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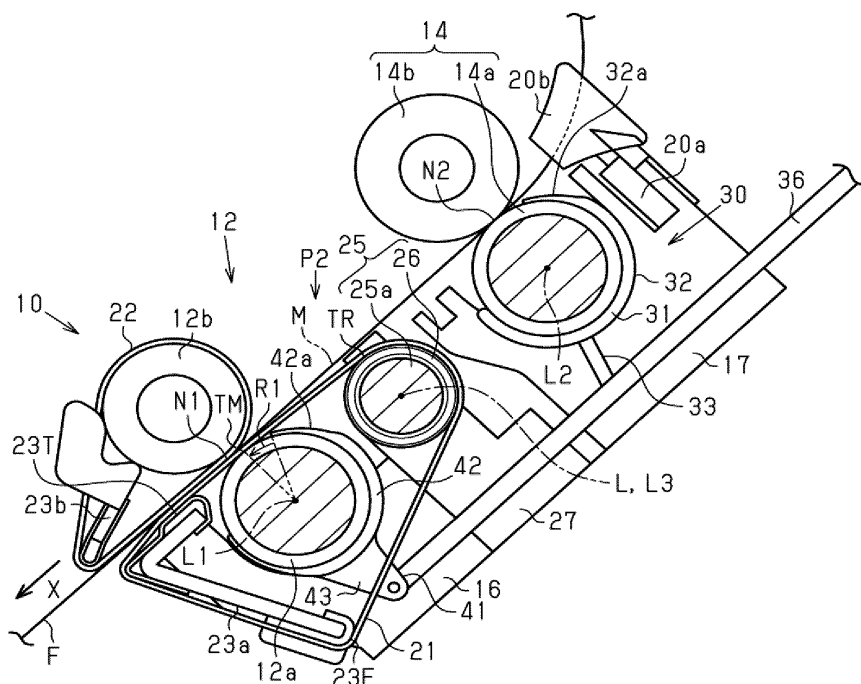
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(54) ROVING SUPPLY STOP DEVICE OF SPINNING MACHINE

(57) A spinning machine (100) includes a draft device (10) provided with a roving supply stop device (30). The draft device (10) includes: a back roller unit (14) including a back bottom roller (14a) and a back top roller (14b); and a middle roller unit (12) including a middle bottom roller (12a), a middle top roller (12b), a middle bottom apron (21), and a middle top apron (22). The roving supply stop device (30) includes a back roller engaging portion (32) having a back roller wedge portion (32a), and a

middle roller engaging portion (42) having a middle roller wedge portion (42a). The roving supply stop device (30) includes an apron guide roller (25) disposed upstream of the middle bottom roller (12a) and downstream of the back bottom roller (14a) in a traveling direction (X) of a roving (F). The middle bottom apron (21) is wound around the apron guide roller (25) at a position upstream of and away from the middle bottom roller (12a) in the traveling direction (X).

FIG. 2

Description

[0001] The present invention relates to a roving supply stop device of a spinning machine.

BACKGROUND ART

[0002] The spinning machine uses a draft device to draft a roving. The spinning machine includes a roving supply stop device that is configured to stop the supply of the roving to the draft device when a roving breakage occurs. Examples of the roving supply stop device include a roving supply stop device of a ring spinning machine disclosed in Chinese Utility Model No. 217399067.

[0003] The roving supply stop device disclosed in Chinese Utility Model No. 217399067 includes a first support plate and a second support plate disposed on a push plate of a drive assembly. The first support plate has a first arcuate wedge. The second support plate has a second arcuate wedge. The first arcuate wedge engages with the peripheral surface of a rear roller, and the second arcuate wedge engages with the peripheral surface of a middle roller.

[0004] In the ring spinning machine, the first arcuate wedge is not in contact with the roving and the second arcuate wedge is not in contact with a lower belt when the roving supply stop device is not in a roving supply stop state. Accordingly, the roving is delivered.

[0005] When the roving supply stop device needs to stop the supply of the roving due to the roving breakage, the drive assembly pulls the push plate upward. The second arcuate wedge then rotates in a counterclockwise direction relative to the middle roller to enter between the lower belt and the middle roller. The second arcuate wedge interrupts the contact of the lower belt with the middle roller. This prevents the lower belt from receiving the power from the middle roller, thereby preventing the rotation of the lower belt and therefore stopping the delivery of the roving. Also, the first arcuate wedge enters between the rear roller and the roving, which prevents the delivery of the roving. In such a way, the roving supply stop device stops the supply of the roving.

[0006] Like the roving supply stop device disclosed in Chinese Utility Model No. 217399067, it is necessary for stopping the rotation of the lower belt that the second arcuate wedge enters between the lower belt and the middle roller. However, if the second arcuate wedge deeply enters between the lower belt and the middle roller, the time required to stop the rotation of the lower belt increases. This unfavorably increases the amount of the roving delivered by the rotation of the lower belt.

[0007] The present invention, which has been made in light of the above described problem, is directed to providing a roving supply stop device that is capable of decreasing time to stop the supply of a roving.

SUMMARY

[0008] In accordance with an aspect of the present invention, there is provided a roving supply stop device of a spinning machine. The spinning machine includes a draft device provided with the roving supply stop device. The draft device includes: a back roller unit including a back bottom roller and a back top roller; and a middle roller unit including a middle bottom roller, a middle top roller, a middle bottom apron, and a middle top apron. The roving supply stop device includes a back roller engaging portion and a middle roller engaging portion. The back roller engaging portion engages with a peripheral surface of the back bottom roller, and has a back roller wedge portion that is configured to move from a roving release position to a roving holding position to enter between the back bottom roller and the back top roller so that the back roller wedge portion blocks a transmission of rotation from the back bottom roller to the back top roller. The middle roller engaging portion engages with a peripheral surface of the middle bottom roller, and has a middle roller wedge portion that is configured to move from the roving release position to the roving holding position to enter between the middle bottom roller and the middle bottom apron so that the middle roller wedge portion blocks a transmission of rotation from the middle bottom roller to the middle bottom apron. The roving supply stop device includes: an apron guide roller disposed upstream of the middle bottom roller and downstream of the back bottom roller in a traveling direction of a roving in the draft device. The middle bottom apron is wound around the apron guide roller at a position upstream of and away from the middle bottom roller in the traveling direction.

