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54 Method and device for winding yarn turns onto empty cops on changing production in a ring spinning machine.

57 The method of the present invention consists substantially of winding yarn turns onto the empty cops mounted on spinning spindles during production change-over in a ring spinning machine. More specifically, the carriage-mounted device for implementing said method comprises a motor-rotated auxiliary pivot, a supplementary bobbin containing wound yarn, and a radial cam to guide the cop gripper from the spinning spindle to the auxiliary pivot and from there back to the same spinning spindle.

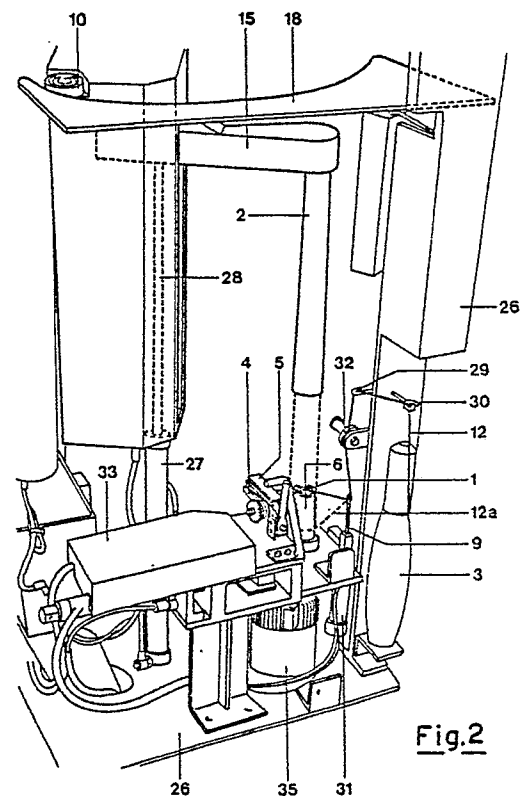


Fig.2

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METHOD AND DEVICE FOR WINDING YARN TURNS ONTO EMPTY COPS ON CHANGING PRODUCTION IN A RING SPINNING MACHINE

This invention relates to an improvement in the method and device described in European patent application No.88202767.5 in the name of the present applicant.

More particularly, the invention relates to a method and carriage-mounted device for winding yarn turns onto empty cops which have been mounted on the spindles during feed change consequent for example on a required change in the quality of the yarn to be produced on the ring spinning machine. Using the device described in the cited European patent application No.88202767.5 of the present applicant it is possible to automatically restart the spinning process under all operational conditions in which the forming yarn can suffer breakage with resultant interruption in the continuous spinning process.

Said device could however be improved in terms of allowing increased automation of a certain operational stage which occurs whenever the production programme is changed in order to accommodate a required change in the characteristics of the yarn to be produced.

Production has currently to be organized to take account of frequent changes in the production run on spinning machines. In this respect, spinning programmes have to accommodate frequent seasonal production variations, and thus the machines must have an equipment flexibility to be able to work different qualities of natural, artificial or mixed fibre. Under such conditions, ring spinning machines must be adaptable to the different practical contingencies dictated by the market. Cooperation between the technical and commercial management of a spinning department must be total. The technical side must be handled to the extent of satisfying commercial requirements to a maximum, to obtain yarn production exactly in line with market requirements. The importance of smooth change-over of spinning machine production when the characteristics of the product yarn are to be modified is therefore apparent.

Changes in the type and quality of yarn produced on a ring spinning machine result in a direct cost increase not only because of the reduction in spinning machine working time due to the down-time for preparation purposes, but also because of the labour required to implement these changes, which further increase overall spinning costs.

The number of personnel required to change the type of yarn produced is related to the overall total of tasks which have to be carried out on the machine. These include the replacement of feed packages, the cleaning of the rollers and the var-

ious machine components, and the winding of a few turns of yarn onto the empty cops which have been automatically mounted on the spinning spindles by the doffing device to allow the new product yarn to be spun.

The application of these few yarn turns on feed change-over has always been done manually, and represents one of the main tasks of the personnel responsible for preparing the spinning machine for new production.

