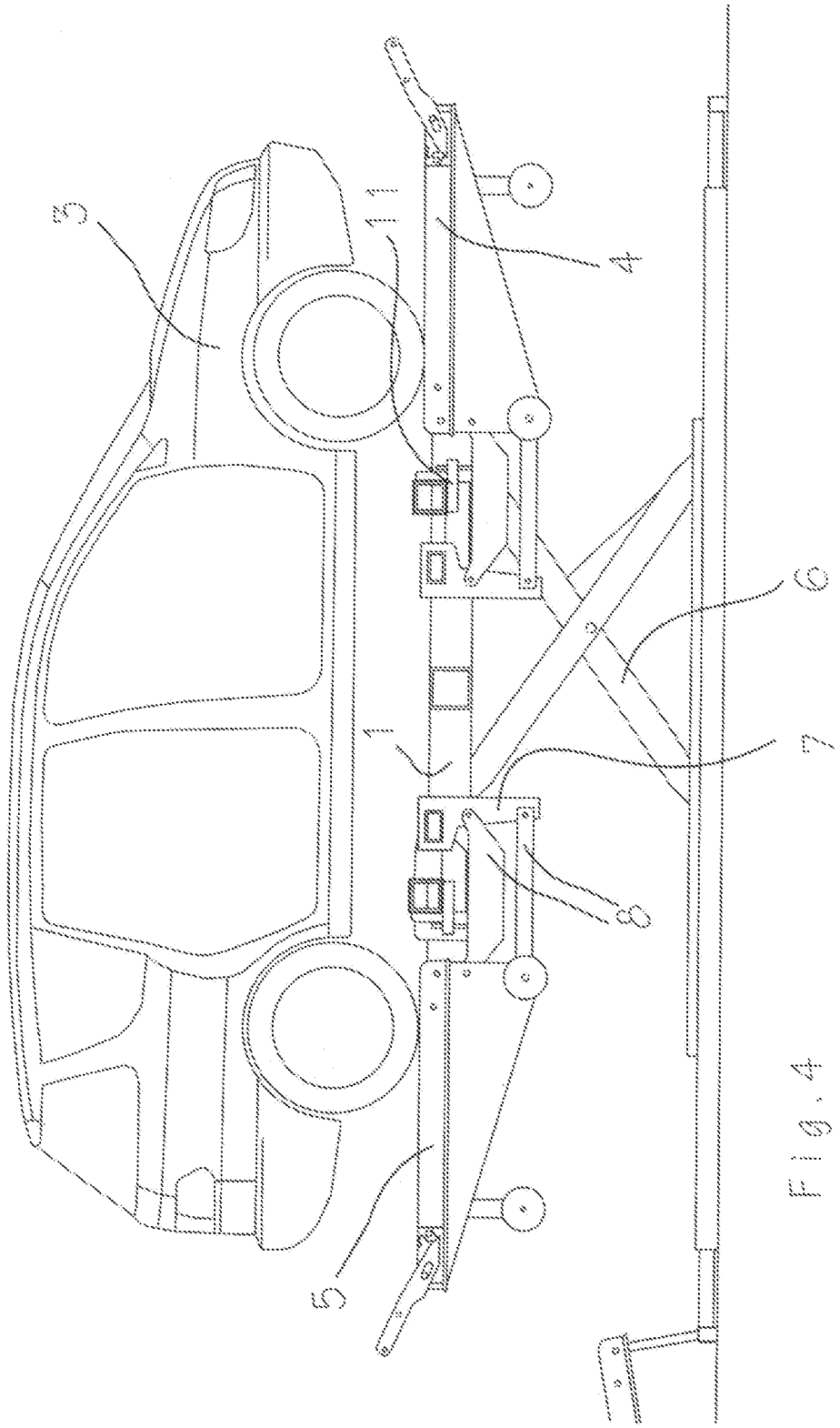


Fig. 4

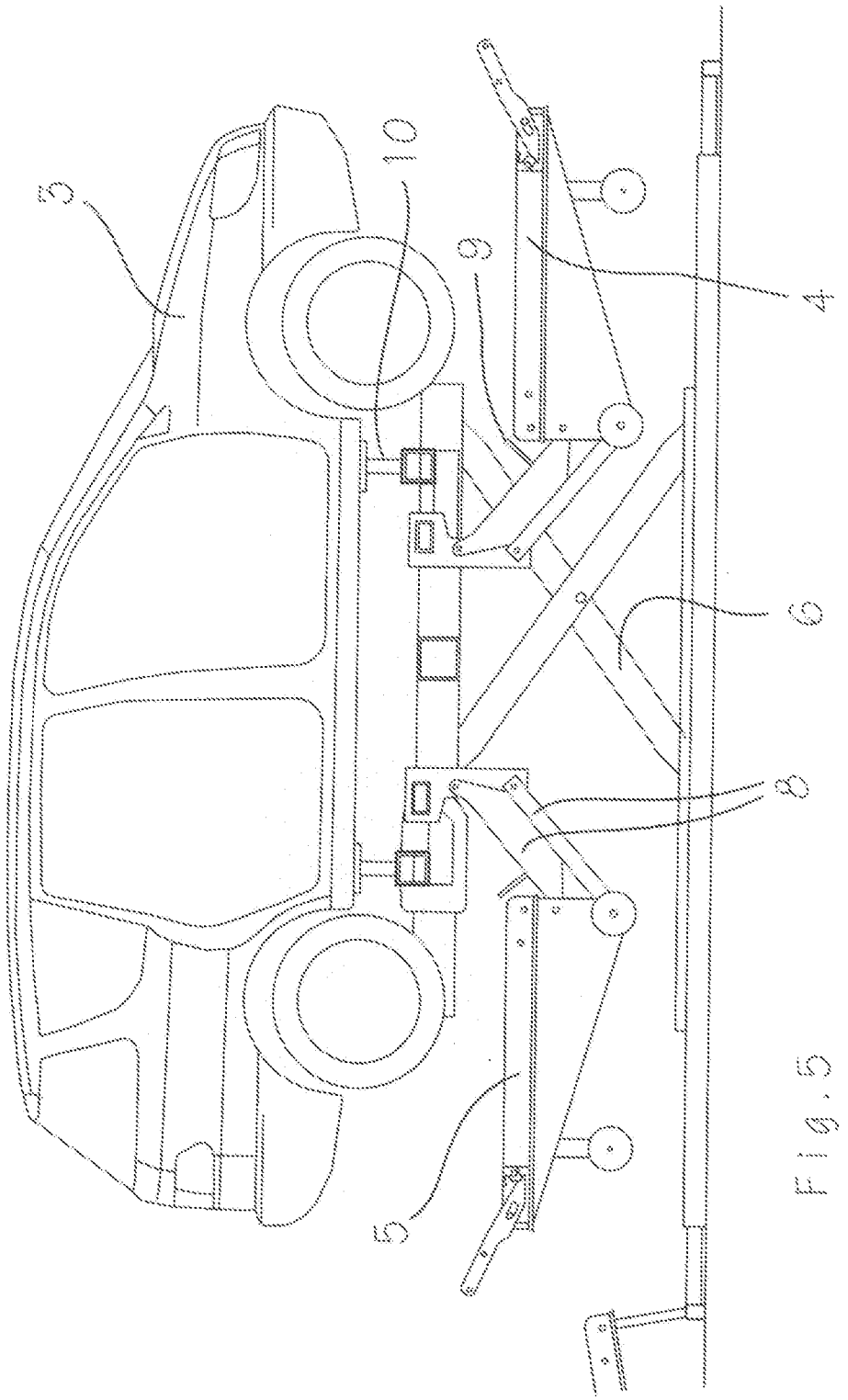


Fig. 5

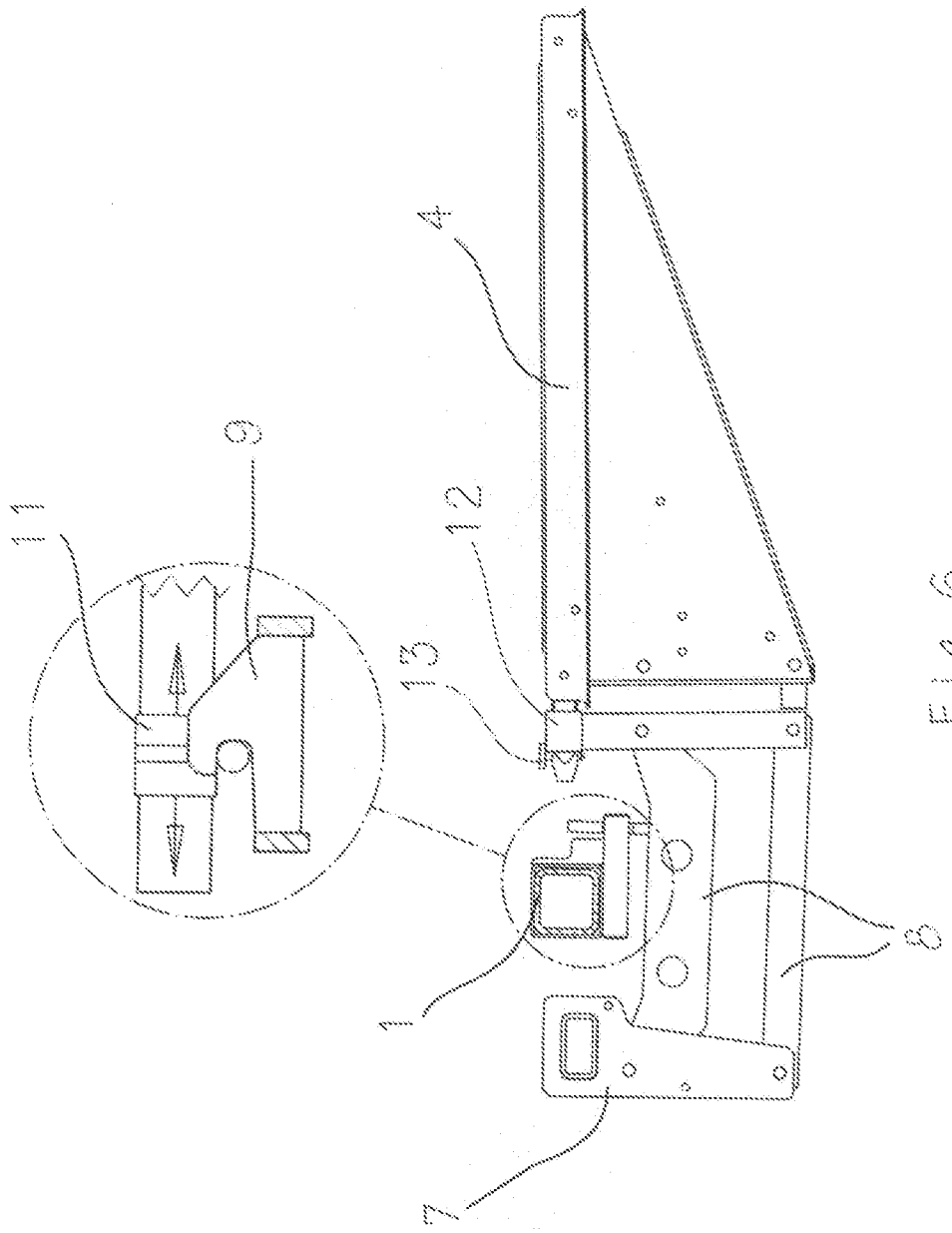


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2009/050054

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B21D, B66F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

FI, SE, NO, DK

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FI 117892 B (AUTOROBOT FINLAND) 13 April 2007 (13.04.2007), whole document	1-5
A	FI 53930 C (VENAELAEINEN TEUVO OLAVI) 11 September 1978 (11.09.1978), whole document	1-5
A	WO 9626152 A1 (YRVUM GUNNAR V) 29 August 1996 (29.08.1996), whole document	1-5
A	FI 85232 C (AUTOROBOT FINLAND) 25 March 1992 (25.03.1992), whole document	1-5
