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54 **Pincer grab.**

57 The invention relates to a pincer grab (1), comprising:
a frame (2) with attachment means (3) for coupling to a hoisting device;
two jaws (6,7) carried by that frame (2) and pivotable around mutually parallel horizontal centre lines (4,5), which jaws have complementary edges (8,9) facing one another and which can together form a grab;
a drive unit, for example at least one hydraulic cylinder (10), with coupling means (11) for coupling to a controllable energising unit, for example a source for a medium under pressure; and
transmission means (14,15,16,17,18,19) which are arranged between the drive unit and the jaws;
whereby the disposition is such that through suitable energising of the drive unit the jaws can be moved between a closed position, wherein they together form a grab, and an open position.

The invention has for its object to embody a pincer grab such that no torsional forces can occur. The pincer grab according to the invention displays to this end the feature that the transmission means are arranged such that the forces produced by the

drive unit in a vertical plane are transmitted in substantially that same vertical plane onto the jaws, such that no or only negligible torsion can occur in the transmission means.

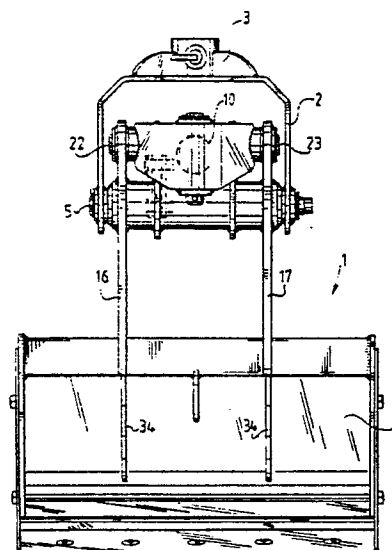


FIG. 3

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Pincer grab

The invention relates to a pincer grab, comprising:

a frame with attachment means for coupling to a hoisting device;

two jaws carried by that frame and pivotable around mutually parallel horizontal centre lines, which jaws have complementary edges facing one another and which can together form a grab;

a drive unit, for example at least one hydraulic cylinder, with coupling means for coupling to a controllable energising unit, for example a source for a medium under pressure; and

transmission means which are arranged between the drive unit and the jaws;

whereby the disposition is such that through suitable energising of the drive unit the jaws can be moved between a closed position, wherein they together form a grab, and an open position.

Such a pincer grab is known.

With this known pincer grab the transmission means are embodied such that torsional forces can occur therein. The occurrence of torsional forces can have various disadvantages. Torsion is usually a phenomenon not taken into account in the design. Constructions are therefore often over-dimensioned in order empirically to reduce the consequences to a minimum. The further drawback can occur that various parts of the construction start to assume mutual positions other than those required. In addition an elastic torsion forming implies the presence of a relatively weak element in the mechanical chain and a reduced force transmission.

The invention has for its object to embody a pincer grab such that the problems described above do not occur. The pincer grab according to the invention displays to this end the feature that the transmission means are arranged such that the forces produced by the drive unit in a vertical plane are transmitted in substantially that same vertical plane onto the jaws, such that no or only negligible torsion can occur in the transmission means. With this construction the weak link in the chain is eliminated and the total pincer grab can be lighter whilst an improved force transmission is nevertheless achieved.

In order to ensure the desired symmetry an embodiment can display the characteristic that the transmission means comprise at least two pairs of transmission arms bearing the jaws, each disposed symmetrically in relation to the vertical central transverse plane of the jaws.

A comparatively light and nevertheless mechanically strong and stiff construction is achieved with a variant whereof the transmission arms have

considerably larger dimensions in a vertical plane than transversely thereof, such that the arms possess an increased stiffness and mechanical strength in the plane in which the forces are transmitted.

A further elaboration of the latter two embodiments displays the special feature that the drive unit comprises at least one pressure cylinder, the ends of which are coupled by means of two at least more or less U-shaped coupling members to two respective pairs of transmission arms, each connected to a jaw. Thus achieved with this variant in a very simple manner and without the occurrence of torsion is that the active ends of the pressure cylinder transmit the force generated thereby onto the transmission arms at an axial distance relative to the pivot centre line. The tensile and pressure forces occurring can be absorbed easily using simple mechanical constructions.

The invention will now be elucidated with reference to the drawing of several embodiments to which the invention is not limited. In the drawing:

fig. 1 shows a side view, partly along the cross section I-I as in fig. 2, of a pincer grab according to the invention;

fig. 2 shows a top view;

fig. 3 shows a side view;

fig. 4 shows a frontal view of an alternative; and

fig. 5 shows the detail V of fig. 4.

