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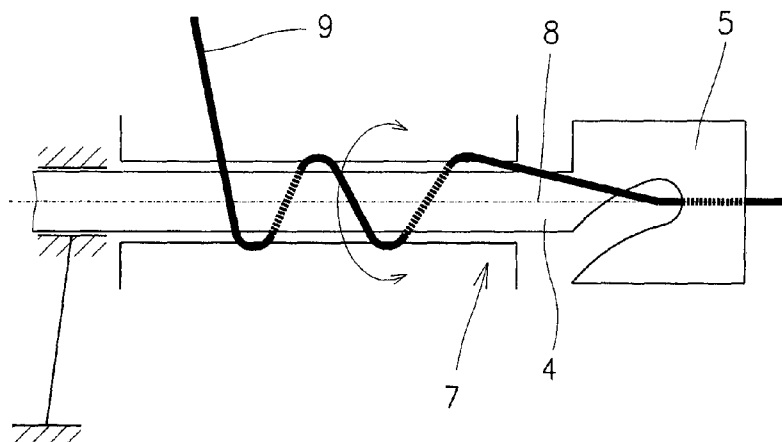
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(54) **Title:** PRESSER FINGER FOR A ROVING WINDER, ROVING WINDER, AND METHOD OF WINDING A ROVING



Obr. 2

(57) **Abstract:** The invention relates to a presser finger (4) which is a component of a winder for winding a roving on to a rotating bobbin (1) with a longitudinal axis (10). The presser finger (4) has a carrying arm (40) with a longitudinal axis (8) and a roving guide element. The presser finger (4) also has a guide plate (5) for guiding the roving on to a rotating bobbin (1). The presser finger (4) is alternately movable in the direction (X) of the longitudinal axis (10) of the rotating bobbin (1), and this movement of the presser finger (4) is provided by a drive means. The invention also relates to a roving winder with the aforementioned presser finger (4) and a method of winding a roving with the aid of the aforementioned presser finger (4).

Presser finger for a roving winder, roving winder, and method of winding a roving**Technical field**

The invention relates to a presser finger for a winder for winding a roving on to a
5 rotating bobbin, in which the rotating bobbin has a longitudinal axis, the presser finger
having a carrying arm with a longitudinal axis, a roving guide element and a guide plate.

The invention also relates to a roving winder with the aforementioned presser finger and
a method of winding a roving with the aid of the aforementioned presser finger.

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Prior art

Fine textile yarns are usually produced on spinning frames, such as ring spinning
frames. The technology for preparing fibre material for this production process includes
the operation of slubbing, in which a relatively fine cohesive roving is formed from a
15 staple fibre sliver, with a small twist. As it leaves the slubbing frame, the roving is wound
on to a roving bobbin to form a feed bobbin for a ring spinning frame. The roving must
be a linear textile system with uniform dimensions and mass, and must be suitable for
subsequent processing; consequently the protective twist applied to the roving gives it
only a low degree of cohesion. When the roving is wound on to the bobbin, a constant
20 tensile force must be maintained on the roving between the point of departure from the
slubbing frame and the roving bobbin, without exceeding the rather low tensile strength
of the roving imparted by its small twist.

Prior art devices for producing roving include what is known as a flyer spinning frame,
25 which comprises a sliver drafting machine, a flyer and a spindle. From the drafting
machine the sliver is guided across the guide opening in the fixed plate on the flyer arm,
which is fitted rotatably about its vertical axis in the vertically fixed part of the frame. At
the lower end of the flyer arm, which retains the sliver, there is a presser finger on to
which the sliver is transferred from the inner arm of the flyer, the presser finger being
30 provided with a guide plate adjacent to the surface of the bobbin on to which the roving
is wound. The roving is formed by the rotation of the bobbin and the rotation of the flyer.
While the roving is being wound on to the bobbin it passes through a number of turns

(wraps) on the surface of the presser finger, which promotes the application of the protective twist, described below, to the roving. The bobbin is positioned with its longitudinal axis vertical, and is fitted on a vertically located rotating spindle which is fitted rotatably on the vertically movable part of the frame. The sliver leaving the drafting
5 frame is twisted into roving by the rotary movement of the bobbin and flyer, and is then wound on to a bobbin in such a way that the flyer with the presser finger rotates around the bobbin, which simultaneously moves vertically to guide the wound roving along the length of the bobbin, the roving receiving a limited twist as a result of the rotary movement of the flyer before the roving is laid on the bobbin. The roving wound in this
10 way has a fibre structure such that each fibre in the cross section of the roving is substantially twisted in the direction of the protective twist of the roving.