The object of the present invention is to effectively automate the operation of winding said yarn turns onto the empty cops on feed change-over in order to reduce the spinning machine down-time to a minimum and obtain better personnel efficiency by providing them with a work load which is more balanced and less onerous due to the smaller number of tasks to be carried out during yarn production change-over.

With reference to the aforesaid patent application in the name of the present applicant, the device claimed therein remains unaltered but is subjected to improvements and operational simplifications designed to provide greater versatility in the application of the carriage-mounted device with a view to a more thorough and complete automation of the ring spinning machine, with a resultant reduction in operating costs because of the lesser use of personnel.

These and further advantages are attained according to the present invention by a method for automatically winding a few yarn turns onto the empty cops mounted on the spindles on feed change-over due to a change in the quality of yarn produced on a ring spinning machine, said method consisting of:

- mounting each cop individually on an auxiliary pivot after extracting said cop from the spindle on which it had been previously mounted by the automatic doffing device;
- from a supplementary bobbin, unwinding yarn and transferring it to the region in proximity to the larger-diameter end of said cop, about which a few turns of it are wound;
- then conveying the cop, about which the few yarn turns have been wound, from the auxiliary pivot to a spindle and finally mounting it on this latter.

The carriage-mounted device used in the practical implementation of the inventive method comprises, in mutual cooperation, a motor-rotated auxiliary pivot, a supplementary bobbin and a radial cam for guiding a cop gripper.

Said auxiliary pivot is surrounded by several operating elements the purpose of which is to

position the end of the yarn at the top of the auxiliary pivot after it has arrived from the supplementary bobbin and hold it there by gripping it as the cop descends into a position mounted on said pivot, it also passing between scissor elements which cut the yarn when a few turns of it have been wound on the cop.

The said supplementary bobbin is flanked by a yarn guide driven with vertical reciprocating motion by any drive source, said radial cam having a lateral contour suitable for guiding the cop gripper from the spindle position to the auxiliary pivot position and from this latter to the spindle of the individual ring spinning unit. The movement of the gripper can be obtained by any actuator of the known art.

The carriage-mounted device used for the practical implementation of the present invention is associated with programmer means to advantageously coordinate the sequence in which the various operating elements enter into operation.

The invention is described in detail hereinafter in terms of the embodiment shown diagrammatically in the figures of the accompanying drawings which illustrate the basic characteristics of the invention, it being however emphasized that the accompanying drawings and the description based thereon correspond only to a preferred embodiment given by way of example to make its implementation more apparent, the patent protection extending therefore to all constructional modifications included in the general idea exhibited on the accompanying drawings, in which:

Figure 1 is a diagrammatic plan view of the cop gripper operationally associated with the radial contour cam, and showing the lever system and actuator which execute its movements, the continuous lines representing the moment in which the gripper is in the vertical position above a spinning spindle and the dashed lines representing the moment in which the gripper is in a vertical position above the auxiliary pivot;

Figure 2 is a diagrammatic isometric perspective view of the device arranged for winding a few yarn turns on the empty cop during feed change-over, and represents the moment in which the cop withdrawn from the spindle and held by the gripper is descending vertically to be mounted on the underlying auxiliary pivot, the end of the feed yarn from the supplementary bobbin having already been laid and tensioned diametrically on the top of said auxiliary pivot by the yarn seizure element, this latter already external to the auxiliary pivot on the opposite side to the supplementary bobbin;

Figure 3 is a diagrammatic isometric perspective view of the carriage-mounted device of the present invention at the moment in which a few

turns of yarn are being wound onto the mounted cop by the simultaneous rotation the auxiliary pivot and the vertical to-and-fro reciprocating movement of a yarn guide;

Figure 4 is a diagrammatic isometric perspective view of the carriage-mounted device of the present invention at the moment in which a few yarn turns have been wound on the cop, and the yarn seizing element and yarn cutting element, associated with each other as an operational unit, have been transferred into a position to grip and cut the yarn in that section taut between said cop and the yarn guide element. At the moment following this latter moment the gripper, having gripped the cop at its top, vertically lifts the cop to remove it from the auxiliary pivot (dashed line). In the figures identical elements carry the same reference numerals. In addition, for reasons of overall clarity those parts not necessary for an understanding of the invention have either been omitted or are shown in a general manner as they are of known type.

