ABSTRACT: An improved bobbin hanger for supporting bobbins of various diameters, having a clutch mechanism to operate movable paws which engage the shoulders of the bobbin. A compression spring is also provided to control the speed of rotation of the bobbin.
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BOBBIN HANGER FOR SPINNING MACHINES

BACKGROUND OF THE INVENTION

This invention relates to a bobbin hanger, More particularly, this invention relates to a bobbin hanger for a spinning machine, adapted to rotatably hang onto a hanger rail and permitting easy attachment and detachment of a bobbin.

The high-speed performance of recent spinning machines has, as a matter of course, greatly sped up the draw of string, sliver, thread, etc., from the bobbins. The result is that the bobbin runs out of thread in a very short time. This necessitates frequent replacement of bobbins. This has necessitated a bobbin hanger which allows frequent replacement of bobbins securely and with ease.

In response to such requirements, many kinds of bobbin hangers have been devised so far, among which the most popular type is provided with paws rotatably pivoted in the lower part of a hanger body, which paws rest on the shoulder of a bobbin to hook it. More specifically, a cylindrical shell of shell of a hanger body is of split construction, each mate being provided with like cam grooves inside, along which a camshaft moves up and dow with a pair of paws coupled in the lower end, which camshaft is movable in association with a hand-operated slider fitted around the shell, thereby causing the paws to spread and contract to engage and disengage the shoulder of a bobbin.

Alternatively, there is a bobbin hanger a having a pair of legs inserted inside a cylindrical shell of the body, said legs being provided with a paw at the top portion, which legs is slideable in association with the movement of a slider fitted around the shell, thereby causing the pair of legs to forcibly spread when the lowering legs finally comes in contact with an appropriate inverse V-shaped means installed in the lower end of the shell, wherein the paws extending outside the shell engage the shoulders of a bobbin to hang it.

However, such devices of the prior art have many drawbacks and disadvantages. The former is of split construction, and is fitted with a cam, resulting in a complicated mechanism which requires an unattainable degree of precision in production, many steps for assembly, high production costs, etc. The latter is required to have a long leg built in a bobbin hanger body sufficient to reach the means for spreading them, and, therefore, the hanger as a whole tends to be weighty because of the metallic legs. And the means spreading the legs is so much limited in size that the spreading extent of the legs is very small, which makes it impossible to apply a hanger for a big bobbin.

This invention is similar to those conventional devices in that the paws are pivotally mounted in the lower end of a hanger body in conjunction with the movement of a slider fitted around the body of a hanger, so as to engage and disengage the shoulder of a bobbin. But this invention has quite new constructive and operational features in respect to the paws.

OBJECTS OF THE INVENTION

An object of this invention is to provide a bobbin hanger which can easily and securely support bobbins of various diameters without any special skill.

Another object of this invention is to provide a bobbin hanger which protects the thread from tangles and breakage as it is withdrawn from the individual bobbin.

A further object of this invention is to provide a bobbin hanger which automatically controls a blind rotation of a hanger unsynchronized with a drawing speed of thread, so as to prevent possible tangles and breakages of thread.

A still further object of this invention is to provide a bobbin hanger requiring no special working skill, making it easily handled by anyone.

SUMMARY OF THE INVENTION

Briefly stated, a bobbin hanger of this invention consists essentially of a cup-shaped cover having a hanging rod adjustably screwed thereto, a cap body rotatably supported by said hanging rod extending inside the cover, a hanger body received in the cap body, which hanger body has a fixed clutch and a movable clutch installed in a bore of the body, a vertical bar extending in a bore of the fixed clutch with a spring interposed therebetween, said movable clutch being raised up in association with the movement of a slider fitted around the body when the latter is pushed upwardly by hand.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects and advantages of the invention will become apparent from the detailed description of a preferred embodiment thereof when read in conjunction with the drawings in which:

FIG. 1 shows an entire internal construction in section of the bobbin hanger.

FIG. 2 is a plan view of the bobbin hanger illustrated in FIG. 1.

FIG. 3 is a view in section when a bobbin is hung onto the bobbin hanger.

FIG. 4 is a view in section when a bobbin is removed from the bobbin hanger with a slider pushed up, wherein the wings are completely housed in the body.

FIG. 5 is a view in section of the hanger body.

