



**EUROPEAN PATENT APPLICATION**

Application number : **95301001.4**

Int. Cl.<sup>6</sup> : **E02F 3/00, E02F 3/345**

Date of filing : **16.02.95**

Priority : **23.02.94 GB 9403392**

Inventor : **Lewis, Ian William, c/o Lewis Equipment Ltd.  
Waterloo Road  
Bedford-on-Avon, Warwickshire (GB)**

Date of publication of application :  
**30.08.95 Bulletin 95/35**

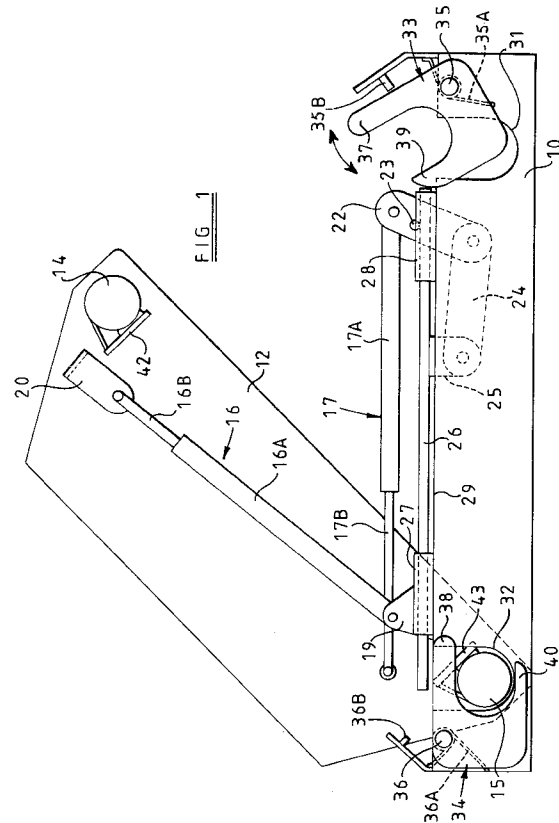
Designated Contracting States :  
**BE DE DK ES FR IE IT NL**

Representative : **Cowan, David Robert  
E.N. Lewis & Taylor  
5 The Quadrant  
Coventry CV1 2EL (GB)**

Applicant : **Lewis Equipment Limited  
Waterloo Road  
Bedford-on-Avon, Warwickshire B50 4JH (GB)**

**54 Tipping mechanism.**

57 A tipping mechanism is provided which is intended to incorporate a bucket (12) capable of being tipped about either one or two spaced apart axes (14-15) so that by operating appropriate drive means (16, 17) the tipping bucket is selected to tip either to one side or the other of the vehicle according to the operation of the drive means.



This invention relates to tipping mechanisms and, in particular but not exclusively, to tipping mechanisms for tipping a bucket or other container mounted for tipping relative to a vehicle.

Vehicles carrying tipping buckets have been able to tip about a generally horizontal axis transverse to the vehicle for loading and unloading the bucket. In some cases such buckets have also been able to tip to one side of the vehicle about an axis extending in the fore and aft direction of the vehicle to unload the contents to one side of the vehicle.

Such vehicles are often used in transporting materials in situations in which there is limited space for vehicle turning and for discharge of the bucket contents. In these situations there is a need for a more versatile system for permitting the bucket to be discharged to either side of the vehicle.

According to the invention a tipping mechanism comprises a frame, an article to be tipped relative to the frame, drive means for tipping the article relative to the frame, connecting means interconnecting the frame and the article, pivot means whereby the article may be pivoted relative to the frame about either one of two pivots by operation of the drive means, said pivots being located spaced apart from one another along the article, and stop means for selectively retaining the pivot about which tipping of the article is to take place in position relative to the frame.

Preferably the pivots are each carried on the article to be locatable in a respective seating on the frame, and each pivot is selectively locatable by said stop means for rotation in said seating.

