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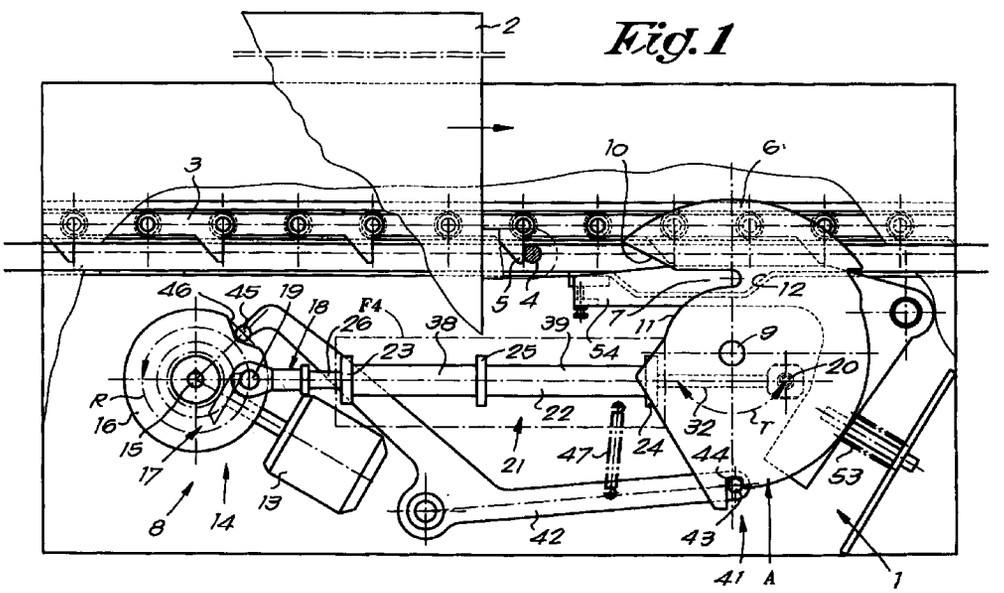
(54) Device for coupling and/or uncoupling conveyor elements in relation to a driving mechanism

(57) Device for coupling and/or uncoupling conveyor elements in relation to a driving mechanism, consisting of a rotatable element (6) in which is provided a guide (7) for a drag pin (4) of a conveyor element (2) and driving means (8) to rotate the rotatable element (6), such that a conveyor element (2), as a result of the rotation of the rotatable element (6) and by putting it in a given angular position, can be uncoupled from and/or coupled to the driving mechanism, characterized in that means (21) are provided between the driving means (8) and the rotatable element (6) which can give away when the rotatable element (6) jams.

Fig. 1



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Description

This invention concerns a device for coupling and/or uncoupling conveyor elements in relation to a driving mechanism.

In particular, the invention concerns driving mechanisms which mainly consist of a continuously moving driving element, such as an endless drag chain and conveyor elements, which usually consist of trolleys, and which are coupled to such a drag chain by means of a coupling part provided onto it, such as a drag pin, which works in conjunction with the driving element.

It is known that for coupling and/or uncoupling conveyor elements in relation to the driving mechanism, use can be made of an element which can be rotated by means of driving means in which is provided a guide for a drag pin of a conveyor element, such that a conveyor element, due to the rotation of the rotatable element so as to place it in a given angular position, can be uncoupled from and/or coupled to the drag device, as the drag pin is either put out of the path followed by the driving mechanism, or is put back into this path by means of the above-mentioned guide.

However, the known devices are disadvantageous in that they are easily damaged. This damage is caused when the above-mentioned rotatable element jams and the driving element continuous to exert a force on it, whereby either parts break off, or gears are damaged, or also the driving element is put out of order.

The invention aims to provide a solution to this.

To this end, the invention concerns a device for coupling and/or uncoupling conveyor elements in relation to a driving mechanism, consisting of a rotatable element in which is provided a guide for a drag pin of a conveyor element, and driving means to rotate the rotatable element, such that a conveyor element, as a result of the rotation of the rotatable element and by putting it in a given angular position, can be uncoupled from and/or coupled to the driving mechanism, characterized in that means are provided between the driving means and the rotatable element which can give away when the rotatable element jams.

