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(54) **Reel handling device**

(57) A description is given of a device designed to be suspended from loading hooks or pulley blocks fitted to a bridge crane or the like, which is used for handling cylindrical reels with a horizontal hole axis. It consists of two facing L-shaped jaws (3,3') each having a horizontal support arm slidably inserted inside a seat of matching shape formed in a central body (2). Each of the two arms is operated by a control screw (7,7') which is arranged above and parallel to the two support arms and which consists of a long threaded bar (15,15') rotat-

ably associated with the central body on which a nut screw (19,19') connected to the said support arm moves. A motor-driven thrust block (13) with a vertical axis is arranged above the two threaded bars (15,15'). The two threaded bars (15,15') and the motor-driven thrust block are moved by two drive systems arranged substantially above the motor-driven thrust block and alongside the coupling zone.

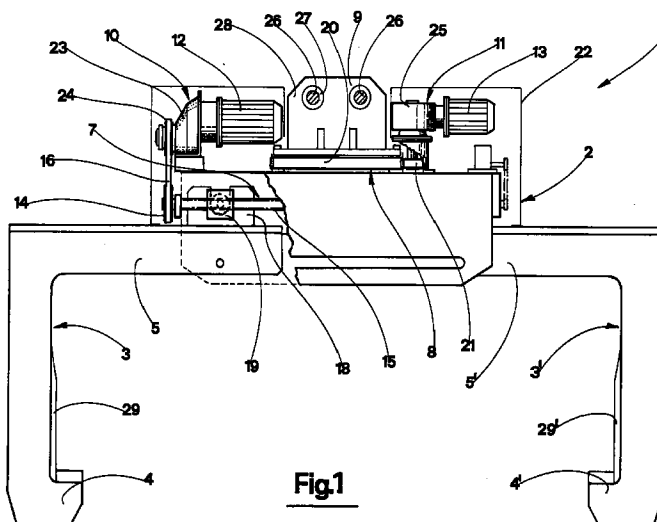


Fig.1

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Description

The present invention relates to a reel handling device, in particular for cylindrical reels with a horizontal hole axis.

These devices are used mainly in factories or warehouses where it is required to move cylindrical reels on which long strips of sheet metal, paper, plastic and the like are wound.

These reels, which may be of considerable size and weight, have a cylindrical hollow central core inside which it is possible to insert the ends of the arms of a manipulator so as to grip said reels securely when moving them from one location to another.

In the art it is known of reel handling devices which consist substantially of a central body which is located above a set of grippers composed of a pair of facing L-shaped jaws which are moved by an electro-mechanical or electro-hydraulic drive system housed inside the device itself. The central body comprises at the top a hooking pin by means of which the device may be hung from loading hooks or pulley blocks fitted to a bridge crane or the like.

The jaw drive system, which is fairly bulky, is arranged underneath the hooking pin.

The particular feature of these devices is that they depend on the cable from which they are hung, for movement thereof from one location to another, but are absolutely autonomous as regards opening and closing of the jaws. In general the electrical or hydraulic power necessary for operation of the jaws is conveyed to the device by means of pipes or cables which are hung from the bridge crane by means of cable-winding or pipe-winding devices.

In order to increase the versatility of these devices it is known to arrange a rotating head or motor-driven thrust block between the central body and the hooking pin so as to allow complete rotation of the reels about a vertical axis. In this way it is possible to pick up the reels, irrespective of their orientation, and deposit them, arranging them as required.

The jaw drive system, usually arranged in a central position with respect to the transverse extension of the central body, is thus located between the jaws and the thrust block.

This solution, however, has the serious drawback that it increases the overall height of the device to the detriment of its manageability.

In fact, since these devices are often used in large closed warehouses where, in addition to machinery and material of various kinds, the warehouse staff are also present, it is extremely difficult for the operator responsible for handling of the reels, or for the bridge crane operator, to move a device which is suspended in mid-air and which, in addition to being bulky, also partially obstructs the field of vision of said operator.

Large overall dimensions of the device make the handling operations more difficult and less safe and increase the risks of accidental collisions due partly to

the size of the zones which are hidden from the operator's sight by the shape of the device itself.

The high productivity achieved by the present-day industries requires, however, rapid times for handling of the reels, thus imposing high speeds also for carrying out these particularly delicate operations.

The main object of the present invention is therefore that of overcoming the aforementioned drawbacks present in the known art by providing a reel handling device which comprises a rotational head and the overall vertical dimensions of which are substantially similar to those of devices of the known type, but not equipped with the rotational head.

