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- (71) **Applicant:** RIETER CZ S.R.O. [CZ/CZ]; Moravska 519,
562 01 Usti nad Orlici (CZ).
- (72) **Inventors:** STUSAK, Miroslav; Smetanova 1828, 565 01
Chocen (CZ). MORAVEC, Milan; Dukelska 431, 562 01
Usti nad Orlici (CZ).
- (74) **Agent:** MUSIL, Dobroslav; Zabrdovicka 11, 615 00 Brno
(CZ).
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(54) **Title:** ELECTROMAGNETIC DEVICE FOR ELIMINATING A YARN LOOP WHEN WINDING YARN ON A CROSS-
WOUND BOBBIN ON A SPINNING MACHINE AT A CONSTANT SPEED OF THE YARN PRODUCTION

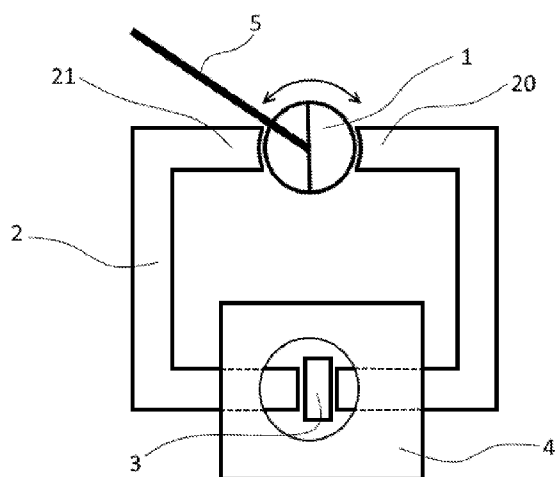


FIG. 1

(57) **Abstract:** The invention relates to an electromagnet-
ic device for eliminating a yarn loop during the process
of winding yarn on a cross-wound bobbin on a spinning
machine at a constant speed of the yarn production,
which comprises a cylindrical two pole magnet (1),
which is connected to a compensatory arm (5) of a yarn
loop and which is mounted rotatably about its longitudi-
nal axis between two pole pieces (20, 21) of a magnetic
core (2) of a coil (4), which are situated opposite each
other, whereby on the side remote from the cylindrical
two-pole magnet (1) and the pole pieces (20, 21), the
magnetic core (2) passes through the electrical coil (4)
connected to a source of electrical energy and to a control
device. The magnetic core (2) is interrupted in the cavity
of the coil (4) and a two pole permanent magnet (3) is
located at the point of its interruption.

Electromagnetic device for eliminating a yarn loop when winding yarn on a cross-wound bobbin on a spinning machine at a constant speed of the yarn production

5 **Technical field**

The invention relates to an electromagnetic device for eliminating a yarn loop during the process of winding yarn on a cross-wound bobbin on a spinning machine at a constant speed of the yarn production, which comprises a cylindrical two-pole magnet, which is connected to a compensatory arm of a
10 yarn loop and which is mounted rotatably about its longitudinal axis between two pole pieces of a magnetic core of a coil, which are situated opposite each other, whereby on the side remote from the cylindrical two-pole magnet and the pole pieces, the magnetic core passes through the electrical coil connected to a source of electrical energy and to a control device.

15

Background art

During the winding of yarn on a cross-wound bobbin on a spinning machine at a constant speed of the yarn production, for example, on an open-end spinning machine or on a jet-nozzle spinning machine, due to the traversing
20 of the yarn across the width of the bobbin, the yarn is periodically slackened. As a result, it is necessary to compensate for this slackening by lengthening and shortening the length of the yarn travel path between the drawing-off mechanism and the yarn winding device owing to the constant speed of the yarn production and the constant speed of the yarn draw-off process from the
25 spinning unit. For this purpose, various compensators can be used, which comprise a compensatory arm which by one of its ends acts upon the yarn, lengthening or shortening the travel path of the yarn at a workstation in the relevant section between the drawing-off mechanism of yarn and the winding device of yarn as required, while maintaining a constant tension in the yarn,
30 which is a necessary condition for proper winding of yarn on the bobbin.

However, as development has shown especially recently, existing solutions of spring compensators have their limitations, which worsen meeting

technological requirements for cross-wound bobbin formation if we want to maintain simplicity of construction, possibility of easy and fast setting of the individual parts of the device and the device itself, also with regard to the needs of the activities and manual handling operations carried out during transient
5 phases at a workstation, such as spinning-in yarn, yarn breakage, replacing a bobbin, etc.

