

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 574 615 A1

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **92201755.3**(51) Int. Cl.⁵: **B66F 9/08**(22) Date of filing: **15.06.92**

(43) Date of publication of application:
22.12.93 Bulletin 93/51

(84) Designated Contracting States:
**AT BE CH DE DK ES FR GB GR IT LI LU MC
NL PT SE**

(71) Applicant: **R. BLOM BEHEER B.V.**
Hemmeweg 28
NL-9076 PH St. Annaparochi(NL)

(72) Inventor: **De Vries, Hendrik**
Stadhoudersweg 75
NL-9076 AG St Annaparochie(NL)

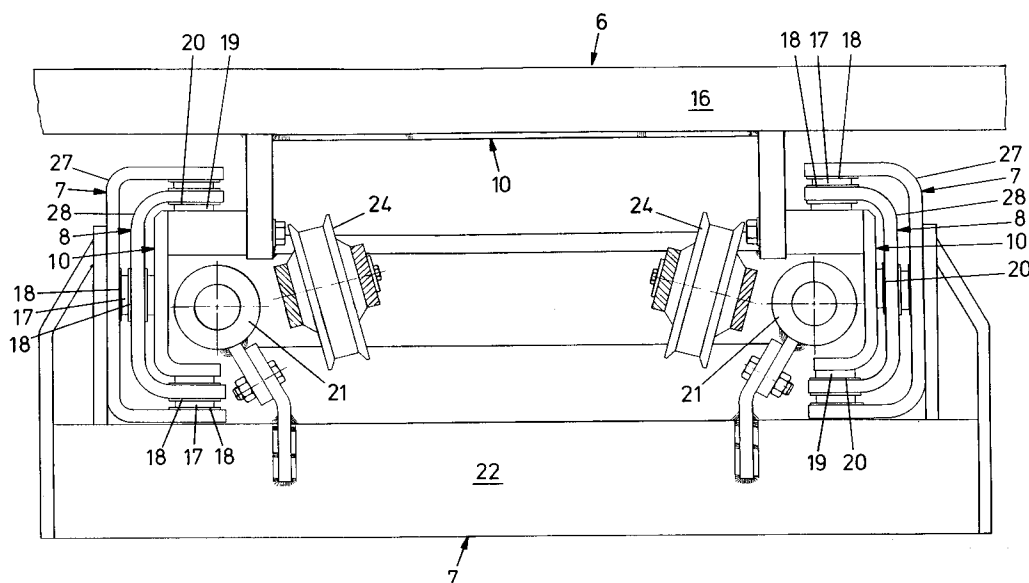
(74) Representative: **Smulders, Theodorus A.H.J.,
Ir. et al**
Vereenigde Octrooibureaux
Nieuwe Parklaan 97
NL-2587 BN 's-Gravenhage (NL)

(54) **Telescopic upright for a lift truck.**

(57) The upright comprises a fixed upright section (7), an upright section (8) movable in the longitudinal direction of the fixed upright section (7), a load carrier (10) movable in the longitudinal direction of the movable upright section (8), a first guide (17, 18) for guiding the movable upright section (8) relative to the fixed upright section (7), a second guide (19, 20) for guiding the load carrier (10) relative to the movable upright section (8). The guides are each de-

signed as sliding guides, with each of the sliding guides comprising cooperating guide elements (17-20) made of plastics and of corrosion-resistant metal.

The guides of the upright according to the invention become fouled relatively slowly, are easy to clean and give off little or no grease. Further, the upright according to the invention can be made of relatively light construction because the upright is subject to less high locally concentrated loads.

**FIG. 3****EP 0 574 615 A1**

The invention relates to a telescopic upright according to the preamble of claim 1.

Such an upright is known from NL-C-165 992. In this known upright, the load carrier is guided relative to the movable upright section by means of rotatable rollers mounted on the load carrier, which rollers can roll over the movable upright section in longitudinal direction.

