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

(11) EP 0 803 454 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
29.10.1997 Bulletin 1997/44

(51) Int. Cl.[6]: **B65G 35/00**, F15B 15/08

(21) Application number: **97301504.3**

(22) Date of filing: **06.03.1997**

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB IE IT LI NL PT

(30) Priority: **24.04.1996 GB 9608580**

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(54) Transfer arrangement

(57) There is disclosed a transfer arrangement (10) comprising:

a support (32) above floor level (12) for an item to be transferred;

a rodless cylinder (26) including a piston mounted below floor level;

the cylinder defining a slot which is normally closed by a seal, the seal being arranged to permit a member connected with the piston to move along the slot with the piston;

means extending through a slot (28) in the floor and connecting the support with said member;

means for supplying pressurised fluid to the cylinder to move the piston through the cylinder and thus the support along the slot in the floor.

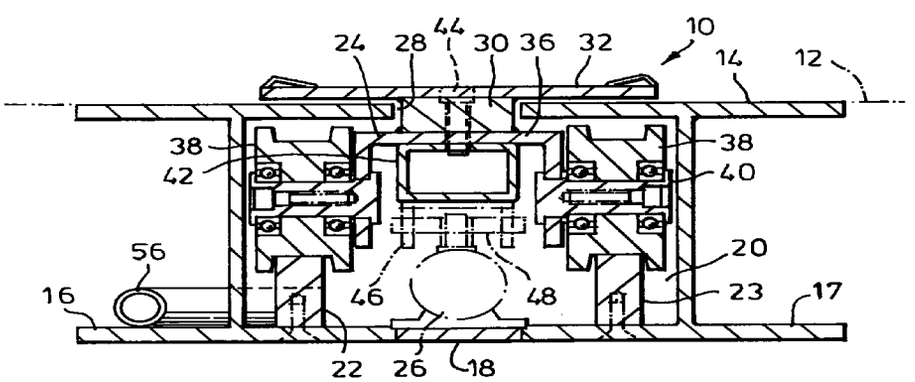

FIG.4

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Description

This invention relates to a transfer arrangement and, in particular but not exclusively, to an arrangement for linear transfer of heavy or bulky items.

In many industries bulk materials and other large or heavy items are transferred within factories using bogies which travel along rails or tracks mounted in a channel below floor level. The bogies are typically connected to an endless chain which passes around a sprocket driven by an electric or hydraulic motor. While such transfer systems generally operate satisfactorily, the chains do tend to stretch, requiring adjustment of the system, and such stretching does not tend to occur evenly over the length of the chain such that chains may have to be replaced at relatively frequent intervals. In addition, chains are vulnerable to contamination and may wear rapidly if used in dirty or dusty environments. Further, the requirement to provide an electric or hydraulic motor below floor level complicates the installation and maintenance of such systems.

It is among the objects of aspects of the present invention to provide a transfer arrangement which obviates or mitigates these disadvantages.

According to the present invention there is provided a transfer arrangement comprising:

a support above floor level for an item to be transferred;
a rodless cylinder including a piston mounted below floor level;
the cylinder defining a slot which is normally closed by a seal, the seal being arranged to permit a member connected with the piston to move along the slot with the piston;
means extending through a slot in the floor and connecting the support with said member;
means for supplying pressurised fluid to the cylinder to move the piston through the cylinder and thus the support along the slot in the floor.

The means connecting the support with the member may include a carriage moveable along a track.

The carriage and track may be located below floor level.

The carriage and track may be located above floor level.

The rodless cylinder may be a pneumatic air cylinder.

Pressurised fluid may be supplied to both ends of the cylinder, allowing the piston to be moved in both directions under close control. The cylinder may be pressurised on both sides of the piston and movement of the piston may be achieved by controlled exhaustion of fluid from one end of the cylinder. This arrangement has been found to provide for smooth and controlled movement of the piston and carriage.

The track may be in the form of a pair of parallel rails with the cylinder located therebetween.

The carriage may include wheels or rollers for engaging the track. The wheels or rollers may be configured such that the carriage will be moveable even if one wheel or roller should collapse. The carriage may include three pairs of wheels for engaging a pair of rails, and if one wheel collapses the carriage remains supported and moveable on the rails.