[0009] Other aspects and advantages of the invention will become apparent from the following description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The invention, together with objects and advantages thereof, may best be understood by reference to the following description of the embodiments together with the accompanying drawings in which:

FIG. 1 is a schematic side view of a draft device and a roving supply stop device according to an embodiment of the present invention;

FIG. 2 is an enlarged side view of the roving supply stop device, indicating a roving release position of the roving supply stop device;

FIG. 3 is a sectional view of an apron guide roller;

FIG. 4 is a partially perspective view of the roving supply stop device;

FIG. 5 is an enlarged side view of the roving supply stop device, indicating a roving holding position of the roving supply stop device; and

FIG. 6 is a partial side view of a roving supply stop device according to a comparative example.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0011] The following will describe an embodiment of a roving supply stop device of a spinning machine with reference to FIGS. 1 through 6.

Spinning machine

[0012] FIG. 1 illustrates a spinning machine 100 that includes a draft device 10 and a roving supply stop device 30.

Draft device

[0013] The draft device 10 includes a front roller unit 11, a middle roller unit 12, and a back roller unit 14.

[0014] The front roller unit 11 includes a front bottom roller 11a and a front top roller 11b.

[0015] The middle roller unit 12 includes a middle bottom roller 12a, a middle top roller 12b, a middle bottom apron 21, and a middle top apron 22. The middle roller unit 12 further includes a bottom guide 23a, a top guide 23b, and an apron guide roller 25. The apron guide roller 25 includes a support shaft 25a and a plurality of roller members 26, which will be described in detail later. The apron guide roller 25 also serves as a component of the roving supply stop device 30.

[0016] As illustrated in FIG. 2, the middle bottom apron 21 is wound around the bottom guide 23a and the apron guide roller 25, and comes into sliding contact with the middle bottom roller 12a. The middle top apron 22 is wound around the middle top roller 12b and the top guide 23b. A roving F is nipped by the middle roller unit 12 at a nip point N1 located between the middle bottom apron 21 and the middle top apron 22.

[0017] The back roller unit 14 includes a back bottom roller 14a and a back top roller 14b. The roving F is nipped by the back roller unit 14 at a nip point N2 located between the back bottom roller 14a and the back top roller 14b. The roving F travels from the nip point N2 of the back roller unit 14 toward the nip point N1 of the middle roller unit 12 in a straight line, which is an imaginary line M linearly connecting the nip point N2 of the back roller unit 14 and the nip point N1 of the middle roller unit 12. The imaginary line M corresponds to the roving F, and is indicated by a two dot-dash lead line in FIG. 2.

[0018] As illustrated in FIG. 1, the front bottom roller 11a is supported by a roller stand 15. The middle bottom roller 12a is rotatably supported by the roller stand 15 via a middle bottom roller support 16. The support shaft 25a of the apron guide roller 25 is supported by the roller

stand 15 via a roller support 27. The back bottom roller 14a is rotatably supported by the roller stand 15 via a back bottom roller support 17. The front bottom roller 11a, the middle bottom roller 12a, and the back bottom roller 14a are rotated by a drive source (not illustrated). The rotation of the front bottom roller 11a is transmitted to the front top roller 11b. The rotation of the middle bottom roller 12a is transmitted to the middle top roller 12b via the middle bottom apron 21 and the middle top apron 22. The rotation of the back bottom roller 14a is transmitted to the back top roller 14b.

[0019] A weighting arm 18 is rotatably supported, via a bracket 19a, by a support shaft 19 supported by the roller stand 15. Each of the front top roller 11b, the middle top roller 12b, and the back top roller 14b is supported by the weighting arm 18 via a top roller support (not illustrated).

[0020] A support bar 20a is located between the back bottom roller 14a and the bracket 19a, and extends along the back bottom roller 14a. The support bar 20a is fixed to a trumpet 20b for guiding the roving F. The roving F is supplied to the back roller unit 14, i.e., the draft device 10, via the trumpet 20b from a roving bobbin suspended by a creel (not illustrated).

Middle roller unit

[0021] The following will describe the middle roller unit 12. In the draft device 10, the roving F travels from the back roller unit 14 to the front roller unit 11 along a traveling direction X.

[0022] As illustrated in FIG. 2, the apron guide roller 25 is disposed upstream of the middle bottom roller 12a and downstream of the back bottom roller 14a in the traveling direction X of the roving F in the draft device 10.

[0023] The apron guide roller 25 is located upstream of and away from the middle bottom roller 12a in the traveling direction X of the roving F. The apron guide roller 25 is located downstream of and away from the back bottom roller 14a in the traveling direction X of the roving F. That is, the apron guide roller 25 is located between the middle bottom roller 12a and the back bottom roller 14a in the traveling direction X of the roving F.

[0024] The apron guide roller 25 has a smaller diameter than the diameters of the middle bottom roller 12a and the back bottom roller 14a. The middle bottom roller 12a and the back bottom roller 14a have the same diameter in this embodiment, but may have different diameters. A central axis L of the apron guide roller 25 is located closer to the traveling roving F than a central axis L1 of the middle bottom roller 12a and a central axis L2 of the back bottom roller 14a.

[0025] As illustrated in FIGS. 2 and 3, the apron guide roller 25 includes the support shaft 25a supported by the roller support 27, and the plurality of roller members 26 that rotate relative to the support shaft 25a. That is, the apron guide roller 25 includes the support shaft 25a and the plurality of roller members 26 rotatably supported by

the support shaft 25a.

[0026] Each of the roller members 26 is a cylindrical resin molded member and has a crowning shape. Each roller member 26 is defined by one end having a first end surface 26a and another end having a second end surface 26b in the axial direction of the roller member 26 (i.e., the direction of the central axis L3), in other words, the roller member 26 has the first end surface 26a and the second end surface 26b in the axial direction of the roller member 26. The outer diameter of the roller member 26 having a crowning shape is maximum at the center of the roller member 26 in the axial direction. Accordingly, the top of the crowning shape of the roller member 26 is located at the center of the roller member 26 in the axial direction. A roller top TR of the apron guide roller 25 is located at the center of the roller member 26 in the axial direction. The outer diameter of the roller member 26 gradually decreases from the center of the roller member 26 in the axial direction toward the first end surface 26a, and the second end surface 26b.