The figures 1, 2 and 3 show a pincer grab 1 in a first embodiment. This comprises a frame 2 with attachment means 3 for coupling to a hoisting device (not drawn). The pincer grab 1 further comprises two jaws 6, 7 carried by the frame 2 and pivotable around mutually parallel horizontal shafts 4, 5, said jaws having complementary edges 8, 9 facing one another such that the jaws 6, 7 can together form a closed grab in the manner clearly indicated in fig. 1. The pincer grab 1 further comprises a hydraulic cylinder 10 with connections 11 for coupling to a controllable source for hydraulic oil.

Extending between the ends 12, 13 of the hydraulic cylinder 10 on the one side and transmission arms 14, 15; 16, 17, which bear the jaws 6 and 7 respectively, on the other are more or less U-shaped coupling members 17, 18 which transfer the forces generated by the hydraulic cylinder 10 onto the transmission arms 14, 15; 16, 17 via respective pivot joints 20, 21; 22, 23.

From the figures 1, 2 and 3 it will be apparent that the forces generated by the drive unit 10, 18, 19, which are produced in the two planes of re-

spectively the transmission arms 14, 16 and 15, 17 are transmitted in that same vertical plane onto the jaws. This means that in the chain of transmission as described above no or at least practically no torsional forces occur.

The operation of the pincer grab 1 will be further apparent without explanation. Through a suitable energising of the hydraulic cylinder 10 via the connections 11 the jaws 6, 7 can pivot around the shafts 4, 5 between the closed position shown particularly clearly in fig. 1 in which they together form a grab and a desired open position.

Fig. 4 shows a pincer grab 24 in side view. In this figure the elements which correspond with those according to figures 1, 2 and 3 are indicated with the same reference numerals as therein. These elements will therefore not be further discussed.

The pincer grab 24 bears two jaws, only one of which is drawn. This has the reference numeral 26. This jaw 26 is carried by two transmission arms 27, 28. These arms 27, 28 are situated on the lengthwise ends of the jaw 26. Hydraulic cylinders 128, 129 transmit the forces generated thereby onto the transmission arm 28 via transmission arms 30, 31 (see also fig. 5) which are connected to the hydraulic cylinder 129 by means of a pivot joint 32.

The embodiment according to fig. 4 therefore comprises, at variance with the embodiment according to figures 1, 2 and 3, two hydraulic cylinders 128, 129. In this embodiment, therefore, the use of extra transmission elements such as the U-shaped coupling members 18, 19 can be dispensed with. It will be otherwise apparent that any desired number of cylinders can be employed and that use can be made if required of four cylinders provided pairwise with U-shaped coupling members.

With respect to the embodiment as in the figures 1, 2 and 3 attention is further drawn to the presence of a coupling arm 33 which is connected for pivoting with the transmission arms 14 and 16, this on either side of and at equal distances from the pivot shafts 4, 5. A symmetrical movement of the jaws 6, 7 is thereby always assured.

Attention is finally drawn to the fact that the transmission arms 14, 15, 16, 17, 27, 28 all have considerably larger dimensions in a vertical plane than transversely thereof. As a result these arms possess an increased stiffness and mechanical strength in the plane in which the main forces are transmitted. Ribs, which are designated generally with 34, increase the stiffness of the jaws 6, 7, 26.

Claims

1. Pincer grab, comprising:

a frame with attachment means for coupling to a hoisting device;

two jaws carried by that frame and pivotable around mutually parallel horizontal centre lines, which jaws have complementary edges facing one another and which can together form a grab;

a drive unit, for example at least one hydraulic cylinder, with coupling means for coupling to a controllable energising unit, for example a source for a medium under pressure; and

transmission means which are arranged between said drive unit and said jaws;

whereby the disposition is such that through suitable energising of said drive unit said jaws can be moved between a closed position, wherein they together form a grab, and an open position;