A drawback of this known upright is that the guides thereof must be kept greasy so as to prevent corrosion and undue friction. This last in turn entails the drawback that the guides become fouled rapidly, in particular when the lift truck which the upright is a part of is used as an accessory lift truck belonging to a lorry, suspended from the back of the lorry, as is also known from the patent specification referred to. Grease falling off the guides and fouled grease that is left when the grease has been changed constitute a burden on the environment. Further, changing the grease and cleaning the guides is a time-consuming, dirty and unpleasant job.

The object of the invention is to provide an upright which may be of lighter construction and whose guides become fouled less rapidly.

This object is realized according to the invention by using the characterizing features according to claim 1 in an upright of the type described in the preamble.

Inasmuch as in the upright according to the invention both guides are designed as sliding guides with cooperating guide elements made of plastics and of corrosion-resistant metal, they need not be greased. As a consequence, they do not become fouled rapidly, they are simple to clean with water, optionally under high pressure, and a burdening of the environment through grease falling from the guides and fouled grease that is left when the grease has been changed, is avoided.

A further advantage of the use of plastic sliding guides is that they distribute the force exerted on the upright sections over a larger part of the upright section in question than the known rollers do. Accordingly, the upright sections need to be less resistant to a locally exerted high pressure. This in turn makes it possible to design the upright sections so as to have a slighter wall thickness or to make them of a lighter and softer metal, such as aluminium.

Hereinafter the invention will be further explained on the basis of a most preferred embodiment, with reference to the accompanying drawings, in which:

Fig. 1 is a side elevation of a lift truck with an upright according to the invention;

Fig. 2 is a view of the lift truck shown in Fig. 1 viewed from the operating side; and

Fig. 3 is a cutaway top plan view of the upright of the lift truck shown in Figs 1 and 2.

Figs 1 and 2 are overall views of a lift truck with an upright according to one embodiment of the invention. The lift truck comprises a main frame 1, two front wheels 2 and a driven rear wheel 4 to be steered by means of a steering pole 3.

Mounted on the frame is an upright 6. The upright 6 comprises a fixed upright section 7, an upright section 8 which can be moved relative to the fixed upright section 7 in the longitudinal direction thereof, and a load carrier 10 which is movable relative to the movable upright section 8 in the longitudinal direction thereof. In the lift truck shown, the movable upright section 8 and the load carrier 10 are approximately in the lowest position and can be moved telescopically in the direction indicated by an arrow 9.

With the lift truck according to the embodiment shown, the load carrier 10 may be provided with one or more forks 15 mounted on a fork board 16. Depending on the field of application, the load carrier can also be of different design, for instance without a separate fork board or with differently shaped forks.

The upright 6 can be tilted and moved laterally relative to the frame 1. For varying the tilt of the upright 6, two double-acting working cylinders 12 are included between a rail 11 extending across the frame and the upright 6.

The lift truck comprises a combustion engine 13 for driving a hydraulic pump (not shown) for driving the different working cylinders and a hydromotor (not shown) connected to the wheel 4. Naturally, instead of a combustion engine, an electric motor can be used.

The steering pole 3 is fitted with a group of control handles 5 for controlling the vertical displacement of the load carrier 10 as well as the lateral displacement and the tilt in the direction of travel of the upright 6. Mounted further on the frame 1 is a control panel 14 with control means for starting and stopping the engine 13.

For a further description of the upright, reference is made to Fig. 3, where it is shown in more detail. In Fig. 3 the forks have been dismantled from the load carrier, so that only the fork board 16 is shown.

Arranged between the fixed and the movable upright sections 7 and 8 is a first guide for guiding the movable upright section 8 relative to the fixed upright section 7. This first guide comprises plastic sliding shoes 17 and metal slideways 18. For the sake of clarity, not all sliding shoes and slideways are indicated by reference numerals. The metal slideways 18 extend substantially throughout the length of the fixed upright section 7 and the movable upright section 8. Mounted on the fixed up-

right section 7, adjacent the top end thereof, are sliding shoes 17 which can slide over the associated slideways 18 mounted on the movable upright section 8. Mounted on the movable upright section 8, adjacent the bottom end thereof, are sliding shoes 17 which can slide over the associated slideways 18 mounted on the fixed upright section 7.