[0027] The inner diameter of the roller member 26 increases from the first end surface 26a toward the second end surface 26b. The roller member 26 is formed into a cylindrical shape by extracting a jig (not illustrated) from the roller member 26. This forms a draft angle in the roller member 26, thereby increasing the diameter of the roller member 26.

[0028] The roller member 26 having the inner diameter and the outer diameter, and the thickness of the roller member 26 at the first end surface 26a is the same as the thickness of the roller member 26 at the second end surface 26b. Accordingly, the curvature of the roller member 26 from the center to the one end of the roller member 26 is different from the curvature of the roller member 26 from the center to the other end of the roller member 26. In other words, the thickness of the roller member 26 at the first end surface 26a is the same as the thickness of the roller member 26 at the second end surface 26b, and the curvature of a portion of the roller member 26 from the center of the roller member 26 in the axial direction to the first end surface 26a is different from the curvature of a portion of the roller member 26 from the center to the second end surface 26b such that the top of the crowning shape of the roller member 26 is located at the center of the roller member 26 in the axial direction. The inner diameter of the roller member 26 increases toward the second end surface 26b, so that the curvature of the portion of the roller member 26 from the center to the second end surface 26b is smaller than that of the portion of the roller member 26 from the center to the first end surface 26a.

[0029] As illustrated in FIGS. 2 and 4, the middle bottom apron 21 is wound around the bottom guide 23a and the roller member 26 of the apron guide roller 25 with the middle bottom roller 12a disposed between the bottom guide 23a and the roller member 26. The bottom guide 23a is configured to guide the middle bottom apron 21 so that the middle bottom apron 21 is wound around the

apron guide roller 25 with the middle bottom roller 12a disposed between the bottom guide 23a and the apron guide roller 25. Specifically, the bottom guide 23a has a portion extending diagonally to the traveling direction X, and the dimension of the portion extending diagonally to the traveling direction X is greater than the diameter of the middle bottom roller 12a. More specifically, an upper end 23T of the bottom guide 23a is located adjacent to the imaginary line M, and a lower end 23E of the bottom guide 23a is located under the lower end of the middle bottom roller 12a. Accordingly, the bottom guide 23a causes the middle bottom apron 21 to surround the bottom guide 23a in the vertical direction and be wound around the apron guide roller 25. The bottom guide 23a allows the tension of the middle bottom apron 21 to be adjusted. The middle bottom apron 21 is wound around the apron guide roller 25 at a position upstream of and away from the middle bottom roller 12a in the traveling direction X.

[0030] As illustrated in FIG. 3, the middle bottom apron 21 is wound around the crowned roller member 26 such that the center of the middle bottom apron 21 in the width direction of the middle bottom apron 21 is located at the roller top TR of the apron guide roller 25.

[0031] As illustrated in FIGS. 2 and 4, the upper end of the middle bottom roller 12a, which is a top TM, comes into sliding contact along a line with the inner peripheral surface of the middle bottom apron 21. Accordingly, the middle bottom apron 21 does not extend in an arc shape along the peripheral surface of the middle bottom roller 12a. That is, the apron guide roller 25 is disposed such that the middle bottom apron 21 does not extend along the peripheral surface of the middle bottom roller 12a.

[0032] The roller top TR of the roller member 26 of the apron guide roller 25 is located below the imaginary line M. Accordingly, the middle bottom apron 21 wound around the apron guide roller 25 and the bottom guide 23a comes into sliding contact with the top TM of the middle bottom roller 12a.

Roving supply stop device

[0033] As illustrated in FIGS. 1 and 2, the draft device 10 is provided with the roving supply stop device 30 that includes a back roller stop member 31, a middle roller stop member 41, the apron guide roller 25, a driving force transmission member 36, and a switching device 37.

[0034] The back roller stop member 31 has a back roller engaging portion 32 curved in an arc shape, and a connecting portion 33 extending in a plate shape from the back roller engaging portion 32. The back roller stop member 31 does not rotate together with the back bottom roller 14a.

[0035] The back roller engaging portion 32 engages with and partially covers the peripheral surface of the back bottom roller 14a. The arc-shaped back roller engaging portion 32 has opposite ends, and one of the opposite ends distant from the apron guide roller 25 serves

as a back roller wedge portion 32a. The back roller wedge portion 32a is configured to enter between the back bottom roller 14a and the back top roller 14b. The back roller wedge portion 32a is a thinnest portion of the back roller engaging portion 32, and the thickness of the back roller wedge portion 32a decreases toward its distal end. This shape allows the back roller wedge portion 32a to easily enter between the back bottom roller 14a and the back top roller 14b.

[0036] The middle roller stop member 41 has a middle roller engaging portion 42 curved in an arc shape, and a connecting portion 43 extending from the middle roller engaging portion 42. The middle roller stop member 41 does not rotate together with the middle bottom roller 12a. The middle roller engaging portion 42 engages with and partially covers the peripheral surface of the middle bottom roller 12a. The arc-shaped middle roller engaging portion 42 has opposite ends, and one of the opposite ends adjacent to the apron guide roller 25 serves as a middle roller wedge portion 42a. The middle roller wedge portion 42a is configured to enter between the middle bottom roller 12a and the middle bottom apron 21. The middle roller wedge portion 42a is a thinnest portion of the middle roller engaging portion 42, and the thickness of the middle roller wedge portion 42a decreases toward its distal end. This shape allows the middle roller wedge portion 42a to easily enter between the middle bottom roller 12a and the middle bottom apron 21.

[0037] A part of the middle roller engaging portion 42 including the middle roller wedge portion 42a is disposed between the middle bottom roller 12a and the roller member 26 of the apron guide roller 25.

[0038] The connecting portion 33 of the back roller stop member 31 and the connecting portion 43 of the middle roller stop member 41 are swingably connected to the driving force transmission member 36. The driving force transmission member 36 transmits a driving force of the switching device 37 to the back roller stop member 31 and the middle roller stop member 41.