Those parts of the arrangement located below floor level may be mounted within a housing embedded in the floor and defining the slot in the floor.

The connection between the support and the piston may permit a degree of vertical movement such that if, for example, the carriage wheels should collapse the carriage may come to rest on a fixed structural member, such as a housing, without damaging the cylinder.

The connection between the piston and the support may be releasable. Thus, if the arrangement develops a fault such that the piston cannot be moved, the connection may be released to permit the support to be moved independently of the piston. In many applications it will be possible to move the loaded support manually along the track.

This and other aspects of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a side elevation of a transfer system according to a preferred embodiment of the present invention;

Figure 2 is a plan view of the system of Figure 1;

Figure 3 is a sectional view through line A-A of Figure 2;

Figure 4 is a somewhat enlarged sectional view through line B-B of Figure 1;

Figure 5 is a schematic representation of the pneumatic controls of the system in Figure 1; and

Figure 6 is a view similar to that of Figure 4 but showing a modified configuration.

Figures 1 through 4 illustrate a transfer arrangement 10 for paper rolls in accordance with a preferred embodiment of the present invention.

The arrangement 10 is set in a concrete floor substantially flush with the floor level which is indicated by chain dotted line 12 in Figure 4 of the drawings. In this embodiment the arrangement 10 is utilised to transfer large rolls of corrugated paper, typically weighing around two tonnes, from a loading station at one end of the arrangement to a paper handling machine at the other end of the arrangement.

The arrangement 10 comprises a channel or housing 14 formed of a pair of universal columns 16, 17 joined by a plate 18. The housing 14 is thus inexpensive

to manufacture and the external configuration of the housing 14 facilitates secure location of the housing 14 within a floor. Internally, the housing 14 defines a cuboid volume 20 which accommodates a track in the form of a pair of rails 22, 23, a carriage in the form of a bogie 24 which runs on the rails 22, 23 and a pneumatic rodless cylinder 26 which extends through the housing 14 between the rails 22, 23.

The cylinder 26 includes a piston and defines a slot which is normally closed by a seal but arranged to permit a member 27 connected with the piston to move along the slot with the piston. In this embodiment, the cylinder 26 is a 40 mm diameter cylinder with a four metre stroke. The upper face of the housing 14 defines a slot 28 through which a member 30 extends to link the bogie 24 to a support plate 32 on which the paper rolls are positioned.

The rails 22, 23 are screwed and welded to the face of the housing 14, and as may be seen from Figures 1, 2 and 3 the rails 22, 23 extend beyond one end of the housing 14: in this example, the housing 14 is five metres long while the rails 22, 23 are six metres long. This permits the "free" ends of the rails 22, 23 to be connected by an angle member 34 screwed into the upper faces of the rails 22, 23 and also allows the free ends of the rails to be set in concrete when the track 10 is installed such that the rails 22, 23 do not rely solely upon the housing 14 for support and location.

The bogie 24 includes a central inverted U-shaped channel member 36 on which three pairs of wheels 38 are mounted for engaging the rails 22, 23. The wheels 38 may be mounted to the channel member 36 using stub axles 40 as illustrated, though in other embodiments the end pairs of wheels may be mounted on single axles.

Centrally located within the channel member 36 is a box section 42 which is retained relative to the remainder of the bogie 24 by a pair of cap screws 44 which pass through the support plate 32 and member 30. Mounted to the underside of the box section 42 is a slotted fork 46 which engages a transverse bar 48 linked to the member 27 and hence the cylinder piston. The slots in the fork 46 provide for a degree of vertical movement between the fork 46 and the bar 48 such that the cylinder 26 does not have to support any vertical load and in the event of, for example, the wheels 38 collapsing the support plate 32 will engage the upper face of the housing 14 before the base of the fork slots engage on the bar 48.

The cylinder 26 is fixed on the plate 18 which joins the bases of the columns 16, 17 with a mid-section support 50 and two end supports 52, 53.