A drawback of this equipment is the relatively low roving production rate, averaging 20 to 40 metres per minute, due to the difficulties of the twisting process which make it
15 impossible to achieve high speeds, and therefore high productivity, in the production of roving. A further drawback of this solution is the structure of the resulting roving, in which each fibre in the cross section of the roving is substantially twisted in the direction of the protective twist of the roving, which limits to some extent the attainable quality of yarns subsequently formed from this roving. A further drawback of this arrangement is
20 the relatively high price of such equipment.

There is also a known device disclosed in EP 2 112 258 (US2009/0289141), in which the resulting roving contains fibres lying parallel virtually throughout its cross section and only a few fibres on the outer surface of the roving are wound around the body of
25 the roving, causing the roving to remain sufficiently cohesive and substantially compensating for the protective twist of the roving created on flyer spinning frames. This effect is achieved by using a pneumatic device placed on the sliver drafting frame. The pneumatic device comprises a spinning chamber in which individual fibres of the sliver are wound around the core fibres. After the pneumatic device there is a roving winder
30 comprising a rotary spindle for a bobbin which is coupled to a driven pair of delivery rollers which are arranged immediately before the roving bobbin, and which have a nip line through which the wound roving passes. In order to guide the roving along the

length of the roving bobbin, the delivery rollers can be arranged movably along the roving bobbin or the delivery rollers can be coupled to a guide element which helps to guide the roving along the roving bobbin and along the nip line of the delivery rollers. Similarly, the roving bobbin can be axially movable while the delivery roller remains in place. Since guiding by means of the delivery rollers which are movable along the roving bobbin or by means of a roving bobbin which is movable relative to stationary delivery rollers requires the handling of a relatively large mass, it is preferable to guide the roving by means of a roving guide element when this solution is used. The advantage of this device is that it enables the roving to be wound at high speeds of up to 600 metres per minute, but this solution has the drawback of being technically demanding and occupying a large amount of space, while, owing to the presence of an unguided section between the bobbin and the delivery cylinders, the tension on the roving may be unstable and the roving may break. Another disadvantage is the price.

The object of the invention is to enable high roving winding speeds to be achieved while the roving is guided in such a way as to anticipate an unstable tension on the roving which might cause the roving to break during winding, and high quality winding is obtained while the production, operating and energy requirements of the winder are decreased.

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Brief description of the invention

The object of the invention is achieved by means of a presser finger for a roving winder, having the essential feature that the carrying arm with the guide plate is alternately movable along the longitudinal axis of the bobbin.

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The advantage of this invention is that higher winding speeds than existing standard speeds in winders can be achieved by means of a presser finger while obtaining high quality winding and prevent the roving from breaking as a result of the tension on the roving. The winding speed achieved according to the invention is of the order of hundreds of metres per minute, typically in the range from 100 to 400 metres per minute, with the potential to raise the winding speed above 400 metres per minute. The invention also makes it possible to reduce the mechanical complexity of the winder and

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decrease overall energy consumption for roving winding. These advantages also enable the variety of types of roving production to be increased considerably. This enables the roving to be wound on to bobbins which are processed by high-speed systems such as air-jet spinning machines.

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The advantageous embodiments described in the patent claims can extend the features of the presser finger according to the invention, particularly in terms of the spatial arrangement of the winder with the bobbin positioned either vertically or horizontally, and can also extend the possibilities offered by the invention in terms of the control of the speed of movement of the wound roving and the tension in the wound roving.

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Examples of embodiment of the invention and brief description of the drawings

The presser finger of a roving winder is a component of a roving winder for winding a roving on to a revolving bobbin. The roving being wound is guided with the aid of the presser finger along the height and/or width of the bobbin and is wound progressively in individual layers, thus progressively forming a wound bobbin for further processing.

