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(11) Publication number:

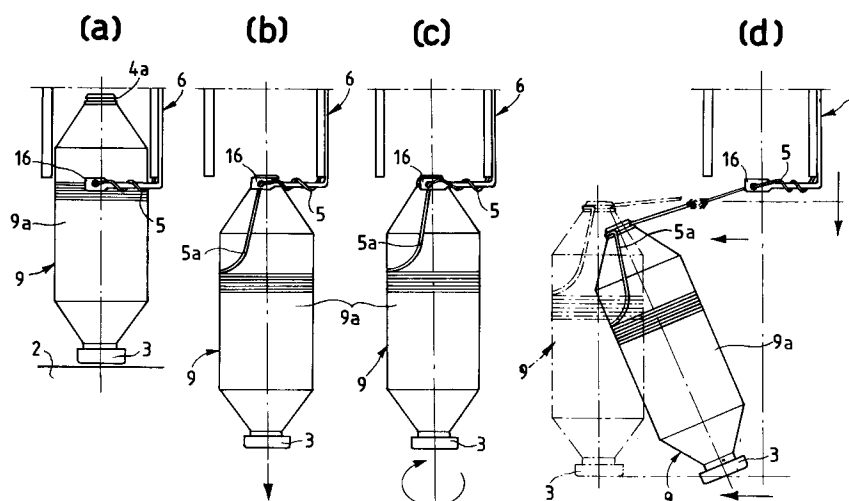
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EUROPEAN PATENT APPLICATION(21) Application number: **91201878.5**(51) Int. Cl.⁵: **D01H 9/16, D01H 1/38**(22) Date of filing: **16.07.91**(30) Priority: **17.07.90 IT 2096290**(43) Date of publication of application:
22.01.92 Bulletin 92/04(84) Designated Contracting States:
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I-20121 Milano(IT)(54) **Method and apparatus for separating from flyers the roving wound onto cops and securing the end of the roving on the cops at the time of removal in a fly frame or similar machine.**

(57) In order to secure the end of roving (5) on cops (9) on removal from a fly frame it is proposed initially to lower cop carriage (2) to a position such as to bring the top end of bobbins (4) to the height of compressor (16) of flyers (6), then to rotate cops (9) a few turns to wind roving (5) into a groove (17) or onto a roughened or similar surface of bobbins (4) capable of retaining roving (5), after which carriage

(2) is further lowered or inclined to cause roving (5) to snap in the section between the end of bobbins (4) and flyers (6). Preferably, before lowering cops (9), a reserve of roving (5) is created by slowly rotating flyers (6) and cops (9) for a few turns with no supply, simultaneously imparting a twist to roving (5) and strengthening it.

Fig.2**EP 0 467 475 A1**

The present invention relates to a **method** and apparatus for separating from flyers the roving wound onto cops and securing the end of the roving on the cops at the time of removal in a fly frame or similar machine.

It is known that when the winding of roving onto the cops in a fly frame has been completed, before removal of the cops from the frame, the roving is snapped in the section between each cop and the relative flyer as a result of lowering the cop carriage and the end of the roving is then secured by a worker on the respective cop suitably arranging it, so as to prevent it from unwinding during the subsequent stages of removing and transporting of the cops.

The operation of stopping the roving for the above-mentioned purpose of course requires time, during which the frame must remain stationary until the operation has been completed for all the cops, and therefore for a relatively long total time.

This operation is very awkward for the workers, who must bend down to find first the free end of the roving and then arrange it so that it will not unroll. The need to reduce by as much as possible, for economic reasons, the intervention time for each cop, carries the risk that the work is not always done properly and the roving end of some of the cops, incorrectly secured, may later free itself and lead to some of the roving unrolling, compromising the correct supply of cops at the next working stage.

Devices are known which after removal of the cops from the fly frame hold the end of the roving in contact with the winding to prevent it unwinding. These devices, however, are designed and effective only along the cop transportation line downstream of the frame and are not therefore capable of preventing accidental unwinding of the roving end between the frame and the start of the transportation line. Furthermore, they do not eliminate the unproductive time and cost resulting from human intervention in the stage of binding the roving to the cops on the frame.