The stop means may include a stop member which is slidable relative to the frame between positions in which one pivot is retained in its seating and the other pivot is free to move about said one pivot with the article.

The stop means may further include pivotable stop elements associated with each pivot and carried on the frame, which elements are releasably engaged by a respective stop member to permit each element to move between a pivot retaining position and a pivot release position.

Conveniently the pivotable elements are each movable to a pivot release position in which the element prevents movement of the stop member in one direction.

The stop member may be movable from one of its positions to the other position by a linkage connected to the drive means wherein said movement is effected prior to tipping of the article relative to the frame.

The drive means may comprise a pair of rams comprising piston and cylinder devices, each connected at one end to the frame and at the other end to the article and the rams being so located and operable together to cause the article to be tipped relative to the frame. Conveniently the rams are arranged so that as one extends the other is contracted during

a tipping movement.

In a preferred embodiment the article is a tipping bucket capable of being tipped about either one of two spaced apart, generally horizontal axes, the frame being arranged for mounting on a vehicle and being pivoted relative to the vehicle about another axis transverse to said axes.

By this arrangement a vehicle can be fitted with the frame and the frame carries the tipping bucket or a support for the tipping bucket and the bucket is selected to tip either to one side or other of the vehicle according to the operation of the drive means.

Further features of the invention will appear from the following description of an embodiment of the invention given by way of example only and with reference to the drawings, in which:-

Fig. 1 is a side elevation of a tipping mechanism according to the invention in one position tipping about one pivot,

Fig. 2 is a side elevation corresponding to Fig. 1 showing tipping about the other pivot, and Fig. 3 is an end elevation of the mechanism.

Referring to the drawings the mechanism comprises a base frame 10 which in use is arranged to be attached to a vehicle (not shown) by the use of spaced attachment brackets 11 (Fig. 3) in conventional manner. The frame 10 carries for tipping or pivoting relative thereto an article 12, in this case a bucket, which can be tipped to either side of the mechanism, i.e. to the left or to the right as seen in Figs. 1 and 2. The brackets 11 are each formed with connection points a lower point being attached to an arm 11A and the upper to a ram or link 11B whereby the brackets 11 and hence frame 10 is pivoted about a horizontal transverse axis relative to the vehicle. Alternatively the frame 10 is demountably supported on a frame which is pivotable in a similar manner to that described.

The bucket 12 carries two pivots 14 and 15 which are spaced apart along the bucket 12 towards opposite ends thereof and tipping of the bucket 12 is either about pivot 14 or about pivot 15. In Fig. 1 pivoting is about the pivot 15 and in Fig. 2 pivoting is about the pivot 14. In use the pivots 14 and 15 have their axes extending parallel to one another and in a generally horizontal direction longitudinally of the vehicle so that the bucket 12 pivots upwards about one or other of the pivots 14 or 15 to empty the contents of the bucket. The pivots 14 and 15 incorporate bushings (not shown) rotatable, about the pivots whereby the bushings engage the seatings 31 and 32.

A drive arrangement for effecting the tipping action of the bucket 12 includes a pair of hydraulic cylinders or rams 16 and 17, each interconnecting the frame 10 and the bucket 12. The ram 16 is attached by its cylinder 16A to a bracket 19 mounted on the frame 10, and by its piston 16B to a bracket 20 mounted on the bucket 12.

The ram 17 is pivotally attached by its cylinder 17A to a link 22 pivotally mounted at 23 to the frame 10, and by its piston 17B to the bucket 12. The link 22 is pivotally attached to a further link 24 which is in turn pivotally attached to a bracket 25 secured to a slide member 26 carried on the frame 10.

It will be seen that the slide member 26 is movable between guide plates 27 and 28 and a surface 29 of the frame 10 in a direction longitudinally of the frame 10. As shown in Fig. 1 the slide member 26 is at its left-hand position located over the pivot 15 and in Fig. 2 the slide member 26 is in its right-hand position and over the pivot 14. The slide member 26 comprises part of stop means, as will be described, and is moved by operation of the ram 17 and via the links 22 and 24 between the positions of Fig. 1 and Fig. 2.