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The presser finger comprises a carrying arm provided with a roving guide plate, the carrying arm with the guide plate being movable along the longitudinal axis of the bobbin; in other words, the roving being wound is guided along the length and/or width of the bobbin by the movement of the presser finger along the rotating bobbin. The bobbin can be positioned either vertically or horizontally or in practically any other orientation. Clearly, the preferred orientation of the longitudinal axis of the bobbin is vertical or horizontal.

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The presser finger is provided with at least one roving guide element which is rotatable about the longitudinal axis of the carrying arm. The longitudinal axis of the carrying arm is perpendicular to the direction of movement of the presser finger along the bobbin, the rotatable roving guide element of the presser finger being made in the form of a disc or as an additional part of the presser finger, for example an outer shell fitted rotatably on the carrying arm, or the like. Essentially, it is possible for only one of the parts of the presser finger to be rotatable, or for two or three or more of the parts to be rotatable

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simultaneously. For example, only the carrying arm is rotatable, while the guide plate is fixed, or the carrying arm is rotatable and the guide plate and outer shell are fixed, or the carrying arm and guide plate are rotatable and the outer shell is fixed, or the outer shell is rotatable and the carrying arm and guide plate are fixed, and so on. For the purpose of this rotation, the rotatable part is connected to a suitable drive means and the drive means is provided with a suitable controller.

While it is being wound on to the bobbin, the roving passes through a braking means located either on the carrying arm or on the roving guide element. The roving braking means can be used, in particular, to control the tension in the roving wound on to the bobbin. This control can be of the stepped or continuous type and can be applied, in view of the arrangement of the presser finger, during the winding of the roving thus enabling the possibilities of the winder to be extended further.

The roving braking means is made, for example, in the form of a surface of the carrying arm and/or a guide plate and/or an additional part of the presser finger (an outer shell and/or disc); alternatively, the braking means can be made in the form of a braking element fitted to any of the parts of the presser finger, in other words on the carrying arm, on the outer shell or disc, or on the guide plate, or elsewhere. The braking element can be fixed or rotatable with the rotatable part of the presser finger, or can be independently rotatable about the longitudinal axis of the carrying arm. If the braking means is fitted to a rotatable part of the presser finger, it is theoretically unnecessary for it to be independently rotatable, but it is possible for the braking element to be independently rotatable on another rotatable part of the presser finger. The braking element is substantially made in the form of a radial projection on any of the parts of the presser finger, for example a transverse pin, or in the form of a shaped slot or recess in the disc of the guide element or roving guide means, or similar.

In principle, different combinations of the individual elements of the presser finger can be used in order to achieve the objects of the invention.

Clearly, the aforesaid presser finger is a component of a winder for winding a roving 9 on to a rotating bobbin 1. The winder winds the roving 9 on to a rotating bobbin 1. The roving 9 is guided by the presser finger 4 with a roving guide element and guide plate 5, while the presser finger 4 moves in an alternating way along the longitudinal axis 10 of the rotating bobbin 1. The presser finger 4 also moves transversely with respect to the longitudinal axis 10 of the rotating bobbin 1, as the diameter of the rotating bobbin 1 increases because of the roving 9 wound on it. The roving 9 is wound at least once around the roving guide element, and the roving 9 is then positioned on the rotating bobbin 1 by the guide plate 5. The guide plate 5 contacts or almost contacts the rotating bobbin 1 and the roving 9 is wound around the roving guide element by the rotation of the roving guide element of the presser finger 4 and/or by the rotation of the carrying arm 40 of the presser finger 4 and/or by the rotation of the guide plate 5 of the presser finger 4. The rotation of the roving guide element of the presser finger 4 and/or the rotation of the carrying arm 40 of the presser finger 4 and/or the rotation of the guide plate 5 of the presser finger 4 is provided by the drive means in the course of winding. For the practical control of the tension in the roving, the rotation of the roving guide element of the presser finger 4 and/or the rotation of the carrying arm 40 of the presser finger 4 and/or the rotation of the guide plate 5 of the presser finger 4 is provided by the drive means in the course of winding, according to the tension on the roving, and is used to set the desired tension on the roving.