It is observed that it is also possible, for instance, to use plastic slideways and metal sliding shoes or to provide both upright sections with cooperating slideways extending at least substantially throughout the length thereof, one slideway of any two cooperating slideways being made of plastic while the other is made of metal.

Mounted between the movable upright section 8 and the load carrier 10 is a second guide for guiding the load carrier relative to the movable upright section 8. This second guide comprises plastic sliding shoes 19 and metal slideways 20. For clarity's sake, of this second guide, too, not all sliding shoes and slideways are indicated with reference numerals.

The upright 6 further comprises means for displacing the movable upright section 8 relative to the fixed upright section 7. These means are designed as a pair of working cylinders 21 which are mounted between a cross beam 22 of the fixed upright section 7 and a bridge member 23 (see Fig. 2) of the movable upright section 8. For displacing the load carrier 10 relative to the movable upright section 8, the upright 6 comprises pulleys 24 rotatably mounted on the bridge member 23 at the top of the movable upright section. Running over each of the pulleys 24 is a strand 25 (see Fig. 2; not shown in Figs 1 and 3) which, according to the present embodiment, is a chain. One end of each strand is connected to a cross beam 26 of the fixed upright section 7 and another end is connected to the load carrier 10. When the movable upright section 8 is displaced over a given distance, the load carrier 10 moves over twice that distance, the movable upright section 8 being guided relative to the fixed upright section 7 and the load carrier 10 being guided relative to the movable upright section 8.

Inasmuch as in the upright 6 according to the invention, both guides are designed as sliding guides with cooperating guide elements 17-20 made of plastic and of corrosion-resistant metal, they need not be greased, so that they do not become fouled rapidly and, moreover, can simply be cleaned with water, optionally under high pressure. A burdening of the environment through grease falling off the guides and fouled grease that is left when the grease has been changed, is avoided.

A further advantage of the use of plastic sliding guides 17 and 19 is that they distribute the force exerted on the upright sections 7 and 8 over a larger part of the upright section in question than the known rollers do. Accordingly, standards 27 and 28 of the upright section 7 and 8 need to be less resistant to a locally exerted high pressure. This in turn enables the standards 27, 28 to be formed with a slighter wall thickness or to be made of a lighter and softer metal, such as aluminium. A slight weight of the upright leads to a lowering of the centre of gravity of the lift truck and hence to improved stability. A slight weight of the lift truck is of particular importance for lift trucks which are taken along with means of transportation, in particular lorries, as well as for lift trucks which are to drive over soft terrain.

Especially if the movable upright section 8, which in the extended position is located at a great height above the ground, is substantially made of aluminium, a considerable lowering of the centre of gravity in the most critical operative position of the lift truck is achieved.

It is also advantageous, however, to make the fixed upright section 7 substantially of aluminium, because in that way the greatest reduction of the weight of the upright can be achieved. Making the upright sections 7 and 8 of aluminium offers a further advantage in that the upright is less sensitive to corrosion. Electrolytic corrosion of the aluminium parts of the upright can be prevented by insulating them from the parts of the lift truck that consist of more precious metals. Such an insulation is for instance obtained when the aluminium parts are connected to the other parts of the lift truck by means of glued joints.

In the upright 6 shown, the guide elements 17-20 of each sliding guide comprise a stainless steel slideway 18, 20, glued to one of the upright sections 7, 8, respectively, and sliding shoes 17, 19, respectively, which are movable along the slideway. The sliding shoes 17, 19, respectively, form relatively compact and cheap parts which can easily be replaced when they are worn. The stainless steel slideways 18, 20 are highly wear- and corrosion-resistant and have a life which is at least as long as that of the upright 6 as a whole. Inasmuch as the slideways are glued to the corresponding upright section, they can be narrow without attachment means being located in the paths of the sliding shoes.

