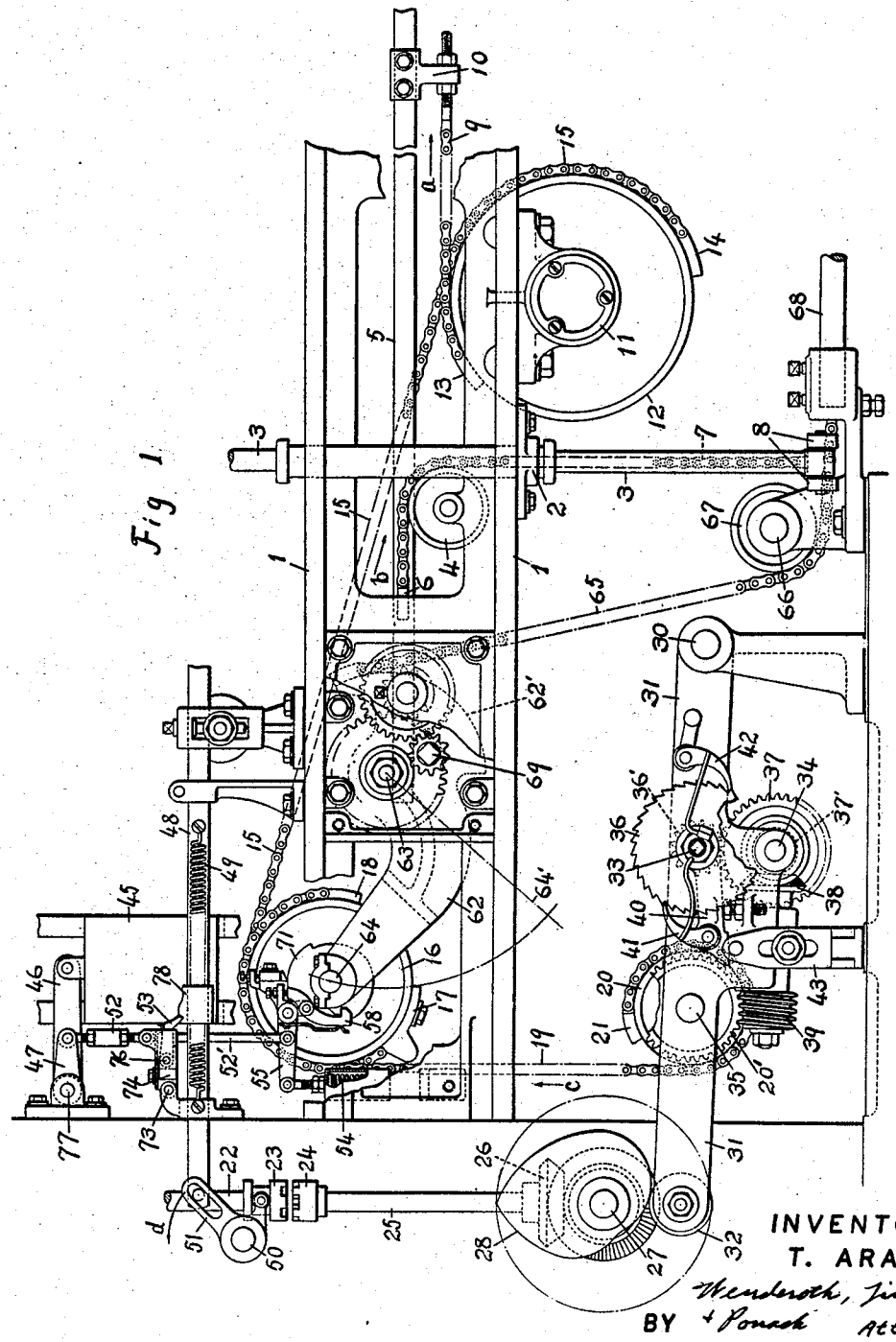
Oct. 21, 1958 TAKEJI ARAI 2,857,114

DEVICE IN A SPINNING FRAME TO WIND UP A YARN END ON THE NECK OF A SPINDLE

Filed March 12, 1956 2 Sheets-Sheet 1

Fig 1



INVENTOR
T. ARAI
Wenderoth, Lind & Ponack
BY Attys.

