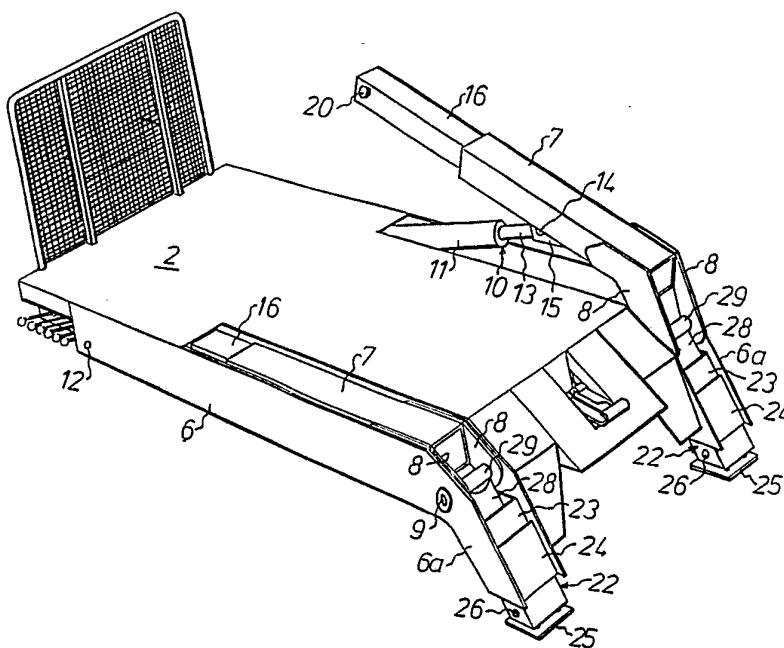




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification<sup>4</sup> : <b>B60P 1/48, 1/64, 1/54</b></p>	<p><b>A1</b></p>	<p>(11) International Publication Number: <b>WO 89/06611</b> (43) International Publication Date: 27 July 1989 (27.07.89)</p>
<p>(21) International Application Number: PCT/SE89/00007 (22) International Filing Date: 12 January 1989 (12.01.89) (31) Priority Application Number: 8800129-2 (32) Priority Date: 18 January 1988 (18.01.88) (33) Priority Country: SE</p> <p>(71) Applicant (for all designated States except US): LESS- EBO HYDRAULIK AB [SE/SE]; Box 35, S-360 50 Lessebo (SE).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only) : LAINE, Kari [SE/ SE]; Odengatan 12B, S-360 50 Lessebo (SE).</p> <p>(74) Agent: AWAPATENT AB; Box 5117, S-200 71 Malmö (SE).</p>		<p>(81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BG, BJ (OAPI patent), BR, CF (OAPI patent), CG (OAPI patent), CH, CH (Euro- pean patent), CM (OAPI patent), DE, DE (Euro- pean patent), DK, FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (Euro- pean patent), MC, MG, ML (OAPI patent), MR (OA- PI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI pa- tent), SU, TD (OAPI patent), TG (OAPI patent), US.</p> <p><b>Published</b> With international search report. In English translation (filed in Swedish).</p>

## (54) Title: LIFTING DEVICE IN A GOODS-CARRYING VEHICLE



## (57) Abstract

A lifting device in a goods-carrying vehicle with a load-supporting platform (2) comprises two lifting arms (7) mounted each on one side of the load-supporting platform and each having a cylinder assembly (10) for pivoting the respective lifting arm about a transverse shaft (9). Each lifting arm (7) is, by means of the associated cylinder assembly (10), pivotable between a rear lifting position and a front resting position. The two pairs of lifting arm (7) and cylinder assembly (10) are mounted each on one side of the load-supporting platform (2), such that both the lifting arm and the cylinder assembly are positioned below or on a level with the load-supporting platform (2), when the lifting arm has taken its front resting position.

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LIFTING DEVICE IN A GOODS-CARRYING VEHICLE

The present invention relates to a lifting device in a goods-carrying vehicle with a load-supporting platform, said device having two lifting arms mounted each on one side of the load-supporting platform and each having a cylinder assembly for pivoting the respective lifting arm about a transverse first shaft, one of the piston-rod unit and cylinder unit of said cylinder assembly being articulated about a transverse second shaft and the other of said units being articulated to said lifting arm about a transverse third shaft, each lifting arm being pivotable by means of the associated cylinder assembly between a rear lifting position and a front resting position.