It has also been proposed, to prevent unrolling of the roving in the section of journey from the frame to an overhead conveyor, to roll the cops in the direction of winding of the roving, during transportation, against a stationary surface. In this case too however the possibility of unrolling of the roving is not completely eliminated and furthermore the means proposed to prevent such unrolling are rather complex and bulky, so that the advantage of their use is relative.

The technical task of the present invention intends to fulfil is to provide a procedure and create an apparatus to separate the roving from the flyers and position the end of the roving on the cops so that it will not come undone or unroll accidentally

from the cops, all in an automatic way and with a considerable reduction in time, since this can be done contemporaneously for all the cops on the fly frame.

Within the scope of the above-mentioned task a **method** and apparatus as specified shall also be provided, which can also be applied to fly frames which are already in use, without requiring substantial structural modifications of the same.

With a view to fulfilling the task specified, a **method** of the type in question is proposed, characterised in that on completion of winding the roving onto the cops, the stationary cops are lowered until the top end portion of the relative bobbins are at the height of the compressor of the respective flyers and then made to rotate to wind under tension and bind a few coils of roving on the said end portion, the cops being finally moved away from the flyers, causing the roving to snap in the section between the said end and the relative flyer.

Before lowering and rotating the cops, it may be appropriate to rotate the flyers and cops for a few turns with no supply of roving, so as to impart an additional twist to the roving and create a reserve of roving capable of preventing breakage of the roving before completing the binding winding.

To perform the **method** according to the invention an apparatus is proposed in a fly frame or similar machine comprising a cop carriage which can be lowered and raised and rotating flyers as well as drive means to rotate the cops and flyers and move the cop carriage, characterised in that the said means are connected to a control unit capable of lowering the carriage with the secured cops to a level at which the top end portion of the cop bobbins are at the height of the compressor of the relative flyers, of rotating the cops for a few turns to wind under tension and bind a few coils of roving onto the said end portion, as well as again moving the carriage to a position between the respective cops and flyers where the roving is snapped. As an advantage, the top end portion of the bobbins, i.e. the opposite end to the end engaged by the cop-turner, may have a suitable annular groove capable of receiving and holding by friction the roving wound round or a roughened or similar portion for the roving, so as to ensure that the end of roving is secured on the bobbin. Furthermore, the apparatus may be set to rotate the flyers and cops with no supply, so as to impart an additional twist to the roving, before lowering the cops to the said level, so as to create a reserve of roving capable of ensuring that breakage of the same occurs only after the end has been wound on, in the section between the end of the bobbin and the respective flyer.

With a **method** and apparatus according to the invention not only is all manual action to secure the

end of roving onto the respective cops eliminated, but a completely automatic operation is performed contemporaneously on all the spindles, with a considerable saving in time and cost. It will be noted that this result is achieved by reversing the sequence currently practised, namely by first winding the roving and snapping it only after it has been bound to the cops.

Lodging the end of the roving in a groove or suchlike on the cop bobbin ensures a firm anchorage until removal and for the entire duration of transportation, without the need for special means associated with the conveyor to secure the roving on each cop.

Further details and advantages of the invention will emerge to a greater extent from the following description, relating to some forms of preferred but not exclusive embodiments of the invention, illustrated by way of example in the attached drawings, in which:

Fig. 1 is a side view, partly cutaway and partly schematic, of a fly frame fitted with apparatus according to the invention;

Fig. 2 shows a side view and the successive stages (a-d) of a **method** according to the invention;

Fig. 3 shows a side view of some stages (a-d) of a variation in performing the **method** according to Fig. 2;

Figs. 4 and 5 show two examples of embodiment of a bobbin for performing the **method** according to the invention.

Fig. 1 shows a fly frame of a known type, indicated generically by 1 and comprising a carriage 2 carrying a plurality of cop-turners 3 according to a known arrangement, capable of rotating the respective bobbins 4 onto which is wound roving 5 supplied by means of rotating flyers 6. Carriage 2 can be lowered and raised since it is associated with racks such as the one shown by 7, guided vertically and engaged with respective pinions 8 driven in rotation by a motor schematically indicated by M1. The arrangement may be such that in the lowest position carriage 2 inclines as indicated by dashed lines, bringing cops 9 into an inclined position for removal, in a known way.