The frame 10 provides seatings 31 and 32 for the pivots 14 and 15 respectively and when the bucket 12 is in a non-tipping position the pivots 14 and 15 are both located in their respective seatings 31 and 32, the seatings being profiled at their base for receiving the pivots or their associated bushings.

Associated with the seatings 31 and 32 are pivot members 33 and 34 respectively which are pivotally mounted about pivots 35 and 36 to the frame 10. The pivot members 33 and 34 each comprise a semi-circular recess in which the pivots 14 and 15 are locatable according to the operative position of the mechanism. The pivot members 33 and 34 also each comprise an arm 37 and 38 respectively which serve to prevent release of the respective pivots 14 and 15 when the pivot members 33 and 34 are in their retaining position. It will be seen that the pivot members 33 and 34 are located in their retaining position by the slide member 26 when said slide member 26 is located over the arms 37 or 38.

The pivot members 33 and 34 also have a further arm 39 and 40 respectively which each serve to obstruct movement of the slide member 26 when the respective pivot members are rotated about their respective pivots 35 and 36.

The pivots 14 and 15 also carry plates 42 and 43 respectively which further serve to restrict movement of the slide member 26 during tipping of the bucket 12 about the frame 10 the pivot members 33 and 34 are each pivotally mounted for resisted movement about their respective pivots 35 and 36.

In addition the pivot members 33 and 34 each pivotally mounted for resisted movement about their respective pivots 35 and 36. In addition the members 32 and 34 are spring urged by springs 35A and 36A towards an upwards directed position, the extent of upward movement being limited by stops 35B and 36B. In this way it is ensured that the members are ready to receive the respective pivots 14 and 15 as a fail safe arrangement.

This is better understood with reference to the tipping movements shown in Figs. 1 and 2. In Fig. 1 the

bucket 12 is tipping about the pivot 15 with the slide member 26 in the left-hand position. Tipping is initiated by the rams 16 and 17 being operated simultaneously, one to extend and the other to contract. The initial operation of the ram 17 is to move the slide member 26 to the left out of registration with the pivot member 33 and away from a position covering the pivot 14. On reaching the position shown in Fig. 1 the slide member 26 permits the bucket 12 to move about the pivot 15 with the pivot 14 being released from its seating 31. The bucket 12 begins to rise and movement of the pivot 14 out of the seating 31 causes the pivot member 33 to pivot about its pivot 35 towards the position shown in Fig. 1.

The pivot member 34 is covered by the slide member 26 by location of the slide member 26 over the arm 38 whereby the pivot 15 is held in the seating 32 and is retained by the arm 38. Further extension and retraction of the rams 16 and 17 elevates the bucket 12 to the position shown in Fig. 1 in which the bucket empties to the left hand side. Reversal of the operation of the rams 16 and 17 lowers the bucket 12 so that the pivot 14 enters between the arms 37 and 39 of the pivot member 33, displacing the pivot member about the pivot 35 until the arm 37 is located over the pivot member 14 and pivot 14 lies in the seating 31.

Operation of the mechanism to pivot the bucket about the pivot 14 is effected by operating the rams 16 and 17 in the reverse directions. This initially causes the slide member 26 to move to the right, as shown in Fig 2, so that the right-hand end of the slide member 26 engages over the arm 37 thereby preventing any pivoting of the pivot member 33. As the rams 16 and 17 are further extended and retracted the pivot 15 is drawn out of its seating 32 and the bucket pivots about the pivot 14. In a similar manner to the pivoting action previously described the pivot 15 moves upwards rotating the pivot member 34 about its pivot 36. During the initial part of this movement the end of the arm 38 located in a position to prevent the slide member 26 from moving to the left and as the arm 38 moves upwards the plate 43 carried on the pivot 15 serves to prevent any leftwards movement of the slide member 26. Upon still further movement of the pivot 15 in the upwards direction the arm 40 of the pivot member 34 takes over the function of preventing movement of the slide member 26 to the left and this remains the case as the bucket 12 is tipped further about the pivot 14 so that the bucket 12 can be elevated upwards to tip its contents to the right, as shown.