The fixed and the movable upright section 7 and 8 each comprise two standards 27 and 28, respectively, which have an open profile. These standards 27, 28 are arranged so as to have their open sides facing each other, the standards 27, 28 of the fixed and the movable upright sections 7 and 8, respectively, being mutually nested when the

upright is in the retracted position. The means for moving the movable upright section 8 relative to the fixed upright section 7, which are designed as a pair of working cylinders 21, are each at least partly recessed in one of the standards 28.

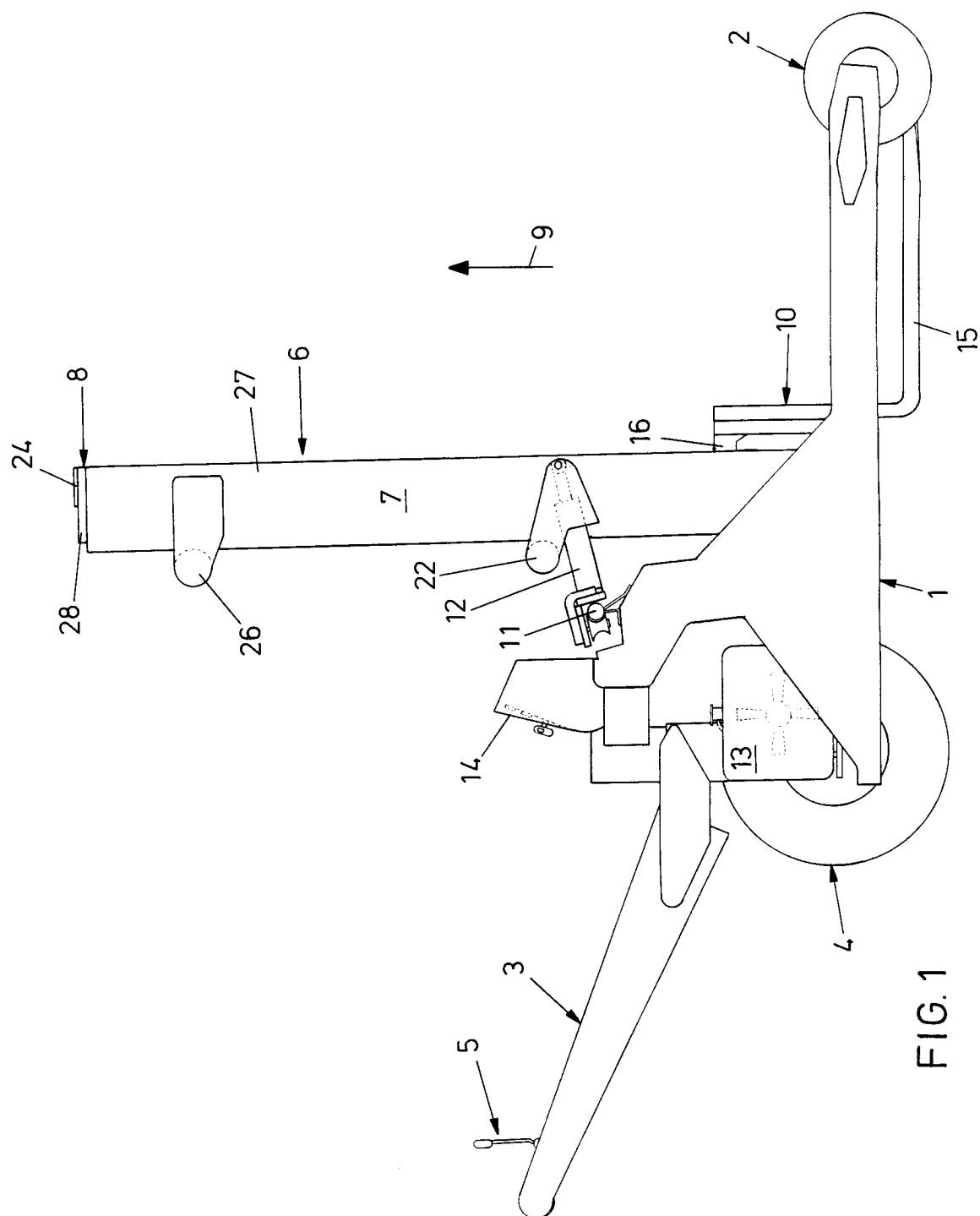
As a result, with the upright 6 according to the embodiment shown, a particularly good view through the standards is provided. This is particularly evident in Fig. 2. This design is made possible owing to the circumstance that the sliding guides of the upright according to the invention can be particularly compact so that within the standards 28 space can be left for the working cylinders 21.