Oct. 21, 1958 TAKEJI ARAI 2,857,114

DEVICE IN A SPINNING FRAME TO WIND UP A YARN END ON THE NECK OF A SPINDLE

Filed March 12, 1956 2 Sheets-Sheet 2

Fig. 2.

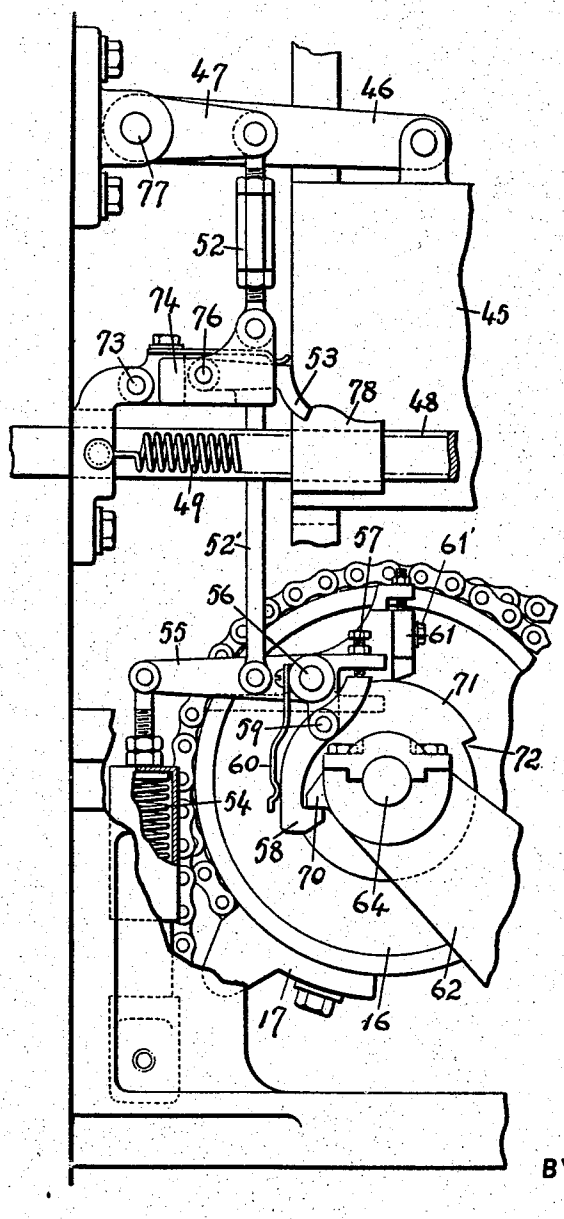
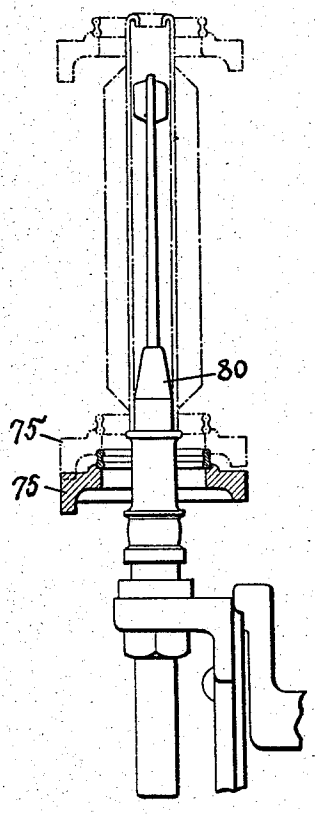


Fig. 3.



INVENTOR
T. ARAI

BY Wenderoth, Lind & Ponack
Attys.

United States Patent Office 2,857,114 Patented Oct. 21, 1958

2,857,114

DEVICE IN A SPINNING FRAME TO WIND UP A YARN END ON THE NECK OF A SPINDLE

Takeji Arai, Shinji-cho, Japan, assignor to O-M Spinning Machine Mfg. Co., Ltd., Kita-ku, Osaka, Japan, a company of Japan

Application March 12, 1956, Serial No. 570,816

Claims priority, application Japan April 13, 1955

2 Claims. (Cl. 242—26.1)

This invention relates to improvements in a device in a spinning frame to wind up a yarn end on the neck of a spindle, when a bobbin on the spindle becomes full of yarn layers and is to be replaced by an empty one.