Cop-turners 3 are made to rotate in a known way by means of a gear transmission such as that shown by 10, driven in rotation by a motor M2. The mechanical connection between the transmission elements on carriage 2 and those on the stationary framework of frame 1 is achieved in such a way as to maintain such connection in all the positions of carriage 2, according to a technique which is known and not therefore shown in detail.

Flyers 6 are made to rotate by transmission 11 which is powered by a motor indicated schematically by M3. Roving 5 reaches flyers 6 from a

drafting unit 12 of a known type, from which the sliver of fibres 13 comes from supply bins 14. The drive rollers of drafting unit 12 are made to rotate by a motor M4.

Motors M1, M2, M3 and M4 are connected to a control unit 15 capable of actuating such motors to carry out the various winding operations, but also of actuating the motors according to certain sequences or methods which shall be described later, so as automatically to achieve separation and securing of roving 5 on the respective cops 9 when the winding stage is completed, before removing the cops and replacing them with empty bobbins 4.

After roving 5 has been wound onto cops 9, the latter are in the position shown in Fig. 2a, with compressor 16 of the respective flyers 6 at an intermediate height in cylindrical part 9a of cops 9.

Cops 9 are then lowered by carriage 2 by means of a command to motor M1, until the top end portion 4a of the relative bobbins 4 is at the height of compressor 16 of the respective flyers 6 (Fig. 2b). In this position a section 5a of roving 5 is created from the last wound coil of cop 9 towards the end portion 4a of bobbin 4.

Cops 9, by means of motor M2, are now rotated a few turns, so as to wind under tension and bind some coils of roving 5 onto the end portion of the respective bobbins 4 (Fig. 2c). As an advantage, to ensure that roving 5 is properly secured, bobbins 4 have, on the said portion, an annular groove 17 (Fig. 4), preferably rectangular in section, capable of receiving the said coils of roving 5 and effectively retaining the same since they are taut and squeezed in groove 17. Alternatively, end portion 4a of bobbins 4 may have an area which is roughened or knurled or otherwise machined 18 (Fig. 5) to create a retaining action or an effective anchorage of wound roving 5.

This securing stage being complete, preferably control unit 15 further lowers cop carriage 2, to a position such that the top of bobbins 4 is at a lower level than the minimum level of flyers 6 and there is no longer any possibility of interference between the latter and the bobbins. At this point carriage 2 may be inclined so as finally to distance the cops from the relative flyers 6, causing roving 5 to snap in the section between the top end of bobbins 4 and the respective flyers 6 (Fig. 2d). Instead of inclining carriage 2, it would also be possible to move carriage 2 parallel to itself in a horizontal or substantially horizontal direction, appropriately guiding the carriage, until the cops are in the snapping position shown by dashed and dotted lines in Fig. 2d.

Cops 9, ready for removal, now have the end of roving 5 secured to the respective bobbins 4, without the need for any human intervention in this regard. All the cops 9 of the frame have undergone

the same operation, with a considerable saving in time and cost. It will be noted that depending on the actual point at which roving 5 is broken a free section of roving 5, varying in length, remains. This free section causes no problems however, to the contrary, it is of assistance in seeking the end of roving when the cop reaches the subsequent ring spinning machine.

Thanks to the firm anchorage of the end of roving, no element or special equipment is required along the entire journey of the cops from the frame to the ring spinning machine, resulting in simpler transportation devices than those currently in use. It is understood that with the **method** and apparatus according to the invention it is not necessary to make significant structural modifications to the traditional frame, it being sufficient to implement a set sequence of commands for the driving organs of the frame at the end of the normal operations involved in forming the cops, in order to secure and break the roving automatically. The required sequence may be easily achieved with the appropriate electronic board or in any event according to known techniques.

According to a development of the invention, before proceeding to lower cops 9 into the position shown in Fig. 2b, it may be appropriate to create a special reserve of roving 5, to prevent the roving from breaking prematurely.

In this regard it is possible, as shown in Figures 3a-3d, to cause flyers 6 and cops 9 to make a few turns with no supply, i.e. with the drafting unit stopped (motor M4 off) and cops 9 in the raised position shown in Fig. 3a (corresponding to that shown in Fig. 2a), so as to impart an additional twist to roving 5 (Figs. 3b and 3c), strengthening it and obtaining a sufficient reserve of roving for the subsequent operations (position shown in Fig. 3d which corresponds to the position shown in Fig. 2b).

