(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 261 168 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.10.2023 Bulletin 2023/42

(21) Application number: **23167353.4**

(22) Date of filing: **11.04.2023**

(51) International Patent Classification (IPC):
B65H 54/74 *(2006.01)* ***B65H 54/88*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B65H 54/88; B65H 54/74; B65H 2701/31

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **15.04.2022 CN 202220881803 U**

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(54) AN AUXILIARY DEVICE FOR ASSISTING IN BOBBIN CHANGE

(57) Auxiliary device (1) for assisting bobbin change, comprising a cutting mechanism (13), a suction mechanism (14) and a negative pressure generator, wherein, the suction mechanism (14) is provided in a rotatable manner driven by a drive (21), and the suction mechanism (14) has a suction tube (11) for gas passage, wherein, the suction tube (11) has a vertical portion (9) and a transversal portion (8) at an angle to the vertical portion (9), and the drive (21) is of inner rotor type, the vertical portion (9) is arranged on an inner rotor (12) of the drive. In this technical solution, the rotation of the vertical portion (9) is achieved without use of gearing. The vertical portion (9) is mounted directly on the rotor (12) and moves with rotor rotation. At the same time, the vertical portion (9) of the suction tube can still be used to pass through a negative airflow in order to achieve suction of yarn ends produced during doffing.

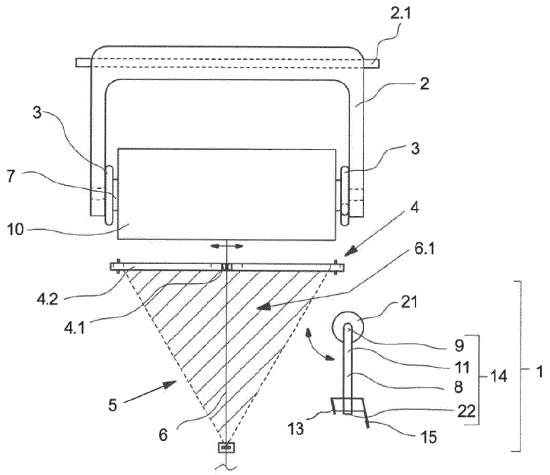

Figure 1

EP 4 261 168 A1

Description

Technical field

[0001] This utility model relates to an auxiliary device, in particular, an auxiliary device for assisting bobbin change.

Background Technology

[0002] The applicant has described a similar auxiliary device for assisting bobbin change in the published patent document CN108861865B. From process point of view, the prior art auxiliary device serves the same purpose as the auxiliary device at present patent, both of which are to cut full bobbin from the continuously supplied yarn and to hang the yarn onto an empty tube after the full bobbin is replaced with an empty tube.

[0003] The structure disclosed in patent CN 108861865B is called as "front suction structure" because the suction nozzle is located in front of the friction roller (here, the nozzle is located on the side of the friction roller near the operating space). A rotatable auxiliary device moves back and forth between the two positions to achieve the aforementioned yarn cutting and yarn hanging action. In order to achieve rotation of the auxiliary device, gears are provided on a vertical portion of the suction tube and engage with gears of an output shaft of a stepper motor.

[0004] It is further known from the above prior art disclosure that the auxiliary device is placed close to the winding device and is in one-to-one relationship with the winding device. As the number of winding devices increases, the space occupied by each winding device per unit area decreases. The result is that there is higher demand on simplicity of internal structure of the auxiliary device.

Contents of the utility model

[0005] In order to improve structure of prior art, with purpose of optimizing the structure of the auxiliary device, the utility model proposes an auxiliary device for assisting bobbin change that is improved on basis of prior art.

[0006] According to a first technical scheme, an auxiliary device for assisting bobbin change includes a cutting mechanism for cutting yarn, a suction mechanism for suction of cut yarn and a negative pressure generator for generating a suction effect, wherein, the suction mechanism is set in a rotatable manner driven by a drive and the suction mechanism has a suction tube for gas passage, the suction tube has a vertical portion and a transversal portion at an angle to the vertical portion, the drive being of the inner rotor type, the vertical portion being arranged on an inner rotor of the drive.

