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## (54) System for controlling and pre-selecting the extension of the single sections which make up a telescopic jib of a crane truck or the like

(57) A system for rationalizing and controlling an independent intervention of the single sections making up a telescopic jib of a crane truck in order to reach considerable increments in the capacity thereof in comparison with the conventional solutions.

In general, the present system consists in the installation of particular clamping and unclamping mechanisms (10) which are arranged in those sectors where ropes (8) for permitting the extraction of the extensible jib sections are anchored. The extraction of the jib sections may be proportional in case each rope remains constrained to its respective support. On the contrary, the use of the new mechanisms according to the present system permits to excluse from the extraction those sections that are not necessary for a certain configuration, beginning from a last element supporting a head.

The exclusion of the sections that are not to be used from the extraction is determined by unclamping pivots (11) of units (10), which pivots fix the anchoring points (9) for the ropes (8).

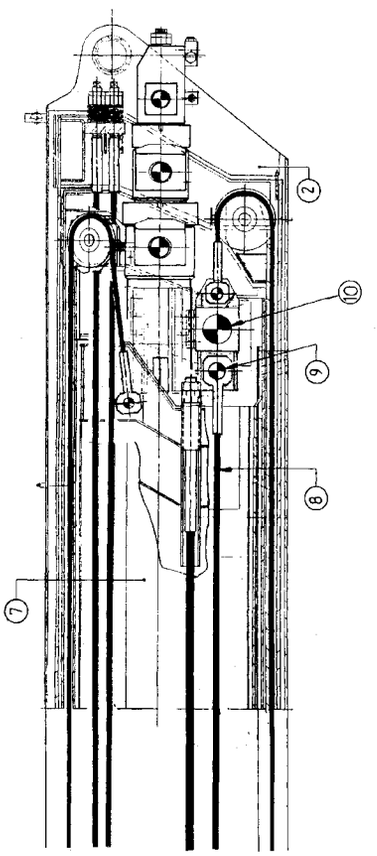


Fig. 2

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## Description

The present disclosure relates to a system which permits both a control and a pre-selection of the extension or going-out of the single component sections of a telescopic jib of a crane truck or the like.

As it is well-known, there is a wide variety of lifting apparatuses including self-propelled apparatuses such as the so-called crane trucks. The crane trucks can be used in various places of intervention where it is necessary to lift loads. To this end, such crane trucks are carried out by coupling a road vehicle showing appropriate dimensions and a movable jib. The jib is extensible like a telescope. A hook controlled by a winch is arranged on the free end of the jib.

The crane jib consists usually of four or five telescopic elements of which three or four telescopic elements are movable. The extension or going-out of such telescopic parts is permitted by double-acting hydraulic jacks and rope transmissions. In such a way it is possible to extend the jib itself until its end provided with the hook reaches the vertical of the operative position.

The extracting operations or "jib configurations" can be easily performed. Such configurations represent the various lengths which can be reached by the jib itself with a suitable extraction or return of its components, also in a not sequential manner, in order to obtain the best performances for the crane truck.

At present the jib configurations permit to reach quite limited capacities above all owing to the fact that the extraction of the larger sections for lifting heavier loads can be done only by using the smaller sections of the inner telescopic jack since the arrangement of the sections of the jack is inverse to the arrangement of the sections of the jib. Secondarily, it is not possible to control the sections to be extracted. Therefore, the extension of the jib begins necessarily with the extraction of the larger sections and goes on with the progressive, proportional extraction of the smaller sections until the jib reaches its longest extension, which involves a considerable limitation of the forces to be used in the thrust phases. In conclusion, an inadequate jib capacity is reached in the known solutions.

The aim of the present invention consists in conceiving and carrying out a system which comprises suitable mechanisms for releasing the extraction ropes of the jib, which system permits to rationalize and control an independent intervention of the single sections and to obtain considerable increases in the capacity in comparison with the conventional solutions, even 60%, with certain configurations of the jib.

The following advantages are reached by using the above mentioned mechanisms, which advantages are not reached in the other solutions offered by the market,:-

a) the possibility of obtaining a proportional extraction of more sections with an only stroke of the jack;

b) the possibility of choosing the section to be extracted beginning from the section carrying the head;

c) the possibility of utilizing the extraction power of the jack, which power is available when the sections not used are disengaged; in this way it is possible to sensibly increase the capacities, that is the loads to be lifted, in the low or middle range of action.