[0039] The driving force transmission member 36 has a long plate shape and extends in the traveling direction X of the roving F. The connecting portion 43 of the middle roller stop member 41 is connected to the distal end of the driving force transmission member 36, and the connecting portion 33 of the back roller stop member 31 is connected to the driving force transmission member 36 at a position between the middle roller stop member 41 and the proximal end of the driving force transmission member 36. The switching device 37 is connected to the proximal end of the driving force transmission member 36. The switching device 37 is, for example, an air cylinder. The switching device 37 is electrically connected to a roving breakage sensor and a control device (not illustrated). When the roving breakage sensor detects a roving breakage of the roving F, the roving breakage sensor outputs a detection signal to the control device.

[0040] The control device controls the switching device 37 based on a detection signal from the roving breakage

sensor. The control device drives the switching device 37 to move the driving force transmission member 36 upon receiving the detection signal from the roving breakage sensor. When the driving force transmission member 36 drives the switching device 37 upon receiving the detection signal from the roving breakage sensor, the driving force transmission member 36 is located at a roving holding position P1 as illustrated in FIG. 5. The positions of the back roller stop member 31 and the middle roller stop member 41 when the driving force transmission member 36 is located at the roving holding position P1 are also defined as the roving holding position P1.

[0041] The control device does not drive the switching device 37 unless the control device receives a detection signal from the roving breakage sensor. The driving force transmission member 36 is located at a roving release position P2 as illustrated in FIG. 2 when the switching device 37 is not driven. The positions of the back roller stop member 31 and the middle roller stop member 41 when the driving force transmission member 36 is located at the roving release position P2 are also defined as the roving release position P2. The configurations of the driving force transmission member 36 and the switching device 37 are not particularly limited to the configuration according to the present embodiment. That is, the configurations of the driving force transmission member 36 and the switching device 37 may be modified as appropriate, as long as the positions of the back roller stop member 31 and the middle roller stop member 41 may be switched between the roving holding position P1 and the roving release position P2 based on the detection signal of the roving breakage sensor.

Roving release position

[0042] As illustrated in FIG. 2, the back roller wedge portion 32a of the back roller engaging portion 32 does not enter between the back bottom roller 14a and the back top roller 14b when the back roller stop member 31 is located at the roving release position P2. At the roving release position P2, the back roller wedge portion 32a is not in contact with the roving F.

[0043] Further, the middle roller wedge portion 42a of the middle roller engaging portion 42 does not enter between the middle bottom roller 12a and the middle bottom apron 21 when the middle roller stop member 41 is located at the roving release position P2. At the roving release position P2, the middle roller wedge portion 42a is not in contact with the middle bottom apron 21.

[0044] The distal end of the middle roller wedge portion 42a is located slightly away from the nip point N1 of the middle roller unit 12 in the reverse rotation direction of the middle bottom roller 12a. Specifically, the distal end of the middle roller wedge portion 42a is located adjacent to the top TM of the middle bottom apron 21. The top TM of the middle bottom apron 21 forms the nip point N1 of the middle roller unit 12. That is, the distal end of the middle roller wedge portion 42a is located adjacent to

the nip point N1 of the middle roller unit 12. The distal end of the middle roller wedge portion 42a is located directly under the inner peripheral surface of the middle bottom apron 21 without contact with the inner peripheral surface of the middle bottom apron 21. Specifically, the distal end of the middle roller wedge portion 42a is located directly below the imaginary line M.

Roving holding position

[0045] As illustrated in FIG. 5, the back roller wedge portion 32a of the back roller engaging portion 32 enters between the back bottom roller 14a and the back top roller 14b when the back roller stop member 31 is located at the roving holding position P1. This blocks the transmission of rotation from the back bottom roller 14a to the back top roller 14b. That is, the back roller wedge portion 32a of the back roller engaging portion 32 moves from the roving release position P2 to the roving holding position P1 to enter between the back bottom roller 14a and the back top roller 14b so that the back roller wedge portion 32a blocks the transmission of rotation from the back bottom roller 14a to the back top roller 14b. At the roving holding position P1, the back roller wedge portion 32a comes into contact with the roving F. Accordingly, the back roller wedge portion 32a cooperates with the back top roller 14b to hold the roving F.

[0046] Further, the middle roller wedge portion 42a of the middle roller engaging portion 42 enters between the middle bottom roller 12a and the middle bottom apron 21 when the middle roller stop member 41 is located at the roving holding position P1. This blocks the transmission of rotation from the middle bottom roller 12a to the middle bottom apron 21. That is, the middle roller wedge portion 42a of the middle roller engaging portion 42 moves from the roving release position P2 to the roving holding position P1 to enter between the middle bottom roller 12a and the middle bottom apron 21 so that the middle roller wedge portion 42a blocks the transmission of rotation from the middle bottom roller 12a to the middle bottom apron 21. At the roving holding position P1, the middle roller wedge portion 42a comes into contact with the middle bottom apron 21. The distal end of the middle roller wedge portion 42a is located at the top TM of the middle bottom roller 12a forming the nip point N1 of the middle roller unit 12. This causes the roving F to be held between the middle top apron 22 and the middle bottom apron 21. As illustrated in FIG. 2, the travel amount of the distal end of the middle roller wedge portion 42a from the roving release position P2 to the roving holding position P1 serves as a rotation amount R1 of the middle roller engaging portion 42.

Comparative example

[0047] FIG. 6 illustrates a roving supply stop device 70 according to a comparative example located at the roving release position P2. In the comparative example, the mid-

dle bottom apron 21 is wound around the middle bottom roller 12a, the bottom guide 23a, and a tension roller 60 located under the middle bottom roller 12a. The middle bottom apron 21 extends in an arc shape along the peripheral surface of the middle bottom roller 12a.

[0048] This increases the winding amount of the middle bottom apron 21 around the middle bottom roller 12a, compared with the winding amount of the middle bottom apron 21 around the middle bottom roller 12a in the embodiment of the present invention. In other words, in the roving supply stop device 30 according to the embodiment of the present invention, the presence of the apron guide roller 25 decreases the winding amount of the middle bottom apron 21 around the middle bottom roller 12a.