Due to the fact that such means are applied, the connection can give away should the rotatable element jam, and the driving means can continue to function normally without being excessively loaded, such that any damage to these driving means is excluded.

According to a preferred embodiment, the above-mentioned means consist of an elastic, deformable connection. The connection hereby preferably offers some initial resistance against the deformation, which is so great that a deformation only occurs when there is a jam.

In a constructional simple embodiment, the above-mentioned connection will consist of axially slidable parts in between which are provided springs.

The above-mentioned connection can be provided with a spring which allows at least for an extension of the connection. According to a variant, it can be provided with a spring which allows at least for a shortening of the connection.

Preferably, however, in order to optimally exclude damages, the device will be designed double-acting, such that the connection can give away in both directions, in other words such that it can both be elongated and compressed under a normal load.

The invention is especially useful in the case of a positive drive, such as a drive by means of an electric motor.

In order to better explain the characteristics of the invention, the following preferred embodiment is described as an example only without being limitative in any way, with reference to the accompanying drawings, in which:

figure 1 shows a top view of a device according to the invention, whereby a part of a conveyor element is also represented;
figures 2 and 3 show the device from figure 1 in other positions, however without the conveyor element being represented;
figure 4 shows a section of the part which is indicated in figure 1 with F4 to a larger scale.

As represented in figure 1, the invention concerns a device 1 for uncoupling and/or coupling conveyor elements 2, such as a trolley, in relation to a driving mechanism, in particular a driving element 3 thereof, such as a drag chain.

As is known, the conveyor element 2 can hereby be moved by means of a drag pin 4 or such. The drag pin 4 can hereby be taken along by a protrusion 5 provided on the driving element 3.

The above-mentioned device 1 for coupling and/or uncoupling the conveyor elements 2 in relation to the driving element 3 consists of a rotatable element 6 in which is provided a guide 7 for a drag pin 4 of a conveyor element 2 and driving means 8 to rotate the rotatable element 6, such that a conveyor element 2 can be uncoupled from and/or coupled to the driving element 3 by turning the rotatable element 6 and by putting it in a given angular position.

The rotatable element 6 can have various forms, but it preferably consists of a disc which can rotate around a pivot 9, whereas the guide 7 provided in it consists of a recess which is confined by two guiding edges 10 and 11.

When the disc is in a first position A, as represented in the figures 1 and 2, the guiding edge 10 stretches such that the drag pin 4 of an approaching conveyor element 2 is guided outside the path of the driving element 3 according to the course X represented in figure 2.

By rotating the rotatable element 6 into a position B, as represented in figure 3, the guiding edge 11 makes sure that the drag pin 4 is forced back into the path of the driving element 3 over a fixed guide 12.

In the example represented, the above-mentioned driving means 8 consist of an electric motor 13 and a

crank mechanism 14 which is driven by the motor 13 and which converts the rotating movement R in a to and fro rocking motion T of the rotatable element 6. This crank mechanism 14 may for example consist of a crank rotating around a pivot 15, in the shape of a disc 16 which is driven by the motor 13 via a gear transmission 17, and a connecting rod 18 which is connected to the disc 16 by means of a pivot 19 on the one hand, and which is connected to the rotatable element 6 by means of a pivot 20 on the other hand.

According to the invention, means 21 are provided between the driving means 8 and the rotatable element 6 which can give away when the rotatable element 6 jams.

In the example represented, these means 21 are part of the above-mentioned connecting rod 18. It is clear, however, that these means 21 can also be provided in another place.

As described in the introduction, these means 21 preferably consist of an elastic, deformable connection, in this case between the pivots 19 and 20, which is designed such that it offers some initial resistance against deformation, so that when the device 1 functions normally, there is no or almost no deformation and the distance between the pivots 19 and 20 remains unaltered, but when the rotatable element 6 jams, the connection can be elastically elongated and/or compressed, such that the driving means 8 can carry out a normal working cycle.

