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Publication number:

0 439 105 A1

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EUROPEAN PATENT APPLICATION

21 Application number: **91100723.5**

51 Int. Cl.⁵: **B66C 7/16**

22 Date of filing: **22.01.91**

30 Priority: **25.01.90 IT 8490590**

I-37135 Verona(IT)

43 Date of publication of application:
31.07.91 Bulletin 91/31

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84 Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

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54 **Retractable buffer device for overhead traveling crane or crane.**

57 Buffer device (10) for overhead traveling crane or crane, comprising a supporting structure (16) provided with at least one buffer element (19, 25) which is assembled in a predetermined position on the runways (13, 14) of an overhead traveling crane or of a crane, wherein said supporting structure (16) is rotatably movable by means of a motor between a first limit position, in which said at least one buffer element (19, 25) is placed in such a way as to interfere with the advancing movement of said overhead traveling crane or said crane beyond said predetermined position, and a second limit position, in which said supporting structure (16) is retracted beneath said runways (13, 14) and allows said overhead traveling crane or said crane to advance beyond said predetermined position.

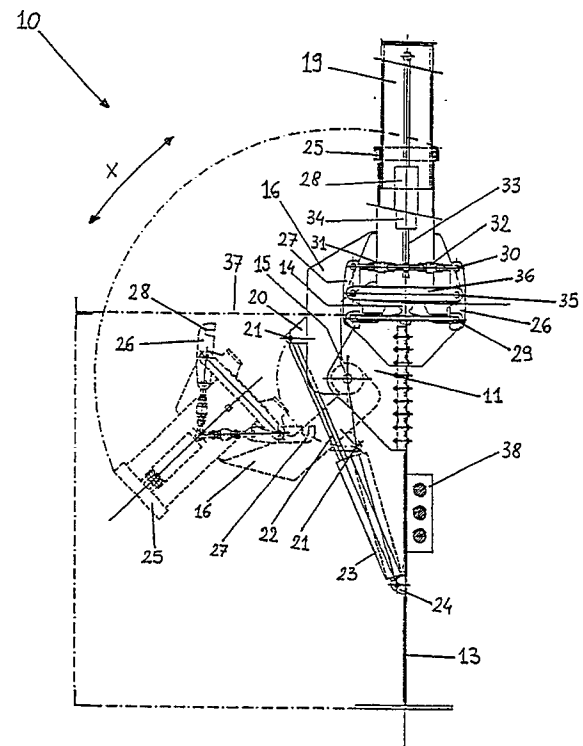


Fig. 2

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RETRACTABLE BUFFER DEVICE FOR OVERHEAD TRAVELING CRANE OR CRANE

The present invention relates to a buffer device for an overhead traveling crane or for a crane.

More particularly, the present invention relates to a retractable buffer device for overhead traveling crane which is suitable for being placed on the path of an overhead traveling crane or of a crane in order to selectively limit its run as far as it reaches a predetermined position, or to allow its advancement beyond said position.

Said device may mainly applied in the application fields of overhead traveling devices such as, for instance, in the fields of mechanical industries, heavy loads transportation, stone and/or marble working etc.

Several types of buffer suitable for limiting the run of an overhead traveling crane or of a crane are known in the art.

Such buffers are always placed close to the ends of the runways on which, for instance, a bridge crane is made to move and they are suitable for cushioning possible impacts against said ends which are by way of example due to a misuse of the bridge crane, or to a failure of the same.

It often happens, for instance in modern mechanical industries, that a single overhead traveling crane is structured for serving different working stations, according to working requirements, and that such working stations have to be physically separated from each other by means of walls on project or on safety grounds.

These kinds of walls are structured in such a way as to be at least partially movable and thus to allow the passage, at a given moment, of the overhead traveling crane, as it is for instance described in italian patent application n. 84906/90 filed by the present applicant.

Such a situation may occur, for example, in the case of the hot zone of a steel plant, in which the overhead traveling crane is used for transporting a ladle towards, respectively, the smelting furnace zone, the casting zone or the maintenance zone, these zones being separated from each other.

