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

(11) **EP 2 067 900 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
10.06.2009 Bulletin 2009/24

(21) Application number: **07122682.3**

(22) Date of filing: **07.12.2007**

(51) Int Cl.:
E02F 9/08 *(2006.01)* ***B66C 23/72*** *(2006.01)*
B66C 23/78 *(2006.01)* ***B60S 9/00*** *(2006.01)*

(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 MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(71) Applicant: **Caterpillar, Inc.**
Peoria, IL 61629 (US)

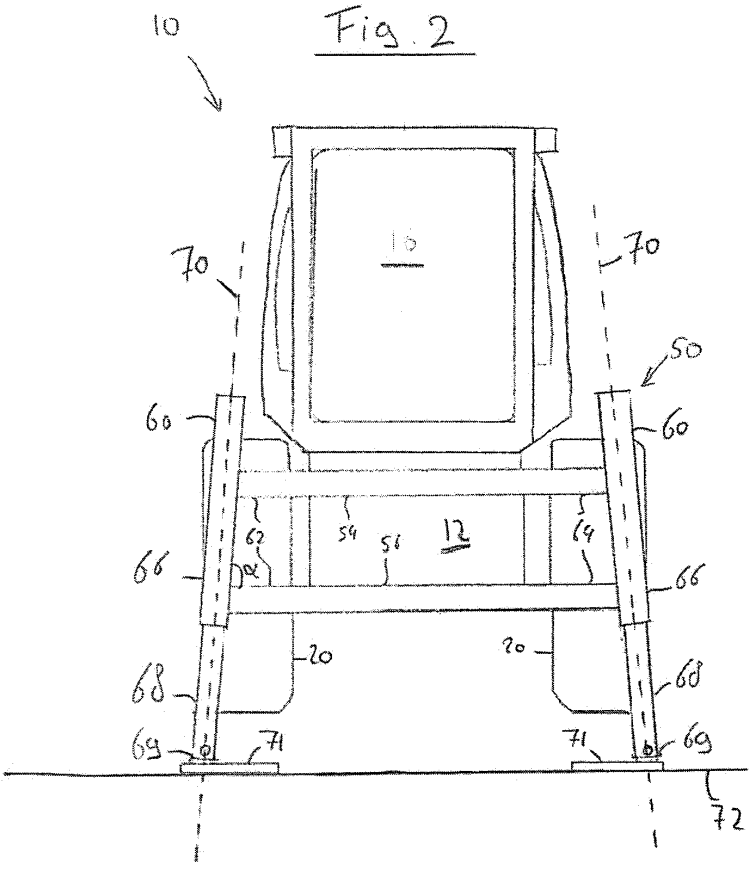
(72) Inventor: **Sheehan, Paul A.**
Leicester (GB)

(74) Representative: **Hatzmann, Martin**
Vereenigde
Johan de Wittlaan 7
2517 JR Den Haag (NL)

(54) Machine stabilizer arrangement

(57) A machine stabilizer arrangement (50) for stabilizing a machine (10) on a surface (72). First and second surface contact portions (71) associated with first and second stabilizer legs (60) respectively are laterally spaced apart. Each of said first and second stabilizer legs (60) are configured such that the associated surface contact portion (71) is linearly moveable from a first position to a second position such that the lateral spacing between the first and second surface contact portions (71) is greater when both surface contact portions are in their second positions than when both surface contact portions are in their first positions.

Fig. 2



EP 2 067 900 A1

Description

Technical Field

[0001] The current disclosure relates to stabilizer arrangements and in particular, but not exclusively, to machine stabilizer arrangements for stabilizing a machine on a surface.