Such lifting devices which are sometimes called tailgate lifts, are available in many different designs. The prior art lifting devices are used for handling relatively heavy units, such as containers and cable drums. When the lifting arms of the prior art lifting devices have taken their front resting position which is the lowest position in which the lifting arms are directed forwards, their cylinder assemblies which usually are hydraulic, and their lifting arms are positioned above the vehicle platform or a corresponding load-supporting surface. This is no disadvantage, when the vehicle is used only for transporting containers and the like which are loaded and unloaded from behind by means of a tailgate lift. If one wants to use the vehicle also for transporting goods which are loaded and unloaded from the vehicle sides, for example by means of a fork truck, the lifting arms and the cylinder assemblies are, however, an obstacle which renders such loading and unloading significantly more difficult and in some cases even makes it impossible to perform these operations.

The object of the present invention is to provide a

lifting device which makes it possible to readily load and unload goods both from behind and from the vehicle sides and which thus makes it possible to use the vehicle for transporting different types of goods.

5           According to the invention, this object is achieved by means of a lifting device which is of the type mentioned by way of introduction and which is characterised in that the two pairs of lifting arm and cylinder assembly are mounted each on one side of said load-  
10 supporting platform, such that both the lifting arm and the cylinder assembly are positioned below or on a level with said load-supporting platform, when the lifting arm has taken its front resting position, the centre of the third shaft being simultaneously positioned  
15 above the straight line connecting the centre of said first shaft with the centre of said second shaft.

          In a preferred embodiment, the lifting device comprises two channel elements arranged each on one side of the load-supporting platform and extending therealong,  
20 said channel elements having an upwardly open channel and the upper portion of said channel elements being positioned below or on a level with the load-supporting platform, and the two pairs of lifting arm and cylinder assembly are each mounted on a channel element, such that  
25 both the lifting arm and the cylinder assembly are completely inserted in the channel of the respective channel element, when the lifting arm has taken its front resting position.

          In a preferred embodiment, each lifting arm has a  
30 planar surface and is designed such that the planar surface is positioned on a level with the load-supporting platform, when the lifting arm has taken its front resting position. When the two lifting arms are in their front resting position, their planar surfaces thus form a  
35 lateral continuation of the load-supporting platform, whereby the width of the load-supporting surface is conveniently increased.

Each channel element preferably is U-shaped in cross-section, each lifting arm being made of a square tube.

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

5 Fig. 1 is a side view of a truck provided with a lifting device according to the present invention;

Fig. 2 is an enlarged partial view and shows the lifting device in more detail; and

10 Fig. 3 is a perspective view of the truck platform and the lifting device in more detail.

The truck 1 shown in Fig. 1 comprises a platform 2 with sideboards 3 and a tailboard 4. The truck 1 is also provided with a lifting device according to the present invention. The lifting device is particularly  
15 used for loading and unloading from behind. This is illustrated in Fig. 1 by means of a load which is a container 5. The tailboard 4 is removed when loading and unloading are to be effected by means of the lifting device. When loading and unloading are to be carried  
20 out from one side, for example by means of a fork truck, the sideboard 3 is lowered on this side.

On each side of the platform 2, the lifting device comprises a channel element 6 having an upwardly open channel and extending along the platform 2. The channel  
25 element 6 is U-shaped in cross-section, and its upper portion is positioned on a level with the top surface of the platform 2. The channel element 6 further comprises an extension 6a extending obliquely downward-backward. The sideboards 3 are attached to the channel  
30 elements 6 by hinge means 6b.

In each channel element 6 of the lifting device, a lifting arm 7 is pivotally mounted. The lifting arm 7 consists of a square tube which by means of two rear  
side members 8 is pivotable about a transverse shaft  
35 9 which is mounted in the rear portion of the channel element 6.

Each lifting arm 7 is pivotable about its shaft 9

by means of a pivot mechanism in the form of a hydraulic cylinder assembly 10 which is articulated both to the lifting arm 7 and to the channel element 6. The cylinder 11 of the hydraulic cylinder assembly 10 is articulated about a transverse shaft 12 which is mounted in the front portion of the channel element 6, and the piston-rod 13 of the hydraulic cylinder assembly 10 is articulated about a transverse shaft 14 which is mounted in a lug 15 on the lower side of the lifting arm 7.