The known buffers involve disadvantages and drawbacks due to the fact that they may only be used, in these cases, at the ends of the runways, and they may clearly not give any help in the case where the overhead traveling crane is inadvertently or by failure moved towards a separating wall striking against it and possibly damaging it.

It is the main purpose of the present invention that of obviating to the disadvantages and drawbacks which are typical of the background art, and to provide, thus, for a retractable buffer device which may be selectively placed at predetermined positions along the runways of an overhead travel-

ing crane or of a crane and which allows, therefore, the movement of said overhead traveling crane or crane to be stopped at a predetermined limit position or, alternatively, to be carried on beyond such position.

This is achieved by means of a buffer device having the features disclosed in the main claim.

The dependent claims describe advantageous forms of embodiment of the invention.

The device according to the invention comprises a buffer structure which is assembled in a predetermined position on the runways of an overhead traveling crane, said structure being rotatably movable by means of a motor between a first limit position, in which the buffer is placed in such a way as to interfere with the advancing movement of the overhead traveling crane beyond said predetermined position, and a second limit position, in which said structure is retracted behind said runways and allows the advancing movement of the overhead traveling crane beyond said predetermined position.

Advantageously, the movable structure of the buffer device is provided with a pair of trap doors which are movable with it and which allow the passage of operators on a gangway disposed adjacent to the runways both in the active and the retracted positions of the buffer.

Furthermore, the buffer device according to the invention is provided with a telescopic buffer element, which allows the device to be rotatably moved also in limited room conditions, such as for instance between a pair of adjacent beams.

The device according to the invention allows a plurality of advantages to be achieved in respect of the known devices, since it may be placed in any position along the runways, thus limiting at will the overhead traveling crane advancing movement.

Other advantages and features of the invention will become apparent from reading the following description, of a form of embodiment of the invention, given as a non-limiting example, with the help of the figures shown in the attached drawings, in which:

- figure 1 shows a side view of the device according to the invention;
- figure 2 shows a section taken along lines A-A of figure 1.

In the figures, reference sign 10 generally indicates a retractable buffer device according to the present invention.

Said device 10 is assembled on supporting elements which are constituted by a pair of L-shaped flanges 11, 12 which are fixed, generally by means of nuts and bolts, to a beam 13 on which a

runway 14, in this case a sliding rail for an overhead traveling crane (not represented in the figures), is formed.

A hole is disposed close to one end of both flanges 11, 12 and acts as a support for a first pivot 15 serving as turnover hinge for device 10.

Said device 10 comprises a structure 16 forming a frame and comprising a pair of elements 17, 18 which support a pair of buffers 19, 25, each element 17, 18 of said pair being further provided with an extension 20 on which is supported a second pivot 21 on which acts the movable arm 22 of an hydraulic and/or pneumatic jack 23, whose base is pivoted on a hinge 24 which is fixed to said beam 13.

Furthermore, said structure 16 is fixed to said first pivot 15 and may be freely rotated about it in the directions which are indicated by the curved line X following to the operation of the movable arm 22 of jack 23, between a first, retracted, position, which is indicated by means of dashed lines in figure 2, and a second, active, position, which is indicated by continuous lines in fig. 2.

Fixed to said supporting structure 16 are a pair of telescopic buffer elements 19, 25 and, respectively, a blocking device formed by a pair of vices which may be hydraulically and/or pneumatically operable in a way which will be in detail hereinafter described.

According to the illustrated form of embodiment, the pair of telescopic buffers 19, 25 generally comprises a fixed buffer element 25, which is integral with the supporting structure 16, and a movable buffer element 19, which is able to slide inside of said fixed element 25.

Anyway, other forms of embodiment fall within the scope of the invention, according to which the movable buffer element slides outside of the fixed element.

The movable buffer element 19 may be moved by means of an hydraulic and/or pneumatic jack 28, whose base is supported on the base of the fixed buffer element 25 and whose movable arm is fixed close to one end of the movable buffer element 19.