Background

[0002] Machines such as mobile construction machines may be provided with arrangements for stabilizing and/or leveling a machine. For example, a construction machine such as a backhoe loader is commonly equipped with two work arms for operations such as loading, lifting and digging. A first work arm may be positioned at the front of the machine and tends to be used for operations wherein the machine is mobile such as digging and loading cycles where the machine digs up a material, which is then being driven to for example a lorry awaiting loading. A second work arm may be fitted to the rear of the machine and tends to be used during operations in which the machine remains static such as for example trenching or precision excavation. During such static operations the machine is often supported by a stabilizer arrangement. Stabilizers provided on the machine are then brought into contact with a support surface and the machine may be partially lifted. This may serve several purposes. For example, excavations may generate large downward forces on the machine tyres. To alleviate this the stabilizers may be employed such that the load on the tyres is partially or wholly relieved and transferred onto the stabilizer arrangement. Another example of how the stabilizers my be employed is to level the machine. the machine may not be on level ground which may for example result in an undesirable trench arrangement or an unsafe machine condition. By independently controlling one, two or more stabilizer legs, the machine may then be brought level to overcome the aforementioned issues.

[0003] In general two stabilizer arrangements are known in the art. Firstly, the so-called pivot style arrangement whereby the stabilizer leg may be folded between raised and lowered positions, which tend to correspond to transport and work positions respectively. Secondly there is the side shift arrangement wherein the stabilizer legs are arranged at either end of a so-called H-frame from which they are raised and lowered via a telescopic action rather than via folding pivot-style system. Both systems have their particular advantages and disadvantages associated therewith, but they share in common that they may be subject to strict road and other legal regulations in the various territories in which the machines are sold.

[0004] One particular regulation may be the maximum width the machine may have whilst on the public road. To satisfy road standards the machine width may have to be limited to for example a maximum of 2150 mm. However, from a stability point of view it may be desirable to have a greater width than what is allowed under the road regulations. Such conflicting requirements may lead to compromises in machine design and functionality or the machine may have to be equipped with complex and costly arrangements.

[0005] This disclosure is aimed at overcoming or alleviating at least some of the problems associated with the prior art.

Summary of the Invention

[0006] In a first aspect a machine stabilizer arrangement for stabilizing a machine on a surface is disclosed. The arrangement includes laterally spaced apart first and second surface contact portions associated with first and second stabilizer legs respectively. Each of the first and second stabilizer legs is configured such that the associated surface contact portion is linearly moveable from a first position to a second position such that the lateral spacing between the first and second surface contact portions is greater when both surface contact portions are in their second positions than when both surface contact portions are in their first positions.

[0007] In another aspect there is disclosed a machine having a body, at least one stabilizer leg connected to the body for stabilizing said machine on a surface. The stabilizer leg has an end portion for selectively contacting the surface and the stabilizer leg is configured to extend along a linear axis from a retracted position to an extended position thereby moving the end portion away from the body in a generally downward and laterally outwards direction.

[0008] In yet another aspect there is disclosed a method of changing the width of a machine having a stabilizer leg. The method includes positioning a machine having a first machine width on a rest surface and extending a stabilizer leg along a single linear extension axis in a direction of the rest surface and generally sideways relative to the machine thereby achieving a second machine width.

[0009] Other features and aspects of this disclosure will be apparent from the following description and the accompanying drawings.

Brief Description of the Drawings

[0010] Fig. 1 is a schematical representation of an exemplary machine suitable for use in combination with an embodiment of the current disclosure.

[0011] Fig. 2 is a schematical representation of a rear view of the machine of Fig. 1 with the stabilizer legs extended.

[0012] Fig. 3 is similar to Fig. 2 except for the stabilizer legs being retracted.

Detailed Description

[0013] Referring to Fig.1 an embodiment of the current disclosure is shown in context of a construction machine known as a backhoe loader. It is to be understood however that the embodiment of Fig. 1 is exemplary only and that the concept is equally applicable to any other suitable machine such as for example excavators and cranes. The machine 10 may have a body 12. The body 12 may be a single piece or may include a set of subassemblies and or components. For example, the body 10 may include a frame 14, an operator platform 16, a pair of front wheels 18 and a pair of rear wheels 20. The body 12 may provide a first connection 21 for connecting a first work arm 22. The first work arm 22 may be a front mounted loader arm provided with any suitable attachment 24 such as for example a work tool like a bucket. The body 12 may further provide a second connection for connecting a second work arm 30. The second work arm 30 may be rear mounted and may for example include a boom 32, a stick 34 and a linkage 36 for connecting to any suitable attachment 38 such as for example a work tool like a bucket. A hydraulic arrangement 40 may include multiple hydraulic components such as for example a plurality of cylinders 42 and 44. The hydraulic cylinders 42 and 44 may be controlled by an operator from the operator platform 16 via any suitable arrangement so as to operate the attachments 24 and 38 in any desirable manner.