The cylinder 26 is connected to a pressurised air supply 54, as illustrated schematically in Figure 5 of the drawings. Air is separately supplied to each end of the cylinder 26 through appropriate tubes 56 and control valves 58, 59. The ends of the cylinder on both sides of the piston are normally pressurised to 6 bar, such that the piston, and thus the bogie 24, is maintained to the desired position. To move the bogie 24 the operator configures one of the valves 58, 59 to exhaust gas from one end of the cylinder, such that the higher pressure in the other end portion of the cylinder pushes the piston towards the low pressure end. The travel of the bogie 24 is limited by a pair of air springs 60, 61 provided at the ends of the housing 14.

The simplicity of the arrangement 10, and the minimal number of moving parts required, allow thearrangement 10 to be manufactured and installed at a lower cost than comparable endless chain transfer systems. Further, initial testing has shown that the arrangement 10 is reliable in operation and it is anticipated that the track will be usable for an extended period (up to 10 years) without requiring substantial maintenance or repair. Testing has also shown that, if necessary, the bogie 24 may be easily uncoupled from the cylinder 26 by removing the cap screws 44 and the cylinder 26 then removed and replaced within the space of 20 minutes. This compares most favourably with maintenance and repair operations on conventional systems. Further, in the unlikely event of a cylinder failure or, for example, failure of the air supply 54, the bogie 24 may be uncoupled from the cylinder 26 to permit the bogie 24, and any paper rolls supported thereon, to be moved manually until an opportunity arises for repairs to be made.

In the arrangement of Figure 6, wherein like parts are indicated by like reference numerals the track and carriage are provided above floor level, the carriage being connected with the member 27 by a post 60 engaging a socket 61 on the underside of the carriage.

It will be clear to those of skill in the art that the above-described embodiments are merely exemplary of the present invention, and that various modifications and improvements may be made thereto without departing from the scope of the invention as defined by the appended claims.

In particular it will be evident that the transfer arrangement of the present invention may be used in a wide variety of applications, for example, in aircraft transfer systems on the decks of ships.

Claims

1. A transfer arrangement comprising:

   a support above floor level for an item to be transferred;
   a rodless cylinder including a piston mounted below floor level;
   the cylinder defining a slot which is normally closed by a seal, the seal being arranged to permit a member connected with the piston to move along the slot with the piston;
   means extending through a slot in the floor and connecting the support with said member;
   means for supplying pressurised fluid to the cylinder to move the piston through the cylinder and thus the support along the slot in the floor.

2. A transfer arrangement according to claim 1 wherein the means connecting the support with the member includes a carriage moveable along a track.

3. A transfer arrangement according to claim 2 wherein the carriage and track are located below floor level.

4. A transfer arrangement according to claim 2 wherein the carriage and track are located above floor level.

5. A transfer arrangement according to any preceding claim wherein the rodless cylinder is a pneumatic air cylinder.

6. A transfer arrangement according to any preceding claim wherein pressurised fluid is supplied to both ends of the cylinder, allowing the piston to be moved in both directions under close control, movement of the piston being achieved by controlled exhaustion of fluid from one end of the cylinder.

7. A transfer arrangement according to claim 2 wherein the track is in the form of a pair of parallel rails with the cylinder located therebetween.

8. A transfer arrangement according to claim 2 wherein the carriage includes wheels or rollers for engaging the track.

9. A transfer arrangement according to any preceding claim wherein those parts of the arrangement located below floor level are mounted within a housing embedded in the floor and defining the slot in the floor.

10. A transfer arrangement according to any preceding claim wherein the connection between the support and the piston permits a degree of vertical movement.

11. A transfer arrangement according to any preceding claim wherein the connection between the piston and the support is releasable.