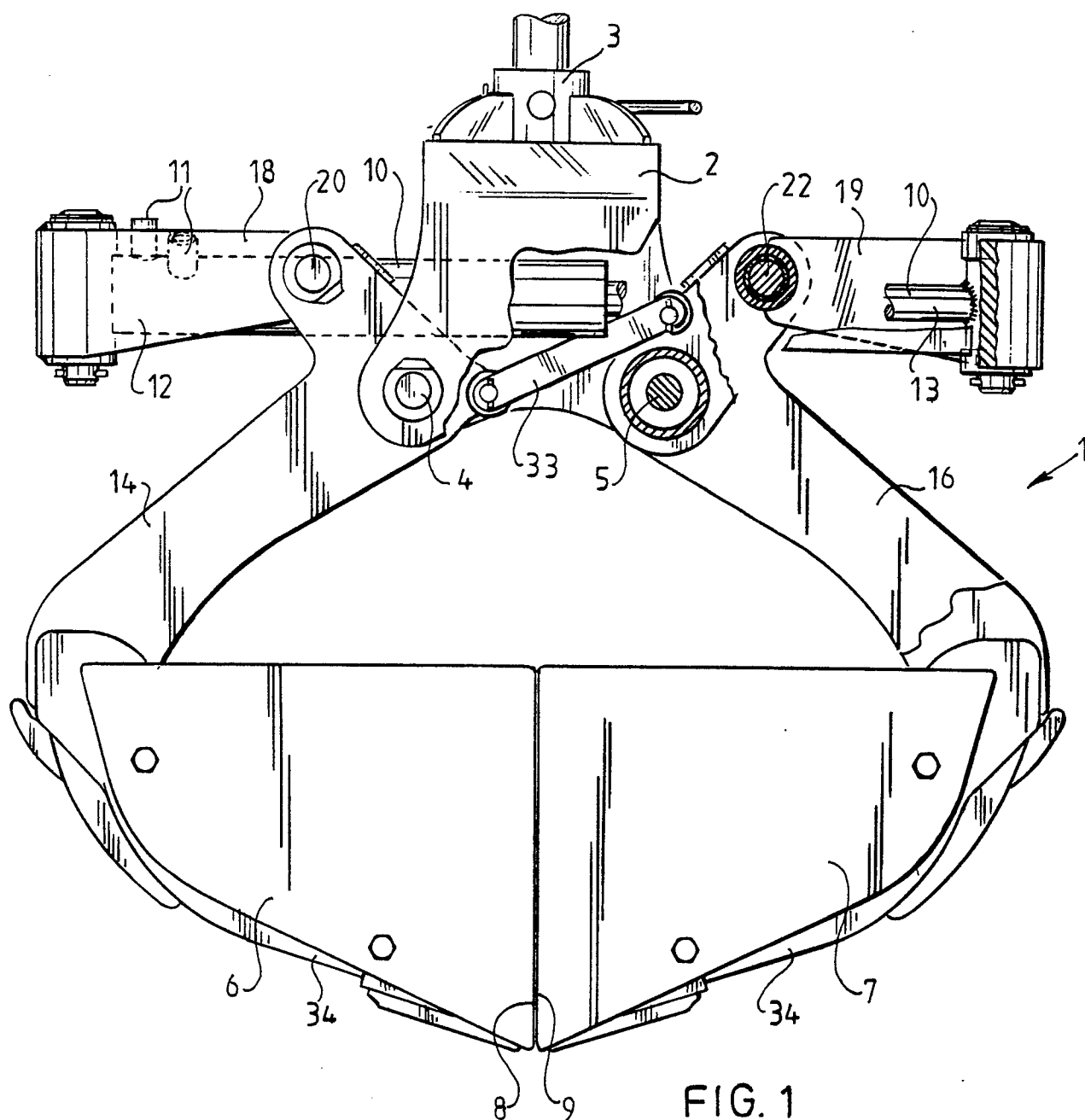
characterized in that

the transmission means are arranged such that the forces produced in a vertical plane by the drive unit are transmitted in substantially that same vertical plane onto the jaws, such that no or only negligible torsion can occur in said transmission means.

2. Pincer grab as claimed in claim 1, **characterized in that** the transmission means comprise at least two pairs of transmission arms bearing the jaws, each pair being disposed symmetrically in relation to the vertical central transverse plane of said jaws.

3. Pincer grab as claimed in claim 2, **characterized in that** the transmission arms possess considerably larger dimensions in a vertical plane than transversely thereof, such that said arms have an increased stiffness and mechanical strength in the plane in which the forces are transmitted.

4. Pincer grab as claimed in either of the claims 2 and 3, **characterized in that** the drive unit comprises at least one pressure cylinder, the ends of which are coupled by means of two at least more or less U-shaped coupling members to two respective pairs of transmission arms, each connected to a jaw.