In the accompanying figures:

1 is the toothing at the top of the auxiliary pivot for retaining the end of the feed yarn 12 in an approximately diametrical position;

2 is the cop removed from its own spindle to receive a few yarn turns wound in proximity to its major base in preparation for the feed change-over resulting from the requirement to change the quality of the yarn under formation;

3 is the supplementary bobbin which holds the yarn 12 as feed for the winding of turns 34 in proximity to the major base of the cop 2;

4 is a scissor element for cutting the feed yarn 12 after a few turns 34 of this have been wound about the cop 2;

5 is the yarn seizure element of gripper or any other form, the purpose of which is to grip and lock the feed yarn 12. The yarn seizure element and the yarn cutter element are mutually associated in the form of a single operating block driven by lever systems about the auxiliary pivot 6;

6 is the auxiliary pivot rotated by the drive source 35. The cop 2 is mounted on said pivot;

7 is the outline of the frame of the operating face of the ring spinning machine;

8 are the spinning spindles disposed one after another to form the entire spinning face;

9 is the reciprocating yarn guide driven vertically with to-and-fro movement by a movement actuator 31. This latter drives it into position 9a and vice versa;

10 is a roller or similar element which guides the movement of the manipulation gripper for the cop 2 by means of the fixed lateral contour of the radial cam 18;

11 is the rod of the movement actuator 14 which determines the arcuate movements 23 and 31 of the square lever 16, this latter rotating about the pivot 19;

16a is the position, shown in dashed lines, of the lever 16 after undergoing the movement 23 to move the gripper and the cop held by it from a position at the spindle 8 to the position 15a above the vertical auxiliary pivot, the guide roller 10 assuming the corresponding position 10a;

12a is the position of the yarn clamped by the cop when this latter is mounted on the auxiliary pivot 6;

15 is the gripper which grips the cop 2 at its top to position it at the points required for the stages of the operation;

26 is the outline of the support frame for the carriage-mounted device of the present invention;

27 is the movement actuator which raises and lowers the rod 28 to vertically move the gripper;

29 and 30 are eyelets for guiding and deviating the path of the feed yarn 12;

32 are washers of known type for tensioning the feed yarn 12 in its passage between the supplementary bobbin 3 and cop 2;

33 is the block comprising the actuators and lever systems for operating the yarn seizure element 5 and yarn cutter 4 in clamping and cutting the yarn 12 and for positioning said elements 4 and 5 at precise points about the auxiliary pivot 6.

The following description of operation, given with reference to the stated figures, relates mainly to that which is new and therefore examines only the device of the present invention for winding a few yarn turns onto the empty cops during production change-over in a ring spinning machine, on the understanding however that complementary devices not included in the invention are required for its operation. It is known to associate the ring spinning machine with carriage-mounted equipment used for operational functions. Such carriage-mounted equipment is mobile along the spinning face or faces on runways comprising one or more rails cooperating with suitable rolling means such as wheels, rollers or equivalent means.

When a feed change is to be made in order to produce a different yarn on a ring spinning machine, maintenance and cleaning work is carried out on the operating faces and in addition a cop containing no wound yarn is mounted on each spindle. After such cops with no wound yarn have been mounted on the spindles of the operating face the carriage-mounted device of the present invention is activated and by known means is made to run towards and stop at the first spindle on which to commence its operation. The gripper 15