Thus by simple reversal of the operative movements of the rams 16 and 17 the bucket 12 is tipped to the left about the pivot 15 or is tipped to the right about the pivot 14. The operator simply selects, through suitable valving (not shown), the operation of the rams 16 and 17 to achieve the desired tipping ac-

tion. The combination of the slide member 26 coupled with the action of the pivot members 33 and 34 and their associated arms, assisted by the plates 42 and 43 acting as stops on the respective pivots 14 and 15, ensures that the desired pivoting action is achieved.

5

## Claims

1. A tipping mechanism which comprises a frame, an article to be tipped relative to the frame, drive means for tipping the article relative to the frame, connecting means interconnecting the frame and the article, pivot means whereby the article may be pivoted relative to the frame about either one of two pivots by operation of the drive means, said pivots being spaced apart from one another along the article, and stop means for selectively retaining the pivot about which tipping of the article is to take place in position relative to the frame. 10
2. A tipping mechanism according to claim 1 wherein the pivots are each carried on the article to be locatable in a respective seating on the frame, and each pivot is selectively locatable by said stop means for rotation in said seating. 15
3. A tipping mechanism according to claim 1 or 2 wherein the stop means includes a stop member which is slidable relative to the frame between positions in which one pivot is retained in its seating and the other pivot is free to move about said one pivot. 20
4. A tipping mechanism according to claim 3 wherein the stop means include pivotable stop elements associated with each pivot and carried on the frame, which elements are releasably engaged by a respective stop member to permit each element to move between a pivot retaining position and a pivot release position. 25
5. A tipping mechanism according to claim 4 wherein the pivotable elements are each movable to a pivot release position in which the element prevents movement of the stop member in one direction. 30
6. A tipping mechanism according to any one of claims 3-5 wherein the stop member is movable from one of its positions to the other position by a linkage connected to the drive means wherein said movement is effected prior to the tipping of the article relative to the frame. 35
7. A tipping mechanism according to any one of the preceding claims wherein the drive means com-

4

prises a pair of rams including piston and cylinder devices, each connected at one end to the frame and at the other end to the article, and the rams being so located and operable together to cause the article to be tipped relative to the frame.

8. A tipping mechanism according to claim 7 wherein the rams are arranged so that as one extends the other is contracted during a tipping movement. 40
9. A tipping mechanism according to any one of the preceding claims wherein the article is a tipping bucket capable of being tipped about either one of two spaced apart, generally horizontal axes, the frame being arranged for mounting on a vehicle. 45
10. A tipping mechanism substantially as described with reference to the drawings. 50