As represented in figure 4, the above-mentioned elastic, deformable connection preferably consists of a cylinder 22 with two end walls 23 and 24 and a dividing wall 25; a first coupling bar 26 which can be moved in the cylinder 22, which goes through the first end wall 23 and which is coupled to the driving means 8, whereby this coupling bar 26 is provided with a stop 27 which cooperates with a first side 28 of the dividing wall 25, whereby this stop 27 prevents the first coupling bar 26 from being pushed in the cylinder 22; a first compression spring 29 which is provided between the inside 30 of the first end wall 23 and a stop 31 on the first coupling bar 26; a second coupling bar 32 which can be moved in the cylinder 22 which goes through the second end wall 24 and which is connected to the rotatable element 6, whereby this coupling bar 32 is provided with a stop 33 which cooperates with the inside 34 of the second end wall 24, whereby this stop 33 prevents the second coupling bar 32 from sliding out of the cylinder 22; and a second compression spring 35 which is provided between the second side 36 of the dividing wall 25 and a stop 37 on the second coupling bar 32.

In order to obtain a constructional simple design, the cylinder 22 is preferably composed of two cylinder parts 38 and 39 which are respectively provided between the end wall 23 and the dividing wall 25 on the one hand, and between the dividing wall 25 and the end wall 24 on the other hand, whereby the whole is held together by means of rods 40 which go through the walls 23, 24 and 25.

The device 1 can possibly be equipped with a mechanical interlock 41 which can interlock the rotatable element 6 in the above-mentioned position A in order to prevent the element 6 from turning when a drag pin 4 slides along the guiding edge 10.

This interlock 41 preferably consists of a rotatable arm 42 with a first pawl 43 which can mesh in a recess 44 in the rotatable element 6 and a second pawl 45 which cooperates with the perimeter of a disc driven by the motor 13, in this case the above-mentioned disc 16, and which takes place in a recess 46 on the perimeter of this disc 16, whereby the interlock 41 is switched on when the second pawl 45 moves in the recess 46 of the disc 16. The arm 42 is hereby forced into one direction by means of a spring 47.

According to the invention, the above-mentioned connection is hereby provided with a play 48 which allows for a rotation of the disc 16 over a small angle without the rotatable element 6 being moved, whereby this play 48 is so large that the interlock can be uncoupled during this rotation. As represented in figure 4, this play 48 can be obtained by using such a compression spring 29 or by mounting this compression spring 29 such that it allows for a free movement of the first coupling bar 26 in relation to the cylinder 22 over a certain distance D. In the example represented, use is made to this end of a slidable connecting piece 49 which retains the compression spring 29 and which is provided with a stop 50 which can cooperate with the stop 31. The first coupling bar 26 can hereby move freely between a position in which the stop 27 makes contact with the side 28 and a position in which the stop 31 acts on the compression spring 29 through the intervention of the connecting piece 49.

It is clear that the device 1 can be equipped with additional accessories.

Depending on the way in which the device 1 must be controlled, use can be made for example of detectors and/or an encoder which are not represented in the drawings to determine the position of the disc 16.

Further, use can be made of a guide 54 which can be moved against the force of a spring 53 which makes sure that the conveyor element 2 is gradually slowed down via the drag pin 4 when it is uncoupled from the driving element 3.

The working of the device 1 can be derived from the accompanying drawings and is mainly as follows.

When an approaching conveyor element 2 must be uncoupled, the rotatable element 6 is maintained in the rest position A. The drag pin 4 which is taken along by the drag chain then makes contact with the guiding edge 10 and is forced in the guide 7 as represented in figure 2. As the drag pin 4 is situated outside the path of the drag chain, in particular of the protrusions 5, the drag movement is interrupted and the conveyor element comes to a standstill.

In order to drag the conveyor element 2, the crank mechanism 4 is moved to and fro over one cycle by mak-

ing the disc 16, via the control of the motor 13, make one rotation.