[0014] The machine 10 may further include a stabilizer arrangement 50. In one embodiment the stabilizer arrangement may be used for leveling the machine 10. The stabilizer arrangement 50 may form part of the body 12, the second work arm 30, be an independent subassembly or a combination of any thereof.

[0015] Figs. 2 and 3 show a schematic simplified view of the rear end of the machine 10. All components of the work arm 30 have been omitted for clarity. The stabilizer arrangement 50 is also simplified for clarity and may have a frame arrangement generally designated with the numeral 52. The frame arrangement may include an upper cross member 54 and a lower cross member 56. Additional cross members may be provided if preferred. One function of the cross members 54 and 56 may be to carry the second work arm 30. The second work arm 30 may be connected to the cross members 54 and 56 via a so-called side-shift arrangement so as to enable the second work arm 30 to selectively slide over the cross members 54 and 56. An operator can select a suitable position of the second work arm 30 relative to the cross members 54 and 56 to match the requirements of the job. The sliding movement of the second work arm 30 relative to the cross members 54 and 56 may for example be achieved by activation of hydraulic cylinders (not shown) coupled between the second work arm 30 and a component of the stabilizer arrangement 50 or the body 12.

[0016] In one embodiment the stabilizer arrangement 50 may include at least one stabilizer leg 60. In one embodiment two stabilizer legs 60 are used, which may be spaced apart and located at, or adjacent to, opposite lateral ends 62 and 64 of the frame arrangement 52. Each stabilizer leg 60 may have an outer portion 66 and an inner portion 68 that can slide relative to one another along a linear axis 70. The outer portion 66 may be fixed to the cross members 54 and 56 whilst the inner portion 68 may be slideably engaged with the outer portion 66. An actuator (not shown) such as a hydraulic cylinder may provide the force for moving the inner portion 68 so as to extend and retract its associated stabilizer leg 60. It is to be understood that the terms extending and retracting encompasses partially extending and partially retracting respectively. Each inner portion 68 may have and end portion 69 that may include a surface contact portion 71 for contacting the rest surface 72. It is to be understood that the inner and outer portions 68, 66 may be reversed such that the inner portion is fixed relative to the cross member 54 and 56.

[0017] In one embodiment at least one of the stabilizer legs 60 may be angled such that the stabilizer leg 60 and hence the axis of the stabilizer leg 60 is pointing in a direction downwards and laterally outwards away from said body. In other words, during extension, the stabilizer leg extends simultaneously in a generally downwards and sideways direction. During retraction the stabilizer leg retracts simultaneously in a generally upwards and inwards direction. In an embodiment with two stabilizer legs 60 it can be said that the stabilizer legs 60 and the cross members 54 and 56 form a generally trapezoidal shape whereby the cross members 54 and 56 run substantially parallel to one another and the stabilizer legs 60 are angled such that the lateral distance between the stabilizer legs 60 is greater at the height of the lower cross member 56 than it is at the height of the upper cross member 54. In one embodiment at least one stabilizer leg 60 may be angled relative to at least one of the cross members, for example the lower cross member 56, such that an angle α between the associated linear axis 70 and the lower cross member 56 is different from 90°. In one embodiment the angle α between the associated linear axis 70 and the lower cross member 56 is substantially different from 90°. In one embodiment the angle α may be between 3° and 20° In one embodiment the angle may for example be 7°. It is to be understood that the angle β between the linear axis 70 and the surface 72 may substantially correspond to the angle α when the respective cross member and the rest surface 72 are substantially parallel to one another.