A further object is that of simplifying access to the drive systems of the jaws and motor-driven thrust block in order to facilitate the maintenance and checking operations.

A further object is that of reducing the intervention times in the event of faults or malfunctions.

Last but not least, an object is that of ensuring safer and more simple use of the device by the operators responsible for handling thereof.

These and still further objects are all achieved by a reel handling device as indicated in the claims which follow.

In particular, the proposed solution envisages the use of two L-shaped jaws which each have a horizontal support arm slidably inserted inside a seat of matching shape formed in a central body. Each of the two arms is operated by a control screw arranged above and parallel to the two support arms. The control screws each consist of a long threaded bar rotatably associated with the central body on which a nut screw moves, said nut screw being connected to the aforementioned support arm.

A motor-driven thrust block with a vertical axis is arranged above the two threaded bars.

The drive systems for the threaded bars and the motor-driven thrust block are arranged substantially above the motor-driven thrust block, alongside the hooking-up zone, so as to make the best possible use of the little space available.

With the proposed solution it is therefore possible to limit considerably the dimensions of the vertical extension of the device forming the subject of the present invention and to convey the reels at greater heights from the ground, greatly reducing any risks of collision with unattentive personnel, who are not visible for the crane operator.

By reducing the height of the device, a reasonable increase in the productivity is also obtained.

Finally, the operator, having a wider field of vision and a smaller area hidden from his sight, is able to operate the device in a safer, more controlled, more efficient and hence faster manner.

The reduction in the risks of collision during handling of the bulky reels is also due to the fact that some of those obstacles which had to be negotiated using the devices of the known art may now be simply avoided by

passing over them.

Further characteristic features and advantages of the present invention will emerge more clearly from the detailed description which follows of a preferred embodiment, illustrated purely by way of a non-limiting example in the accompanying drawings, in which:

- Figure 1 shows a front view of the reel handling device with some parts removed so as to show more clearly other parts thereof;
- Figure 2 shows a side view of the device according to Fig. 1 with some parts removed so as to show more clearly other parts thereof.

With reference to the attached drawings, 1 denotes in its entirety the device for handling cylindrical reels with a substantially horizontal axis, forming the subject of the present invention.

The device 1 consists essentially of a central support body 2 with which there is associated a pair of jaws 3,3' moved by a pair of control screws 7,7' driven by a first drive system 10. The central body 2 has arranged above it a rotating head 8 with a vertical axis, moved by a second drive system 11.

The two jaws 3,3' each consist of a lower L-shaped gripping zone 4,4' and an upper mounting zone 5,5' slidably inserted inside a horizontal guide 6,6' of matching shape formed in the central body 2.

The two jaws are arranged staggered with respect to one another and lie substantially in two planes parallel with each other. As can be seen in Figure 2, the two jaws 3,3' are slightly S-shaped in a plane perpendicular to their direction of translation, such that the two lower gripping zones 4,4' are located in the centre with respect to the vertical axis of the device.

This shape of the jaws therefore serves to correct the two points of application of the weighing force of the reel (which coincide with the lower gripping zones 4,4') in such a way that the axis of the reel is always centred with respect to the transverse plane of symmetry of the horizontal guides 6,6'. The pair of control screws 7,7' is arranged above the upper mounting zone 5,5'. Said screws consists of a pair of horizontal threaded bars 15,15' rotatably associated with the central body 2.

They are arranged parallel with one another.

Each of the two upper mounting zones 5,5' of the jaws 3,3' has a coupling fork 18,18', integral with the mounting zone 5,5', which has inserted inside it a nut screw 19,19' screwed onto the threaded bar 15,15'.

The opening or closing translatory movement of the jaws 3,3' is therefore obtained by means of the simultaneous rotational operation of both the threaded bars 15,15', the threads of which are oriented in opposite directions with respect to one other.

As clearly shown in Figure 1, each of the two threaded bars 15,15' has mounted on one of its ends a first pulley 14,14' moved by the first drive system 10.

The first drive system 10 is composed of a first motor 12 coupled to a first reduction unit 23 which trans-

mits, in turn, the movement to a second pulley 24. The second pulley 24 causes rotation of the pair of first pulleys 14,14' via a single toothed belt 16.

The toothed belt 16 is located on the outer side of the device 1 and is therefore extremely accessible and easy to check and replace. In Figure 2, 30 denotes a belt-tensioning device arranged along the trajectory of the belt 16.