In fact, the present invention refers to a system for controlling and pre-selecting the extension of the single sections forming a telescopic jib of a crane truck or the like, the said jib being provided with a hydraulic double-acting jack and rope transmissions, the rope transmissions being arranged between the jack and the sections forming the jib, characterized by the fact that the respective anchorage points for the ropes are arranged on retaining elements which are interested by the intervention of devices permitting the hydraulic release and that the anchorage points, made free, in case of the external rope, can leaned on a suitable support arranged on the top of the penultimate section so that the length of the external rope itself corresponding to the stroke of the section is recovered when the last section re-enters whereas in case of the internal rope, the respective anchorage element can slide along a suitable slide which is provided on the extraction jack.

Further features and details of the present invention will be better explained in the following description of a preferred embodiment which is given as an example not limiting the invention itself and in the accompanying drawings in which:

- Figure 1 shows a schematic side view of the terminal part of a jib according to the present invention on the whole;
- Figure 2 shows a schematic view of the initial part of the jib according to Fig. 1;
- Figures 3-8 show schematic view of structural details of the present invention.

With reference to the accompanying drawings, in general number 1 denotes an operative jib of a crane truck or the like for lifting loads. This jib according to the present example comprises five telescopic elements or sections 2, 3, 4, 5 and 6, the more external four telescopic elements being movable.

As it can be seen in Figures 1 and 2, the telescopic base element or section 2 is fixed to a revolving-turret while the more external telescopic element 6 comprises the jib head and the respective transmission parts of the lifting hook.

The various telescopic elements 3-6 are extensible outwards through particular extraction procedures which are accomplished by means of double-acting telescopic cylinders indicated in general with number 7, which cylinders are arranged within the jib 1, and suitable ropes 8 are arranged on transmission pulleys 8' both

within the jib and out of the jib between the penultimate section 5 and the last telescopic element or section 6 supporting the head.

From Fig. 2 it appears that the initial part of one of the ropes 8 is retained by a hooking element or anchoring point 9. A peculiarity of the present invention is that the anchoring point 9 may be released from its respective support by means of a hydraulic releasing device 10 or the like.

In fact, the extraction of the sections may be proportional in case each rope remains attached to its own support. Otherwise it is possible to exclude from the extraction the sections which do not interest a given configuration beginning from the last element supporting the head by using the new mechanisms according to the present invention, the said configuration being represented by the position of the sections in respect to their respective total strokes. The exclusion of the sections that are not to be used from the extraction is determined by the hydraulic release or the like of the unit 10. More precisely, such an exclusion is caused by releasing pivots 11 (Fig. 8) which fix the hooking or anchoring points 9 of the extraction ropes 8. The anchoring point for the external rope is a saddle 12 (Fig. 5) supporting the rope itself, whereas the anchoring point for the internal rope is a mechanical element 10 which is provided with a passing pivot on which the terminal part of the internal extraction rope is fixed.

The saddle 12 made free remains leaned on a suitable support placed on the top of the penultimate section is such a way that the length of the external rope equal to the stroke of the section is recovered when the last section re-enters. On the contrary, the inner mechanical element made free may slide along a suitable slide arranged on the extraction jack.

The above described releasing mechanisms permit to obtain a proportional extraction of more sections through an only stroke of the jack and it is possible to choose the section to be extracted beginning from the sector supporting the head.

Furthermore, in addition to the possibility of managing the set-up operative sections continuously the present invention has reached the fundamental aim to take advantage of the extraction power of the jack which is made available by the release of the unused sections. In this way it is possible to sensibly increase the capacities, i.e. the weight of the loads to be lifted, in the middle-low ranges of work under the same jib lengths obtainable by combining various configurations.

As an advantage, the above described hydraulic locking and releasing devices may be replaced by electric or pneumatic devices or the like having the same purpose.

The present system controlling the extraction of a telescopic jib of a crane truck or the like has been described and represented according to a preferred solution. However, there may be variants equivalent technically to the described mechanical parts and components, which variants are to be considered included in the range of protection of the present invention.