The standards each have a U-shaped profile, while the slideways 18, 20 of corrosion-resistant material are arranged along the flanges and the web of each of the U-shaped sections. Thus, a stable guidance is obtained, with minimal loading of the slideways. However, if the requirements in respect of loading capacity of the upright 6 are less high, the standards 27, 28 can also be shaped differently, for instance V-shaped or as sections of a circle.

The pulleys 24 are positioned obliquely, such that the median planes of the pulleys 24 diverge in the direction of the side of the upright 6 where the load carrier 10 is disposed. Thus, the ends of the strands 25 that are connected to the load carrier 10 are close to the standards 27, 28 of the upright 6, where they are less obtrusive within the field of vision of the operator of the lift truck than in the case where they extend more centrally. As appears in particular from Fig. 2, an upright is obtained that affords a proper view through it.

Claims

1. A telescopic upright for a lift truck comprising a fixed upright section (7), an upright section (8) movable in the longitudinal direction of the fixed upright section (7), a load carrier (10) movable in the longitudinal direction of the movable upright section (8), a first guide (17, 18) for guiding the movable upright section (8) relative to the fixed upright section (7), a second guide (19, 20) for guiding the load carrier (10) relative to the movable upright section (8), means (21) for displacing the movable upright section (8) relative to the fixed upright section (7) and means (24, 25) for moving the load carrier (10) relative to the movable upright section (8), the first guide being designed as a sliding guide, characterized in that the second guide is designed as a sliding guide, with each of the sliding guides comprising cooperating guide elements (17-20) made of plastics and of corrosion-resistant metal.
2. An upright according to claim 1, characterized in that at least the movable upright section (8) is substantially made of aluminium.
3. An upright according to claim 2, characterized in that the fixed upright section (7) is also substantially made of aluminium.
4. An upright according to any one of the preceding claims, characterized in that the guide elements of each sliding guide comprise a stainless steel slideway (18 and 20, respectively) glued to one of the upright sections (7, 8) and slide shoes (17 and 19, respectively) movable along the slideway (18, 20).
5. An upright according to any one of the preceding claims, characterized in that the fixed and the movable upright sections (7, 8) each comprise two standards (27 and 28, respectively) with an open profile whose open sides face each other, the standards (27, 28) of the fixed and the movable upright section (7 and 8, respectively) being nested relative to each other when the upright (6) is in the retracted position and the means for displacing the movable upright section (8) relative to the fixed upright section (7) are designed as a pair of working cylinders (21) which are each at least partly recessed in one of the standards (28).
6. An upright according to claim 5, characterized in that the standards (27, 28) each have a U-shaped profile, the tracks (18, 20) made of corrosion-resistant metal being arranged along the flanges and the connecting portion of each of the U-shaped sections.
7. An upright according to any one of the preceding claims, characterized in that the means for displacing the load carrier (10) relative to the movable upright section (8) comprise a pair of strands (25) and a pair of pulleys (24) located adjacent the top of the movable upright section (8) and connected to said upright section (8), each of the strands (25) running over one of the pulleys (24) and the centrelines of the pulleys (24) being located obliquely, such that median planes of the pulleys (24) diverge in the direction of the side of the upright (6) where the load carrier (10) is disposed.