It will be noted that with the system of securing the roving according to the invention, the wound part of the cops is in no way damaged and can thus be correctly unwound in the spinning machine downstream, without irregularities.

Naturally within the scope of the present invention numerous variants and modifications are possible, in addition to those previously described. Thus for example bobbins 4 could also have a second groove, designed to receive a second group of coils for anchoring the roving. The surface of bobbins 4 could be treated so as to enable the roving to be secured without the need for a special groove. The fly frame could obviously also be of a type with automatic removal, without this involving any modification to the **method** and apparatus according to the invention.

Claims

1. A **method** for separating from flyers the roving wound onto cops and securing the end of the roving on the cops at the time of removal in a fly frame or similar machine, characterised in that after winding the roving onto the cops, the cops are lowered until the top end portion of the relative bobbins are at the height of the compressor of the respective flyers and then made to rotate to wind under tension and bind a few coils of roving onto the said end portion, the cops being finally moved away from the flyers, causing the roving to snap in the section between the said end portion and the relative flyer.
2. A **method** according to Claim 1, characterised in that before lowering the cops the flyers and cops are rotated with no supply, to impart an additional twist to the roving and create a reserve of roving before the roving is bound to the bobbin.
3. A **method** according to Claim 1 or 2, characterised in that the coils of roving are wound into an annular groove in the bobbin.
4. A method according to Claim 1 or 2, characterised in that the coils of roving are wound onto a roughened or similar surface of the bobbin.
5. A **method** according to one of the previous Claims, characterised in that the cops are moved away essentially horizontally to snap the roving.
6. A **method** according to one of the Claims from 1 to 4, characterised in that the cops are placed in an inclined position to snap the roving.
7. An apparatus to perform the **method** according to one of the previous Claims in a fly frame or similar machine (1), comprising a cop carriage (2) which can be lowered and raised and rotating flyers (6) as well as drive means (M1, M2 and M3) to rotate the cops and flyers and move cop carriage (2), characterised in that the said drive means (M1, M2 and M3) are connected to a control unit (15) capable of lowering carriage (2) with the secured cops (9) to a level at which the top end portion (4a) of bobbins (4) of cops (9) is at the height of compressor (16) of the relative flyers (6), of rotating cops (9) for a few turns to wind under tension and bind a few coils of roving (5) onto

the said end portion (4a), as well as again moving carriage (2) to a position between the respective cops (9) and flyers (6) where roving (5) is snapped.

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8. An apparatus according to Claim 7, characterised in that the said control unit (15) is capable also of rotating flyers (6) and cops (9) with no supply, to impart an additional twist to roving (5), before the said lowering of carriage (2). 10
9. An apparatus according to Claims 7 or 8, characterised in that the said unit (15) is capable of further lowering carriage (2) after winding the said coils of roving (5). 15
10. A cop bobbin to perform the **method** according to one of Claims 1 to 6, characterised in that at its top end (4a) it has at least one annular groove (17) to house and retain roving (5). 20
11. A cop bobbin to perform the **method** according to one of Claims 1 to 6, characterised in that at its top end (4a) it has a roughened or similar surface (18) capable of retaining the said coils of roving (5). 25