[0007] In the prior art listed above, rotation of the vertical portion is achieved by means of a gear drive, and the suction tube is set apart from a rotating shaft of the drive. In this technical solution, the rotation of the vertical portion is achieved without the use of gearing. The vertical portion is mounted directly on the rotor and moves with rotor rotation. At the same time, the vertical portion of the suction tube can still be used to pass through a negative airflow in order to achieve suction of yarn ends produced during bobbin change.

[0008] According to a second technical scheme, the vertical portion is coaxial with the drive rotor.

[0009] The coaxial setting ensures that the rotor rotates at an angle equal to the rotation angle of the auxiliary device. Given that the rotation angle is pre-set, the drive can be precisely controlled.

[0010] According to a third technical scheme, the vertical portion is arranged inside a hollow tube of the drive rotor.

[0011] The hollow tube is mounted between the vertical portion and the drive rotor, facilitating the disassembly of the suction tube with the vertical portion. Particularly for maintenance, only the vertical portion needs to be removed from the hollow tube.

[0012] Further, according to the fourth technical scheme, the suction mechanism rotates by taking the vertical portion as axis of rotation.

[0013] In order to further optimize the internal structure of the auxiliary device, according to the fifth technical solution, the negative pressure generator is located below the drive.

[0014] Further, according to the sixth technical scheme, the negative pressure generator comprises a compressed air inlet, a compressed air duct, and a negative pressure duct.

[0015] In order to rationalize the arrangement, according to the seventh technical scheme, the compressed air duct is provided transversely to the negative pressure duct.

[0016] According to an eighth technical scheme, the vertical portion of the suction tube passes through the drive and a part of the vertical portion is inserted into an upper end of the negative pressure duct.

[0017] According to a ninth technical scheme, the vertical portion inserted into the negative pressure duct is spaced at a decreasing distance from the negative pressure duct in the direction of air flow.

[0018] As separation distance decreases, high-pressure and high-velocity compressed air flows faster through this area, promoting a vacuum effect at the lower end of the vertical portion.

Description of figures

[0019]

Figure 1 is top view of a winding device;

Figure 2 is a cross-sectional view of the structure of the auxiliary device.

Modes for carrying out the utility model

[0020] Figure 1 shows a top view of a winding device. A winding device comprises a yarn entry side 5, an auxiliary device 1, a reciprocating guide 4, a friction roller not shown and a cradle 2. The yarn entry side 5 is the side where yarn 6 enters into the winding device. The cradle 2 has at one end a pair of clamping discs 3 for holding a winding tube 7 and at the other end a rotation axis 2.1. The cradle 2 can be rotated around the rotation axis 2.1 so that the clamped winding tube 7 can move against or away from the friction roller not shown. The reciprocating guide 4 has a yarn guide 4.1, a guide belt 4.2 and a drive motor not shown. The drive motor, not shown, drives the guide belt 4.2 and moves the guide belt 4.2 in alternating directions by alternately changing its own direction of rotation. The yarn guide 4.1 is fixed to the guide belt 4.2, so that the yarn guide 4.1 is able to move with the guide belt 4.2 in an alternating direction, i.e. reciprocating axially along the winding tube 7. The fiction roller which is directly driven by a drive source not shown is in contact with the winding tube 7 so as to drive the winding tube 7 to rotate by contact friction. The yarn guide 4.1 is located at upstream side of the friction roller, and the auxiliary device 1 is located at upstream side of the yarn guide 4.1. The yarn guide 4.1 and the auxiliary device 1 are both located on the same side of the friction roller, i.e. at the downstream side. During normal winding, the yarn 6 passes through the yarn entry side 5 and is guided by the yarn guide 4.1 in a reciprocal movement in the axial direction of the winding tube 7, after which it enters into the contact position between the winding tube 7 and the friction roller and is finally wound on the winding tube 7 to form a bobbin 10. The trajectory of the yarn 6, confined by the yarn guide 4.1, is a triangular area 6.1.