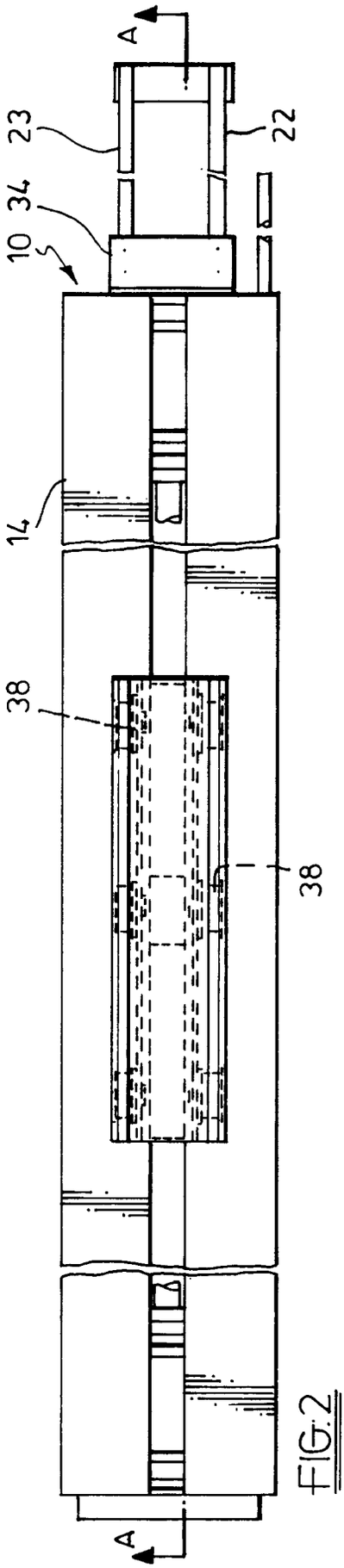

FIG.2

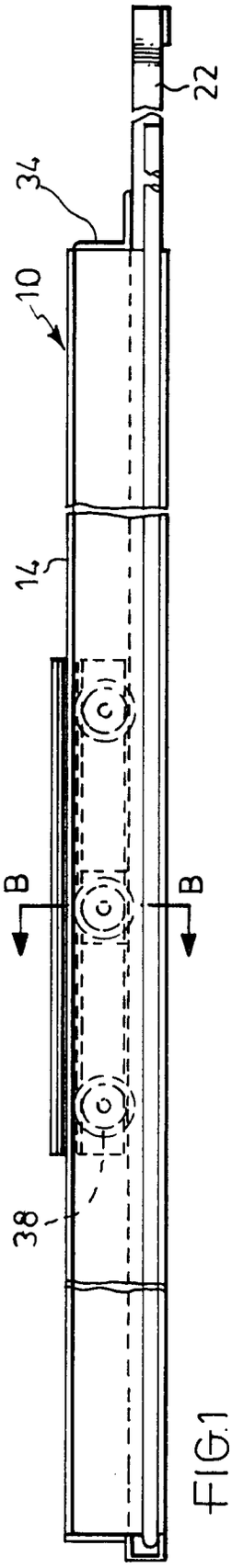

FIG.1

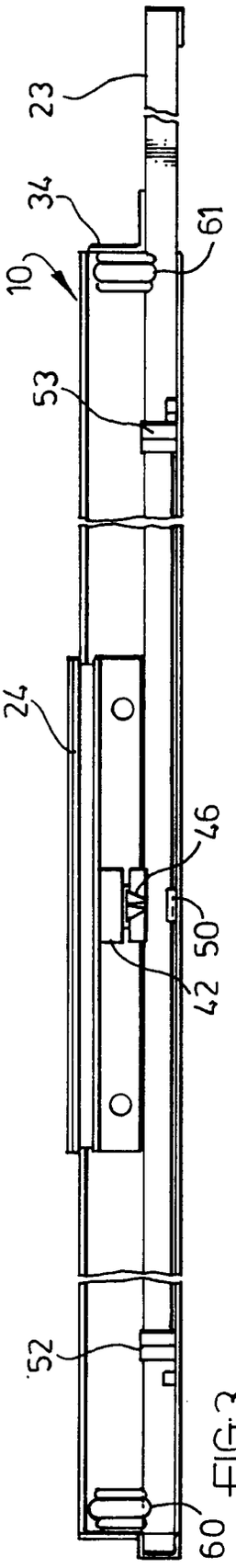

FIG.3

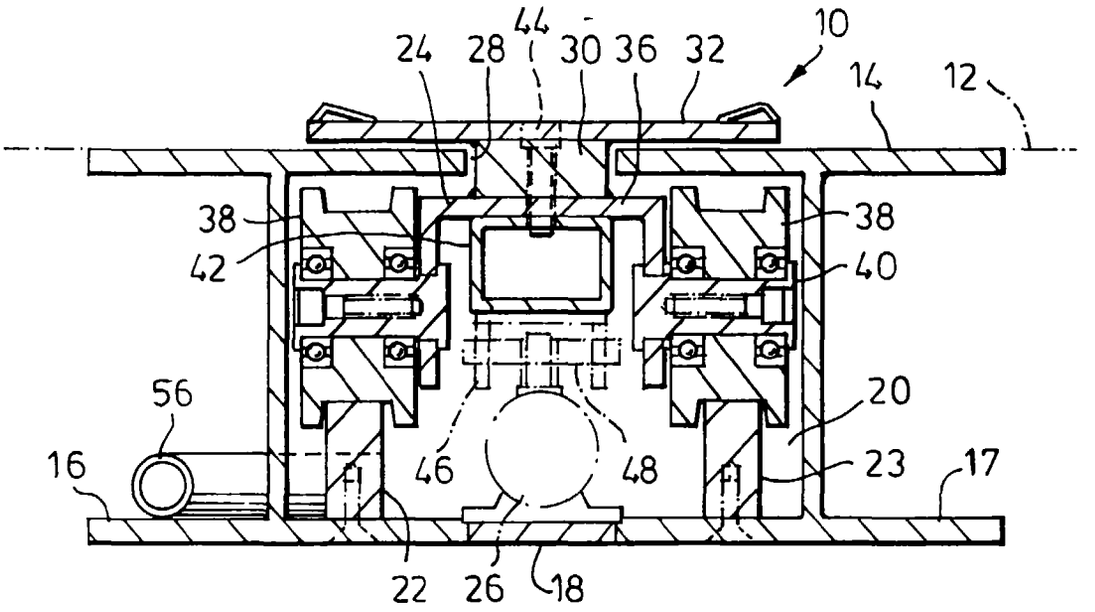