Industrial Applicability

[0018] The stabilizer arrangement 50 for a machine such as machine 10 may be used for changing the overall width of the machine 10 depending on the prevailing conditions, During roading conditions may for example be governed by road regulations, limiting the maximum allowable width of the machine 10. However, during work

operations such as digging the conditions may depend more on stability requirements thereby utilizing a greater machine width than that allowed during roading.

[0019] In one exemplary method of operation the machine 10 may travel to a job site over the public roads. During roading, the operator may select to position the stabilizer leg 60, or as the case may be, stabilizer legs 60, in a first position which may be an at least partially retracted position, the machine thereby having a first machine width. Once on location, the operator may position the machine on the rest surface 72 whilst the machine 10 still has the first machine width. Before commencing digging, the operator may desire to at least partially extend the stabilizer leg or legs 60 to a second position so as to stabilize the machine 10, for example, by at least partially lift or level the machine 10 and/or take load of the tyres 20. Due to the linear axis 70 being angled, extending the stabilizer leg 60 along the single linear extension axis 70 results in the stabilizer leg 60 and in particular the relevant end portion 69 and surface contact portion 71 traveling in a direction generally towards the rest surface 72 and generally sideways away from the machine 10. The sideways travel component results in achieving a greater machine width, and where two stabilizer legs 60 are provided, in a greater lateral distance between the surface contact portions 71 as compared to when the stabilizer legs 60 are in their first position. When it is desirable to move the machine 10, the stabilizer legs 60 may be moved back from their second position to their first position thereby once again reducing overall machine width.

[0020] Although the preferred embodiments of this invention have been described herein, improvements and modifications may be incorporated without departing from the scope of the following claims.

Claims

1. A machine stabilizer arrangement for stabilizing a machine on a surface, comprising:

   laterally spaced apart first and second surface contact portions associated with first and second stabilizer legs respectively, each of said first and second stabilizer legs being configured such that the associated surface contact portion is linearly moveable from a first position to a second position such that said the lateral spacing between the first and second surface contact portions is greater when both surface contact portions are in their second positions than when both surface contact portions are in their first positions.

2. A machine stabilizer arrangement according to claim 1, wherein said first and second stabilizer legs are angled downwards and outwards relative to one another.

3. A machine stabilizer arrangement according to any of the preceding claims, wherein each of said first and second stabilizer legs comprises an outer portion and an inner portion linearly slideable arranged therein such that movement of said outer and inner portions relative to one another results in a change in length of the associated stabilizer leg.

4. A machine stabilizer arrangement according to any of the preceding claims, wherein said stabilizer arrangement further comprises a frame arrangement having at least two cross members and said stabilizer legs are located at, or adjacent to, opposite lateral ends of said cross members.

5. A machine stabilizer arrangement according to claim 4, wherein said at least two cross-members include an upper cross member and a lower cross member running substantially parallel to said upper cross member, which together with said first and second stabilizer legs form a generally trapezoidal shape such that the lateral distance between the stabilizer legs is greater at the height of the lower cross member than at the height of the upper cross member.

6. A machine stabilizer arrangement according to any of claims 4-5, wherein at least one of said stabilizer legs defines a linear axis 70, said linear axis 70 and at least one of said upper and lower cross members intersecting at an angle in the range of 3°-7°.

7. A machine comprising:

   a body;
   at least one stabilizer leg connected to said body for stabilizing said machine on a surface, the stabilizer leg having an end portion for selectively contacting the surface, the stabilizer leg being configured to extend along a linear axis from a retracted position to an extended position thereby moving said end portion away from said body in a generally downward and laterally outwards direction.

8. A machine according to claim 7, wherein said at least one stabilizer leg includes first and a second stabilizer legs and said machine further includes a work arm and a frame arrangement for slideably carrying said work arm thereon, said frame arrangement having an upper cross member and a lower cross member, wherein said first and second stabilizer legs are positioned at opposite lateral ends of said upper and lower cross members.

9. A machine according to claim 8, wherein said upper cross member and a lower cross member running

substantially parallel to one another and together with said first and second stabilizer legs form a generally trapezoidal shape such that the lateral distance between the first and second stabilizer legs is greater at the height of the lower cross member than at the height of the upper cross member.