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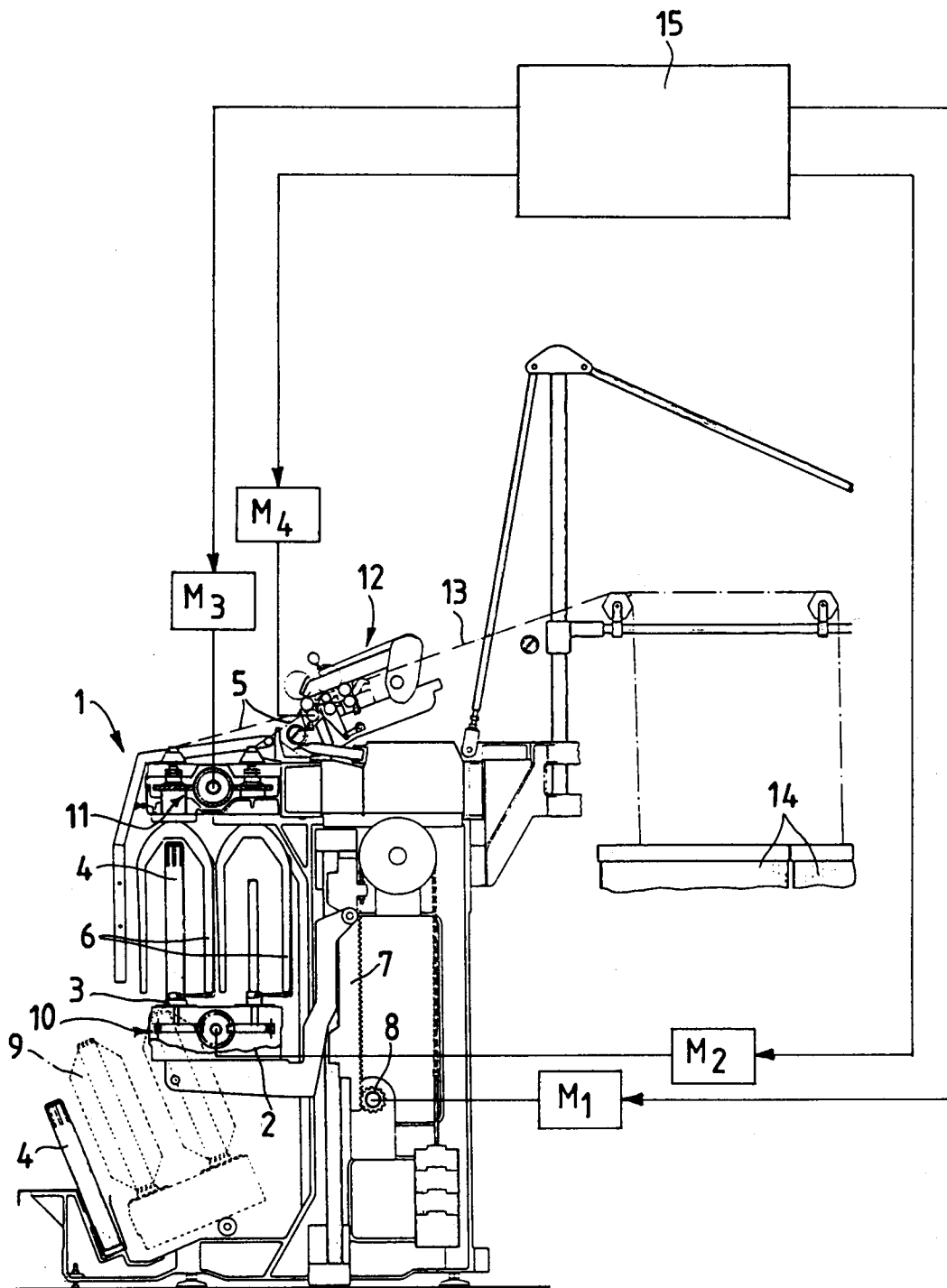