[0049] The middle roller wedge portion 42a is not in contact with the middle bottom apron 21 when the middle roller stop member 41 is located at the roving release position P2, so that the middle roller wedge portion 42a is located away from the middle bottom apron 21. Specifically, the middle roller wedge portion 42a is located away from the middle bottom apron 21 in the reverse rotation direction of the middle bottom roller 12a.

[0050] In the comparative example, although not illustrated, the middle roller wedge portion 42a enters between the middle bottom roller 12a and the middle bottom apron 21, and reaches the top TM of the middle bottom roller 12a forming the nip point N1 when the middle roller stop member 41 is at the roving holding position P1. In the comparative example, the travel amount of the distal end of the middle roller wedge portion 42a from the roving release position P2 to the roving holding position P1 serves as a rotation amount R2 of the middle roller engaging portion 42. Since the middle bottom apron 21 is wound around the middle bottom roller 12a in the comparative example, the rotation amount R2 of the comparative example is greater than the rotation amount R1 of the embodiment of the present invention. In other words, in the roving supply stop device 30 according to the embodiment of the present invention, the presence of the apron guide roller 25 decreases the rotation amount R1 of the middle roller engaging portion 42.

Operation of embodiment

[0051] The following will describe the operation of the embodiment of the present invention.

[0052] As illustrated in FIG. 2, in a non-roving breakage state, the back roller stop member 31 and the middle roller stop member 41 are held at the roving release position P2 by the driving force transmission member 36 and the switching device 37. The non-roving breakage state means: a state where the roving F is detected by the roving breakage sensor when the roving F is being supplied to the draft device 10 through the trumpet 20b and spinning has started; and a state where the roving F has not been supplied to the draft device 10 yet and spinning has not been started yet. In a state where spinning has not started yet, the control device does not de-

termine that a roving breakage has occurred even if the roving F is not detected by the roving breakage sensor, and does not drive the switching device 37 to move the driving force transmission member 36 to the roving holding position P1.

[0053] When the spinning machine 100 operates, the roving F is guided by the trumpet 20b to the back roller unit 14 from the roving bobbin suspended by the creel. The roving F guided to the back roller unit 14 is drafted while traveling from the nip point N2 of the back roller unit 14 to the nip point N1 of the middle roller unit 12. The roving F is further drafted so as to become a fleece while traveling from the middle roller unit 12 to the front roller unit 11. The fleece, as a yarn, is wound on a bobbin via a snail wire and a traveler (not illustrated).

[0054] When a roving breakage occurs, the control device drives the switching device 37 based on a detection signal from the roving breakage sensor. The switching device 37 moves the driving force transmission member 36 to cause the back roller stop member 31 and the middle roller stop member 41 to swing from the roving release position P2 toward the roving holding position P1.

[0055] Accordingly, the back roller wedge portion 32a enters between the back top roller 14b and the back bottom roller 14a, as illustrated in FIG. 5, to block the transmission of rotation from the back bottom roller 14a to the back top roller 14b. This stops the delivery of the roving F.

[0056] Also, the middle roller wedge portion 42a enters between the middle bottom apron 21 and the middle bottom roller 12a to block the transmission of rotation from the middle bottom roller 12a to the middle bottom apron 21. This stops the rotation of the middle bottom apron 21.

[0057] Accordingly, the roving F, which is being pulled by the draft device 10 driven, is cut at a position between the back roller unit 14 and the middle roller unit 12. The back roller stop member 31 blocks the transmission of rotation from the back bottom roller 14a to the back top roller 14b even if the draft device 10 is still driven. This therefore stops the supply of the roving F to the draft device 10.

[0058] The present embodiment obtains the following effects.

(1) The presence of the apron guide roller 25 decreases the winding amount of the middle bottom apron 21 around the middle bottom roller 12a and the rotation amount R1 of the middle roller engaging portion 42. This decreases the time required to rotate the middle roller engaging portion 42 to stop the supply of the roving F. This therefore decreases the amount of the roving F that is fed by the draft device 10 while the middle roller engaging portion 42 rotates as the middle roller stop member 41 swings from the roving release position P2 toward the roving holding position P1, in other words, this therefore decreases the amount of the roving F fed by the draft device 10 until the supply of the roving F is stopped.

(2) The roller member 26 of the apron guide roller 25 has a crowning shape, so that the apron guide roller 25 including the roller member 26 has the roller top TR. This allows the middle bottom apron 21 to be wound around the crowned roller member 26 with the middle bottom apron 21 aligned with the roller member 26, thereby suppressing a lateral displacement of the middle bottom apron 21.

(3) The roller member 26 is a cylindrical resin molded member, and a draft angle of the roller member 26 is formed when the roller member 26 is formed. The presence of the draft angle allows the roller member 26 to easily move along the support shaft 25a. Furthermore, the support shaft 25a of the apron guide roller 25 supports the plurality of roller members 26, and each of the roller members 26 is provided with the middle bottom apron 21 that is wound around the roller member 26. This is likely to cause bending of the support shaft 25a.

[0059] The roller member 26 has a crowning shape, and is asymmetrical by having different curvatures on opposite sides in the axial direction so that the one end and the other end defining the roller member 26 in the axial direction have the same thickness. This shape suppresses the lateral displacement of the roller member 26 caused by the draft angle of the roller member 26 or the bending of the support shaft 25a.

[0060] This crowning and asymmetrical shape therefore eliminates the need for machining of the roller member 26 for removing the draft angle or an increase in the roller member 26 in length in the axial direction to bring the roller members 26 into contact with each other so as to suppress the lateral displacement of the roller member 26. This shape also eliminates the need for a special consideration, such as offsetting the draft angle of the roller member 26 by the bending of the support shaft 25a during assembling of the roller member 26 to the support shaft 25a.

[0061] (4) The apron guide roller 25 is arranged so that the middle bottom apron 21 partially travels under the imaginary line M connecting the nip point N1 of the middle roller unit 12 and the nip point N2 of the back roller unit 14. This eliminates a possibility that a path of the roving F is significantly changed by the presence of the apron guide roller 25, even if the apron guide roller 25 is disposed between the middle roller unit 12 and the back roller unit 14.