The device for fastening the buffer to the runway 13 comprises a pair of vices 26, 27, each of these being constituted by an elongated element in which:

- one end comprises a groove 28 suitable for operatively contacting a reinforcing member 29 carried by the runway 13 in order to block the device 10 on the runway itself;
- the other end carries a pivot 30 which is connected to a toggle suitable for controlling the operation of the vices, said toggle comprising a pair of adjustable connecting rods 31, 32 which are respectively connected by

one of their ends to the pivots 30 of vices 26, 27 and by their other ends to the movable arm 33 of a hydraulic and/or pneumatic jack suitable for controlling the vices operation, and which acts in a way which will be hereinafter described in detail;

- a central part carries a pivot 35 to which a rigid bar 36 is connected, which is suitable for connecting the vices 26, 27, said pivot 35 forming the fulcrum of the lever which is constituted by each of said vices.

According to a further feature of the invention, the device 10 is provided with a pair of trap doors, one of which (37) is indicated by dashed lines in figure 2.

Said trap doors 37 are respectively placed at both sides of device 10 and play the role, which will be hereinafter described in detail, of allowing the passage of an operator on a gangway (not represented) which is disposed parallel to the runway 13, both in the cases where the buffer is in its active position, and where it is in its retracted position beneath the runway 13.

The device 10 is finally completed by a series of signalization and safety devices which include, for instance, semaphores 38, roto-alarm 39, sirens 40, limit switches and magnetical devices for detecting the presence of people (not represented).

The operation of the retractable buffer device 10 according to the invention is as follows.

In the case where the buffer device 10 is in its retracted position beneath the railway 13, and the semaphore 38 indicates a green light, an electrical control signal for moving the buffer switches on the signalization and safety devices; thus, the semaphore 38 indicates a yellow light, the roto-alarm is switched on, and the siren 40 begins to sound.

Successively, the movable arm 22 of jack 23 is raised, and this causes the rotation of the entire supporting structure 16 of the buffer elements about pivot 15.

At the same time, the trap door 37 is also raised and rotated together with structure 16.

At the end of the clockwise rotation movement about pivot 15, the buffer element 25 is supported on railway 13, while a second trap door is made to close the passage hole of device 10 in such a way as to allow the passage of an operator on the gangway.

Thereafter, vices 26, 27 are operated by means of a command on movable arm 33 of jack 34; the extension of movable arm 33 causes the extension of the adjustable connecting rods 31, 32, which are made to exert a thrust on the pivot 30 which is carried by each vice 26, 27.

Consequently, since the vices 26, 27 are connected together by means of bar 36, the grooves 28 are hooked against the reinforcing elements 29

carried by the runway 13.

According to an important feature of the invention, it is not necessary to keep an elevated pressure in jack 34 in order to maintain positioned the vices, since the extension of arm 33 of jack 34 brings the toggle formed by the adjustable rods 31, 32 to overcome the dead point of the toggle itself; consequently, the clamping of the vices takes place inertially, thanks to the mutually opposed thrust action exerted by rods 31, 32, and by exerting on arm 33 only a minimal pressure, in such a way as to keep the toggle constituted by said rods in a position which slightly overcomes the dead point.

At the same time, a command is sent to jack 28 and the buffer element 19 is unthreaded from the interior of element 25.

At this point, the placing operation of the buffer is completed, the semaphore 38 indicates a red light, the limit switches are switched on and the other signalling devices are switched off.

The operating sequence described above is performed in a lapse of time of about thirty seconds.

Similarly, a laps of time of about thirty seconds is necessary for the reverse sequence, i.e. for retracting the buffer beneath the runway.

The invention has been previously described with reference to an advantageous form of embodiment.

However, it comprises several variants which fall within its scope.

By way of example, forms of embodiment fall within the scope of the invention, according to which the device is provided with a single trap door 37 for opening/closing the buffer passage hole, said trap door being directly hinged to the gangway and automatically operable by means of a hydraulic and/or pneumatic jack at the beginning of a positioning manoeuvre of the buffer.