FIG. 6 is a plan view of the hanger body illustrated in FIG. 5.

FIG. 7 is a side view of the hanger body illustrated in FIG. 5.

FIG. 8 is a view in section taken on the line D'-D' in FIG. 7.

FIG. 9 is a cross section taken on the line B'-B' in FIG. 8.

FIG. 10 is a cross section taken on the line C-C' in FIG. 8.

FIG. 11 is a view in section of the cap body.

FIG. 12 is a cross section taken on the line A-A' in FIG. 11.

FIG. 13 is a plan view of the bearing case.

FIG. 14 is a fragmentary view partly in section of the bearing case illustrated in FIG. 13.

FIG. 15 is a plan view of the fixed clutch.

FIG. 16 is a front view of the fixed clutch.

FIG. 17 is a plan view of the movable clutch.

FIG. 18 is a front view of the movable clutch illustrated in FIG. 17.

FIG. 19 is a bottom view of the movable clutch illustrated in FIG. 17.

FIG. 20 is a front view of the vertical rod.

FIG. 21 is a right side view of the vertical rod.

FIG. 22 is a plan view of the vertical rod.

FIG. 23 is a plan view of the slider.

FIG. 24 is a front view of the slider illustrated in FIG. 23.

DETAILED DESCRIPTION OF THE BOBBIN HANGER

A detailed explanation will be given with reference to an example of embodiments constructed in a accordance with this invention.

FIG. 4 shows a hanger body housing wings 47, 48 inside, and FIG. 3 shows a hanger body with a bobbin received in the lower end, with the wings spreading, which wings will rest on the shoulders formed in the upper end portion of a bore of a bobbin to hold the bobbin therein.

FIG. 1 shows a vertical view in section when the wings are housed inside the body.

A long hanger rail R of inverse U-shape in section has each hanger rod 1 hung in the bottom opening, and fixed thereto by means of a nut 2.

A cover 3 screwed to the hanger rod 1, made of synthetic thermoplastic material, having a hole 4 at the top for inserting the hanger rod. Moreover, the cover 3 has a rounded groove 6 formed around the inside of the opened end 5 to be plugged with a bottom cover 8 having an inward projection 9, where a projection 7 is arranged so as to fit in the rounded groove 6 to secure the bottom lid 8 to the cover 3.
The bottom lid 8 has a hole 10 drilled at the center, through which a cap body 11 is inserted inwardly. The cap body 11 is made of synthetic thermoplastic material, whose section substantially takes a form of the inverse U-shape, with a flange U-shaped protruded around the upper end, the upper wall of which cap body is provided with a hole 14 to receive the lower portion of the hanger rod 1. The cap body 11 has the internal wall axially depressed with lengthwise grooves 15 at not less than two places, as shown in FIG. 11 and FIG. 12, having a bearing case 17 therein, as shown in FIG. 13 and FIG. 14, with a projection 16 on its outer face so as to fit in the groove 15. The lower end of the hanger rod 1 is passed through the hole 14, which lower end is projected downwards through a hole 18 centrally formed on the bearing case 17 which is filled with a plurality of steel balls 19, added by a race 20 press fitted thereto, ending with a cup-shaped stopper ring 22 fitted in the narrow part 21 of the hanger rod 1 extending downwards from the race 20. A cylindrical coiled spring 23 is inserted between the upper part of the bearing case 17 and the inner face of the cap body 11, while a conical coiled spring 24 is inserted between the under face of the flange 12 and the circumferential edge of the bottom lid 8.

The cap body 11 has a cylindrical body 26 passed through the bore 25, which body 26 has a fixed clutch 28, as shown in FIG. 14 and FIG. 15, attached in the upper part of the bore 27, the fixed clutch 28 being coupled to the cap body 11 by means of a pin 29. The body 26 has a movable clutch 32, as shown in FIG. 17 and FIG. 18, slidable fitted in the bore 27 which clutch 32 has a plurality of tooth elements 31 to be engaged with tooth elements 30 of the fixed clutch 28.

The movable clutch 32 has a plurality of toothed tails 33 spaced from each other, which space will be hereinafter referred to as space 34, as shown more clearly in FIG. 18. Each toothed tail 33 is made narrower than the width of the space 37 in a bore 35 to permit their axial movement into the space, so that the toothed tails 33 are capable of engaging with the teeth 36 on the inner face of the bore 35 whose inside diameter is smaller than that of the bore 27 of the body 26.