First, the first coupling bar 26 of figure 4 is shifted to the left, over the distance D, without following the cylinder 22 and the second coupling bar 32. The rotatable element 6 keeps standing still during this movement. As the pawl 45 is forced out of the recess 46, the interlocking 41 comes loose. The short standstill of the rotatable element 6 makes it possible to freely take the pawl 43 out of the recess 44.

As the crank 16 is moved further, the stop 31 makes contact with the stop 50. Since the spring 29 will only be compressed under abnormally large forces, the cylinder 22 and the coupling bar 32 are drawn along, so that the rotatable element 6 is brought in the position B of figure 3 and the above-mentioned drag pin 4 is brought back in the path of the driving element 3, and consequently is taken along by this driving element 3.

As the crank 16 is moved still further, the rotatable element 6 is turned back in the position A.

When the rotatable element 6 jams, for any reason whatsoever, for example because a drag pin 4 becomes locked in an abnormal way between the element 6 and another part of the device, the security device is activated, which implies that the motor 13 can continue to work normally without the disadvantages occurring as mentioned in the introduction. In a concrete manner, this means that, in the example represented, the spring 29 will be compressed when the element 6 is jammed as the connecting rod 18 moves to the left, and that the spring 35 will be compressed when the element 6 is jammed as the connecting rod 18 moves to the right, so that in both cases the pivot 19 can move, whereas the pivot 20 stands still.

It should be noted that the position of the figures 1 and 2 preferably forms the rest position, but that this is not necessarily so. In order to obtain that the driving means 8 are always stopped in the rest position, the motor 13 can be controlled in various manners. According to one possibility, use can be made of a servomotor which each time carries out a specific rotation. According to another possibility, an interruption contact can be provided on the arm 42.

The present invention is by no means limited to the embodiment described as an example and represented in the drawings; on the contrary, such a device for uncoupling and/or coupling a conveyor element 2 in relation to a drag mechanism can be made in various forms and dimensions while still remaining within the scope of the invention.

Claims

1. Device for coupling and/or uncoupling conveyor elements in relation to a driving mechanism, consisting of a rotatable element (6) in which is provided a guide (7) for a drag pin (4) of a conveyor element (2) and driving means (8) to rotate the rotatable element (6), such that a conveyor element (2), as a result of the rotation of the rotatable element (6) and by putting it in a given angular position, can be uncoupled from and/or coupled to the driving mechanism, characterized in that means (21) are provided between the driving means (8) and the rotatable element (6) which can give away when the rotatable element (6) jams.

2. Device according to claim 1, characterized in that the above-mentioned means (21) consist of an elastic, deformable connection.

3. Device according to claim 2, characterized in that the connection offers some initial resistance against the deformation, which is so great that a deformation only occurs when there is a jam.

4. Device according to claim 2 or 3, characterized in that the above-mentioned connection consists of axially slidable parts in between which are provided springs (29-35).

5. Device according to claim 4, characterized in that the above-mentioned connection is at least provided with a spring (29) which allows for an extension of the connection.

6. Device according to claim 4 or 5, characterized in that the above-mentioned connection is at least provided with a spring (35) which allows for a shortening of the connection.