Exemplary embodiments of the presser finger 4 according to the invention will now be described with the aid of Figures 1 to 3, in which Fig. 1 shows the arrangement of a presser finger and a bobbin, Fig. 2 shows an exemplary embodiment of the presser finger with a roving braking means, Figs. 2a to 2d show variant embodiments of the presser finger with roving braking means, and Fig. 3 shows another embodiment of the presser finger with a roving braking means.

The presser finger 4 with the guide plate 5 for the roving 9 is alternately movable in the direction X of the longitudinal axis 10 of the bobbin 1, in order to guide the roving 9 along the height and/or width of the bobbin 1 which is rotatable about its longitudinal axis 10. The guide plate 5 for the roving 9 is fitted on the carrying arm 40 of the presser

finger 4, while the presser finger 4 is connected to the drive (not shown) for alternating movement in the direction X of the longitudinal axis 10 of the bobbin 1, and the drive is connected to a control means (not shown).

- 5 In particular, the presser finger 4 is provided with a roving braking means, which in the illustrated exemplary embodiments is based on the principle of a change in the degree of winding, in other words the number of turns or the angular extent of the winding of the roving 9 around the appropriate part of the presser finger 4, in order to improve the controllability of the process of winding the roving 9 on to the bobbin 1. The change in
10 the degree of winding can be either smooth or stepped, and is applied in the course of winding.

- In the embodiment shown in Fig. 2, the presser finger 4 is provided with an outer shell 7, the presser finger 4 being non-rotatable about its longitudinal axis 8, which is
15 perpendicular to the direction X of the longitudinal axis 10 of the bobbin 1, while the outer shell 7 is rotatable about the axis 8. The roving 9 is guided on to the outer surface of the outer shell 7, is wound around this surface and then enters the roving guide plate 5. The rotation of the outer shell 7 about the axis 8 causes a change in the degree of winding (the number of turns) of the roving 9 around the outer shell 7, thus also
20 changing the size of the braking part formed on the roving 9.

- As shown in Fig. 2a, a deflecting guide 11 for the roving 9 is formed on the outer periphery of the outer shell 7. The deflecting guide 11 is made in the form of a radially orientated pin in the illustrated exemplary embodiment. During the winding, the roving 9
25 is guided along the first part of the outer shell 7 and wound in one direction, for example in a clockwise direction, after which the roving 9 passes through the deflecting guide 11 to the second part of the outer shell 7 and the roving 9 is wound around this second part in the opposite direction, for example in an anticlockwise direction. The roving 9 then travels on to the guide plate 5 and to the bobbin 1.

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In the exemplary embodiment shown in Fig. 2b, the deflecting guide 11 for the roving 9 is made in the form of a disc 54 which is coaxial with the outer shell 7, and which is

fixed to the outer shell 7 in the central part of the length of the outer shell 7, a radial recess 541 being created in the disc 54 in the form of an angled cut-out at a suitable angle, for example 90° , and the roving 9 is wound around the working wall 5411 of the radial recess, in other words with a change in the direction of winding of the roving 9
5 around the part of the outer surface of the outer shell 7 between the part before the disc 54 and the part after the disc 54.

In the embodiment shown in Fig. 2c, the deflecting guide 11 for the roving 9 is made in the form of a disc 55 which is coaxial with the outer shell 7, and which is fixed to the
10 outer shell 7 in the central part of the length of the outer shell 7, a radial recess 551 being created in the disc 55 with an enlarged portion in the proximity of the braking surface of the outer shell 7. This embodiment holds the roving 9 correctly in the radial recess 551 when the outer shell 7 rotates about its longitudinal axis. With the aid of the radial recess 551, the roving 9 is wound on to the braking surface of the outer shell 7
15 with a change in the direction of winding of the roving 9 around the outer surface of the outer shell 7 between the parts before the disc 55 and after the disc 55.