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FIG.4

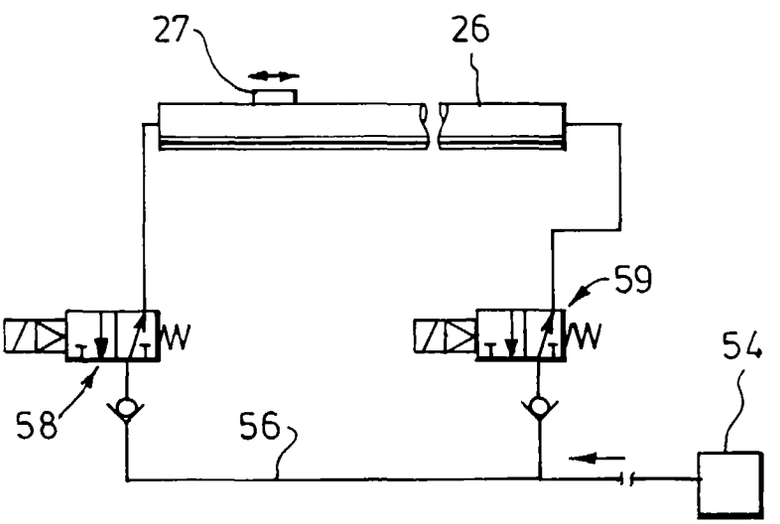
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FIG.5