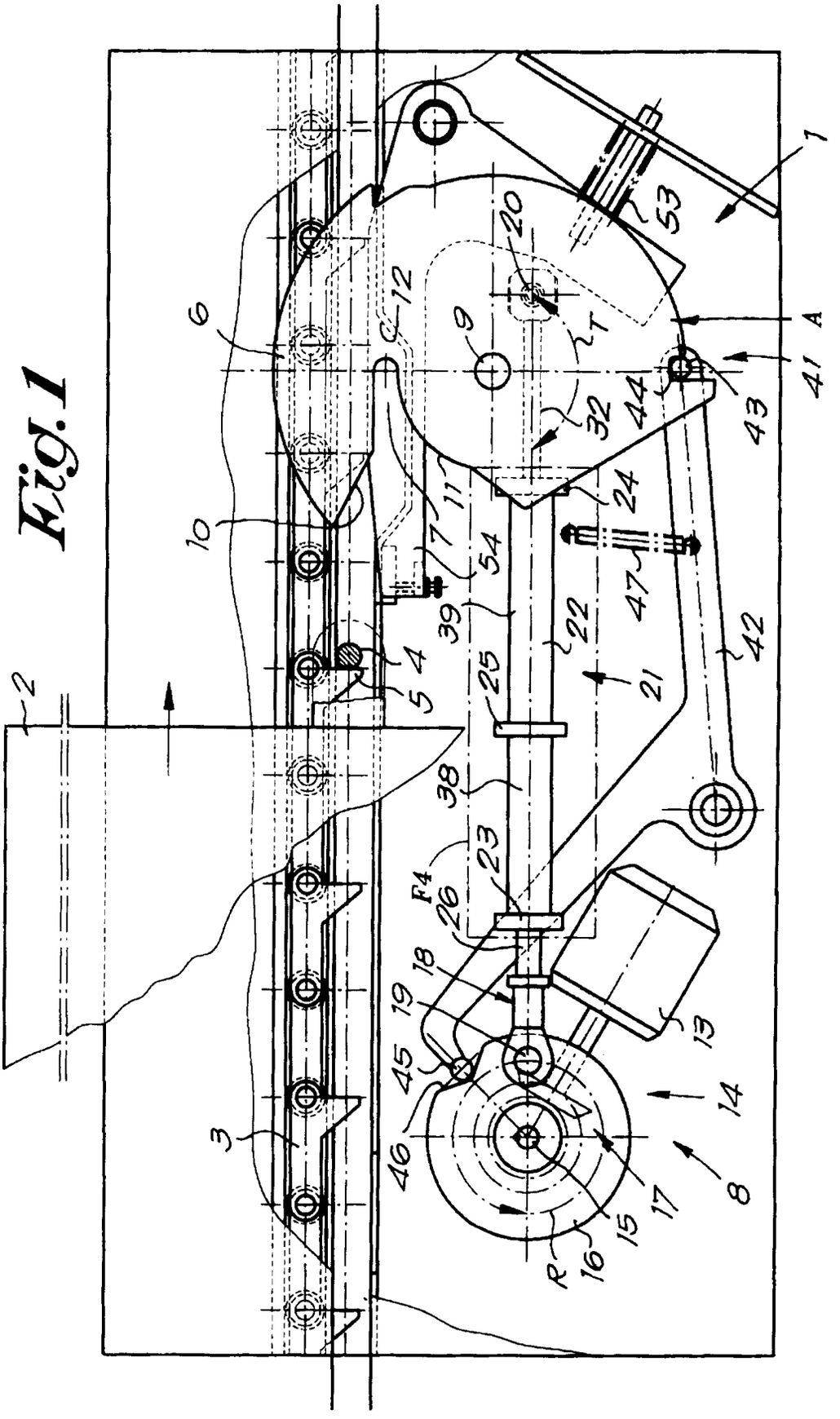
7. Device according to claim 4, 5 or 6, characterized in that the connection mainly consists of a cylinder (22) with two end walls (23-24) and a dividing wall (25); a first coupling bar (26) which can be moved in the cylinder (22), which goes through the first end wall (23) and which is coupled to the driving means (8), whereby this coupling bar (26) is provided with a stop (27) which cooperates with a first side (28) of the dividing wall (25), whereby this stop (27) prevents the first coupling bar (26) from being pushed in the cylinder (22); a first compression spring (29) which is provided between the inside (30) of the first end wall (23) and a stop (31) on the first coupling bar (26); a second coupling bar (32) which can be moved in the cylinder (22) which goes through the second end wall (24) and which is connected to the rotatable element (6), whereby this coupling bar (32) is provided with a stop (33) which cooperates with the second end wall (24), whereby this stop (33) prevents the second coupling bar (32) from sliding out of the cylinder (22); and a second compression spring (35) which is provided between the second side (36) of the dividing wall (25) and a stop (37) on the second coupling bar (32).

8. Device according to any of the preceding claims, characterized in that the driving means (8) make use of an electric motor (13).