In a spinning operation, when bobbins on a ring rail become full of yarn layers, the machine automatically stops and a worker operates a handle to lower the ring rail to its starting position, removing the full bobbins from the spindles, and empty bobbins are inserted in place of the removed ones.

When a full bobbin is to be removed from a spindle, the yarn coming from the front rollers to the bobbin is cut, and the yarn end is wound on the neck of the spindle by hand, so that the yarn winds on the new bobbin when the machine starts its operation again.

An object of this invention is to provide a device to automatically lower the ring rail beyond its starting position when the machine stops, so as to bring a traveller on a ring to the level of a spindle's neck.

Another object of the invention is to provide a means to automatically slack a chain on which the ring rail is supported, when the spindles have turned a pre-determined number of revolutions so that the bobbins become full of yarn.

According to this invention, when bobbins become full of yarn, the machine stops its operation, and the ring rail automatically lowers beyond its starting position, so that the yarns wind on the necks of the spindles as the spindles are still revolving due to inertia. When a full bobbin is replaced by a new one, the yarn will wind on the new bobbin when the machine starts again.

In the drawing,

Fig. 1 is a front elevation of the lower part of a spinning frame at the end thereof provided with a device according to the present invention;

Fig. 2 is a same view showing a part of Fig. 1 in an enlarged scale; and

Fig. 3 shows the relation between a spindle and a ring rail, which is in its lowest position beyond its starting place, the ring rail shown in chain lines being the top and bottom positions in the normal operation.

Referring to Fig. 1, **1** is the machine frame, and the ring rail, not shown, is supported on vertical bars **3**, one of the bars being shown in the drawing. The bars are guided by vertical bearings **2** on the frame. A slide bar **5** is horizontally held on a roller **4** mounted on the frame. A chain **7** is fixed at a point **6** to the bar **5**, and another end is fixed to a lever **8**, on which the vertical bar **3** is supported. A chain **9** is fixed at its end to the bar **5** by means of a bracket **10**, and another end is fixed to a wheel **12**, which is freely mounted on a shaft **11** on the frame, at a point **13** on its periphery. Another chain **15** is fixed at its right end to a point **14** on the periphery of the wheel **12**, and its left end to a point **17** on the periphery of a wheel **16**. Another chain **19** is extended over the wheel **16** and is fixed at its upper end to a point **18** on the periphery of the wheel, and at its lower end to a point **21** on the periphery of a wheel **20**. As the weight of the

ring rail is imposed on the vertical bars **3**, the bar **5** is intended to slide to the right, so that the chains **9**, **15** and **19** are normally pulled in the directions as shown by arrows *a*, *b*, and *c*.

A driving shaft **22** drives another shaft **25** through a clutch **23—24**, and a shaft **27** is driven by the shaft **25** through bevel gears **26**. On the shaft **27** is secured a cam **28**, which is in contact with an idler roller **32** provided at the free end of a lever **31** of the builder motion mechanism, and the lever is pivoted on the frame by a pin **30**, so that the lever is rocked on its pivot. On the lever **31** are provided spindles **33**, **34** and **35**. A ratchet wheel **36** and a spur gear **36'** are secured to the spindle **33**, and the spur gear meshes with a gear **37** secured to the spindle **34**. A bevel gear **38** and a worm **39** are fixed to a shaft rotatably held on an extended part of the lever **31**, and a bevel gear **37'** on the spindle **34** meshes with the bevel gear **38**. The worm **39** meshes with a worm wheel **20'** on the spindle **35**, so that the wheel **20** is rotated by the ratchet wheel **36** through these intermediate gears.