emerges from the carriage-mounted framework 26 and is moved above the first spindle 8 on which the cop 2 is mounted. This is achieved by activating the movement actuator 14, the rod 11 of which angularly shifts the bell-crank lever 16 in the direction of the arrow 21 to rotate the roller 10 along the frontal contour of the radial cam 18 with the result that the gripper 15 is guided into a position above said spindle 8. When said movement is complete, the actuator 27 is activated, the rod 28 of which vertically lowers the gripper 15 until it grips the upper end of the cop 2. The gripper can be of any known form. When the cop 2 has been gripped the actuator 27 is again actuated to raise the cop from its spindle by an amount which enables it to be removed from the operating face 7 of the ring spinning machine. This removal is done by activating the actuator 14, the rod 11 of which, on being extended, angularly shifts the bell-crank lever 16 in the direction of the arrow 23 to move it to position 16a. During this shift movement the gripper is again guided by the roller 10 rolling against the frontal contour of the cam 18 (see Figure 1). The gripper 15 which holds the cop 2 becomes positioned in position 15a corresponding to position 16a of the lever 16 and to position 10a of the roller 10 (fig. 1) when in position 15a the gripper supports the cop 2 vertically above the auxiliary pivot 6. During the aforesaid movements the feed yarn remains positioned and tensioned along a precise path defined by the guide and deviation eyelets 30 and 29 and the tensioning washers 32 and passing through the upper end of the yarn guide 9, which deviates it between the teeth 1 at the top of the auxiliary pivot 6 by its movements, to terminate at the point in which the block comprising the yarn seizure element 5 and the yarn cutting element 4 is at rest. In this respect, said block is positioned waiting for a cop to be mounted on the pivot 6 (see Figure 2).

The actuator 27 is then actuated so that its rod 28 causes the gripper 15 to descend to mount the cop 2 on the auxiliary pivot 6 so that the yarn becomes clamped between the cop and pivot and is forced into position 12a (see Figure 2).

Having mounted the cop, the gripper 15 releases its grip on the upper end of the cop and is raised by activation of the actuator 27 (see Figure 3). A moment after the grip has been released, the drive source 35 is rotated to rotate the auxiliary pivot 6 and thus the cop 2, with simultaneous activation of the actuator 31 which drives the yarn guide 9 with reciprocating motion in a vertical to-and-fro direction. Said rotation and the vertical up-and-down movements compel the yarn 12 to unwind from the supplementary bobbin 3 and accumulate in the form of a few yarn turns 34 in proximity to the major base of the cop 2. After a

few up-and-down movements of the yarn guide 9 a sufficient number of yarn turns 34 will have been wound to enable the drive source 35 and the movement actuator 31 to be deactivated. The movement actuator 27 is activated to cause the gripper 15 to descend and grip the cop 2 at its upper end. As the gripper 15 descends, the actuators and lever systems of the block 33 are activated to initially open the jaws or similar elements of the yarn seizure element 5 and release the end of the wound yarn and to then move the yarn seizure element and yarn cutting element to the other side of the auxiliary pivot 6 so that they become positioned between the cop on which the yarn turns 34 have been wound and the yarn guide 9. On reaching said position the element 5 and element 4 embrace the yarn portion taut between the winding 34 and the yarn guide 9 (see Figure 4).

The jaws of the yarn seizure element 5 close to grip and clamp the yarn between them. At the next moment the yarn is cut at a point just after the jaws in the direction of the cop 2 by the action of the cutting blades of the yarn cutting element. At this same moment also the other end of the wound turns 34 is released and is therefore no longer connected to the feed yarn 12 from the supplementary bobbin 13, the end of the feed yarn 12 being clamped by the jaws of the yarn seizure element 5. At the moment following said cutting operation the actuator 27 is activated to raise the gripper 15 with the cop 2. Activation of the movement activator 14 immediately follows so that its rod 11 shifts the bell-crank lever 16 in the direction of the arrow 21 to position the gripper 15 and cop 2 vertically above a spindle 8.

On completion of the angular rotation of the lever 16 the motion actuator 27 is activated so that its rod 28 descends to mount the cop 2 on a spindle 8.

The various operational elements are returned to their initial position. In accordance with a programmed cycle, the carriage-mounted device is advanced to the position of the next spindle, after which the aforesaid operations are repeated to complete the yarn turn windings on all the cops.

It should be noted that the various aforesaid operations could at least partly overlap in time to optimize the duration of the entire operating cycle.

The described embodiment has been presented by way of non-limiting example only. It is apparent that modifications and additions can be made to the details of the carriage-mounted device by experts of the art, but without leaving the inventive idea.