9. Device according to claim 8 and any of claims 2 to 7, characterized in that the above-mentioned connection is part of a connecting rod (18) between a crank driven by the motor (13) and the above-mentioned rotatable element (6).

10. Device according to claim 9, characterized in that it is provided with a mechanical interlock (41) which can interlock the rotatable element (6) in the position (A) whereby a conveyor element (2) is brought to a standstill; in that this interlock (41) consists of a rotatable arm (42) with a first pawl (43) which can mesh in a recess (44) in the rotatable element (6) and a second pawl (45) which cooperates with the perimeter of a disc (16) driven by the motor (13), and which can take place in a recess (46) on the perimeter of this disc (16), whereby the interlock (41) is switched on when the second pawl (45) moves in the recess (46) of the disc (16); and in that the connection is provided with a play (48) which allows for a rotation of the disc (16) over a small angle without the rotatable element (6) being moved, whereby this play (48) is so large that the interlock (41) can be uncoupled during this rotation.

Fig.1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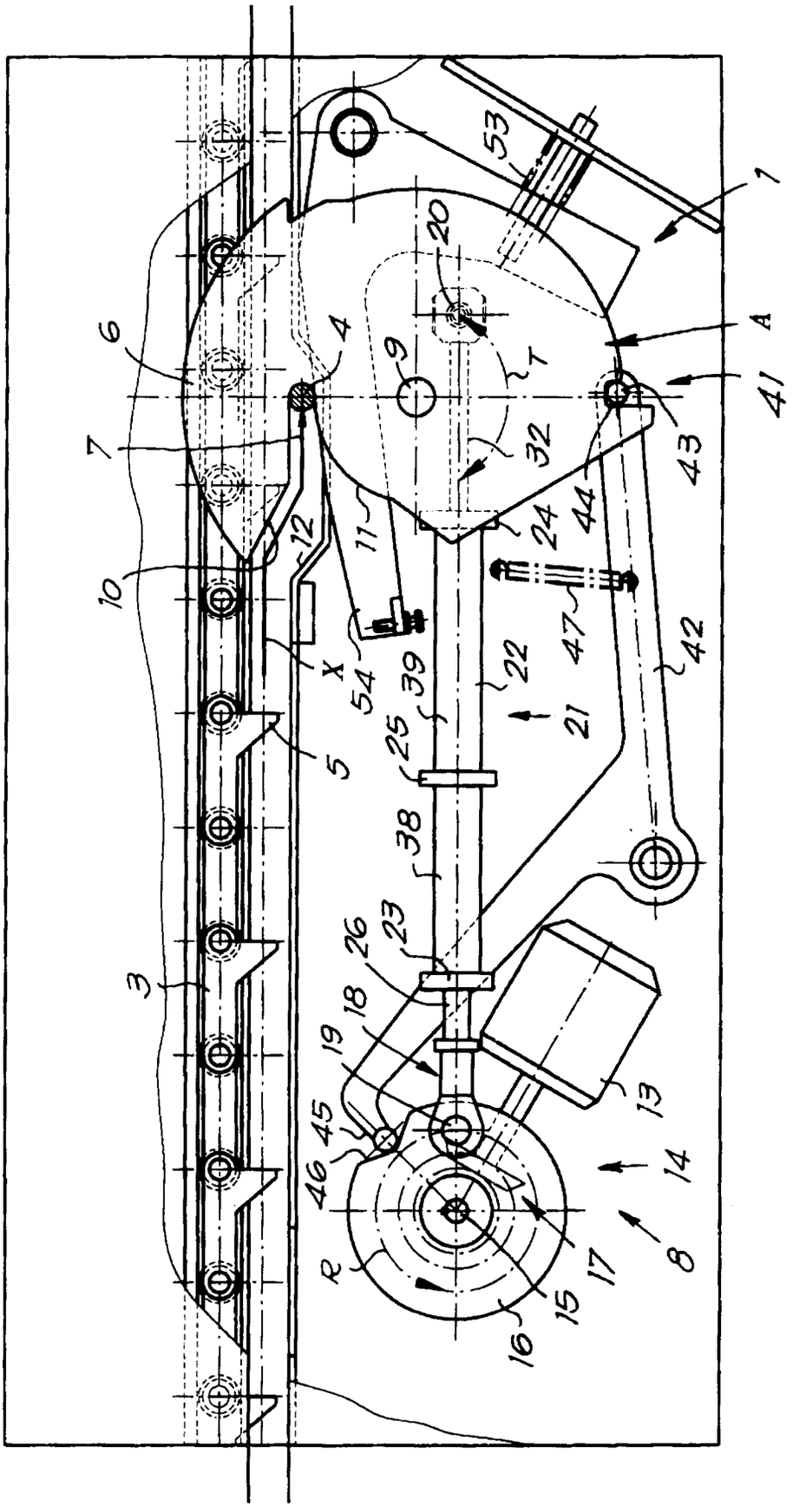
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Fig.2