The adoption of the belt solution used for operation of the two jaws 3,3' is made possible owing to the low output chosen for the control screws 7,7' or for the coupling consisting of threaded bar 15,15' and nut screw 19,19', as a result of which it may be ensured that breakage of the belt 16 does not cause accidental opening of the jaws 3,3' and consequent dropping of the reel (not shown).

The rotating head 8 comprises a toothed wheel 20 integral with an upper coupling zone 9 and a pinion 21, operated by a second drive system 11 integral with the central body 2. The pinion 21 is moved by a second reduction unit 25 with right-angled shafts, operated by the second motor 13.

The first and the second motor 12,13 are located above the plane defined by the rotating head 8.

Both the motors 12,13 are arranged laterally with respect to the coupling zone 9 and therefore are also very easy to reach.

Access to the two motors is protected by a shaped casing 22 which protects said motors from dust and dirt.

The coupling zone 9 comprises two coupling pins 26 removably inserted into seats 27 formed in two vertical walls 28.

Following the mainly structural description given above, operation of the present invention is now described.

Firstly the device 1 is hooked up to the hook of a bridge crane (not shown). This operation requires disengagement of the two hooking-up pins 26 and lowering of the hook (not shown) until it is positioned inside the box-shaped structure defined by the two vertical walls 28. At this point the pins 26 may be reinserted and locked in the respective seats 27. The device must then be raised from the ground before being able to activate opening of the two jaws 3,3'.

Opening of the jaws 3,3' is performed by the first drive device 10 which causes simultaneous rotation of the two threaded bars 15,15'. These bars, rotating, cause feeding of the nut screws 19,19' which, in turn, transmit the rectilinear movement to the coupling forks 18,18' and hence to the jaws 3,3'. The two jaws 3,3' are moved apart until the distance between them is greater than the width of the reel (not shown) to be raised. The lower gripping zone 4,4' of the jaws 3,3' is brought into alignment with the axis of the hole in the reel. At this point the first drive system 10 is operated for closing so as to move the two jaws 3,3' closer together. The motor 12 is stopped when both inner flanks 29,29' of the jaws come into contact with the reel.

By operating the crane controls it is possible to

transport the reel into the desired position in an extremely safe manner, taking advantage of the limited overall dimensions of the device 1. In order to avoid obstacles or also merely to orient in a different direction the reel suspended in mid-air, it is possible to operate the rotating head 8, thereby activating the second drive system 11.

In this case the motor 13 transmits its movement to the pinion 21 by means of the second reduction unit 25. The rotation of the pinion 21 on the toothed wheel 20 results in rotation of the central body 2 with respect to the coupling zone 9, i.e. of the suspended reel with respect to the crane hook.

The present invention therefore achieves the preset objects. The arrangement of the two motors alongside the coupling zone, in addition to permitting a considerable reduction in the height of the device, also ensures extremely convenient and safe access to the two drive systems. The toothed belt may also be easily inspected and, where necessary, may be replaced with equal ease.

From the point of view of safety, it is quite clear that the smaller height of the device allows the transportation of reels suspended from it at heights greater than those possible using the devices of the known type. This fact makes it possible to pass over all those obstacles which previously required complex negotiating manoeuvres by the bridge crane operator.

Obviously the present invention may also assume, in its practical embodiment, forms and configurations different from those illustrated above without thereby departing from the present scope of protection.

Claims

1. Reel handling device comprising:

- a central support body (2);
- a pair of jaws (3,3') each consisting substantially of a lower L-shaped gripping zone (4,4') and an upper mounting zone (5,5') slidably inserted inside a guide (6,6') of matching shape formed in the central body (2);
- translating means (7,7') operating between the central body (2) and the upper mounting zone (5,5'), for opening and closing the jaws (3,3'), moved by a first drive system (10);
- a rotating head (8) arranged between the central body (2) and an upper coupling zone (9) operated by a second drive system (11); characterized in that said first and second drive systems (10,11) are both arranged substantially above the rotating head (8) and alongside the coupling zone (9).