Fig.1

Fig.2

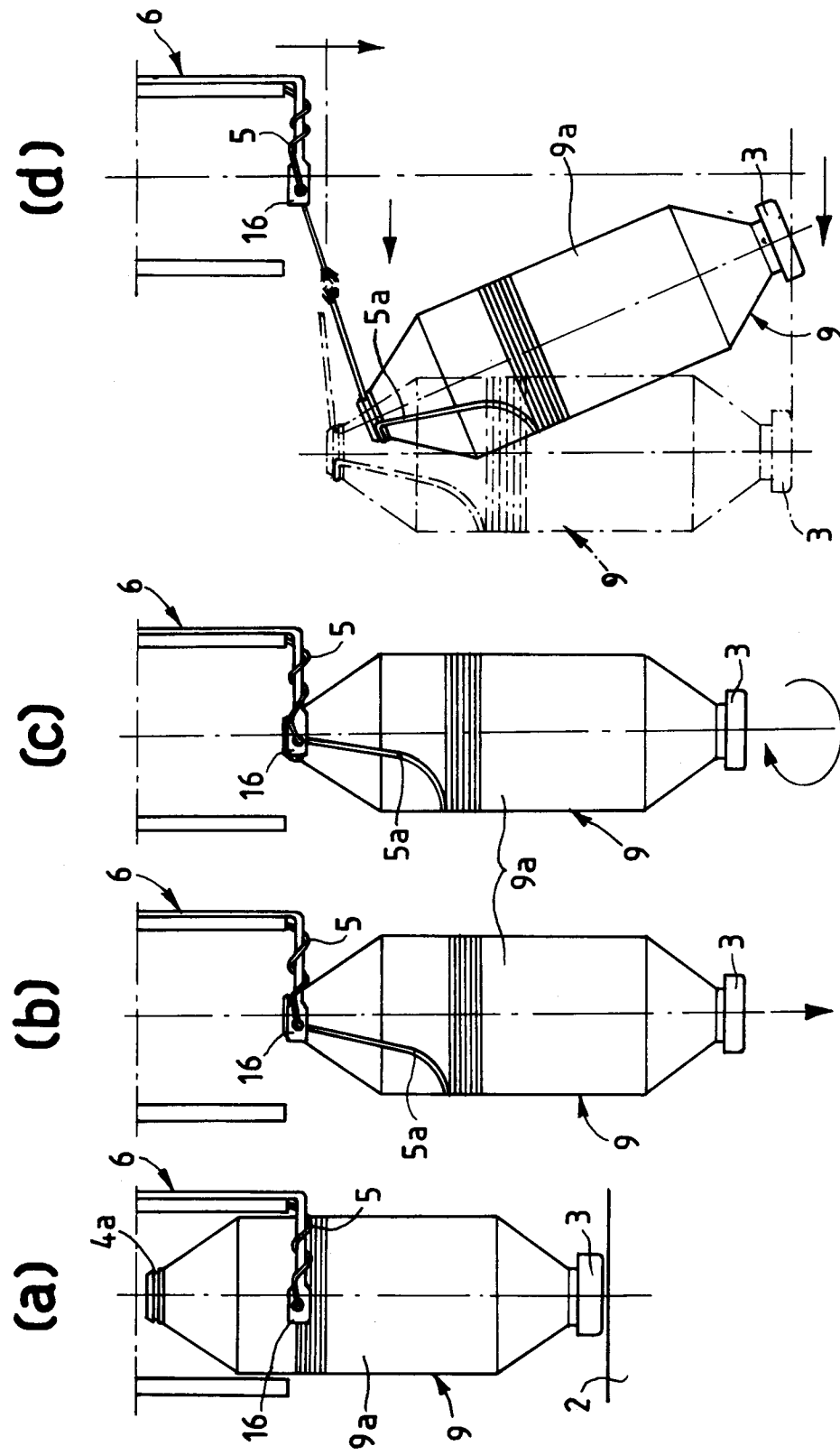
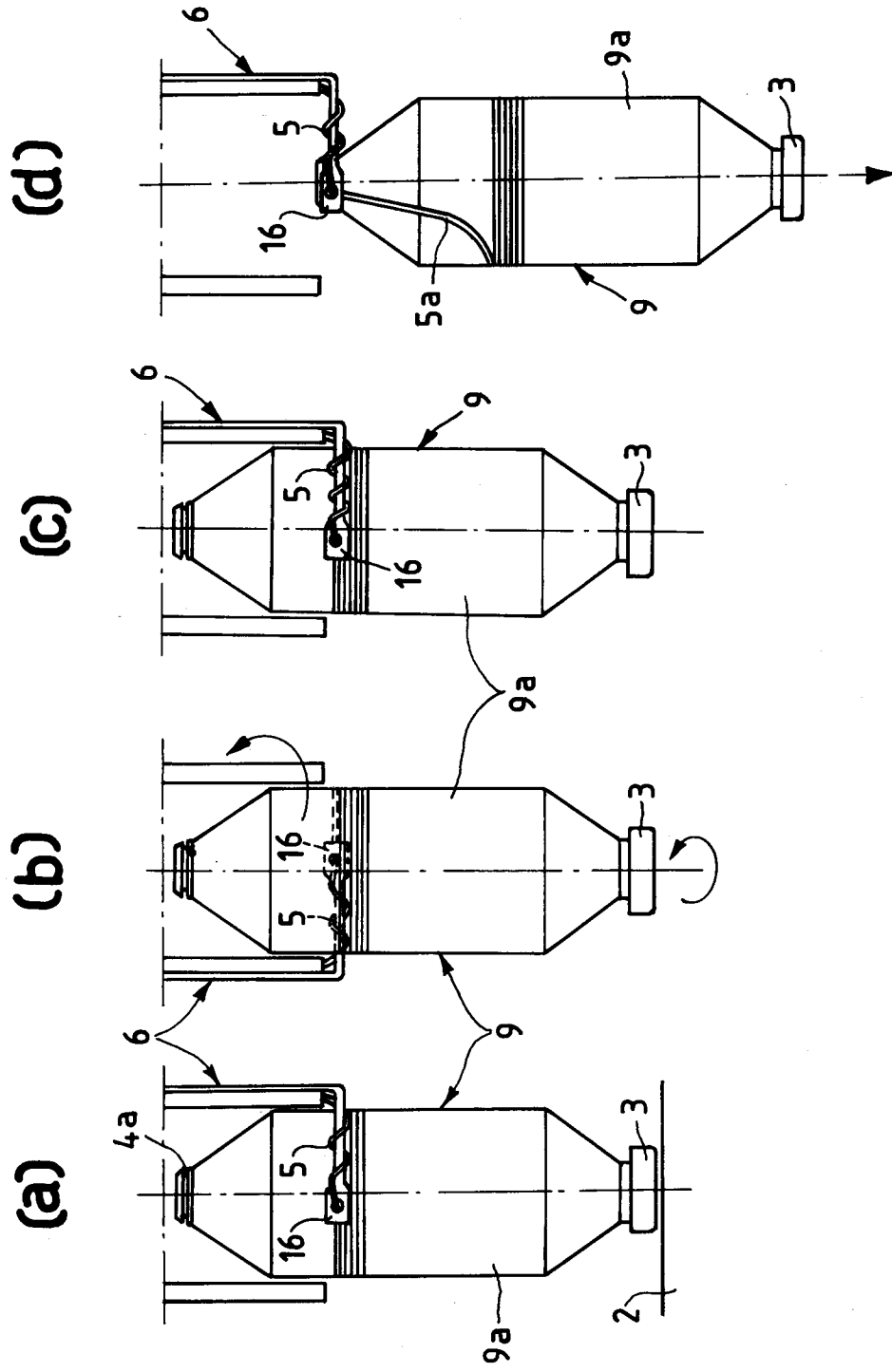