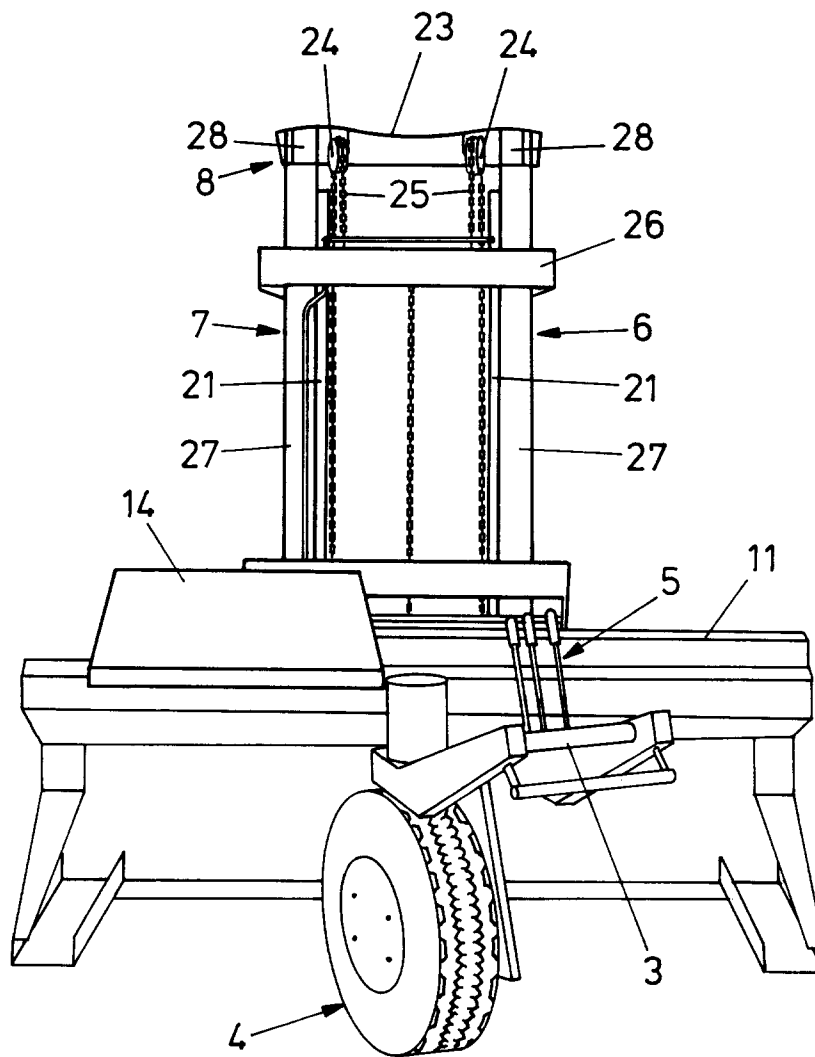


FIG. 2

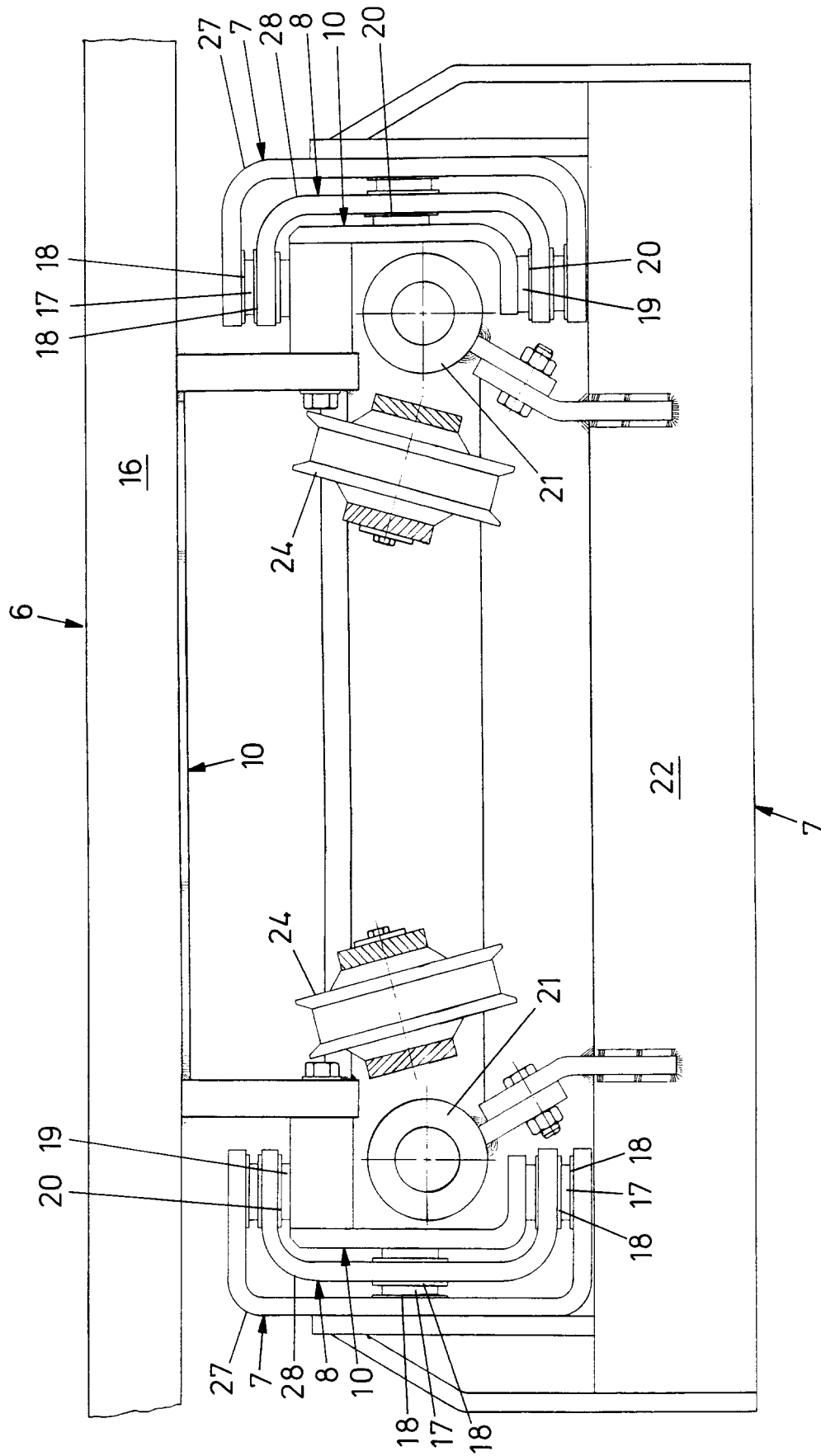


FIG. 3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 20 1755

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	WO-A-8 303 406 (TOW MOTOR CORPORATION) * page 11, line 20 - line 33 * * figure 3 * ---	1	B66F9/08
A	CH-A-464 794 (H. H. MEYER OHG) * column 4, line 7 - line 22 * * figure * ---	1	
A	WO-A-8 203 215 (TOW MOTOR CORPORATION) * page 8, line 30 - line 35 * * figures 3-8 * ---	1	
A	US-A-3 961 689 (LESKOVEC) * figure 2 * * column 3, line 31 - line 34 * ---	1	
A	US-A-3 208 556 (SHAFFER) * column 3, line 30 - line 38 * * figure 3 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B66F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 12 FEBRUARY 1993	Examiner GUTHMULLER J.A.
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			