[0021] As further shown in figure 1, the auxiliary device 1 comprises a suction mechanism 14, a guiding mechanism 15, a cutting mechanism 13 and a drive 21. The suction mechanism 14 is constituted as a suction tube 11. For suction of yarn, the suction tube 11 includes a transversal portion 8 and a vertical portion 9. One end of the vertical portion 9 is connected to a negative pressure source not shown, whereas one end of the transversal portion 8 is an open end 22 for suction of the yarn. When the negative pressure source is connected to the suction tube 11, a suction effect is generated at the open end 22 of the suction tube 11. The yarn 6 can be sucked by the open end 22 when the cut yarn end is located near the open end 22, in such a way that the yarn 6 can be held at the open end 22 with a certain tension. The guiding mechanism 15 comprises a capturing element. The capturing element can hold the yarn 6 drawn by the open end 22 in conjunction with the open end 22 of the suction tube 11, by which this held yarn is delivered to an area near the clamping disk 3 at an angle where it can be easily hooked by a hook element of the clamping disk 3. In order to cut the yarn 6, the cutting mechanism 13 comprises a cutting element. The cutting element is preferably a cutting knife with a knife edge. The knife edge is set in such a way that it faces the yarn when cutting the yarn, i.e., the knife edge is oriented in substantially the same direction as the opening of the open end 22.

[0022] Figure 2 shows a cross-sectional view of the structure of the auxiliary device. The suction tube 11 has a curved "L" shape consisting of the transversal portion 8 and the vertical portion 9. The open end 22 is provided at the end of the transversal portion 8. The transversal portion 8 is rotatable in the direction of the arrow in figure 1, with the vertical portion 9 as the axis of rotation. Lower end 17 of the vertical portion 9 is inserted into a negative pressure generator. The negative pressure generator uses the principle of negative pressure generation to generate negative pressure in the suction tube 11, so that the yarn end can be drawn into the suction tube 11.

[0023] The negative pressure generator comprises a compressed air inlet 23 connected to a compressed air source not shown, a compressed air duct 24, and a negative pressure duct 19. The compressed air inlet 23 is communicated with the compressed air duct 24, the compressed air duct 24 being provided transversely to the negative pressure duct 19. The negative pressure duct 19 leads to a waste yarn box, where, for example, waste yarn can be collected. A narrow space 18 is formed between the lower part 17 of the vertical portion 9 and the inner wall of the negative pressure duct 19. The compressed air enters the narrow space 18 and goes downwards into the negative pressure duct 19, thus creating a vacuum effect at position of the lower part 17. In particular, the distance between the outer surface of the lower end 17 and the inner surface of the negative pressure duct 19 decreases along the direction of air flow, which in this embodiment is shown by reference sign 20 as facing downwards along the negative pressure duct 19.

[0024] Above the negative pressure generator, a drive 21 is provided, which is an internal rotor type motor. The vertical portion 9 of the suction tube 11 is arranged to be through the drive 21. Specifically, the vertical portion 9 is fixedly set on the rotor 12 of the drive 21. The central axis of the rotor 12 coincides with the axis of rotation of the vertical portion 9 so that rotation of the drive 21 directly produces rotation of the vertical portion 9, i.e. rotation of the auxiliary device as a whole.

[0025] Further, the rotor 12 is provided with a hollow tube 16, the hollow tube 16 being wrapped around the outer side of the vertical portion 9. The rotor 12 is fixedly connected to the hollow tube 16, and the hollow tube 16 is connected to the vertical portion 9 in a removable manner.

[0026] From the perspective of structural complexity, compared to the prior art which is mounting a gear on the rotating shaft of the drive, whose gears mesh with the gears of the vertical portion to achieve transmission, the internal structure of the auxiliary device in this patent is simplified.