[0062] The embodiment of the present invention may be modified in various manners, as exemplified below. The present embodiment and the following modification examples may be combined within the scope of the present invention.

◦ According to the present embodiment, the apron guide roller 25 is arranged so that the middle bottom apron 21 partially travels under the imaginary line M.

However, the apron guide roller 25 may be arranged so that the middle bottom apron 21 partially travels along the imaginary line M. That is, the apron guide roller 25 may be arranged so that the middle bottom apron 21 partially travels under or along the imaginary line M connecting the nip point N1 of the middle roller unit 12 and the nip point N2 of the back roller unit 14. Furthermore, the apron guide roller 25 may be arranged so that the middle bottom apron 21 partially travels above the imaginary line M.

◦ The thickness of the roller member 26 having a crowning shape may be different between the one and the other end of the roller member 26 in the axial direction. In this configuration, the roller member 26 may have the same curvatures on opposite sides in the axial direction.

◦ The roller member 26 may not have a crowning shape. The roller member 26 may have a constant outer diameter in the axial direction.

◦ The roller member 26 may be made of metal.

A spinning machine (100) includes a draft device (10) provided with a roving supply stop device (30). The draft device (10) includes: a back roller unit (14) including a back bottom roller (14a) and a back top roller (14b); and a middle roller unit (12) including a middle bottom roller (12a), a middle top roller (12b), a middle bottom apron (21), and a middle top apron (22). The roving supply stop device (30) includes a back roller engaging portion (32) having a back roller wedge portion (32a), and a middle roller engaging portion (42) having a middle roller wedge portion (42a). The roving supply stop device (30) includes an apron guide roller (25) disposed upstream of the middle bottom roller (12a) and downstream of the back bottom roller (14a) in a traveling direction (X) of a roving (F). The middle bottom apron (21) is wound around the apron guide roller (25) at a position upstream of and away from the middle bottom roller (12a) in the traveling direction (X).

Claims

1. A roving supply stop device (30) of a spinning machine (100), the spinning machine (100) including a draft device (10) provided with the roving supply stop device (30), the draft device (10) including: a back roller unit (14) including a back bottom roller (14a) and a back top roller (14b); and a middle roller unit (12) including a middle bottom roller (12a), a middle top roller (12b), a middle bottom apron (21), and a middle top apron (22), the roving supply stop device (30) comprising:

a back roller engaging portion (32) engaging

with a peripheral surface of the back bottom roller (14a) and having a back roller wedge portion (32a) that is configured to move from a roving release position (P2) to a roving holding position (P1) to enter between the back bottom roller (14a) and the back top roller (14b) so that the back roller wedge portion (32a) blocks a transmission of rotation from the back bottom roller (14a) to the back top roller (14b); and a middle roller engaging portion (42) engaging with a peripheral surface of the middle bottom roller (12a) and having a middle roller wedge portion (42a) that is configured to move from the roving release position (P2) to the roving holding position (P1) to enter between the middle bottom roller (12a) and the middle bottom apron (21) so that the middle roller wedge portion (42a) blocks a transmission of rotation from the middle bottom roller (12a) to the middle bottom apron (21), **characterized in that**, the roving supply stop device (30) includes an apron guide roller (25) disposed upstream of the middle bottom roller (12a) and downstream of the back bottom roller (14a) in a traveling direction (X) of a roving (F) in the draft device (10), and the middle bottom apron (21) is wound around the apron guide roller (25) at a position upstream of and away from the middle bottom roller (12a) in the traveling direction (X).

2. The roving supply stop device (30) of the spinning machine (100) according to claim 1, **characterized in that**

the apron guide roller (25) includes a support shaft (25a) and a roller member (26) rotatably supported by the support shaft (25a), and the roller member (26) has a crowning shape.

3. The roving supply stop device (30) of the spinning machine (100) according to claim 2, **characterized in that**

the roller member (26) is a cylindrical resin molded member and has a first end surface (26a) and a second end surface (26b) in an axial direction of the roller member (26), and an inner diameter of the roller member (26) increases from the first end surface (26a) toward the second end surface (26b), and a thickness of the roller member (26) at the first end surface (26a) is the same as a thickness of the roller member (26) at the second end surface (26b), and a curvature of a portion of the roller member (26) from a center of the roller member (26) in the axial direction to the first end surface (26a) is different from a curvature of a portion of the roller member (26) from the center to the second end surface (26b) such that a top of the

crowning shape of the roller member (26) is located at the center of the roller member (26) in the axial direction.

4. The roving supply stop device (30) of the spinning machine (100) according to any one of claims 1 to 3, **characterized in that** the apron guide roller (25) is arranged so that the middle bottom apron (21) travels under or along an imaginary line (M) connecting a nip point (N1) of the middle roller unit (12) and a nip point (N2) of the back roller unit (14).