2. Device according to Claim 1, characterized in that said translation means comprise a pair of control screws (7,7').

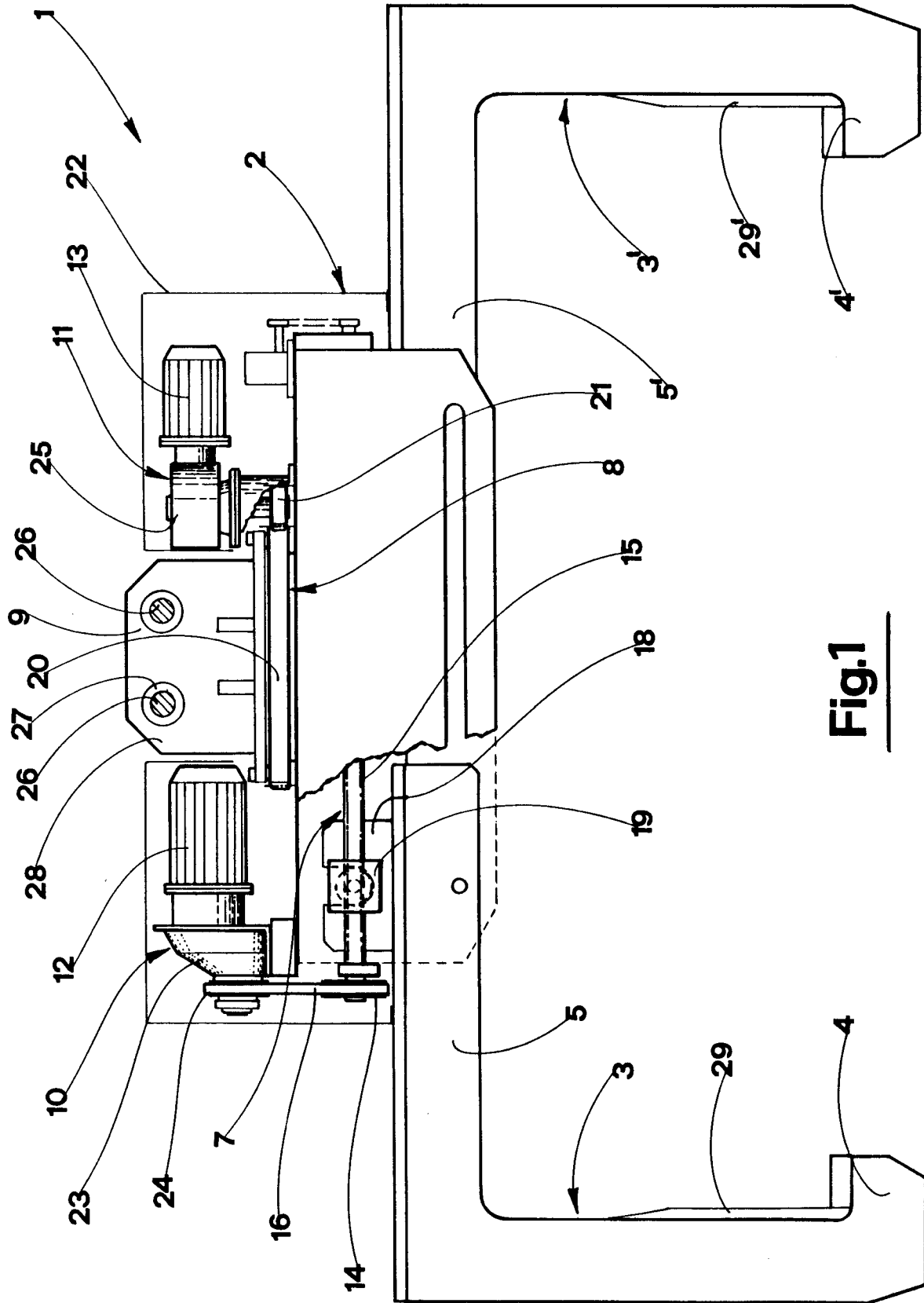
3. Device according to Claim 2, characterized in that said pair of control screws (7,7') comprises, for each jaw (3,3'), a horizontal threaded bar (15,15') carrying a pulley (14,14') arranged at one of the ends of the bar (15,15') itself and connected to the first drive system (10) by means of a drive belt (16).

4. Device according to Claim 3, characterized in that said two control screws (7,7') are arranged alongside each other and parallel to one another.

5. Device according to Claim 1, characterized in that the rotating head (8) comprises:

- a horizontal toothed wheel (20) integral with the said coupling zone (9);
- a pinion (21) integral with the central support body (2) and operated by the said second drive system (11).