Claims

1. An auxiliary device for assisting bobbin change, comprising a cutting mechanism for cutting the yarn, a suction mechanism for suctioning the cut yarn and a negative pressure generator for generating a suction effect, wherein, the suction mechanism is provided in a rotatable manner driven by a drive and the suction mechanism has a suction tube for passage of gas, the suction tube having a vertical portion and a transversal portion at an angle to the vertical portion, **characterized in that**,

   the drive is inner rotor type,
   the vertical portion is arranged on an inner rotor of the drive.

2. The auxiliary device as claimed in claim 1, **characterized in that**,
   the vertical portion is co-axial with a rotor of the drive.

3. The auxiliary device as claimed in claim 1, **characterized in that**,
   the vertical portion is arranged inside a hollow tube of the rotor of the drive.

4. The auxiliary device as claimed in claim 1, **characterized in that**,
   the suction mechanism rotates by taking the vertical portion as axis of rotation.

5. The auxiliary device as claimed in claim 2 or 3 or 4, **characterized in that**,
   the negative pressure generator is located below the drive.

6. The auxiliary device as claimed in claim 5, **characterized in that**,
   the negative pressure generator comprises a compressed air inlet, a compressed air duct, and a negative pressure duct.

7. The auxiliary device as claimed in claim 6, **characterized in that**,
   the compressed air duct is provided transversely to the negative pressure duct.

8. The auxiliary device as claimed in claim 7, **characterized in that**,
   the vertical portion of the suction tube passes through the drive and a part of the vertical portion is inserted in an upper end of the negative pressure duct.

9. The auxiliary device as claimed in claim 8, **characterized in that**,
   the vertical portion inserted into the negative pressure duct is spaced at a decreasing distance from the negative pressure duct in the direction of air flow.