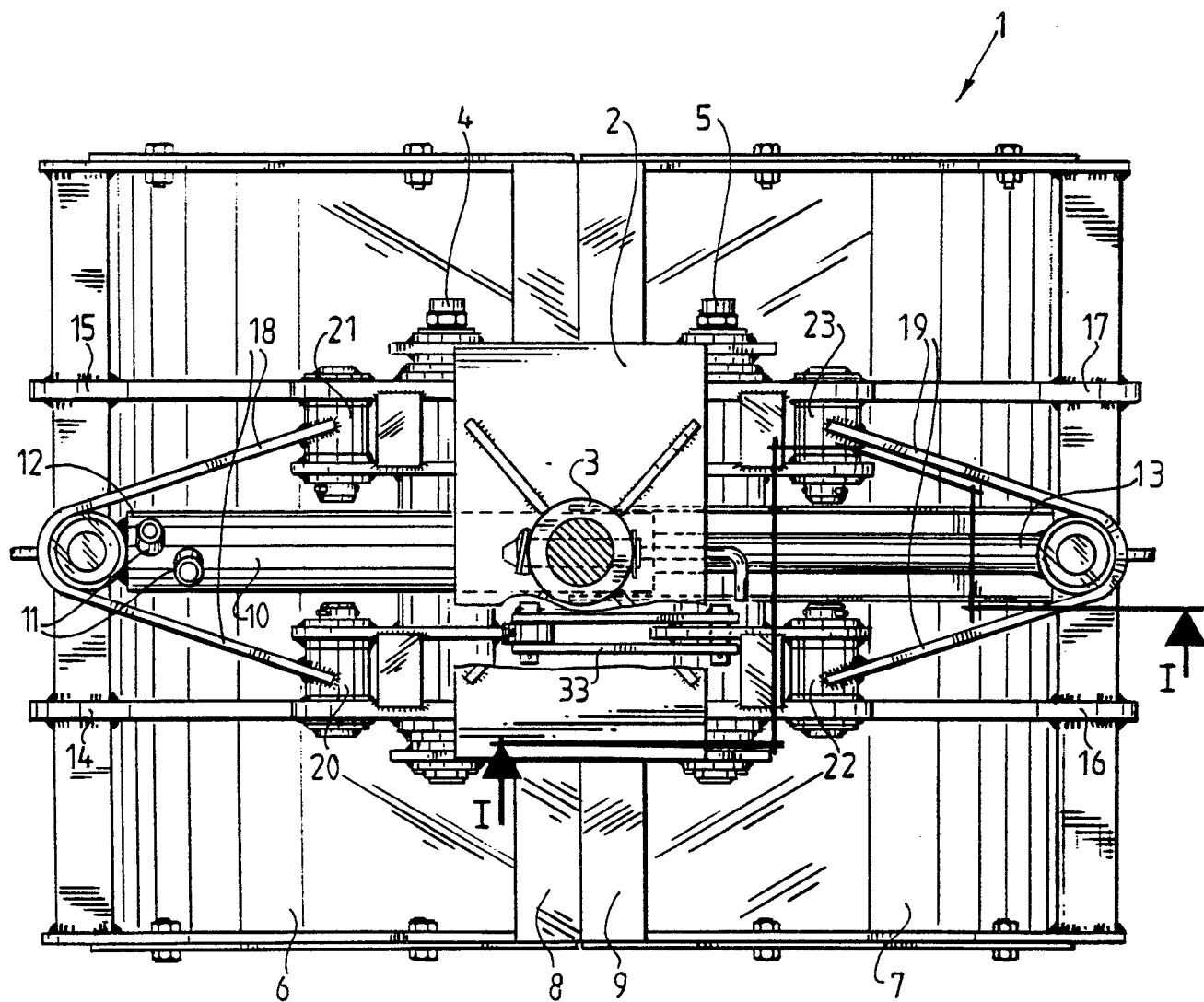


FIG. 2

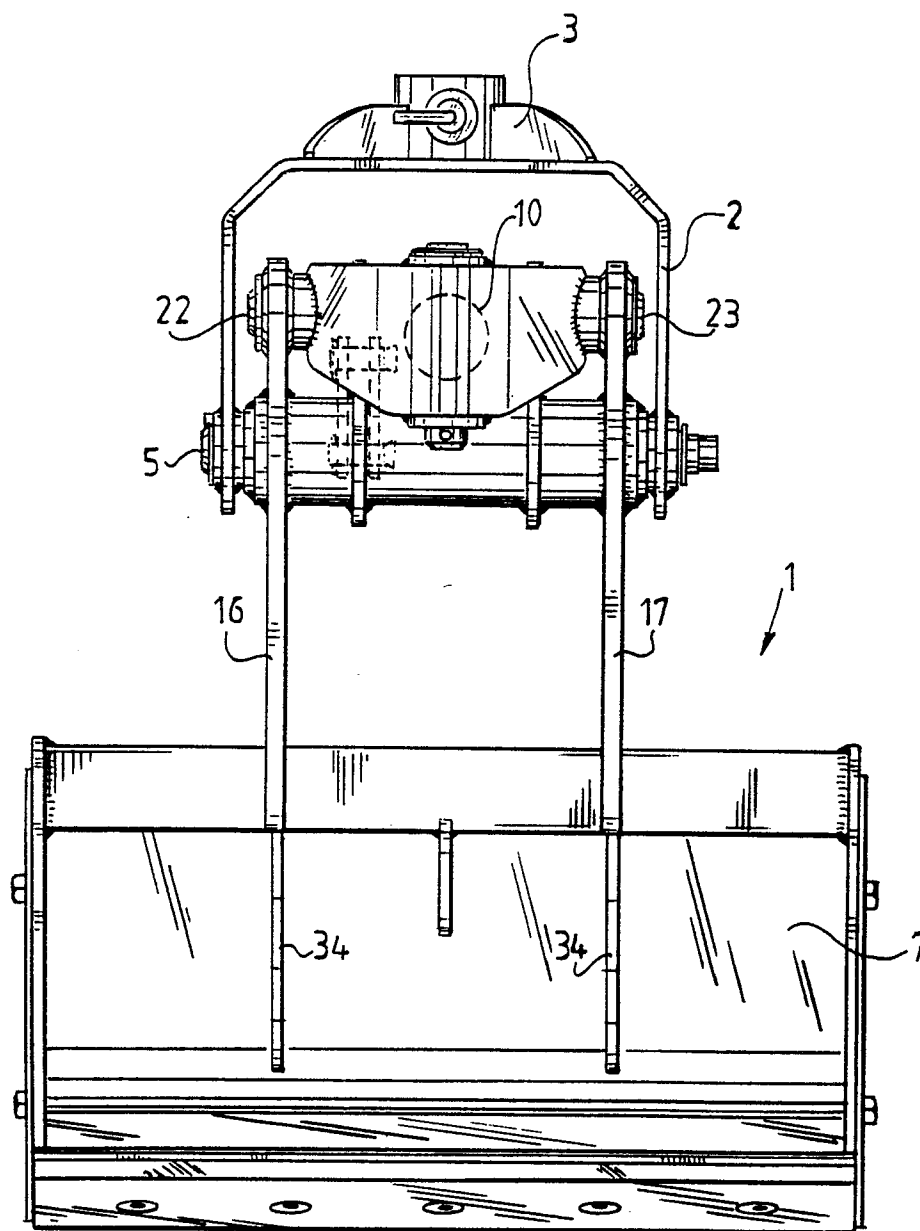


FIG. 3

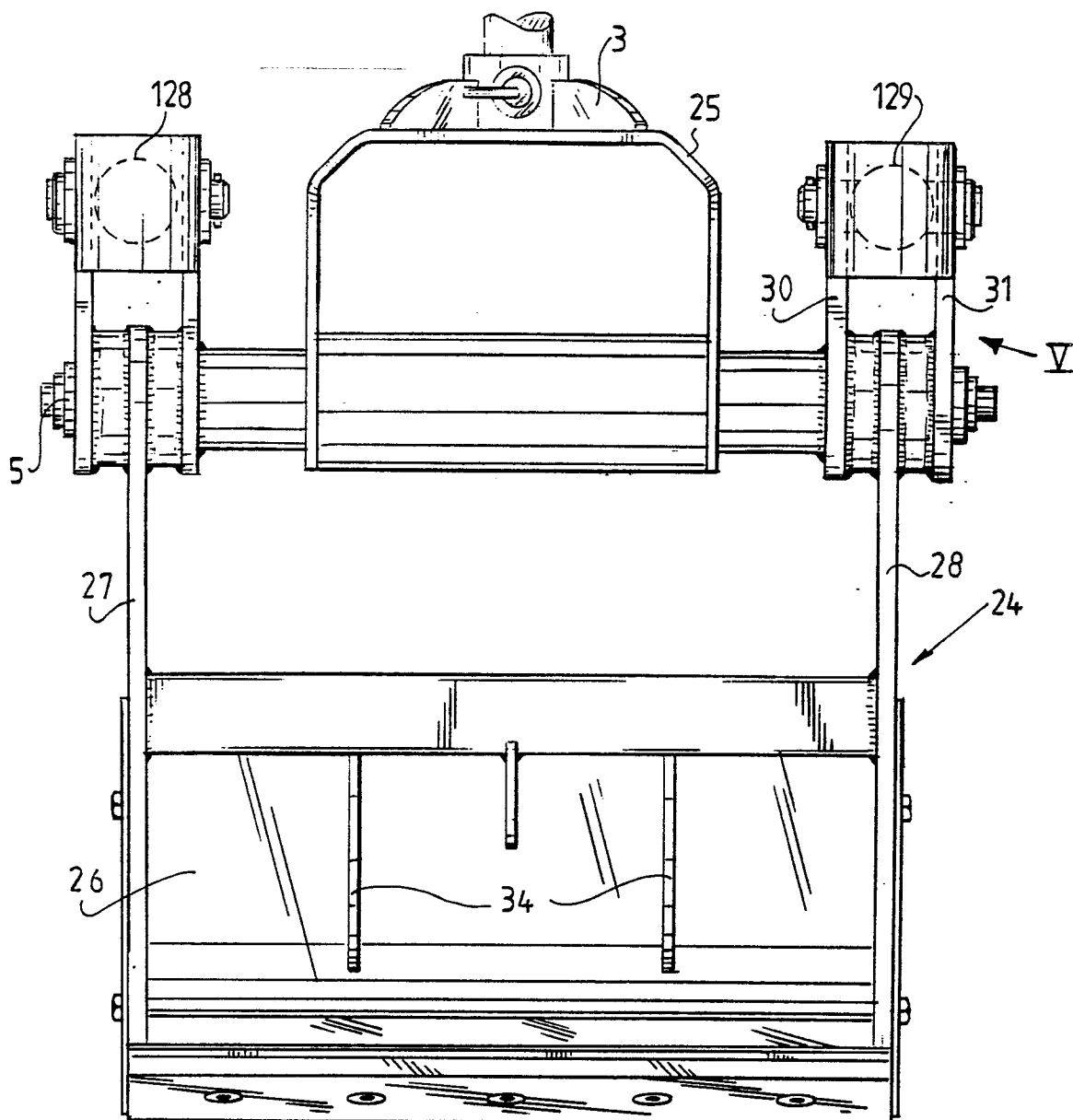


FIG. 4

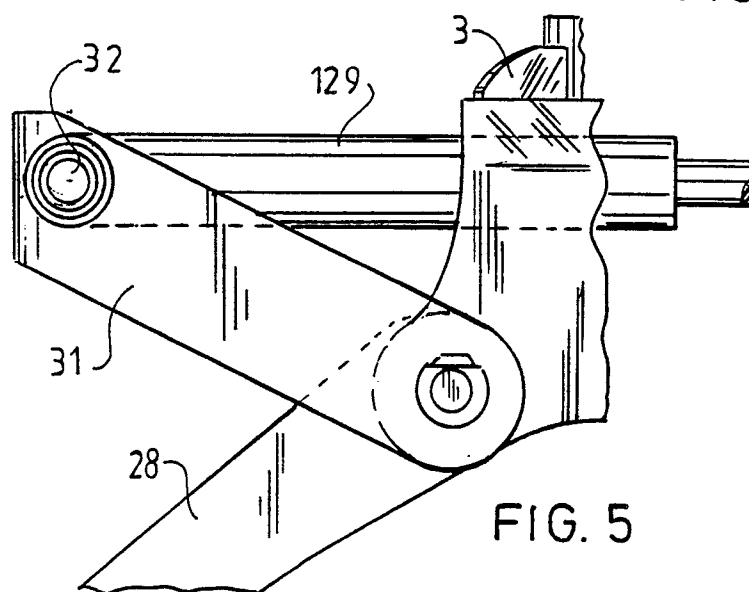


FIG. 5



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.4)
X	DE-A-2 536 709 (KINSHOFER) * Page 4, two last paragraphs; page 5; figures 1-3 *	1-4	B 66 C 3/16
A	US-A-3 641 689 (BILLINGS)		
A	DE-B-1 127 560 (ALFAWERK FÖRDERANLAGEN)		
A	US-A-2 622 915 (HORN)		
A	FR-A-1 354 668 (SCHWERMASCHINENBAU S.M. KIROW)		
A	US-A-4 405 167 (KINSHOFER)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 66 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 31-08-1989	Examiner VAN DEN BERGHE E.J.J.
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	