Furthermore, means for moving the device or parts thereof which are different from those described above may be adopted, e.g. helical gear or rack couplings.

These and other variants are possible within the scope of mechanical equivalences.

Claims

1. Buffer device (10) for overhead traveling crane or crane, comprising a supporting structure (16) provided with at least one buffer element (19, 25) which is assembled in a predetermined position on the runways (13, 14) of an overhead traveling crane or of a crane, characterised in that said supporting structure (16) is rotatably movable by means of a motor between a first limit position, in which said at

least one buffer element (19, 25) is placed in such a way as to interfere with the advancing movement of said overhead traveling crane or said crane beyond said predetermined position, and a second limit position, in which said supporting structure (16) is retracted beneath said runways (13, 14) and allows said overhead traveling crane or said crane to advance beyond said predetermined position.

2. Device (10) according to claim 1, characterised in that it is rotatably mounted about a first pivot (15) cooperating with supporting elements (11) which are fixed to said runways (13).
3. Device (10) according to claim 2, characterised in that said supporting structure (16) comprises an extension (20) on which is supported a second pivot (21) on which operate first means (22, 23) for rotating said supporting structure (16).
4. Device according to anyone of the preceding claims, characterised in that said supporting structure (16) further comprises a device for clamping said supporting structure (16) to said runways (13, 14), said clamping device being provided with a pair of interconnected vices (26, 27) which are operable by means of second means (31, 32, 33) for clamping the vices (26, 27).
5. Device according to claim 4, characterised in that said second clamping means (31, 32, 33) comprise a toggle which is formed by a pair of adjustable connecting rods (31, 32), one end of each of said connecting rods is respectively connected to said vices (26, 27), and the other end cooperates with the movable arm (33) of a hydraulic and/or pneumatic back (34) in order to overcome, in a clamping position of said vices (26, 27) against said runways (13), the dead point of said toggle.
6. Device (10) according to anyone of the preceding claims, characterised in that it comprises a pair (19, 25) of buffer elements, one element (19) of said pair being telescopically insertable inside of the other (25) element of said pair by means of third hydraulic and/or pneumatic and/or mechanical means (28).
7. Device (10) according to claim 6, characterised in that said third means (28) comprise an oleodynamical jack, the movable arm of which is connected to said insertable buffer element (19).

8. Device (10) according to anyone of the preceding claims, characterised in that it further comprises a pair of trap doors (37) which are rotatably movable together with said supporting structure (16) and which are suitable for allowing the passage, in both of said first and second limit positions of said supporting structure (16), of an operator on a gangway which is parallel to and adjacent to said runways (13, 14). 5 10
9. Device (10) according to claim 7, characterised in that it comprises a trap door (37) which is hinged to a gangway adjacent to and parallel to said runways (13, 14), said trap door (37) being suitable to be opened and closed through motor means which are operable by means of a starting signal of said device (10). 15
10. Device (10) according to anyone of the preceding claims, characterised in that it further comprises movement-signalizing and operating personnel safety means (38, 39, 40). 20
11. Device according to anyone of claims 3 to 10, characterised in that said first rotation means (22, 23) comprise a hydraulic and/or pneumatic jack (23) whose base is hinged to said runways (13) and whose movable arm (22) is connected to said second pivot (21). 25 30