6. Reel handling device substantially as described and illustrated and for the objects specified.



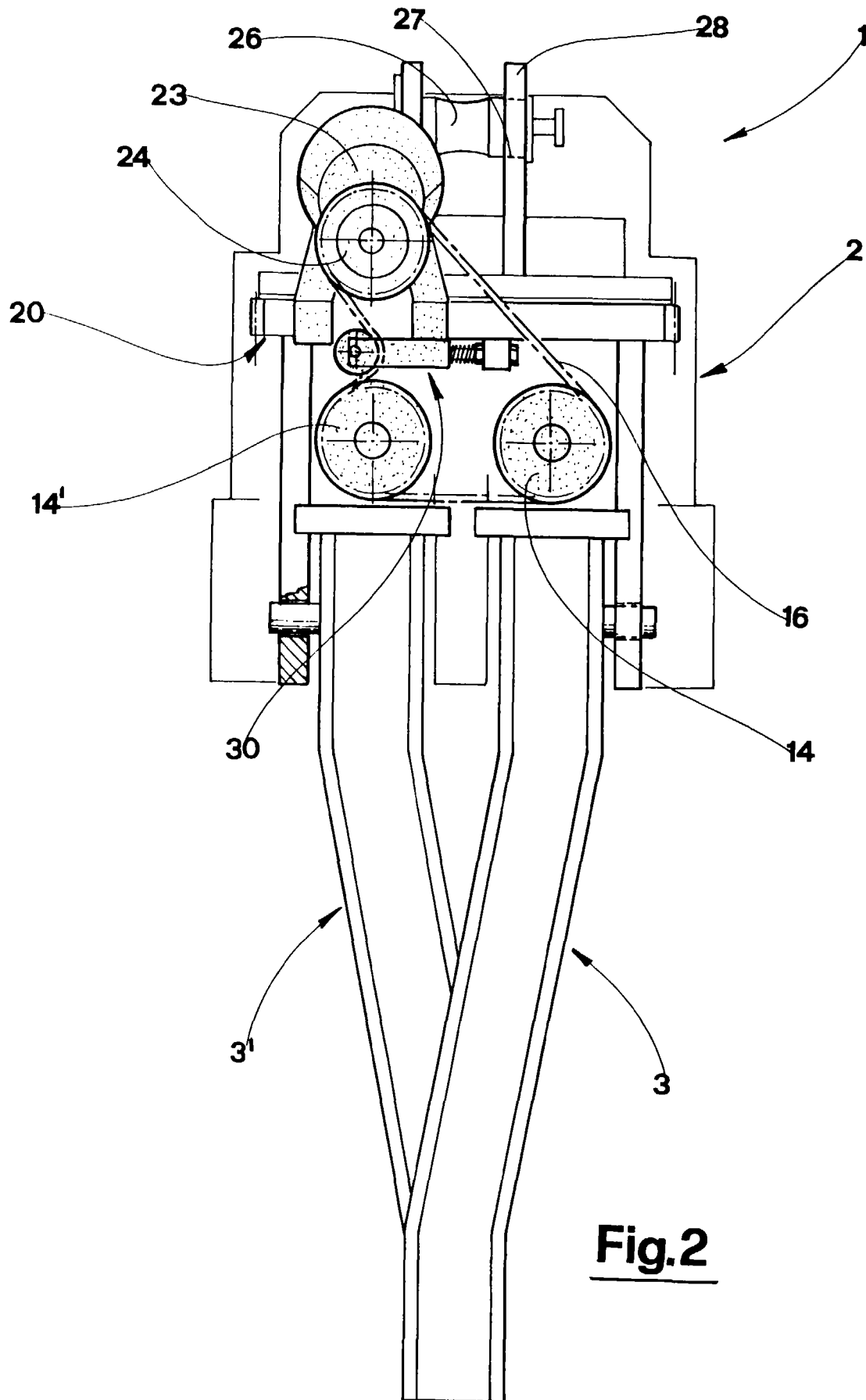


Fig.2



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EUROPEAN SEARCH REPORT

Application Number
EP 96 83 0633

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	BE 660 916 A (PHILIPPE BARRA) * page 4, line 19 - page 6, line 6; figure 1 *	1	B66C1/28
A	DD 245 180 A (VEB(B) INGENIEURBÜRO BAUWESEN KARL-MARX-STADT) * the whole document *	1	
A	EP 0 527 698 A (LBL LAGER- UND BETRIEBSTECHNIK GMBH) * column 3, line 17 - line 19; figure 1 *	1	
A	DE 42 17 333 A (WIMO HEBETECHNIK GMBH) * column 4, line 3 - line 7; figure 1 *	1	
A	FR 2 534 895 A (GREZE ANDRÉ GEORGES) * page 2, line 20 - line 39; figure 1 *	2	
A	US 2 462 691 A (R. N THOMPSON) * column 2, line 8 - line 55; figures 4,5 *	2	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B66C
Place of search		Date of completion of the search	Examiner
BERLIN		13 February 1997	Deprun, M
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			

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