An arm **40** is pivoted on the spindle **33**, and a pawl **41** for driving the ratchet wheel **36** is provided at the end of the arm. A pawl **42** is pivoted on the lever to prevent the counter rotation of the ratchet wheel. An adjustable stopper **43** is provided on the frame under the arm **40**. When the arm **40** is lowered together with the lever **31**, its lowering motion is prevented by the stopper, so that the pawl turns the ratchet wheel **36**, and this rotation eventually drives the wheel **20** in the counter clockwise direction. As the chain **19** is normally pulled upwards, the roller **32** is always in contact with the periphery of the cam **28**.

An electric magnet **45** is provided on the machine frame, and levers **46** and **47** secured to a pivot **77** are pulled downwards when electric current is supplied to the driving motor of the machine.

A horizontal bar **48** is slidably held on the frame, and is normally pulled to the left by a spring **49**. The left end of the bar is connected with a lever **51** on a pin **50**, the bar having a projection extending into a slot in the lever, and the latter is turned in the direction denoted by an arrow *d* when the bar **48** is pulled to the left so that the clutch piece **23** is pulled to disengage from the cooperating piece **24**, and the driven shaft **25** is uncoupled from the driving shaft **22**.

A bar **52** is connected to the free end of the arm **47** and to a bifurcated link **74** which is pivoted on the frame by a pin **73**. An elastic pawl **53** is pivoted on the link by a pin **76**, and normally touches a piece **78** secured to the bar **48** to prevent the latter from sliding to the left. When the spindles have turned a predetermined number of times so that the bobbins have become full of yarn, the current for the motor is automatically cut off so that the magnet is demagnetized and the arms **46** and **47** are pulled up by the action of a spring, so that the pawl **53** is out of contact with the piece **78**, and the bar **48** is pulled to the left by the spring **49**.

When the machine is operating, the driving shaft **22** drives the cam **28** and the lever **31** rocks, so that the ratchet wheel **36** is turned and the spindle **35** is rotated little by little. Thus the wheel **20** is turned and moves up and down with the lever **31**, gradually winding up the chain **19** in the direction opposite to the arrow *c*. As the wheel **20** moves up and down, the horizontal bar **5** traverses in opposite directions so that the ring rail gradually rises upwards while it is repeating up and down movements. When the spindles have turned a predetermined number of rotations, the machine stops.

The above is a well known device in a spinning frame. In that device, when the machine stops, a worker has to lower the ring rail to its starting position by turning the ratchet wheel **36** in the counterclockwise direction with

a handle inserted on the spindle 33, cutting the yarns, removing the bobbins from the spindles, and must wind up the yarn ends on the neck of each spindle for preparation of the next operation.

According to the present invention, the lowering motion of a ring rail and the neck-winding is mechanically performed so that no manual operation is required.

A bar 52' is extended downwardly from the link 74, and a lever 55 is hinged on the bar at its end and is pivoted on the frame by a pin 56. The left end of the lever is connected to a spring 54, which serves to turn the lever 55 in the clockwise direction on the pivot 56 so that the arms 46 and 47 are pushed up if they are not pulled by the magnet 45. A small piece 61 is adjustably fixed on the right end of the lever by a screw 61'. A hook member 58 is pivoted on the lever by a pin 59, and a plate spring 60 fixed on the lever serves to press the hook member, its normal position being adjustable by an adjusting screw 57.

An arm 62 is pivoted on the frame by a pin 63, and a pin 64 is provided on the free end of the arm. The right end 62' of the arm is made in an arc, and a chain 65 is fixed to its upper end. The lower end of the chain extends over a guide wheel 67 mounted on a pin 66 on the frame, and is connected to a bar 68, which is pulled to the right by means of a spring, not shown. The strength of the spring is so adjusted that the weight of the arm 62 in respect of its pivot 63 is a little larger than the strength of the spring.

A spindle 69 is held on the frame, and the arm 62 can be turned on its pivot to the position shown by the line 64'. There is a hook shaped projection 70 on the free end of the arm 62, and the hook member 58 engages with this projection so that the arm 62 is held in the position as shown in the drawing.

On the boss of the wheel 16 is secured a circular disc 71, and a step 72 is provided on its periphery. The disc can be circumferentially slid onto the boss, and secured at any required position, so that the position of the step on the boss can be adjusted. The wheel 16 is held on the pin 64, and the piece 61 can descend with the lever 55 when the step 72 comes beneath the piece 61 and the magnet 45 is demagnetized.