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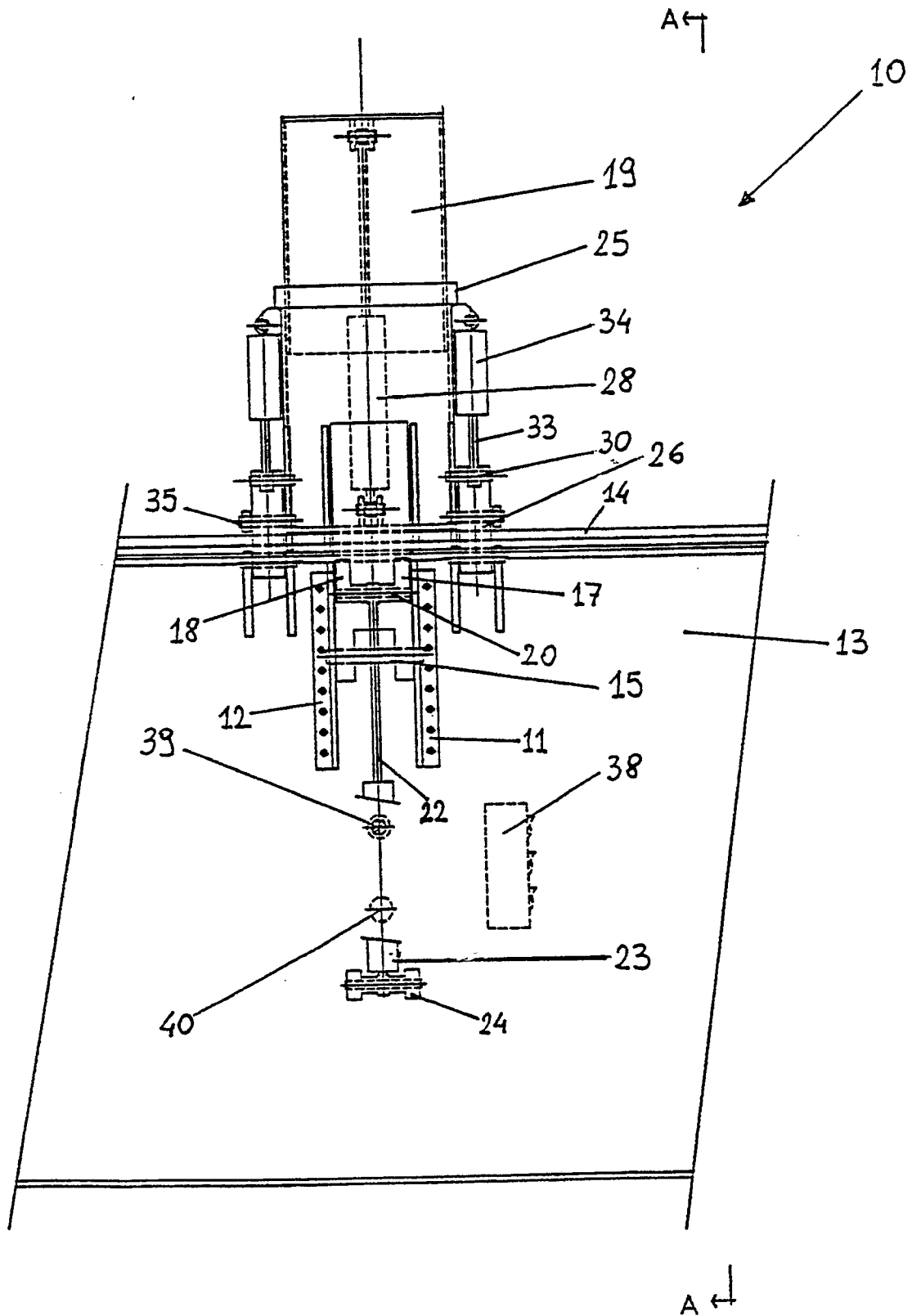