CZ PV 2014-384 discloses a device for eliminating a yarn loop when winding yarn on a cross-wound bobbin on a spinning machine at a constant speed of the yarn production, which comprises a movable compensatory arm
10 with a gripping and guiding means, whose path intersects the path of the yarn between a drawing-off mechanism of yarn and a winding device of yarn, whereby the compensatory arm is fixedly mounted on an output element of a reversible two-way controlled means, which is connected to a control device for controlling the position and/or direction and/or speed and/or force application of
15 the output element of the reversible two-way controlled means. In one embodiment, the reversible two-way controlled means comprises a cylindrical two pole magnet on which a compensatory arm is mounted and which is mounted rotatably about its longitudinal axis in a magnetic circuit with a coil, which is connected to a source of electrical energy for the excitation of the coil
20 according to the instructions received from the control device. The magnetic circuit with the coil comprises a stirrup, whereby at standstill the position of the cylindrical two pole magnet is such that the north pole of the magnet is situated opposite one pole extension of the stirrup whereas the south pole of the magnet is positioned opposite the other pole extension of the stirrup.

25 Although this solution of an electromagnetic device for eliminating a yarn loop, i.e. a magnetic compensator, does have numerous advantages, particularly in terms of speed of reaction and a relatively large oscillation, it has a shortcoming from the point of view of limited controllability, which manifests itself in certain situations.

30 The aim of the invention is to achieve further improvement in the functional properties of the electromagnetic device for eliminating a yarn loop when winding yarn on a cross-wound bobbin on a spinning machine at a constant speed of the yarn production.

Principle of the invention

The goal of the invention is achieved by an electromagnetic device for eliminating a yarn loop during the process of winding yarn on a cross-wound bobbin on a spinning machine at a constant speed of the yarn production, whose principle consists in that the magnetic core in the cavity of the coil is interrupted and a two pole permanent magnet is located at the point of interruption.

The advantage of this solution is the fact that the working range of the compensatory arm extends to an angle greater than 90° without a danger of twisting the cylindrical two pole magnet with the compensatory arm due to the influence of the magnetic poles of the cylindrical two pole magnet and the pole pieces of the magnetic core, which are attracted to each other.

Description of drawings

The invention is schematically represented in the enclosed drawings, where Fig.1 shows a functional diagram of the arrangement of the device according to the invention and Fig. 2 shows an exemplary 3D embodiment of the device according to the invention.

Examples of embodiment

The invention will be described using exemplary embodiments of arrangement and functioning of an electromagnetic device for eliminating a yarn loop at a workstation of a spinning machine between a drawing-off mechanism of yarn from a spinning unit and a winding device of yarn on a cross-wound bobbin. The workstation as such is well-known in the art and therefore here it will be described only symbolically without a drawing. The spinning machine comprises at least one row of identical workstations arranged next to each other, each of which comprises a spinning unit in which yarn is formed. Above the spinning unit is located a drawing-off mechanism of yarn. The drawing-off mechanism of yarn comprises a well-known pair of rollers, between which the yarn passes and which are mounted in the machine frame. One of the drawing-

off rollers is coupled to an unillustrated drive and constitutes a driven drawing-off roller, whereas the other roller is a pressure drawing-off roller, which is rotatably mounted on a spring-loaded arm, which pushes it onto the driven drawing-off roller. In the yarn path behind the drawing-off mechanism is
5 disposed a winding device of yarn on a cross-wound bobbin, which comprises a yarn traversing device, by which the yarn being wound is traversed across the width of the bobbin. The device for eliminating a yarn loop is arranged at the workstation in the yarn path between the drawing-off mechanism and the winding device, in this case it is an electromagnetic device for eliminating a yarn
10 loop.

The electromagnetic device for eliminating a yarn loop comprises a cylindrical two pole magnet 1, on which is mounted a compensatory arm 5 of a yarn loop, whereby the cylindrical two pole magnet 1 is mounted rotatably about its longitudinal axis between two pole pieces 20, 21 of the magnetic core 2
15 situated opposite each other. The pole pieces 20, 21 of the magnetic core 2 have a profile (shape) of their heel portion, which is preferably in the form of a radius, affects the range of oscillation or the working range of the compensatory arm 5. The profile (shape) of the heel portion of the pole pieces 20, 21 is optimized in relation to the profile (shape) of the cylindrical two pole magnet 1,
20 as well as in relation to an air gap between the heel portion of the pole pieces 20, 21 and the cylindrical two pole magnet 1, taking into account the magnetic flux from the cylindrical two-pole magnet 1. Preferably, the magnetic core 2 is made of magnetically-soft steel.

At its other end, i.e. on the side remote from the cylindrical two-pole magnet and from the pole pieces 20, 21 of the magnetic core 2, the magnetic
25 core 2 is interrupted and a permanent magnet 3 is situated in the formed gap. In principle, the magnetic core 2 consists of a pair of identical C-shaped bodies oriented opposite each other, whose ends on one side constitute pole pieces 20, 21 of one end of the magnetic core 2 and whose other ends are arranged in
30 the vicinity of the permanent magnet 3 or they abut against it. The magnetic flux caused by the permanent magnet 3 is in comparison with the magnetic flux of the cylindrical two pole magnet 1 comparable. The permanent magnet 3 by its magnetic flux affects the characteristics of the magnetic field in the area around

the pole pieces 21, 20 so that it extends the possible working angle of turning of the cylindrical two-pole magnet 1 and thus the amplitude of the extreme positions of the compensatory arm 5 to a range (greater than 90 °) without twisting the cylindrical two-pole magnet 1 due to the influence the magnetic poles of the cylindrical two pole magnet 1 and the pole pieces 20, 21 of the magnetic core 2, which are attracted to each other.