## Claims

1. System for controlling and pre-selecting the extension of the single sectors forming a telescopic jib (1) of a crane truck or the like, which jib comprises a hydraulic double-acting jack (7) or the like and rope transmissions (8) arranged between the hydraulic jack (7) and the extraction sectors (3, 4, 5, 6) forming the jib, characterized by the fact that the said rope transmissions (8) are arranged both inside and outside the jib (1) and the respective anchorage points (9) for the ropes (8) are provided on retaining element (10) interested by the intervention of hydraulic release devices (11) or the like.

2. System for controlling and pre-selecting as claimed in claim 1, characterized by the fact that the freed anchorage point (12) for the outer rope may remain leaned on a suitable support arranged on the top of the penultimate sector (4) so that the length of the outer rope itself, which is equal to the stroke of the sector, is recovered once the last sector (5) is re-entered.

3. System for controlling and pre-selecting as claimed in the foregoing claims, characterized by the fact that the freed anchorage point for the inner rope may slide on a suitable slide arranged on the extraction jack (7).

4. System for controlling and pre-selecting as claimed in the foregoing claims, characterized by the fact that it is possible to exclude from the extraction those sectors that are not to be used through a hydraulic release or other type of release of the pivots (11) fixing the hooking or anchoring points (9) for the extraction ropes (8).

5. System for controlling and pre-selecting as claimed in the foregoing claims, characterized by the fact that the anchorage point for the outer rope is formed by a saddle (12) supporting the rope itself.

6. System for controlling and pre-selecting as claimed in the foregoing claims, characterized by the fact that the anchorage point for the inner rope is formed by a mechanical element (10) showing a passing pivot on which the end of the inner extraction rope itself is fixed, which end is in turn hooked to the said hydraulic locking or releasing hydraulic device (11) or other type of device.

7. System for controlling and pre-selecting as claimed in the foregoing claims, characterized by the fact

that the above mentioned locking and releasing hydraulic devices (11) may be replaced by electric or pneumatic devices or the like having the same purpose.