Claims

1. A method for winding yarn turns onto an empty cop mounted on the spindle during production change-over in a ring spinning machine, characterised by:

- mounting the cop on an auxiliary pivot after removing said cop from the spindle on which it had been previously mounted by the automatic doffing device;

- from a supplementary bobbin, unwinding yarn and transferring it to the base of said cop mounted on the auxiliary pivot, and winding a few turns about said cop;

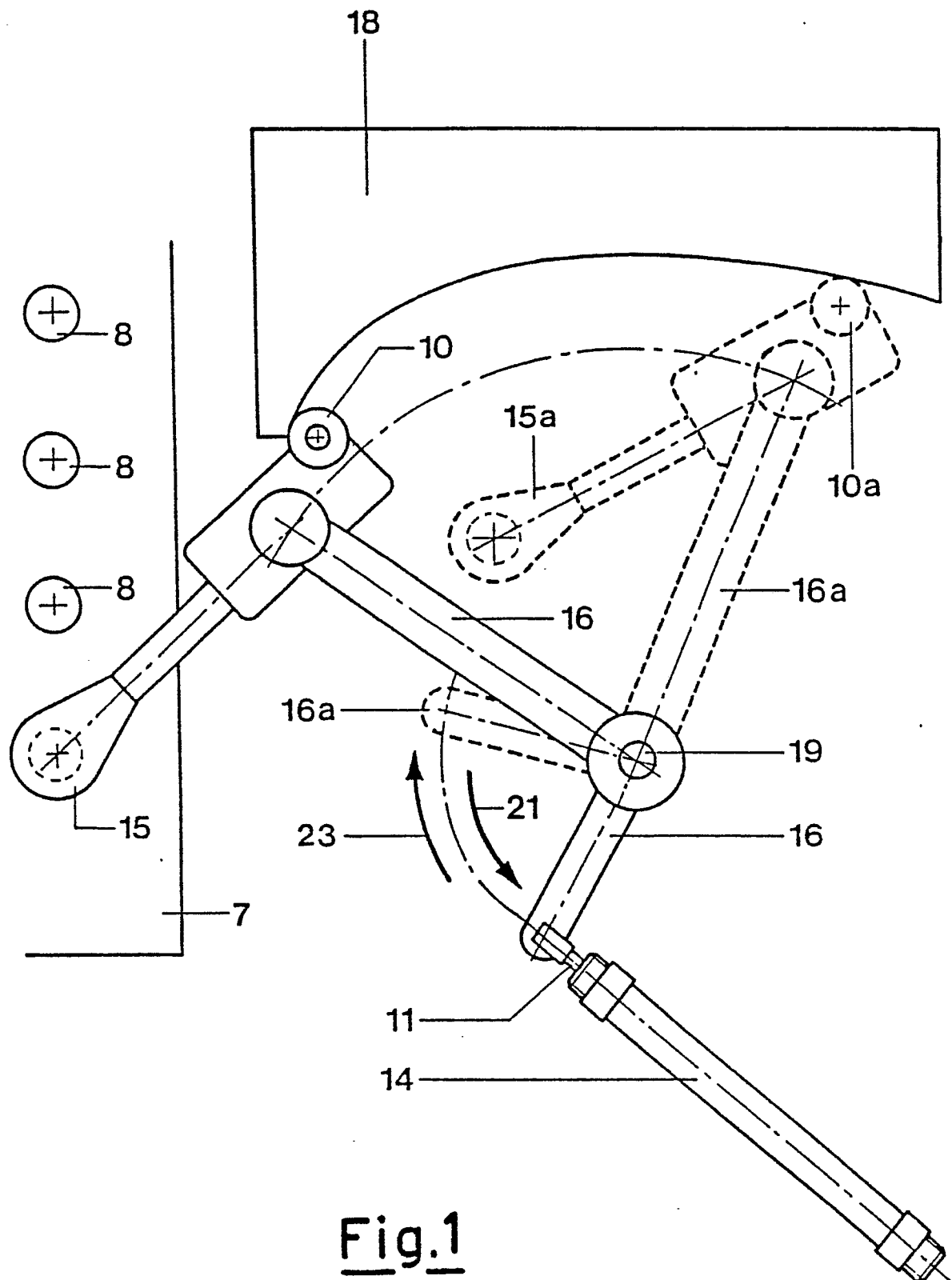
- then conveying the cop, about which the few yarn turns have been wound, from the auxiliary pivot to a spindle and finally mounting it on this latter.