Around the permanent magnet 3 and the abutting ends of the magnetic core 2 is situated an electrical coil 4, which is connected to a source of electrical energy for its excitation according to the instructions of the control device. Thus, the magnetic core 2 is substantially the core of the electrical coil 4.

The cylindrical two pole magnet 1, the electrical coil 4 and the permanent magnet 3 generate a common magnetic flux 6. To improve control, the compensatory arm 5 and/or the cylindrical two pole magnet 1 is aligned with at least one sensor 8 of the position of the compensatory arm 5, which is connected to the control device.

PATENT CLAIMS

1. An electromagnetic device for eliminating a yarn loop during the process of winding yarn on a cross-wound bobbin on a spinning machine at a constant speed of the yarn production, which comprises a cylindrical two pole magnet (1), which is connected to a compensatory arm (5) of a yarn loop and which is mounted rotatably about its longitudinal axis between two poles (20, 21) of a magnetic core (2) of a coil (4), which are situated opposite each other, whereby the magnetic core (2) on the side remote from the cylindrical two-pole magnet (1) and from the pole pieces (20, 21) passes through the electrical coil (4), which is connected to a source of electrical energy and to a control device, **characterized in that** the magnetic core (2) is interrupted in the cavity of the coil (4) and a two pole permanent magnet (3) is located at the point of the interruption of the magnetic core (2).

2. The electromagnetic device according to claim 1, **characterized in that** the magnetic core (2) is composed of a pair of C-shaped elements oriented opposite each other, whereby one of their ends is formed by pole pieces (20, 21) of one end of the magnetic core (2), whereas their other end is arranged in the vicinity of the permanent magnet (3) or abuts against it.

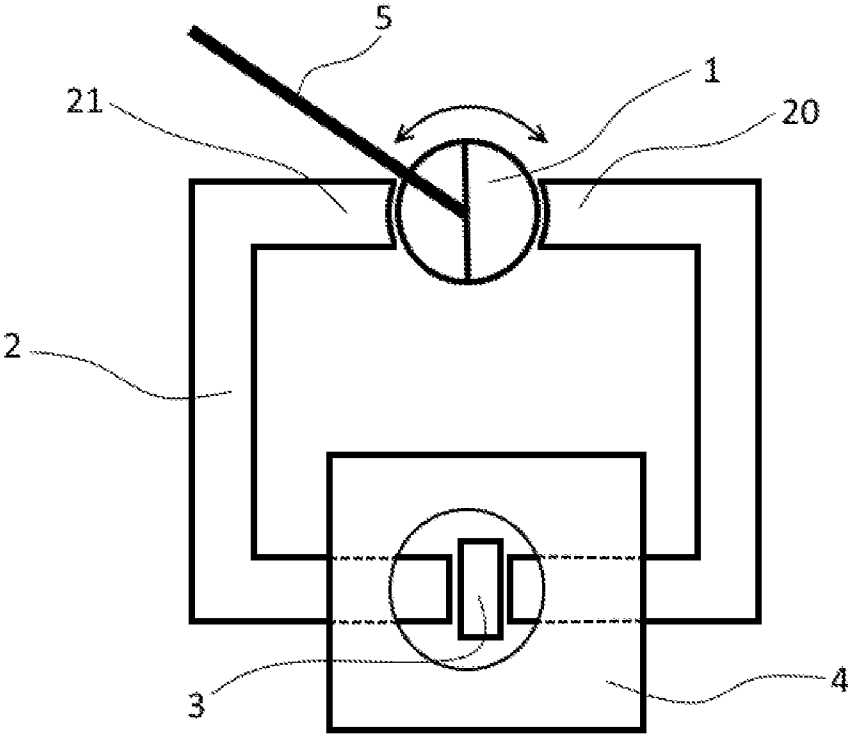


FIG. 1

INTERNATIONAL SEARCH REPORT

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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, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 2 955 142 A1 (RIETER CZ S R O [CZ]) 16 December 2015 (2015-12-16) paragraph [0028]; figure 3 -----	1,2
Y	JP H09 100739 A (MIKUNI KOGYO KK) 15 April 1997 (1997-04-15) abstract; figures -----	1,2
A	DE 10 2004 029925 A1 (AISAN IND [JP]) 27 January 2005 (2005-01-27) paragraphs [0087] - [0089]; figures 8A,8B -----	1,2
A	EP 0 854 561 A2 (MIKUNI KOGYO KK [JP]) 22 July 1998 (1998-07-22) column 8, lines 33-47; figure 14 ----- -/-	1,2
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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