Fig. 1

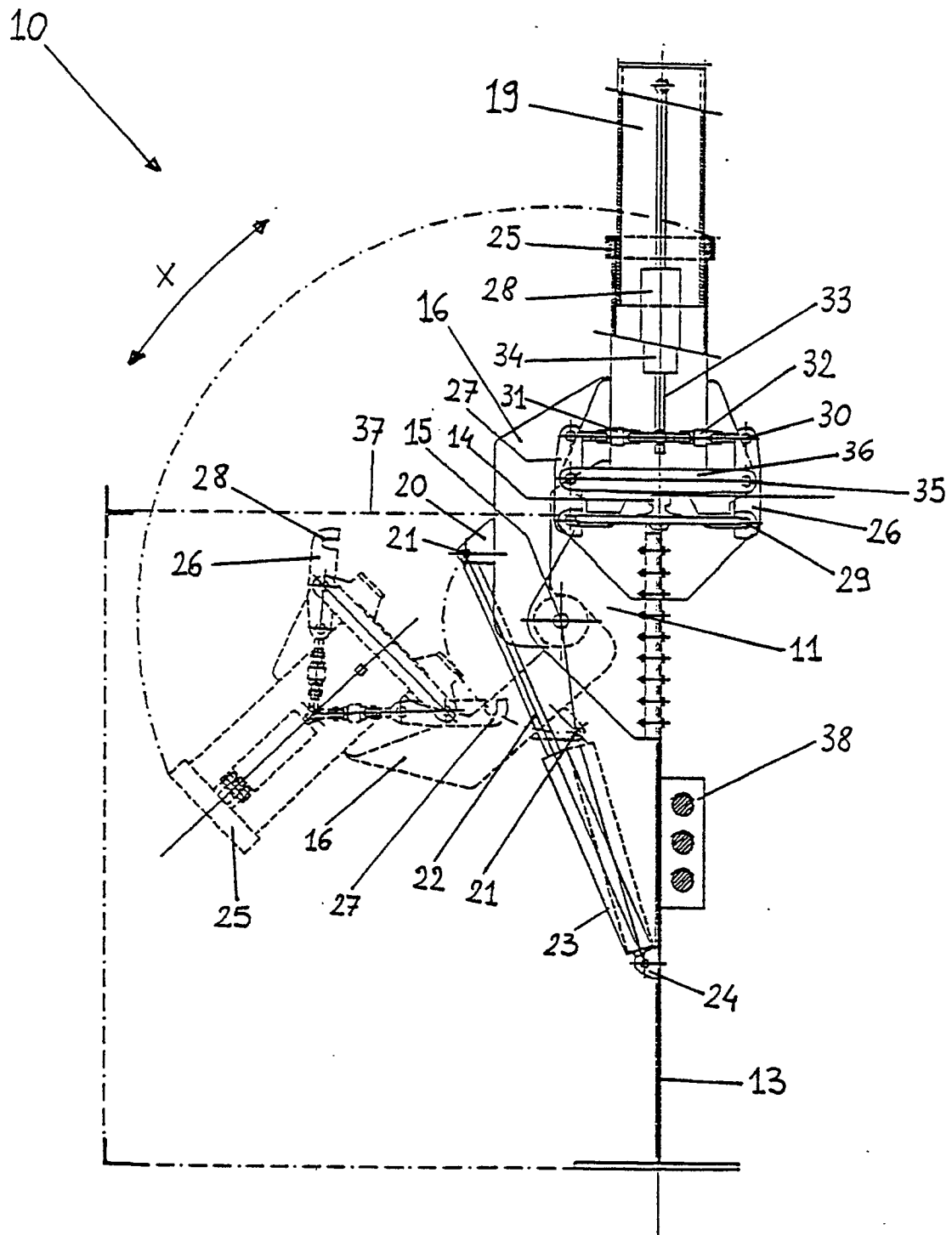


Fig. 2



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EUROPEAN SEARCH REPORT

Application Number

EP 91 10 0723

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)
X	GB-A-2 056 389 (WILISCH) * Page 2, lines 129-130; page 3, lines 1-51 *	1,2,3,6,7, 11	B 66 C 7/16
A	-----	8	
X	DE-A-2 710 965 (WILISCH) * Page 7, last paragraph; pages 8,9 *	1,2,3,4	
X	GB-A-1 108 863 (GODWIN WARREN ENGINEERING) * Complete document *	1,2,3,4	
A	FR-A-2 542 295 (SMIE) -----		
A	DE-B-1 196 334 (POHLIG-HECKEL-BLEICHERT) -----		
A	DE-C-2 965 63 (MÜLLER) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 66 C B 61 K
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of search 16 April 91	Examiner VAN DEN BERGHE E.J.J
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