In the embodiment shown in Fig. 2d, the deflecting guide 11 for the roving 9 is made in the form of a disc 56 which is coaxial with the outer shell 7, and which is fixed to the
20 outer shell 7 in the first part of the length of the outer shell 7, a radial recess 561 being created in the disc 56 with an enlarged portion in the proximity of the braking surface of the outer shell 7. If the roving 9 passes through the radial recess 561, the rotation of the outer shell 7 about its longitudinal axis causes an increase or decrease in the number of turns of the roving 9 around the braking surface of the outer shell 7 arranged in the
25 direction of movement of the roving after the disc 56, leading to a change in the degree of winding of the roving 9 around the outer surface of the outer shell 7, and thus changing the braking force acting on the roving 9. In an exemplary embodiment which is not shown, the disc 56 and the radial recess 561 are provided with a radially orientated pin, in other words one which is transverse with respect to the direction of movement of
30 the roving 9.

In the embodiment shown in Fig. 3, the carrying arm 40 and the guide plate 5 are rotatable together about the axis 8 and the outer shell 7 is not rotatable about the axis 8. The roving 9 is either guided directly to the guide plate 5 for the roving 9 and then on to the bobbin 1, or is first guided on to the outer surface of the carrying arm 40 and wound
5 around it and then guided to the guide plate 5 for the roving 9 and subsequently to the bobbin 1. The rotation of the carrying arm 40 about the axis 8 causes a change in the degree of winding (the number of turns) of the roving 9 around the guide plate 5 or the carrying arm 40, thus also changing the size of the braking part formed on the roving 9. In an exemplary embodiment which is not shown, the deflecting guide 11 is positioned
10 on the outer periphery of the carrying arm 40.

Similarly, in another exemplary embodiment which is not shown, the arrangement is such that only the guide plate 5 rotates about the axis 8, while all the other components are non-rotatable about the axis 8. In this embodiment also, the roving 9 is guided either
15 directly to the guide plate 5 and then on to the bobbin 1, or is first guided on to the outer surface of the carrying arm 40 and wound around it and then guided to the guide plate 5, the rotation of the guide plate 5 about the axis 8 changing the degree of winding (the number of turns) of the roving 9 around the guide plate 5 or the carrying arm 40, thus also changing the size of the braking part formed on the roving 9.
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In another exemplary embodiment which is not shown, the arrangement is such that only the carrying arm 40 is rotatable about the axis 8 and the deflecting guide 11 is formed on the arm, the guide plate 5 and all other components being non-rotatable about the axis 8.
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In another exemplary embodiment which is not shown, the carrying arm 40 is non-rotatable about the axis 8, and the deflecting guide 11 is rotatable about the axis 8, this guide being fitted independently and rotatably on the carrying arm 40 or on the outer shell 7 and being connected independently to a drive means.
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In order to provide controlled rotation about the axis 8, the carrying arm 40 and the guide plate 5 or the outer shell 7 or the deflecting guide 11 are coupled to a drive means

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(not shown) connected to a controller (not shown) which has a means for detecting the speed of movement of the roving 9 and/or a means for detecting the tension in the roving 9, the amount of braking force on the roving 9 being set on the basis of the detected values.