2. A carriage-mounted device for implementing the method claimed in claim 1, characterised by comprising:

- a motor-rotated auxiliary pivot about which several elements operate to position the end of the yarn on the top of the auxiliary pivot after it has arrived from the supplementary bobbin and to hold it there by gripping it while the cop descends to be mounted on said pivot;

- a supplementary bobbin flanked by a yarn guide driven with vertical reciprocating motion;

- a radial cam which by means of its lateral contour guides a cop gripper in moving from the spindle position to the auxiliary pivot position and from this latter back to the spindle position on an individual ring spinning unit.



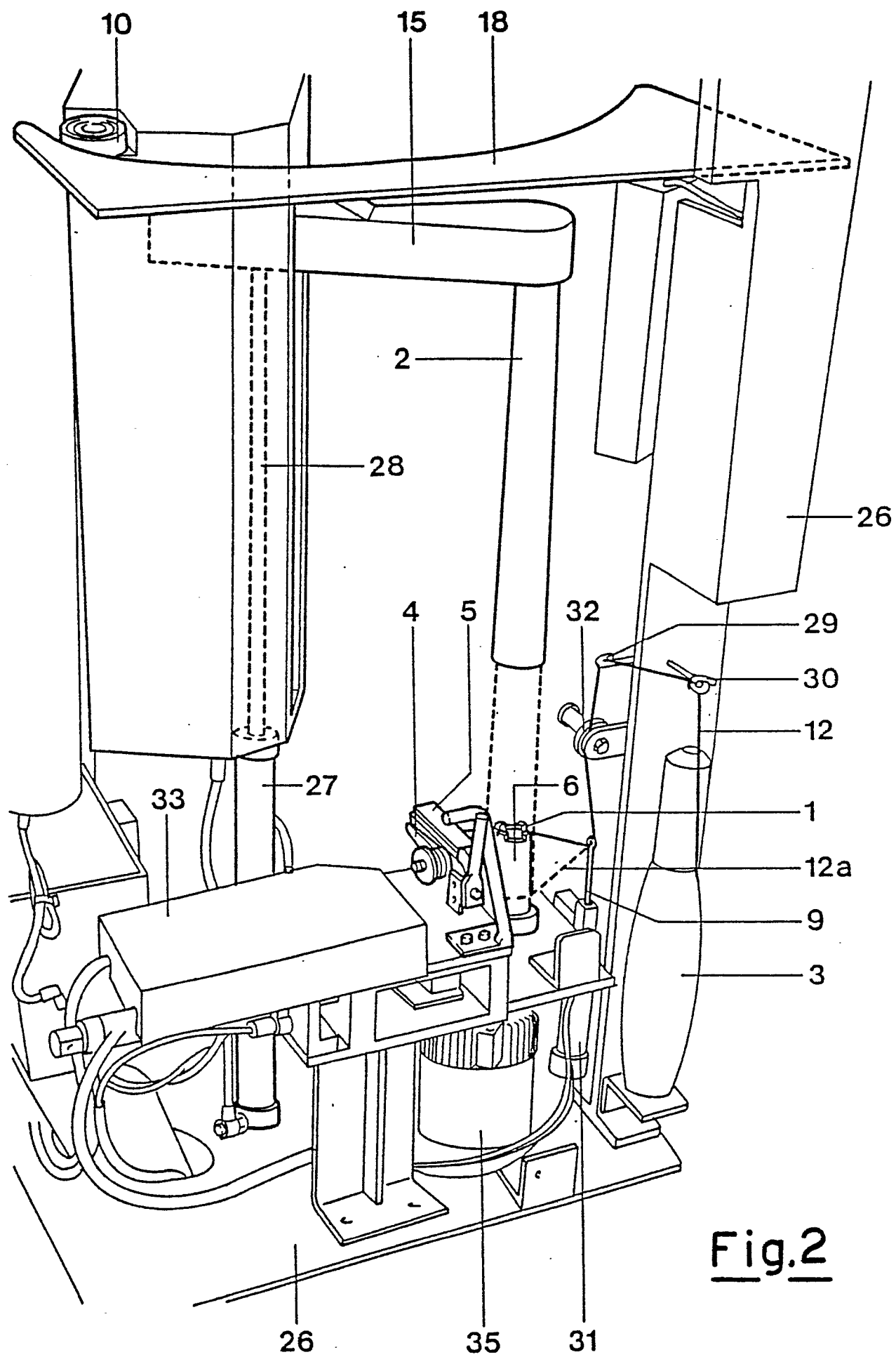


Fig.2

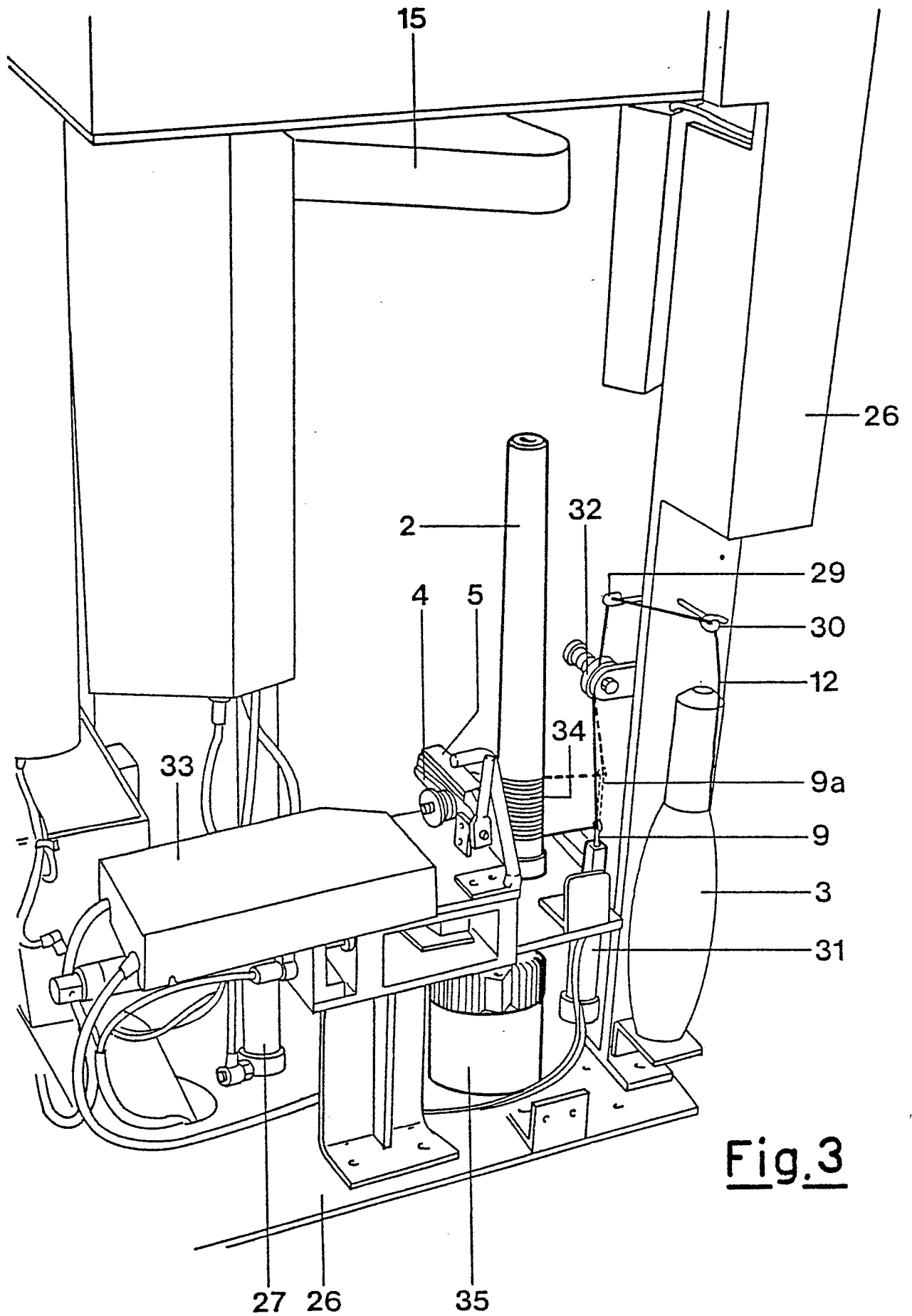


Fig.3

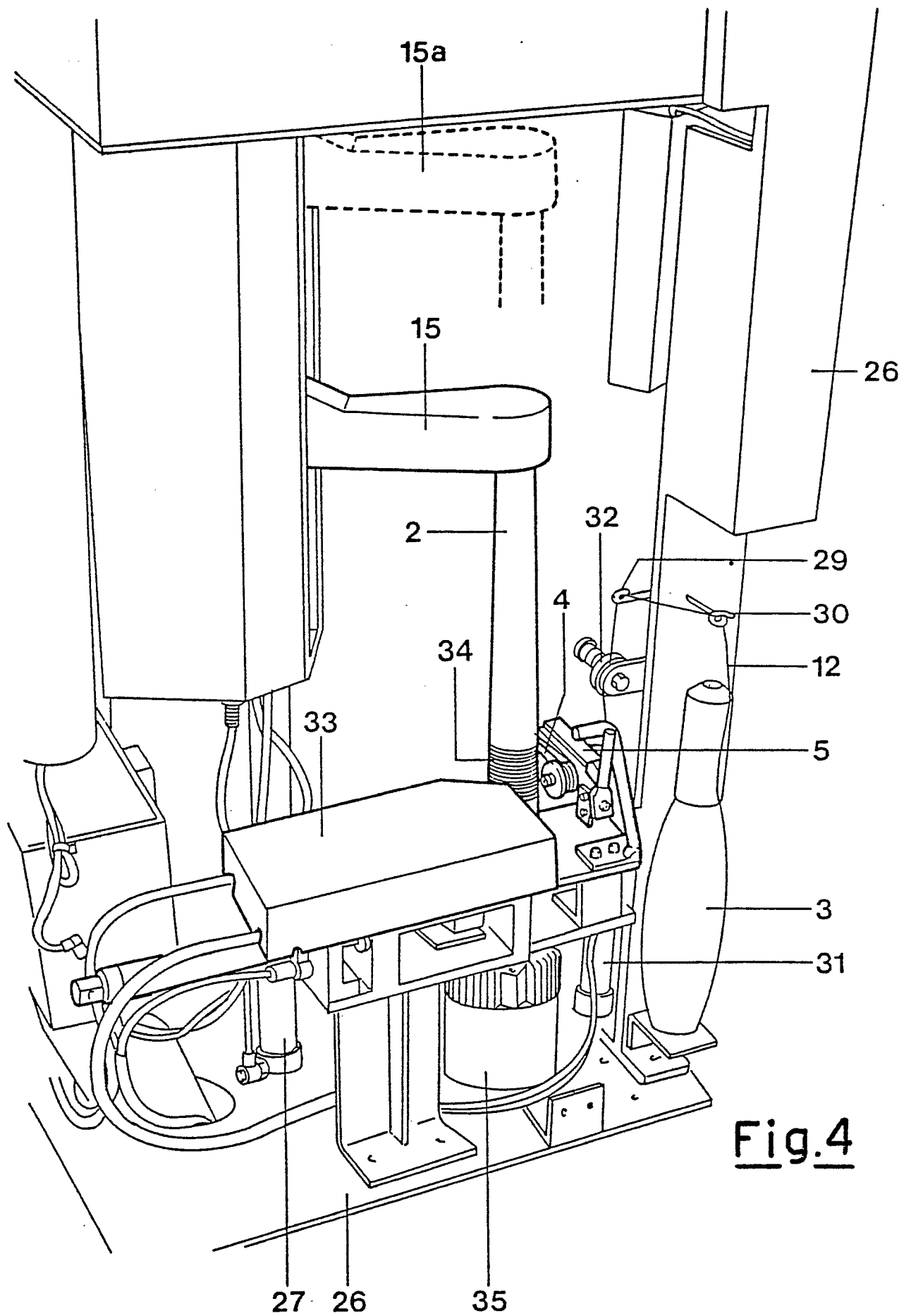


Fig.4



EP 89 20 1240

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.4)
X	FR-A-1582077 (LEESONA CORP.) * page 7, line 28 - line 43; figures 3-7 * -----	1, 2	D01H1/38
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			D01H B65H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14 AUGUST 1989	Examiner HOEFER W.D.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone V : 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			