10. A method of changing the width of a machine having a stabilizer leg comprising:

positioning a machine having a first machine width on a rest surface;
extending a stabilizer leg along a single linear extension axis in a direction of the rest surface and generally sideways relative to the machine thereby achieving a second machine width.

11. The method of claim 10, further including retracting said stabilizer leg to return said machine to said first machine width.

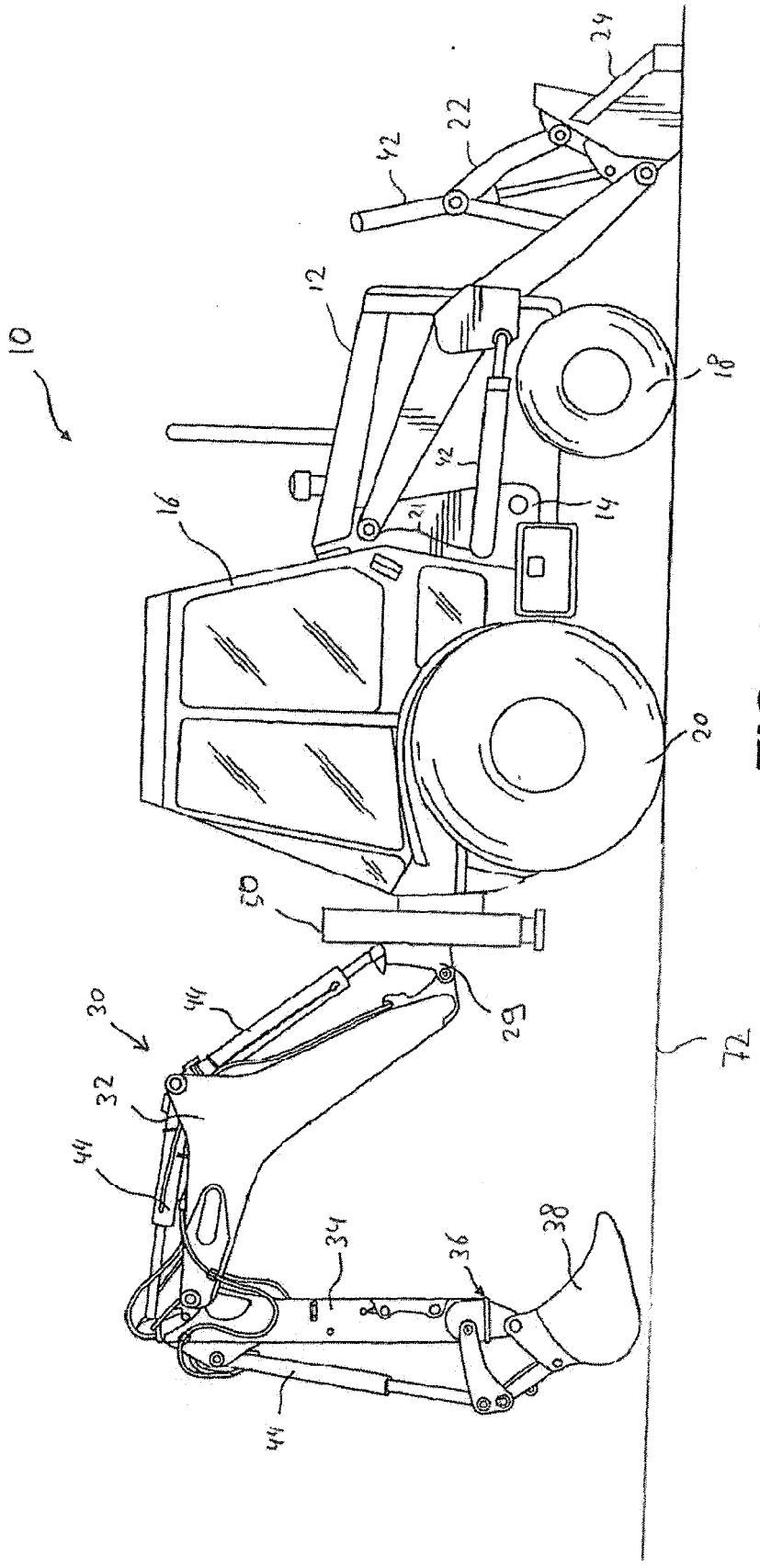


FIG. 1

Fig. 3

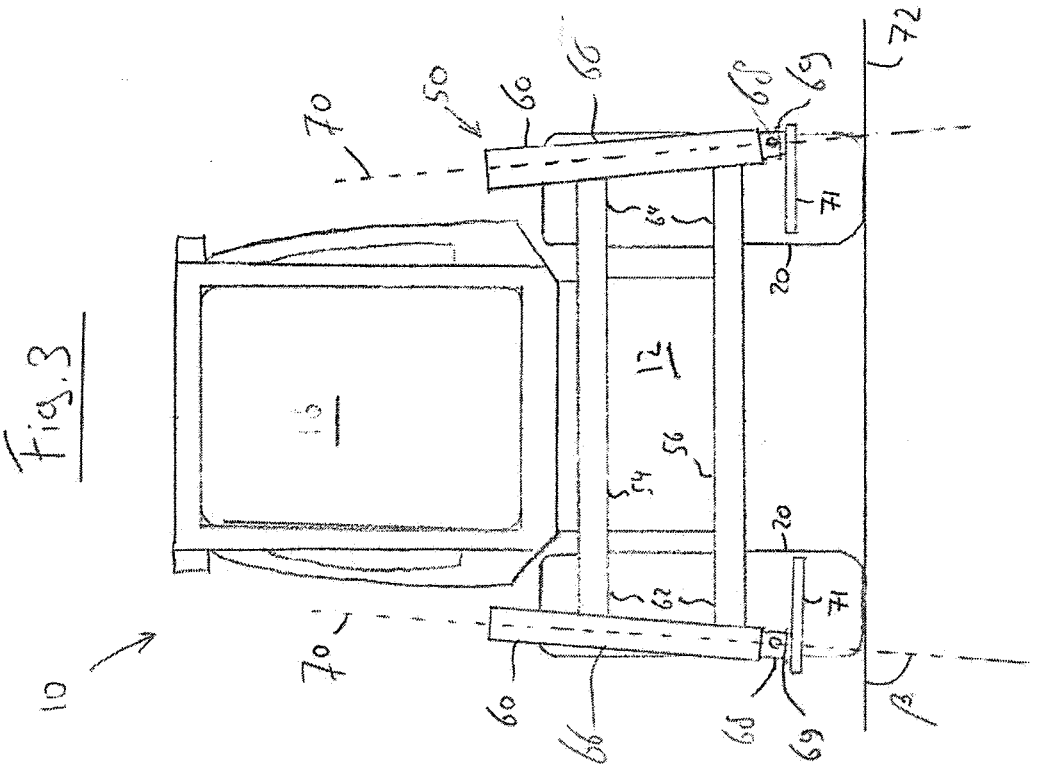
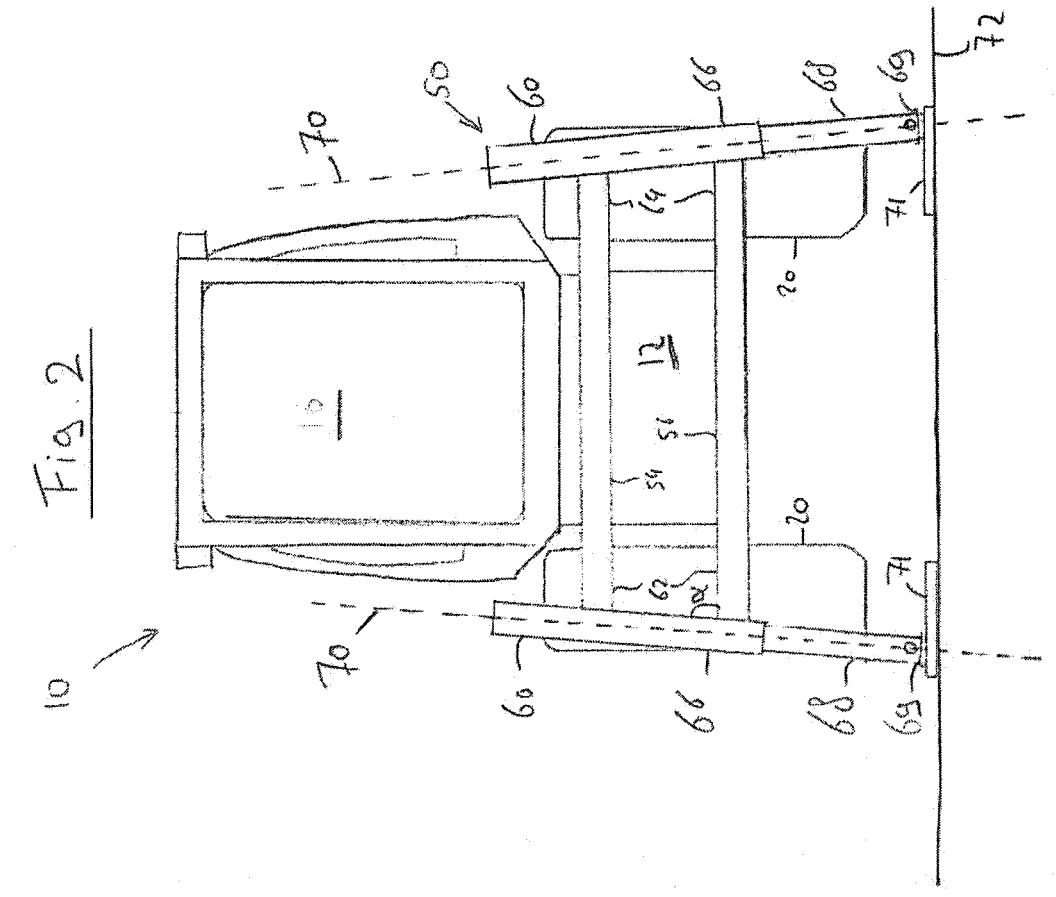