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List of reference numerals

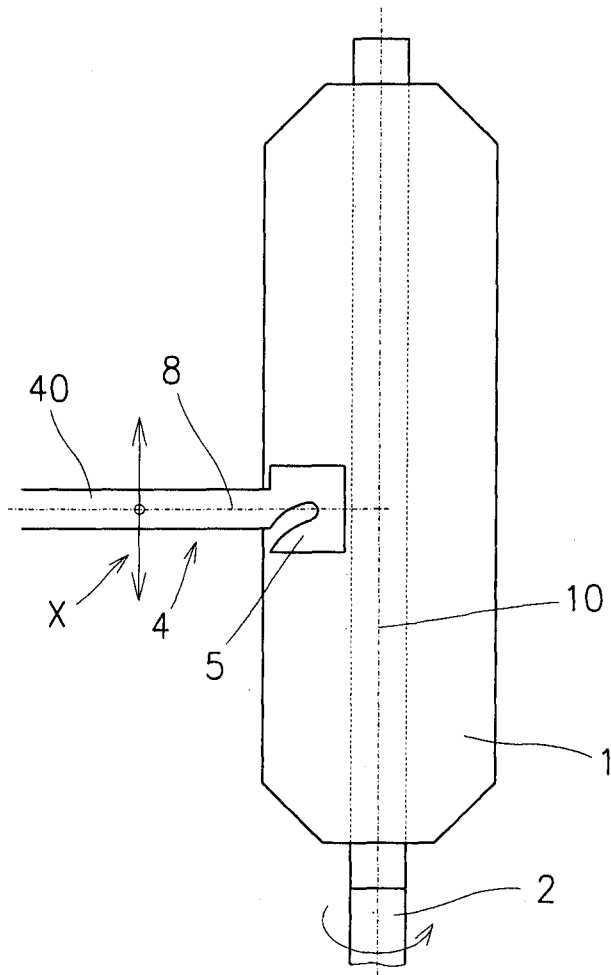
- 1 Bobbin
- 4 Presser finger
- 5 5 Guide plate
- 7 Outer shell
- 8 Longitudinal axis of the presser finger
- 9 Roving
- 10 Longitudinal axis of the bobbin
- 10 11 Deflecting guide
- 40 Carrying arm
- 54, 55, 56 Disc
- 541, 551, 561 Radial recess
- 5441 Working wall
- 15 X Direction of movement of the presser finger

PATENT CLAIMS

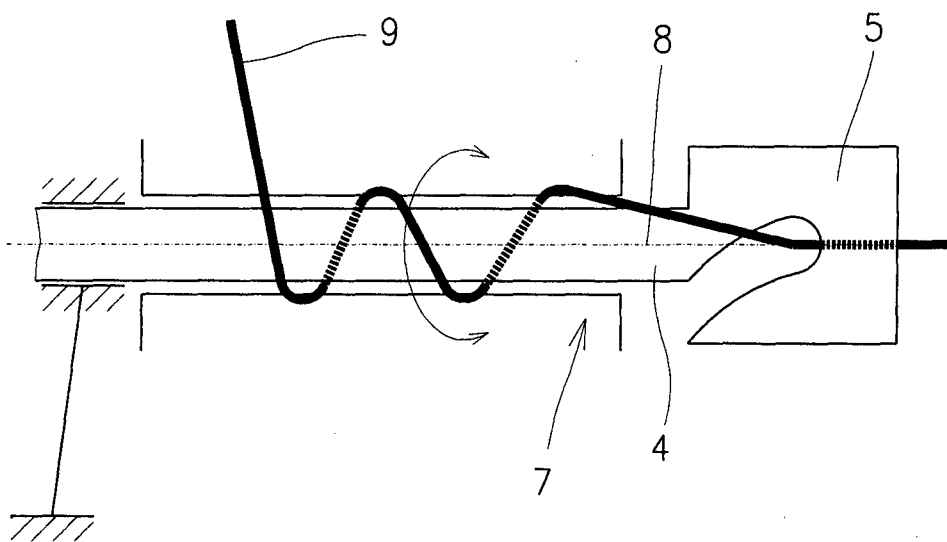
1. Presser finger (4) for a winder for winding a roving on to a rotating bobbin (1), in which the rotating bobbin (1) has a longitudinal axis (10), the presser finger (4)
5 having a carrying arm (40) with a longitudinal axis (8), a roving guide element and a guide plate (5), characterized in that the presser finger (4) is alternatingly movable in the direction (X) of the longitudinal axis (10) of the bobbin (1) and is coupled to a drive means for providing the movement.
- 10 2. Presser finger according to Claim 1, characterized in that the carrying arm (40) is provided with a roving guide element which is rotatable about the longitudinal axis (8) of the carrying arm (40).
- 15 3. Presser finger according to Claim 2, characterized in that the roving guide element is an outer shell (7) which is rotatable about the longitudinal axis (8) of the carrying arm (40), which is perpendicular to the direction (X) of the longitudinal axis (10) of the bobbin (1).
- 20 4. Presser finger according to Claim 1, characterized in that the carrying arm (40) is provided with a roving guide element in the form of an outer shell (7), the carrying arm (40) being rotatable about its longitudinal axis (8) while the roving guide element is not rotatable about this axis (8).
- 25 5. Device according to any one of Claims 2 to 4, characterized in that the roving guide element or the carrying arm (40) is connected to a drive means for rotation.
- 30 6. Presser finger according to any one of Claims 2 to 5, characterized in that the carrying arm (40) or the roving guide element is provided with a roving braking means.