Fig.3



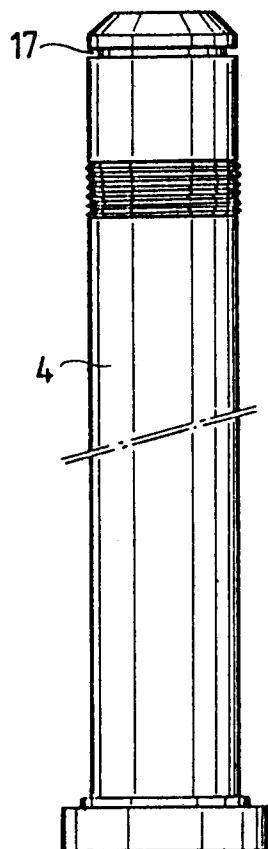


Fig.4

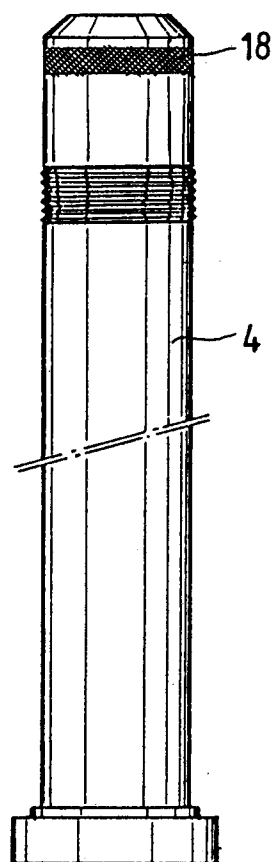


Fig.5



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EUROPEAN SEARCH REPORT

Application Number

EP 91 20 1878

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of search 18 September 91	Examiner RAYBOULD B.D.J.
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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)
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Place of search		Date of completion of search	Examiner
The Hague		18 September 91	RAYBOULD B.D.J.
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			