A	US 4873861 A (BERGSTROM HANS R) 17 October 1989 (17.10.1989), whole document	1-5

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 April 2009 (23.04.2009)	25 May 2009 (25.05.2009)

Name and mailing address of the ISA/FI
National Board of Patents and Registration of Finland
P.O. Box 1160, FI-00101 HELSINKI, Finland
Facsimile No. +358 9 6939 5328

Authorized officer
Matti Santero
Telephone No. +358 9 6939 500

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/FI2009/050054

Patent document cited in search report	Publication date	Patent family members(s)	Publication date
FI 117892 B	13/04/2007	RU 2007125647 A	20/01/2009
		CN 101072648 A	14/11/2007
		WO 2006061457 A1	15/06/2006
FI 53930 C	11/09/1978	None	
WO 9626152 A1	29/08/1996	AU 4851696 A	11/09/1996
		NO 950629 A	21/08/1996
FI 85232 C	25/03/1992	KR 910007124B B1	18/09/1991
		CY 1648 A	11/12/1992
		NO 880349 A	27/01/1988
		DK 38688 A	27/01/1988
		US 4905496 A	06/03/1990
		MX 169259 B	28/06/1993
		IN 166194 A1	24/03/1990
		CN 87103913 A	09/12/1987
		RU 2048323 C1	20/11/1995
		NZ 220467 A	27/07/1989
		JP 1500499T T	23/02/1989
		HU 53312 A2	28/10/1990
		WO 8707190 A1	03/12/1987
		EP 0268657 A1	01/06/1988
		CA 1278499 C	02/01/1991
		AU 7517487 A	22/12/1987
		AU 592204B B2	04/01/1990
US 4873861 A	17/10/1989	None	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2009/050054

CLASSIFICATION OF SUBJECT MATTER

Int.Cl.
B21D 1/12 (2006.01)
B66F 7/00 (2006.01)