7. Presser finger according to Claim 6, characterized in that the roving braking means is a deflecting means (11) which is connected to the carrying arm (40) or to the outer shell (7).
- 5 8. Presser finger according to Claim 6, characterized in that the roving braking device is a shaped recess or cut-out in a radial disc (54, 55, 56) on the carrying arm (40) or on the outer shell (7).
9. Device according to any one of Claims 1 to 8, characterized in that it has control
10 elements for controlling the rotation of the roving guide element or the carrying arm (40).
10. Winder for winding a roving (9) on to a rotating bobbin (1), characterized in that the winder is provided with a presser finger (4) according to Claims 1 to 9.
- 15 11. Method of winding a roving (9) on to a rotating bobbin (1), in which the roving (9) is guided by a presser finger (4) with a roving guide element and guide plate (5), the presser finger (4) moving alternately in the direction of the longitudinal axis (10) of the rotating bobbin (1) and moving with respect to the longitudinal axis (10)
20 of the rotating bobbin (1), whose diameter increases because of the roving (9) wound on it, the roving (9) being wound at least once around the roving guide element and the roving (9) being subsequently placed on a rotating bobbin (1) by the guide plate (5), the guide plate (5) contacting or almost contacting the rotating bobbin (1) and the roving (9) being wound around the roving guide element by the
25 rotation of the roving guide element of the presser finger (4) or by the rotation of the carrying arm (40) of the presser finger (4) or by the rotation of the guide plate (5) of the presser finger (4).
12. Method of winding a roving (9) according to Claim 11, characterized in that the
30 rotation of the roving guide element of the presser finger (4) or the rotation of the carrying arm (40) of the presser finger (4) or the rotation of the guide plate (5) of the presser finger (4) is provided by drive means in the course of winding.

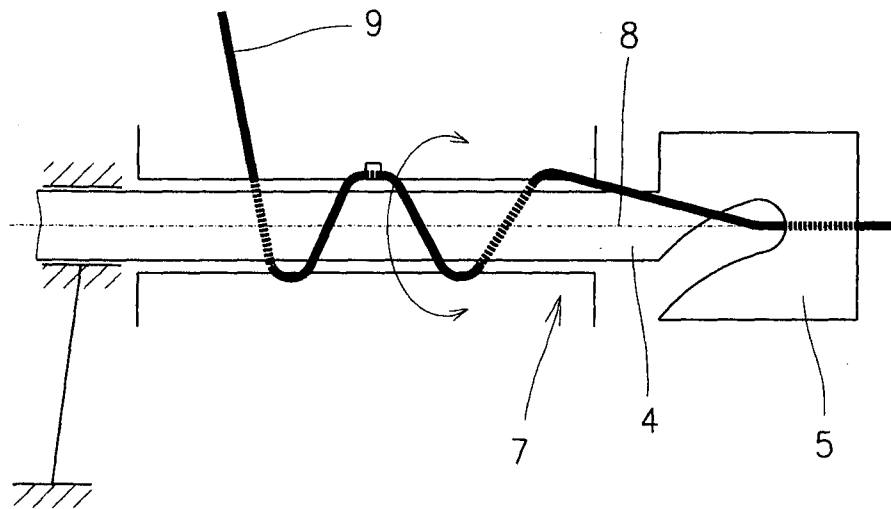
13. Method of winding a roving (9) according to Claim 11 or 12, characterized in that the rotation of the roving guide element of the presser finger (4) or the rotation of the carrying arm (40) of the presser finger (4) or the rotation of the guide plate (5) of the presser finger (4) is provided by drive means in the course of winding in accordance with the tension in the roving, in order to set the desired tension in the roving.