Fig.3

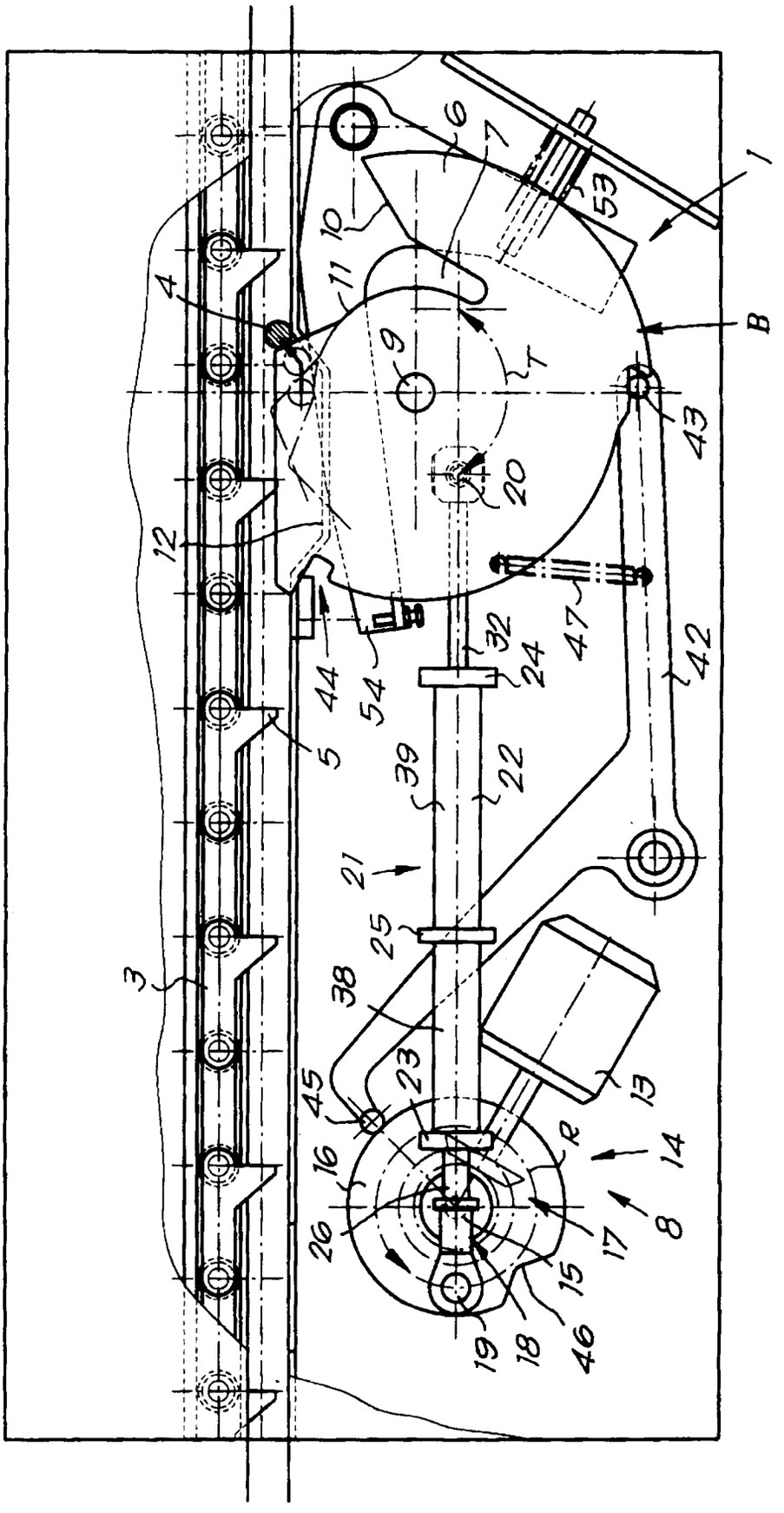
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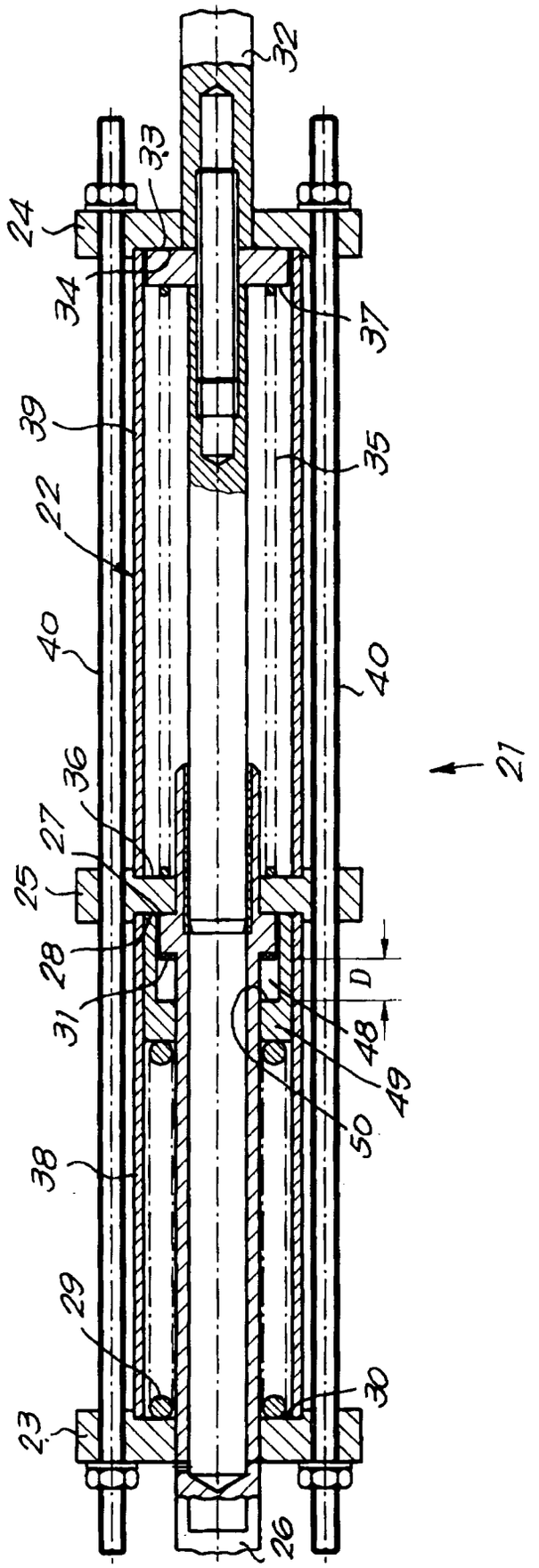
Fig.4



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EUROPEAN SEARCH REPORT

Application Number
EP 95 20 2795

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-A-0 574 971 (EGEMIN) * the whole document *	1	B61B10/04 B61B10/02
A	US-A-3 648 618 (PIERSON ET AL.)		
A	FR-A-2 318 768 (SI HANDLING SYSTEMS INC.)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B61B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	5 February 1996	Beernaert, J

CATEGORY OF CITED DOCUMENTS

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