10
70
50
60
66
68
69
72
71
20
12
54
56
62
70'
60
66
68
69
β

Fig. 2


10
70
50
60
66
68
69
72
71
20
12
54
56
62
70'
60
66
68
69

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 12 2682

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 Y	US 3 033 380 A (DORKINS EVAN E) 8 May 1962 (1962-05-08) * column 1, line 69 - column 2, line 23; figures 1,2 *	1-5,7, 10,11 6,8,9	INV. E02F9/08 B66C23/72 B66C23/78 B60S9/00
X Y	WO 99/65726 A (SCHAENZER DENNIS [US]) 23 December 1999 (1999-12-23) * figures 1,12,14 *	1-5,7, 10,11 6,8,9	
X	US 3 495 727 A (LONG WILLIAM R) 17 February 1970 (1970-02-17) * column 2, line 50 - line 64; figures 1,2 *	1-3,7, 10,11	
X	US 2006/104785 A1 (VACHON ROGER [CA]) 18 May 2006 (2006-05-18) * paragraph [0020]; figures 1,3 *	1-3,7, 10,11	
Y	GB 1 305 378 A (STANLEY PAUL SADLER) 31 January 1973 (1973-01-31) * page 1, line 12 - line 25; figure 1 * * page 1, line 73 - page 2, line 4 *	8	TECHNICAL FIELDS SEARCHED (IPC) E02F B60S B66C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 April 2008	Bultot, Coralie

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 07 12 2682

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.

02-04-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3033380 A	08-05-1962	NONE	
WO 9965726 A	23-12-1999	NONE	
US 3495727 A	17-02-1970	NONE	
US 2006104785 A1	18-05-2006	CA 2479918 A1	20-03-2006
GB 1305378 A	31-01-1973	NONE	

EPO FORM P0459

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