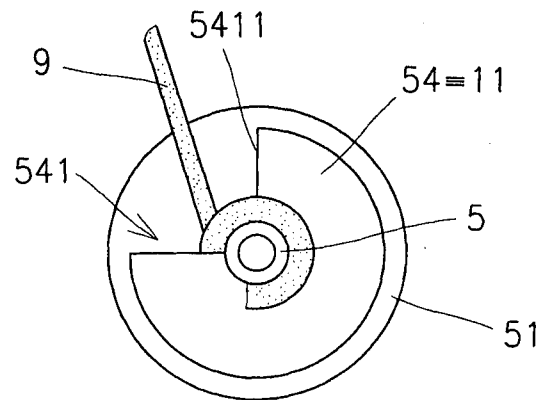
Obr. 1



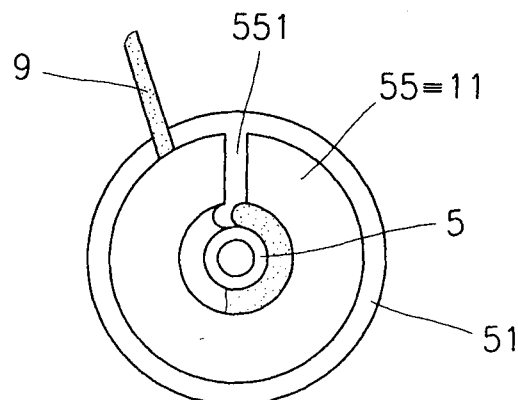
Obr. 2



Obr. 2a

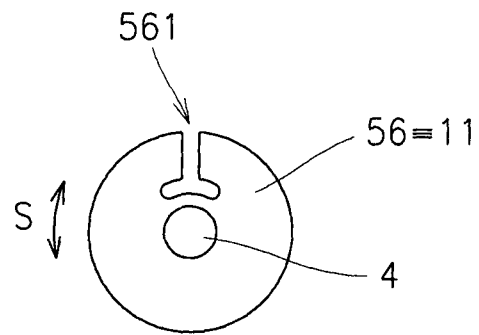


Obr. 2b

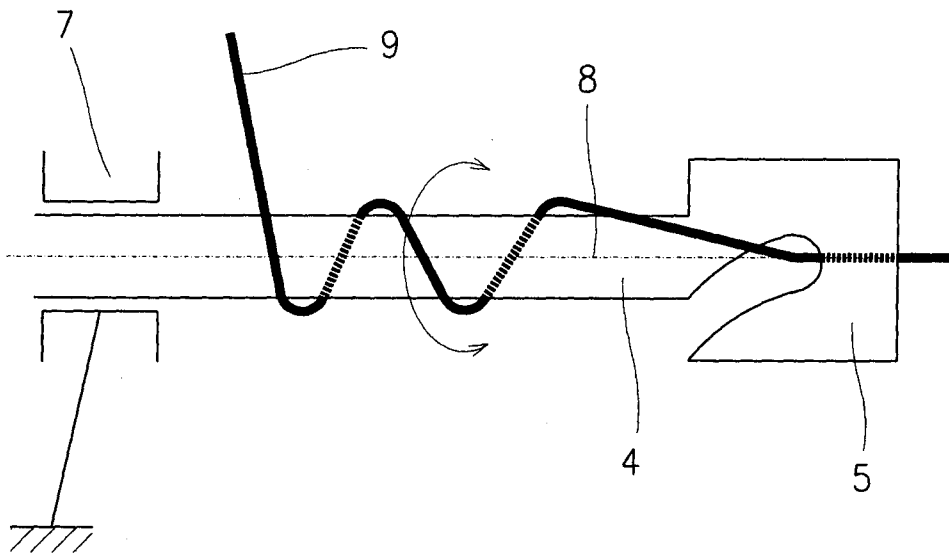


Obr. 2c

3/3



Obr. 2d



Obr. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/CH2012/000136

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65H54/36 D01H1/36
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65H D01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	FR 907 113 A (HALSTENBACH & CO) 1 March 1946 (1946-03-01) claim 1; figure 1, -----	1-13
Y	US 2 600 037 A (WEST PAUL B) 10 June 1952 (1952-06-10) claim 1; figure 1 -----	1-13



Further documents are listed in the continuation of Box C.



See patent family annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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