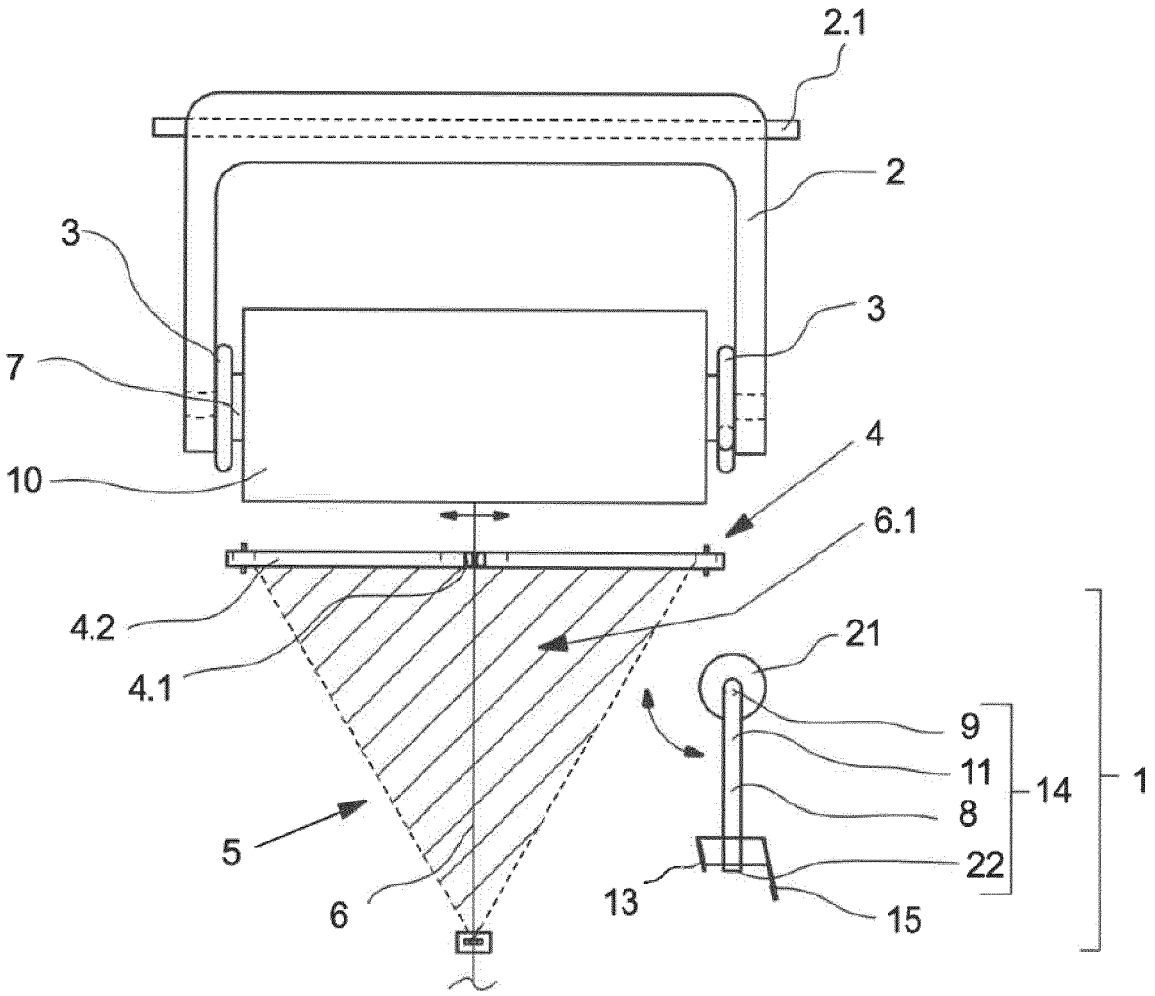

Figure 1

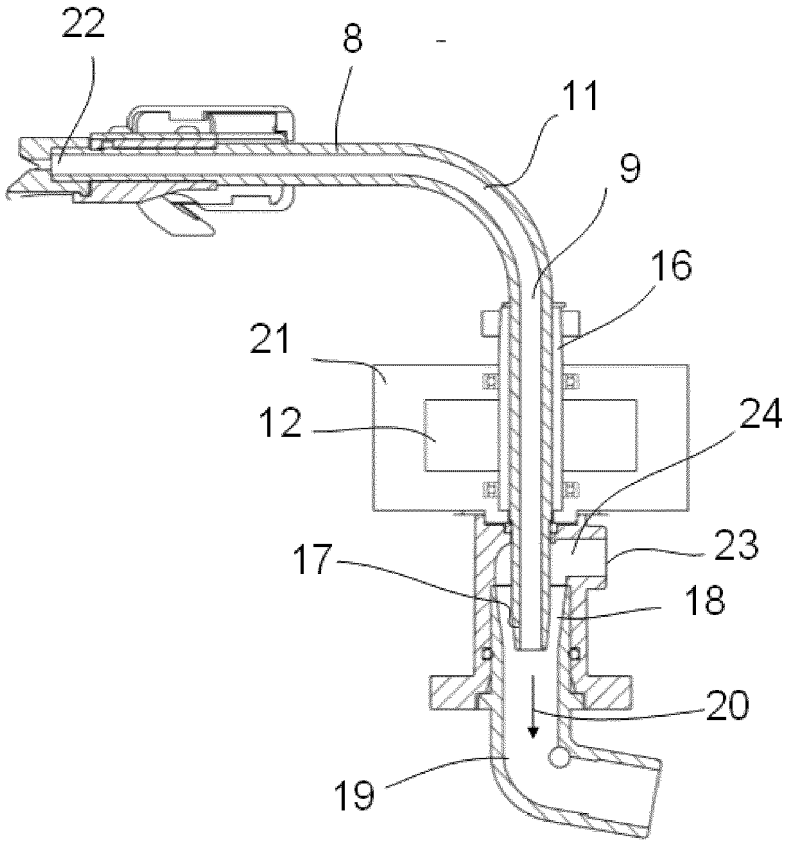

Figure 2

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EUROPEAN SEARCH REPORT

Application Number
EP 23 16 7353

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	CN 108 861 865 B (OERLIKON TEXTILE GMBH & CO KG) 9 July 2021 (2021-07-09) * abstract; figures 1, 6, 7 *	1-9	INV. B65H54/74 B65H54/88
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TECHNICAL FIELDS SEARCHED (IPC)

B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	31 August 2023	Pussemier, Bart

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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