10 The lifting arms 7 are separately pivotable by means of the hydraulic cylinder assemblies 10, between a rear lifting position in which they project backward from the platform 2 as shown by dash-dot lines in Fig. 1, and a front resting position in which they extend forward along the platform 2 and are, together with the hydraulic cylinder assemblies 10, completely inserted in the channels of the channel elements 6 as shown in Fig. 2. Fig. 3 shows the left lifting arm 7 in its front resting position, and it is evident that in the resting position, 15 the planar upper surface of the lifting arm 7 is positioned on a level with the top surface of the platform 2 so as to form a continuation thereof in the lateral direction and thus increase the width of the load-supporting surface. Since both the lifting arm 7 and its hydraulic cylinder assembly 10 are completely inserted in the channel of the channel element 6, when the lifting arm 7 has taken its front resting position, they form no obstacle that could render loading and unloading of goods from the side difficult.

20 25 30 When the lifting arm 7 has taken its front resting position, the centre of the shaft 14 is, as shown in Fig. 2, positioned above the straight line connecting the centre of the shaft 12 with the centre of the shaft 9.

35 In each lifting arm 7, there is arranged a telescoping extension arm 16 consisting of a square tube whose outer dimensions correspond to the inner dimensions of the lifting arm 7. The extension arm 16 is reciprocable

in the lifting arm 7 by means of a hydraulic cylinder assembly 17, the cylinder 18 of which is connected with the rear portion of the lifting arm 7 and the piston-rod 19 of which is connected with and extends a distance  
5 into the extension arm. The free end of the extension arm 16 is provided with a pin 20 for attaching chains 21, as shown in Fig. 1, or for mounting a transverse lifting beam.

A support unit 22 is mounted in the rear extension  
10 6a of each channel element 6. The support unit 22 comprises a support leg 23 which has the form of a square tube and is reciprocable in the channel under a plate 24 which is attached between the two side members of the extension 6a, and a support plate 25  
15 which is hingedly mounted on a transverse shaft 26 inside the support leg 23. The support leg 23 is reciprocable by means of a hydraulic cylinder assembly 27 whose cylinder 28 is articulated about the shaft  
19 by means of a sleeve 29 and whose piston-rod 30  
20 is articulated about the shaft 26. The support leg 23 is, by means of the hydraulic cylinder assembly 27, movable between an upper transport position (Figs 1 and 2) and a maximally extended support position which is shown by dash-dot lines in Fig. 2.

## CLAIMS

1. A lifting device in a goods-carrying vehicle (1) with a load-supporting platform (2), said device having two lifting arms (7) mounted each on one side of the load-supporting platform and each having a cylinder assembly (10) for pivoting the respective lifting arm about a transverse first shaft (9), one of the piston-rod unit (13) and the cylinder unit (11) of said cylinder assembly (10) being articulated about a transverse second shaft (12) and the other of said units being articulated to said lifting arm (7) about a transverse third shaft (14), each lifting arm (17) being pivotable by means of the associated cylinder assembly (10) between a rear lifting position and a front resting position, characterised in that the two pairs of lifting arm (7) and cylinder assembly (10) are mounted each on one side of said load-supporting platform (2), such that both the lifting arm and the cylinder assembly are positioned below or on a level with said load-supporting platform (2), when the lifting arm has taken its front resting position, the centre of said third shaft (14) being simultaneously positioned above the straight line connecting the centre of said first shaft (9) with the centre of said second shaft (12).

2. The lifting device as claimed in claim 1, characterised in that it comprises two channel elements (6) arranged each on one side of the load-supporting platform (2) and extending therealong, said channel elements having an upwardly open channel and the upper portion of the channel element being positioned below or on a level with the load-supporting platform (2), and that the two pairs of lifting arm (7) and cylinder assembly (10) are each mounted on a channel element (6), such that both the lifting arm and the cylinder assembly are completely inserted



in the channel of the respective channel element (6), when the lifting arm has taken its front resting position.

3. The lifting device as claimed in claim 1 or 2, characterised in that each lifting arm (7) has a planar surface and is designed such that the planar surface is positioned on a level with said load-supporting platform (2), when the lifting arm (7) has taken its front resting position.