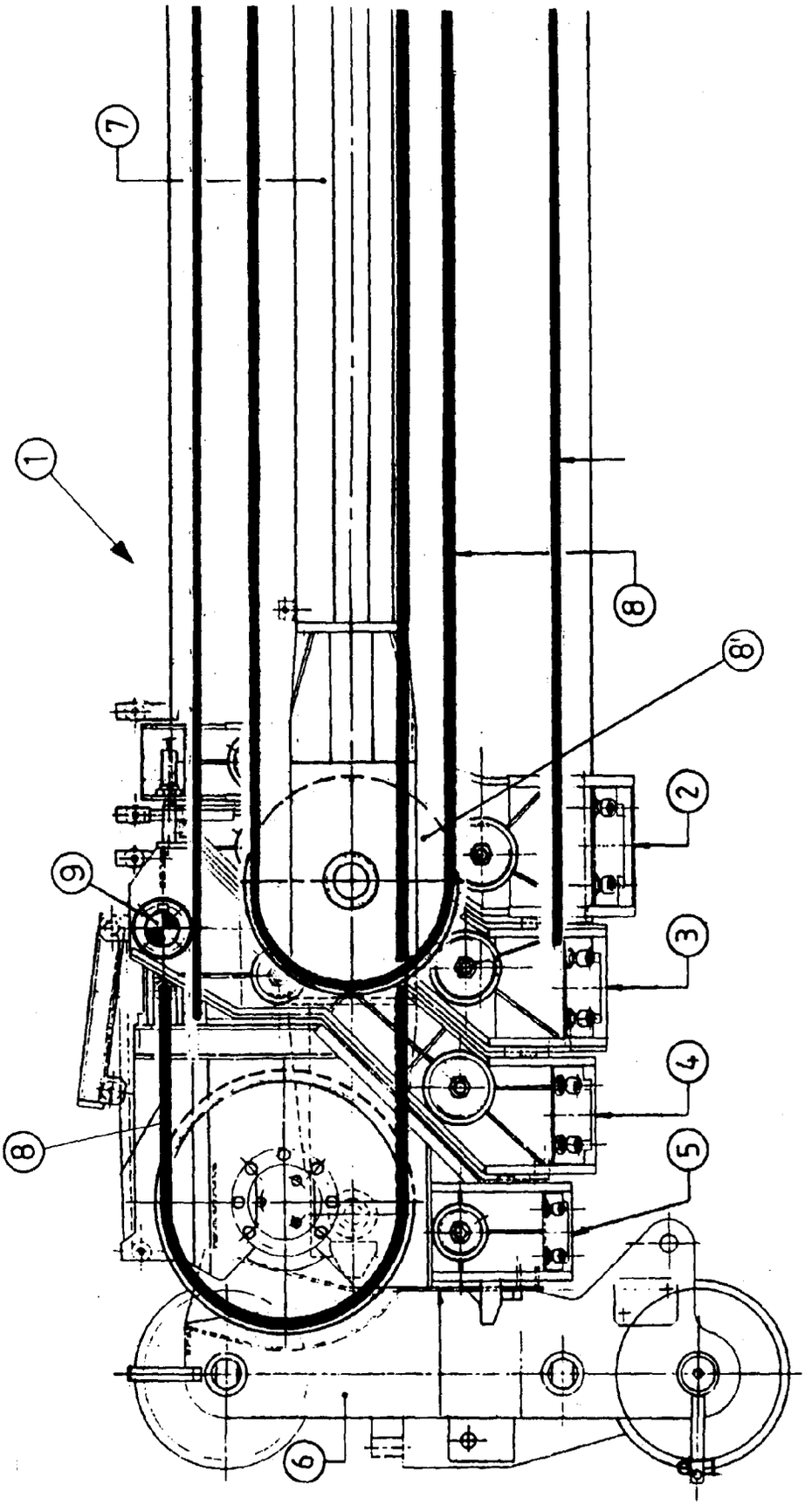


Fig.1

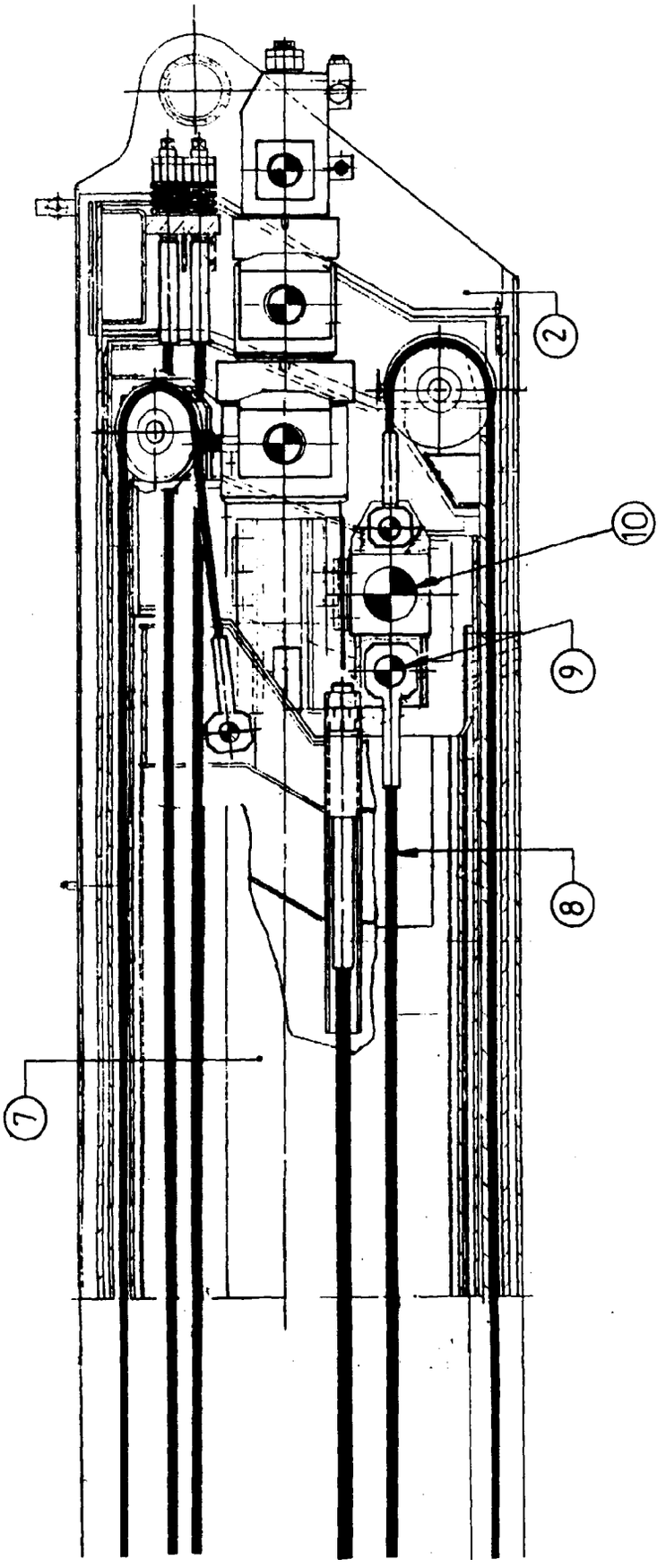


Fig. 2

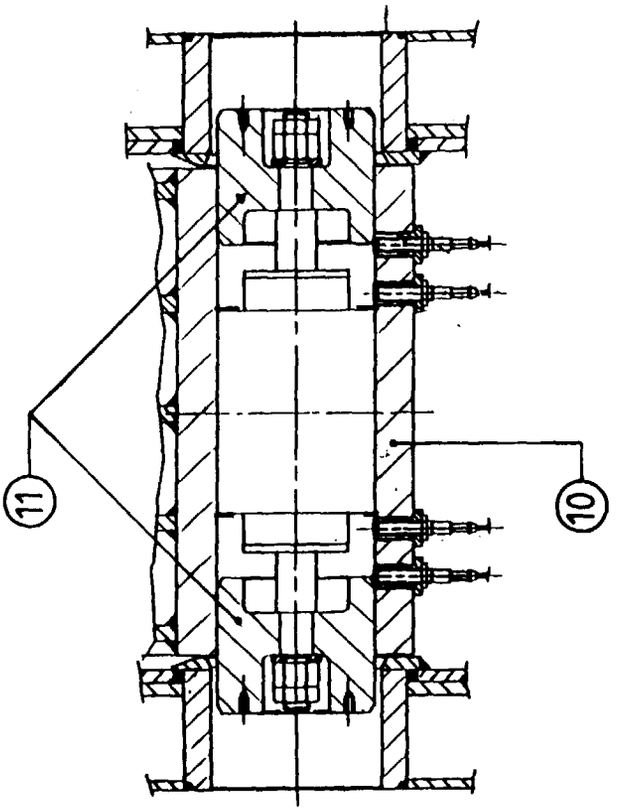


Fig. 8

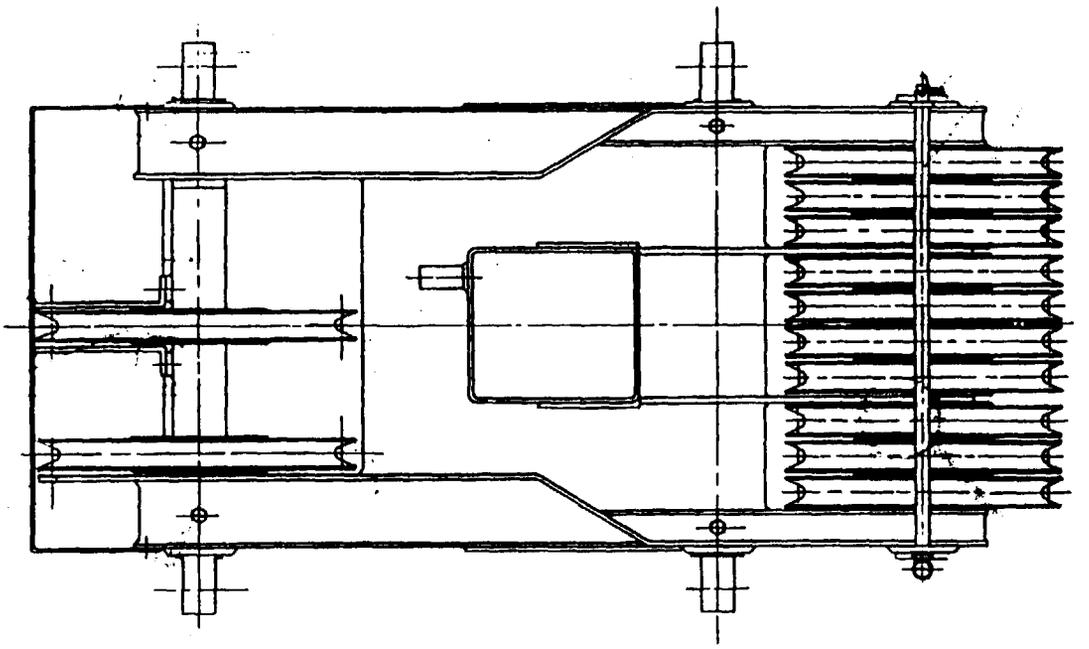

Fig. 7

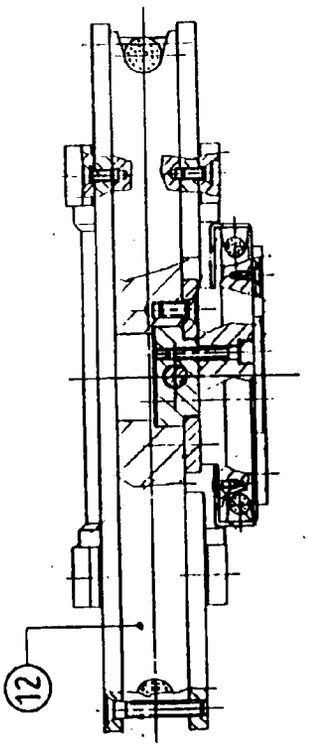


Fig. 5

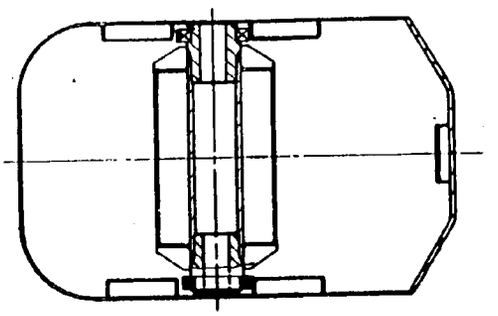

Fig. 6

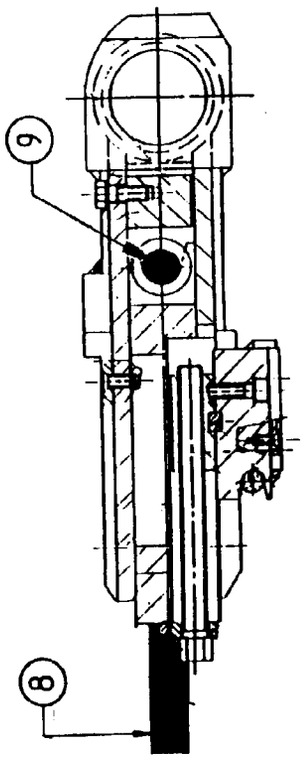


Fig. 4

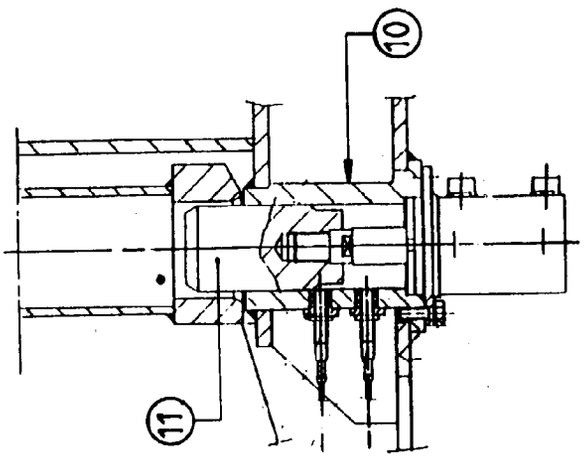


Fig. 3

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# EUROPEAN SEARCH REPORT

Application Number
EP 96 83 0460

## 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) |
|---|---|---|---|
| Y | FR-A-2 708 584 (PPM) 10 February 1995<br>* page 7, line 9 - page 9, line 1 *<br>* figures 2-8 * | 1,4 | B66C23/70 |
| Y | FR-A-2 370 676 (COLES CRANES LTD) 9 June 1978<br>* page 5, line 15 - page 6, line 11 *<br>* figures 1-6 * | 1,4 | |
| Y | DE-A-20 46 652 (EISENGIESSEREI U MASCHINENFABR) 15 April 1971<br>* figures * | 1,4 | |
| A | FR-A-2 681 649 (KRUPP INDUSTRIETECH) 26 March 1993 | | |
| A | EP-A-0 621 229 (KRUPP AG HOESCH KRUPP) 26 October 1994 | | |

| TECHNICAL FIELDS SEARCHED (Int.Cl.6) |
|---|
| B66C<br>B66F |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 7 January 1997 | Guthmuller, J |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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