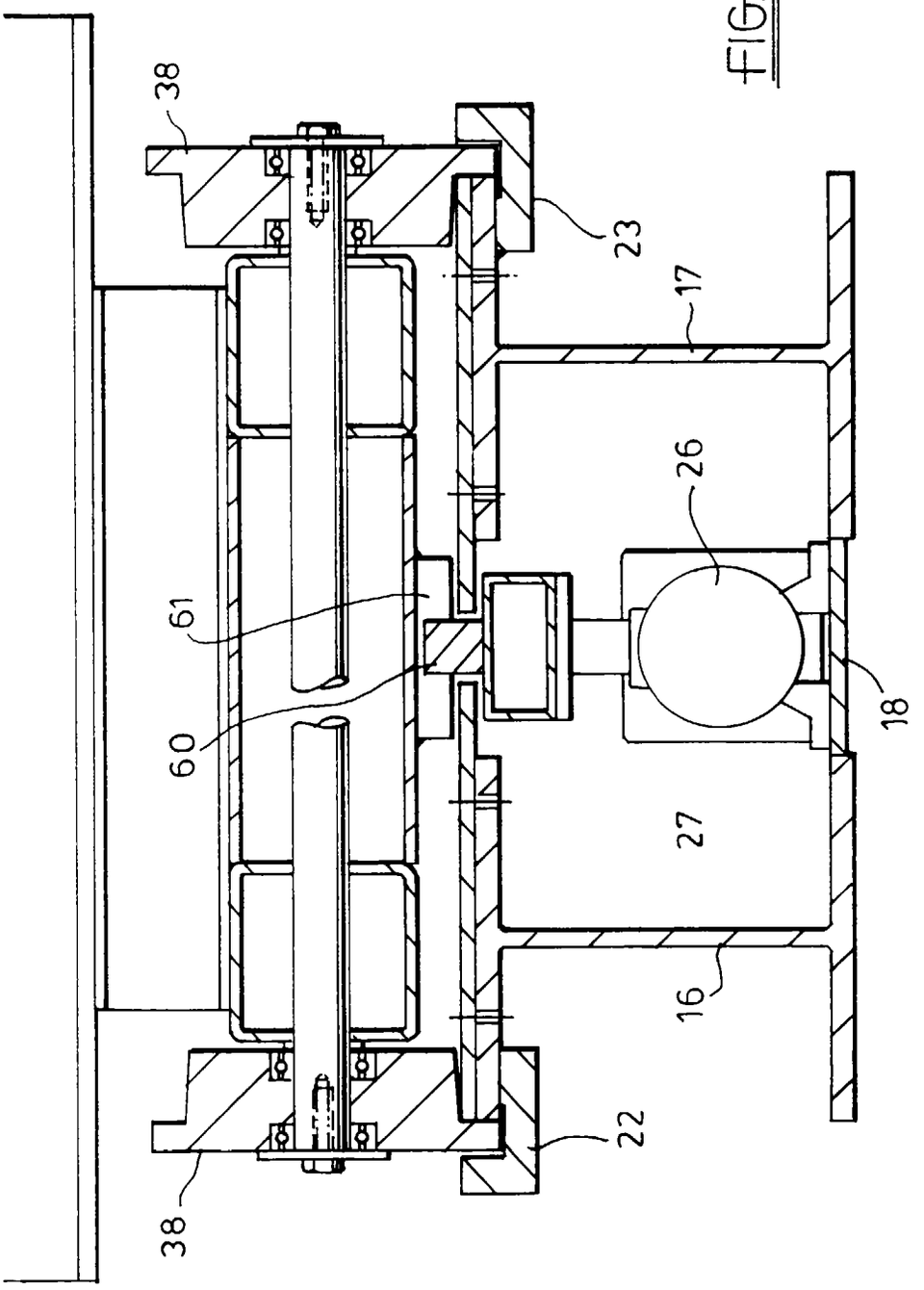

FIG.6

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EUROPEAN SEARCH REPORT

Application Number
EP 97 30 1504

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)
A	EP 0 536 799 A (SMC) * column 2, line 3 - column 4, line 11 * * column 7, line 6 - line 22; figures 1-10 * ---	1,2,5-8	B65G35/00 F15B15/08
A	US 3 421 718 A (GEHRINGER ET AL.) * the whole document * ---	1,4,5,7,8	
A	WO 88 02347 A (HYDRAROLL) * the whole document * ---	1,5	
A	EP 0 157 892 A (LIPINSKI ET AL.) * page 7, line 1 - page 12, line 2; figures 1,2 * ---	1,10	
A	DE 29 43 506 A (W. SCHLAFHORST & CO.) * page 4, line 1 - line 15; figures 1-4 * ---	1	
A	EP 0 654 608 A (HYGRAMA) * column 4, line 39 - column 5, line 5; figure 1 * ---	1,6	TECHNICAL FIELDS SEARCHED (Int.Cl.6) B65G F15B
A	GB 2 189 451 A (YUSHIN SEIKI) * figures 1-4 * ---	1	
A	US 3 838 769 A (FISHBURNE ET AL.) * the whole document * -----	1-3,9	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	4 August 1997	Simon, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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