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FIG. 1

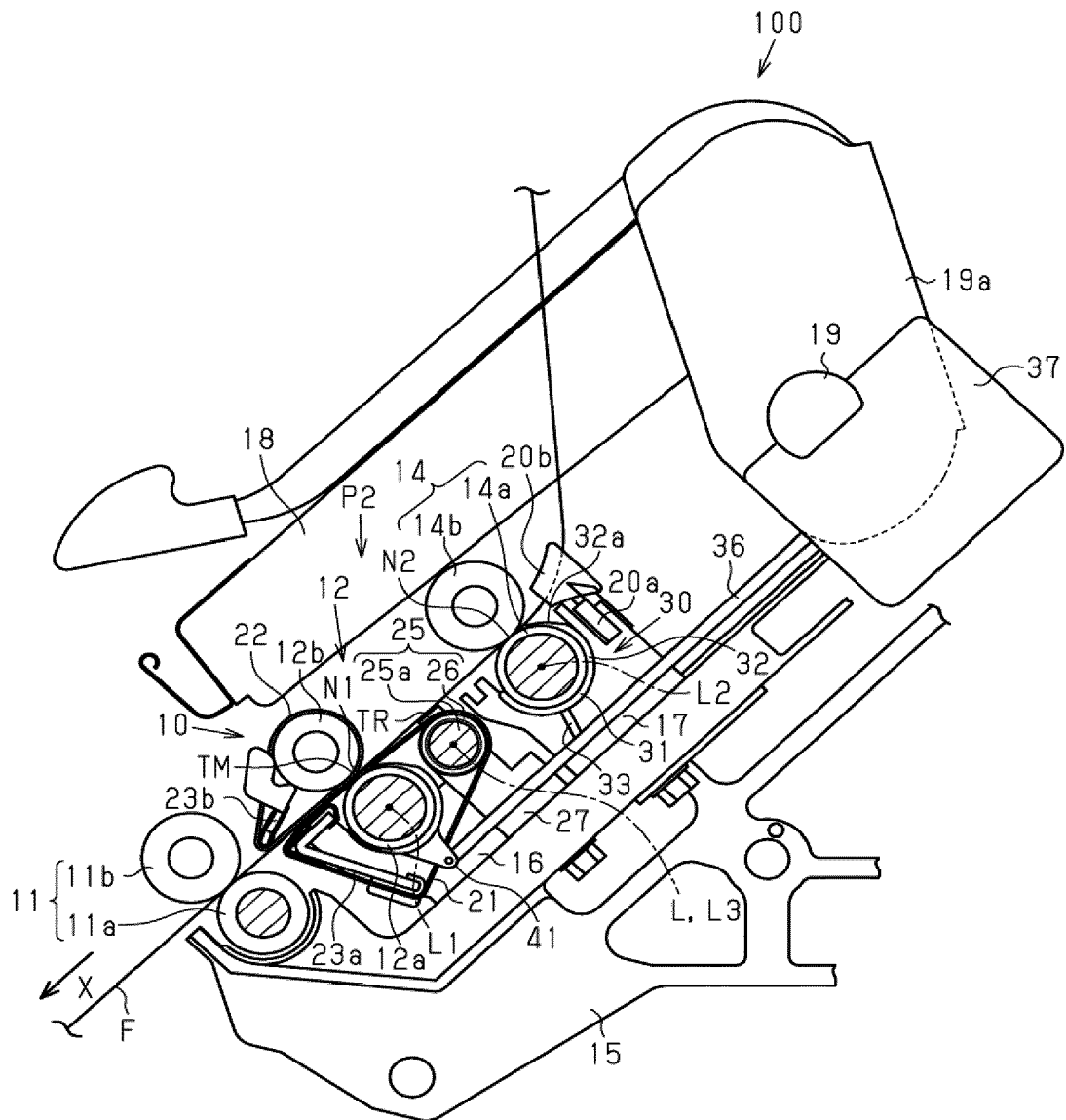


FIG. 2

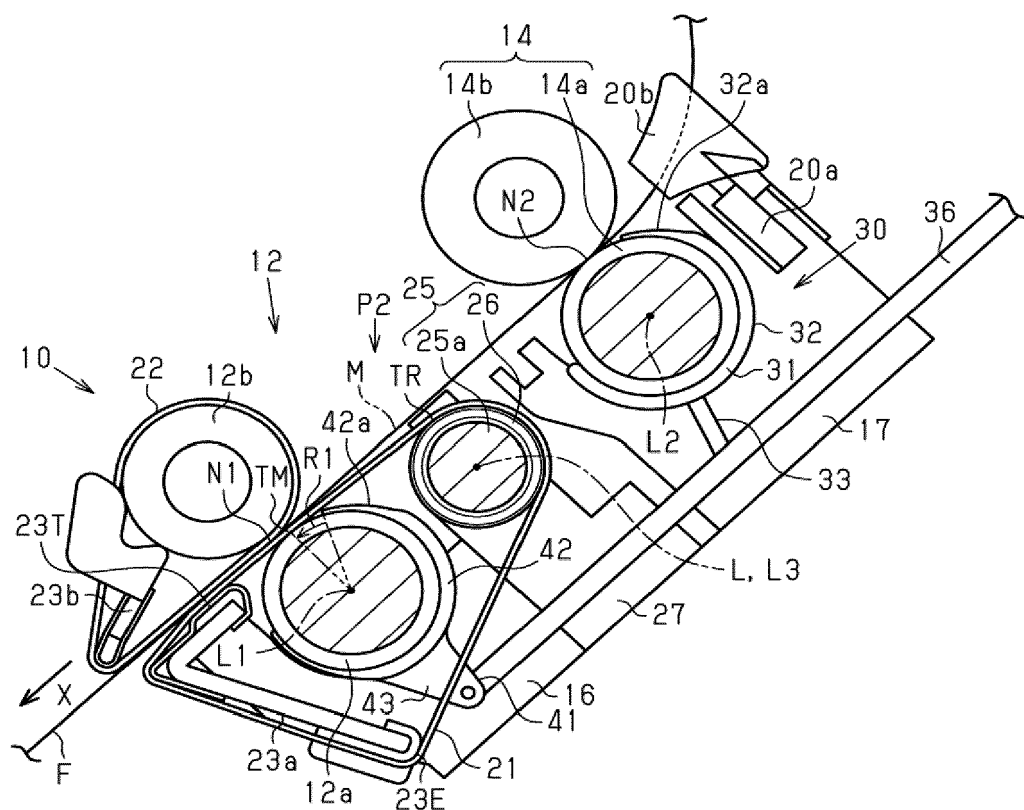


FIG. 3

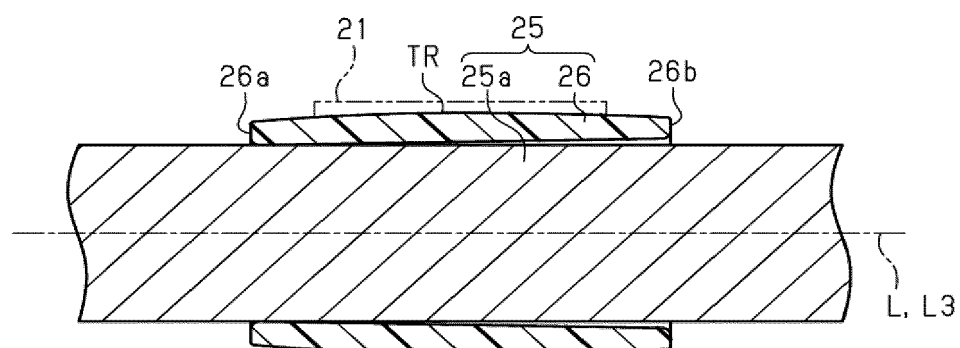


FIG. 4

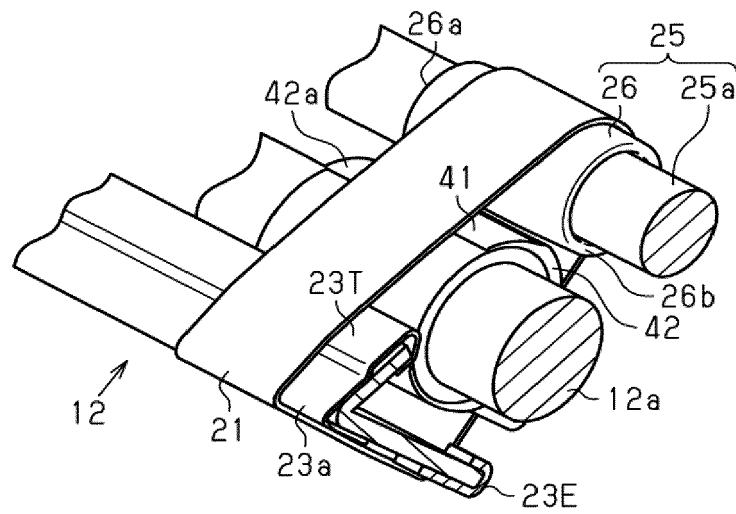


FIG. 5

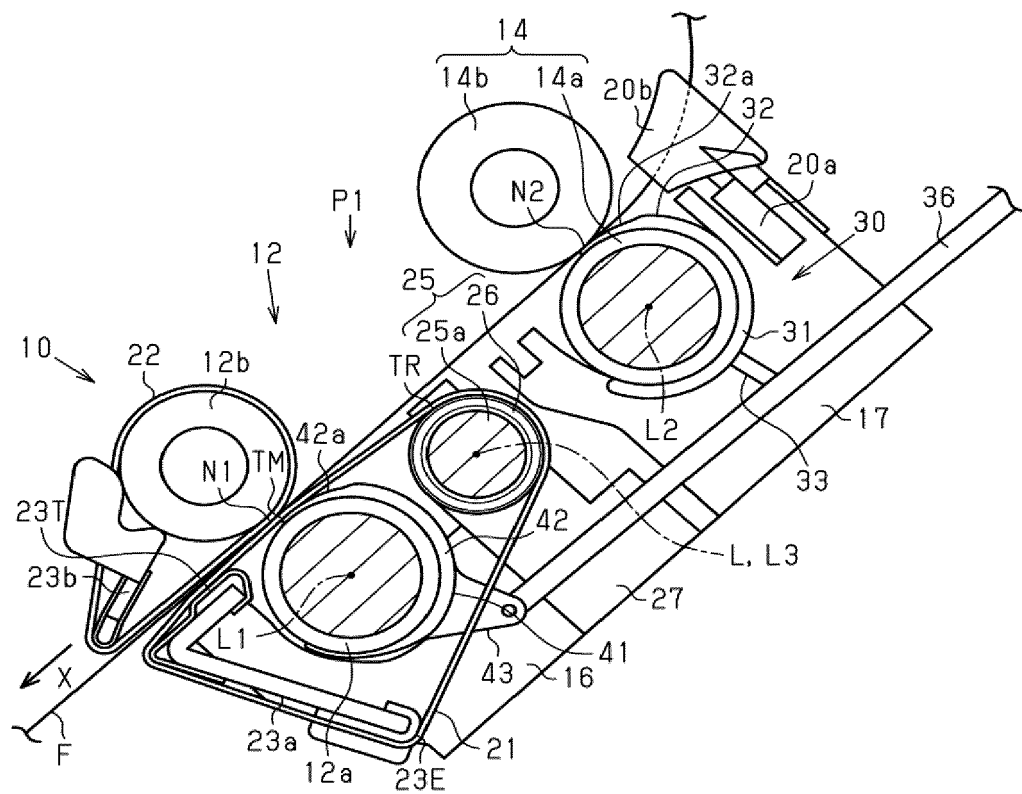
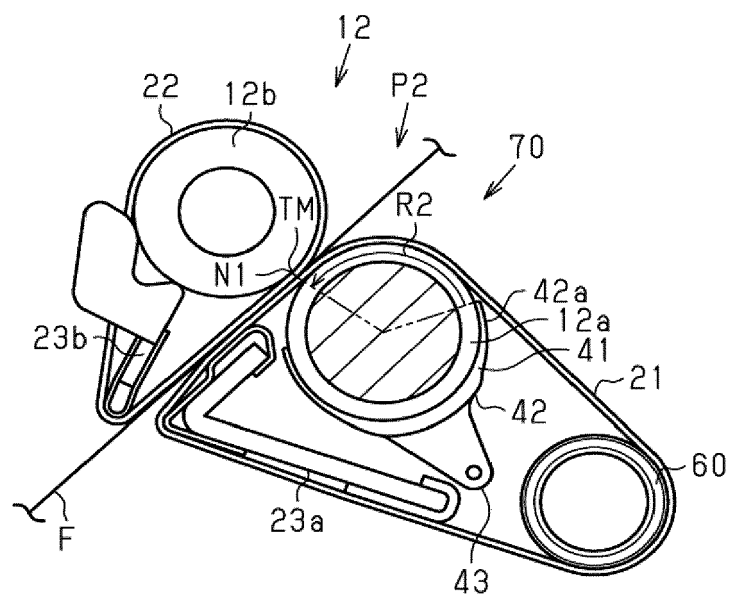


FIG. 6

BACKGROUND ART





EUROPEAN SEARCH REPORT

Application Number

EP 24 16 5809

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			D01H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 September 2024	Examiner Humbert, Thomas
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	

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ANNEX TO THE EUROPEAN SEARCH REPORT
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13 - 09 - 2024

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82