When the machine is to be started, the arm 62 is set in the position as shown in Fig. 1 holding the projection 70 on the hook member 58. The magnet 45 is now magnetized, and the lever 55 is pushed down through the bar 52 and 52' against the action of the spring 54. In the course of the spinning operation, the chains 15 and 19 are pulled in the directions opposite to the arrows *b* and *c* respectively, and the wheel 16 turns in a counterclockwise direction. When the spindles have turned a predetermined number of revolutions so that the bobbins have become full of yarn, the step 72 comes beneath the piece 61, the position of the disc 71 being adjusted to achieve this, and a switch in the circuit for the motor opens. The piece 61 can now descend as abovementioned, and the screw 57 pushes the top of the hook member, so that the latter releases the projection 70. The arm 62 now turns down due to its unbalanced weight to the position as shown by the line 64' carrying with it the wheel 16. On account of this fact, the chain 15 slackens and the ring rail lowers due to its weight which is always supported by the chain. The position 64' is so designed that the ring rail lowers to the level of the neck of the spindle 80 as shown by the full line 75, which is a little lower than its starting position 75' in Fig. 3. The switch has now been opened but the machine is still running due to inertia, and the yarn winds on the neck of the spindle a number of turns until the machine actually stops. The full bobbin is removed by hand from the spindle, the operator cutting the yarn, leaving the part wound on the neck of the spindle untouched, and a new empty bobbin is inserted on the spindle. Next, the spindle 33 is turned in a counterclockwise direction with a handle, disengaging the pawls 41 and 42, so as to bring the wheel 20 to its original position, and the spindle 69 is next turned by a handle to raise the arm 62 until the hook member 58 catches the projection 70. When the machine is again started, the yarn begins to wind on the new bobbin starting from the wound part on the spindle's neck.

According to this invention, the wheel 16 is not mounted at a fixed point as in a known device but is mounted on an arm, which turns on its pivot to bring down the ring rail beyond the starting position, so that the winding of the yarn end on the neck of the spindle is performed by making use of the inertia of the machine, so that replacement of bobbins can be made as soon as the machine stops, thereby the time for replacement of bobbins can be shortened, and the replacing operation can always be made in the same manner as the ring rail is mechanically lowered at a constant speed.

When the supply of electric current for the motor is cut off in course of a spinning operation, the spring 54 tends to bring up the arm 47, but the bar 52' cannot be brought up because the piece 61 cannot be lowered except at the time when the bobbin becomes full so that the step 72 is just beneath the piece 61, and thus the arm 62 is not affected at this time.

What I claim is:

1. A device in a spinning frame for automatically winding a yarn on the neck of a spindle when a bobbin on the spindle becomes full of yarn, comprising an arm pivotally mounted on the spinning frame, a wheel mounted on one end of said arm, two chains fixed to and extending over the wheel, one of the chains being connected to the ring rail on the spinning frame so as to turn the wheel in one direction under the influence of the weight of the ring rail, the other chain being pulled by the builder motion mechanism of the machine which oscillates the ring rail and at the same time progressively raises it, whereby said wheel is turned in opposite directions, a projection provided on the free end of the arm, and a hook member which holds the projection so as to keep the arm's end in its highest position, and a means for disengaging said hook member from the projection when the wheel turns to a position which corresponds to the time when the bobbin becomes full of yarn.

2. A device as claimed in claim 1, in which said means for disengaging said hook member comprises a lever pivotally mounted on the machine frame, a piece provided at the end of said lever, a disc secured to the boss of said wheel and having a step on its periphery, and means for pressing the piece against the periphery of said disc for urging said piece into the step when the wheel is turned through a predetermined angle, said hook member being disengaged from said projection by the motion of the lever.

References Cited in the file of this patent

UNITED STATES PATENTS

195,470	Adams	Sept. 25, 1877
965,306	Koechlin	July 26, 1910
1,459,251	Pierce	June 19, 1923
2,503,099	Culbreath	Apr. 4, 1950