4. The lifting device as claimed in claim 2 or 3, characterised in that each channel element (6) is U-shaped in cross-section, and that each lifting arm (7) is made of a square tube.

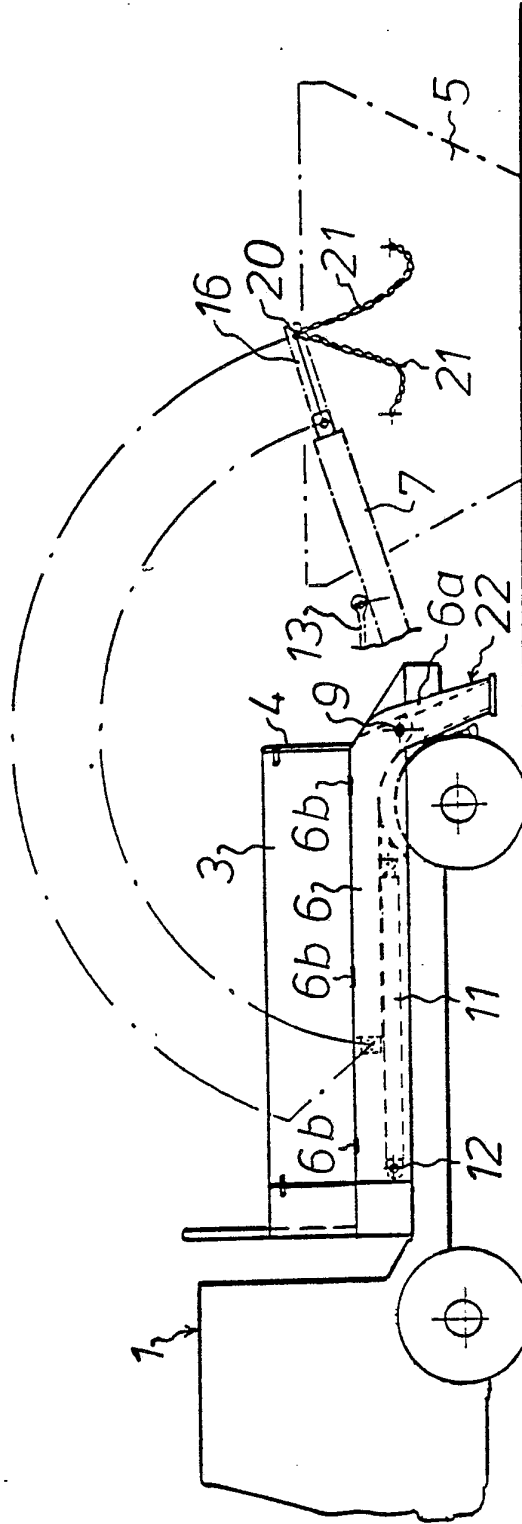
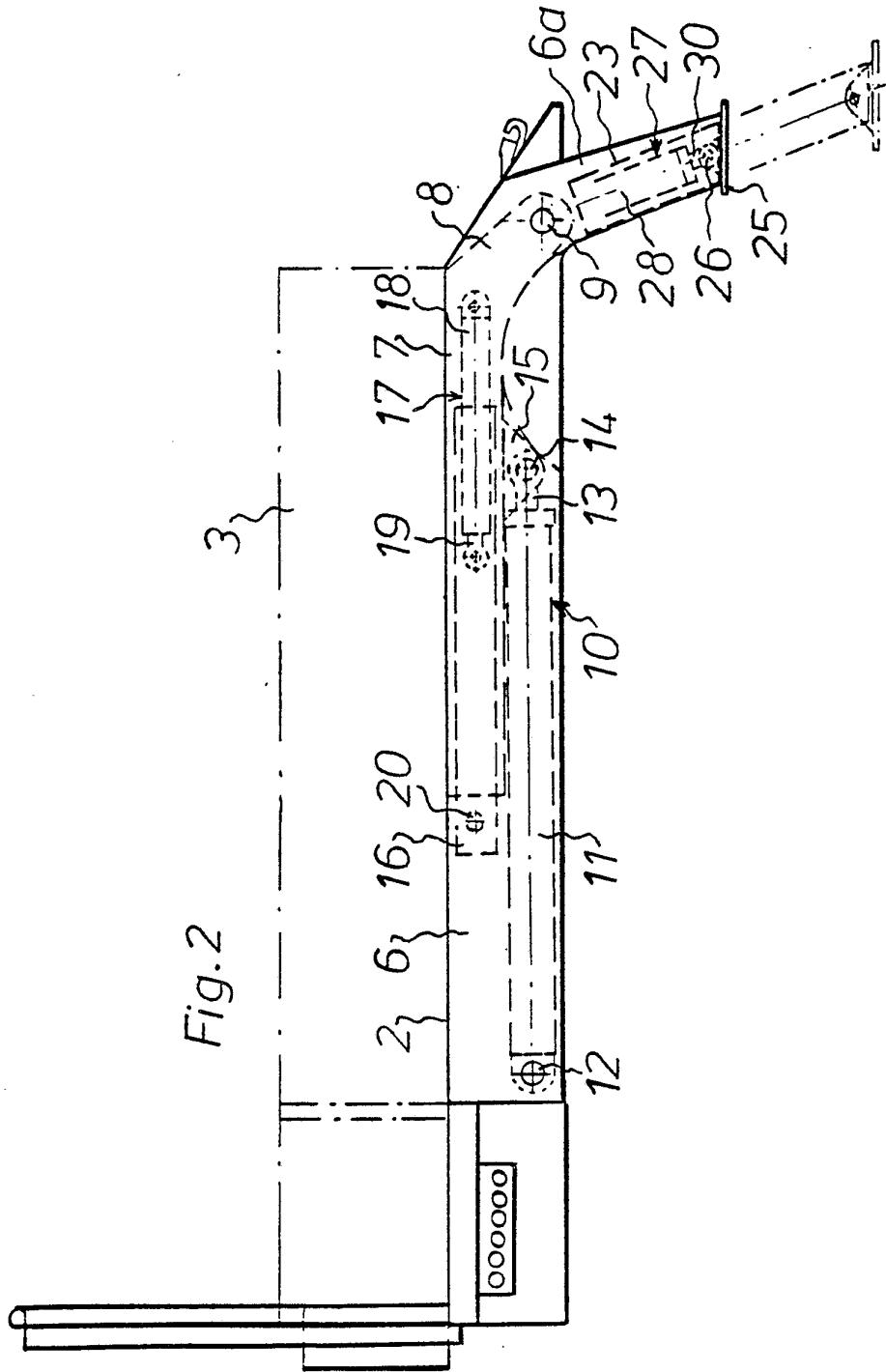