55

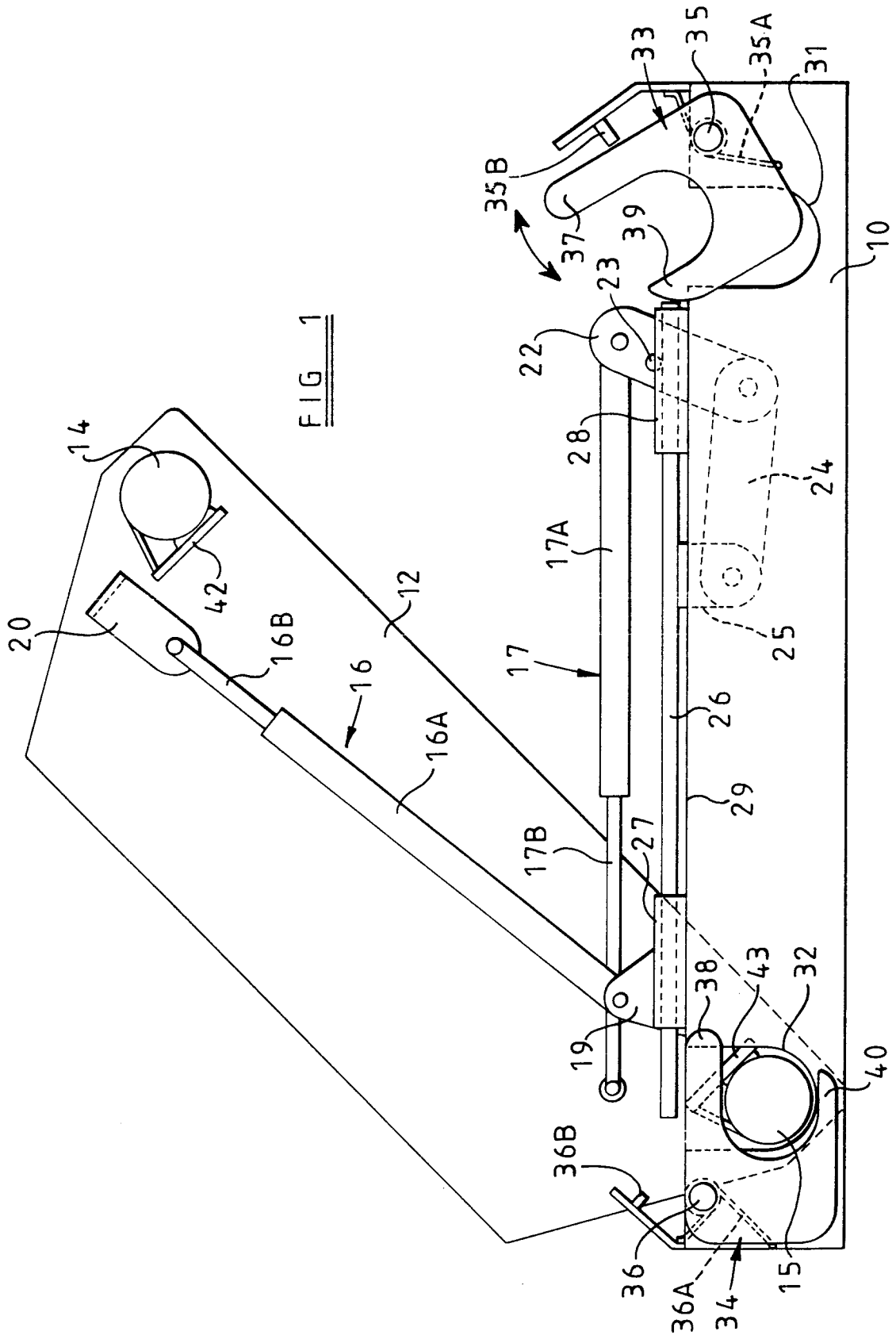


FIG 2

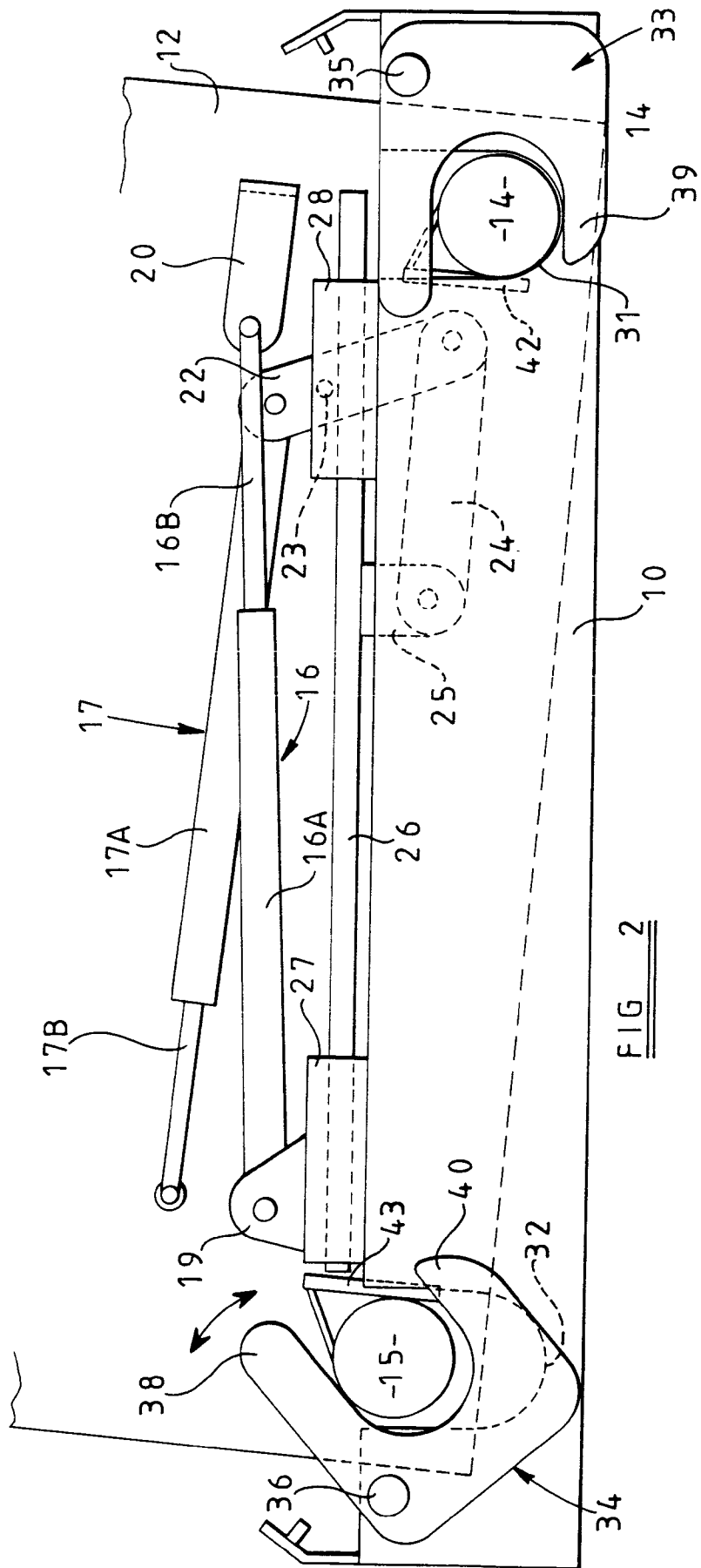


FIG 2

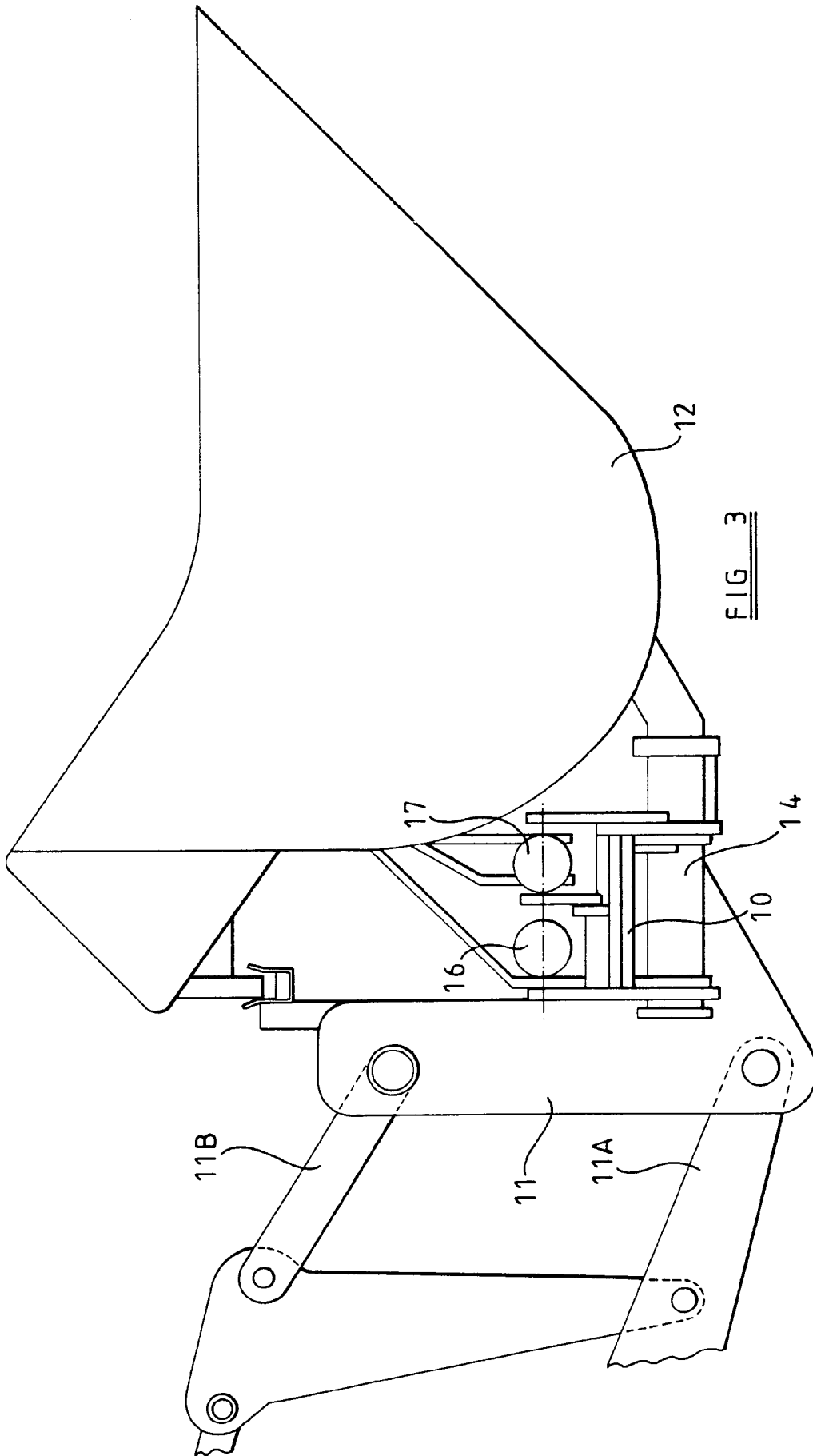


FIG 3



European Patent  
Office

EUROPEAN SEARCH REPORT

Application Number  
EP 95 30 1001

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.6)
X A	US-A-3 400 845 (K. SALNA) * column 2, line 53 - column 5, line 31 * * figures * ---	1-5,9,10 7	E02F3/00 E02F3/345
X	US-A-4 341 026 (UCHIDA ET AL.) * column 7, line 15 - line 51 * * column 10, line 53 - line 63 * * figures * ---	1-7,10	
X A	US-A-3 531 007 (T. N. W. LEIJON) * column 2, line 69 - column 3, line 62 * * figures * ---	1-3,6,9, 10 7,8	
X A	US-A-3 599 819 (T.N.W. LEIJON) * figures * -----	1-3,7,9, 10 8	
			<b>TECHNICAL FIELDS SEARCHED (Int.Cl.6)</b>
			E02F
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>12 May 1995</b>	Examiner <b>Estrela y Calpe, J</b>
<b>CATEGORY OF CITED DOCUMENTS</b>		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	
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			

EPO FORM 1503 03.92 (P04-C01)