Fig.1



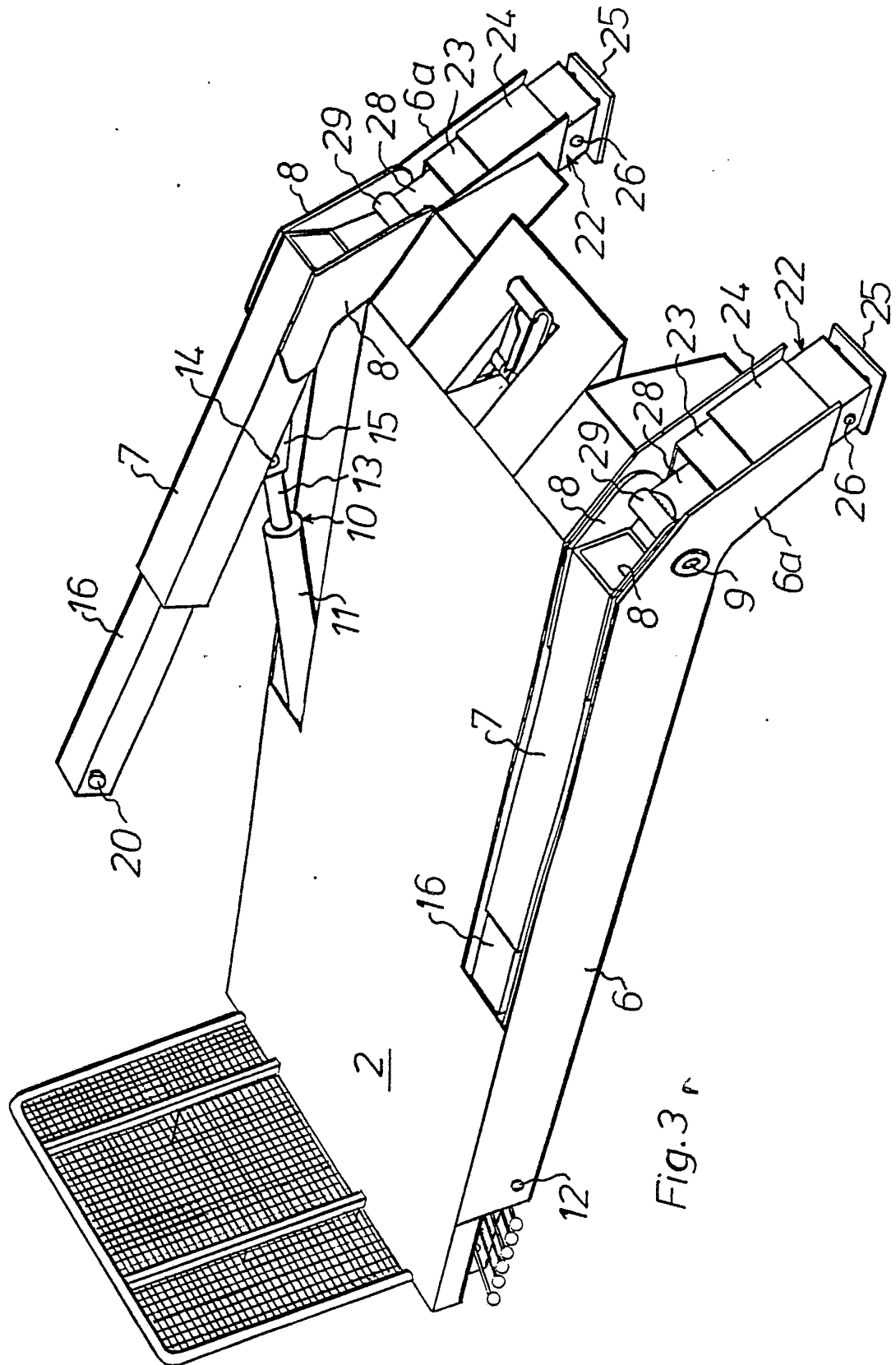


Fig. 3 r

# INTERNATIONAL SEARCH REPORT

International Application No PCT/SE89/00007

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC 4		
B 60 P 1/48, 1/64, 1/54		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched 7		
Classification System :	Classification Symbols	
National CI	63 C: 43/07	
IPC 4	B 60 P 1/48, /54, /64; B 62 D 33/00, /02; B 65 D 19/12; B 66 C 23/36-23/44	
.../...		
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched 8		
SE, NO, DK, FI classes as above		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT 9</b>		
Category 10	Citation of Document, 11 with indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13
A	SE, B, 318 981 (BELTRAMI SPA) 22 December 1969	1
A	SE, B, 357 179 (ARNE GLÜCKSMAN AB) 18 June 1973	1
A	EP, A1, 0 030 074 (HOWE, PETER) 10 June 1981	1
A	GB, A, 1 455 267 (REYNOLDS BOUGHTON LIMITED) 10 November 1976	1
<p>* Special categories of cited documents: 10</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"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</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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.</p> <p>"Δ" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
1989-03-21	1989-03-29	
International Searching Authority	Signature of Authorized Officer	
Swedish Patent Office	Åke Carlsson	

**FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET****II** Fields Searched (cont)

US CI    214: 75-80  
          296: 28, 181-184  
          414: 539-559

**V.  OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE <sup>1</sup>**

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1.  Claim numbers ..... because they relate to subject matter not required to be searched by this Authority, namely:
  
  
  
  
  
  
  
  
  
  
2.  Claim numbers ..... because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
  
  
  
  
  
  
  
  
  
3.  Claim numbers ..... because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

**VI.  OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING <sup>2</sup>**

This International Searching Authority found multiple inventions in this international application as follows:

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:
  
  
  
  
  
  
  
  
  
  
3.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:
  
  
  
  
  
  
  
  
  
  
4.  As all searchable claims could be searched without effort justifying an additional fee, the international Searching Authority did not invite payment of any additional fee.

**Remark on Protest**

- The additional search fees were accompanied by applicant's protest.  
 No protest accompanied the payment of additional search fees.