The fixed clutch 28 has a projection 38, shown in FIG. 15, at the center, and the movable clutch 32 has a depression 39, which depression 39 has a hole 40 at the bottom. A vertical rod 42 having the upper end portion provided with a flange 41 is inserted into the hole 40 of the movable clutch 32, said projection 38 of the fixed clutch 28 and said depression 39 of the movable clutch 32 being associated by a cylindrical coiled spring 43, which fixed clutch 28, movable clutch 32, and vertical rod 42 having a made of synthetic thermoplastic material by press-mold process. The vertical rod 42 has a slat 44 and 45 on each side of the lower end portion, as shown in FIGS. 20 and 21, with a bore 46 traversely passed through the slats 44, 45, in which slits the ends of wings 47, 48 are pivoted by means of a pin 51 through a bore 46 an holes 49 and 50 in the wings 47, 48 so that the wings 47, 48 are coupled to the vertical rod 42.

A body 26 has a bar stopper 52 laterally fitted in the lower part, so that the wings 47, 48 may slide over the bar stopper 52 when the wings 47, 48 go down to come in contact with the bar stopper 52. A body 26 has the outer face depressed with an axial lengthwise groove diagonally opposite to each other, along each extension of which grooves lengthwise hole is formed, respectively, in which holes the wings 47, 48 are made to pivot in accordance with the movement of the vertical rod 42. A metallic slider 60 is slidable fitted around the body 26, which slider 60 takes a form of projections 57, 58 as shown in FIGS. 23 and 24, in the inner face of a bore 59. The slider 60 is hand-operated to move up and down, accompanying a normal movement of the vertical rod 42 journaling the wings 47, 48 in a bore 61 drilled in the body 26.

The slider 60 can be fitted from the lower end of the body 26 so that the wings 47, 48 are housed inside the body 26. The dot-dash lines 62 in the FIGS. show a portion of a bobbin wound with thread.

**OPERATION OF THE BOBBIN HANGER**

The procedure for operation of attaching to and detaching from a bobbin hanger of this invention will be taken as follows:

The body of a bobbin 62 is inserted with the lower end of the body 26 and with the wings 47, 48 completely housed in the lengthwise grooves 55, 56, and, subsequently, he bobbin 62 is slid upwardly along the body 26, in accordance with which the slider 60 is pushed upward by hand, where the movable clutch 32 is caused to rise by means of the slider 60 against a spring 43 force so as to move upward toward the mated fixed clutch until both tooth elements of the clutches 28, 32 meet, wherein the pitched pitches of the V-shaped, tooth elements 31 of the movable clutch 32 are made so as to be differentiated in relation with those of the fixed clutch 28 in such a way as to cause a slight angular displacement of the movable clutch 32, thereby bringing the toothed tails 33 of the movable clutch 32 out of engagement with the teeth 36 in a bore 35 of the body 26, and, simultaneously, ending in a fit in spaces 37 in the bore 35. This enables the movable clutch 32 to further move down by reason of the force exerted by spring 43 until the toothed tails 33 stop in contact with the bottom of the bore 35, in accordance with which the vertical rod 42 received in the bore 39 of the movable clutch 32 is caused to cowork to change the position from that in FIG. 4 to that in FIG. 3. As a result, the wings 47, 48 come to slide over a bar stopper 52 transversely extending in the lower end of the body 26, resulting in the spread of the wings with a compression through the lengthwise grooves 55, 56 until the wings 47, 48 rest on the shoulders of a bobbin. The vertical rod 42 once lowered continues to be witheld by a spring 43 force unless the slider 60 is moved up again.

On the contrary, when an empty bobbin is removed from the hanger to replace it with a full bobbin, the steps for operation will be taken as follows:

The movable clutch 32 is pushed toward the fixed clutch 28 until the tooth elements 31 of both clutches come in engagement with each other. When the slider 60 is pushed up by hand, the movable clutch 32 is moved toward the fixed clutch 28 against a spring 43 force in the body 26, and, then, the tooth elements 31 are engaged with the mated tooth elements 30 of the fixed clutch 28, where the movable clutch 32 is force to rotate circumferentially in the clockwise direction, owing to the arranged differential pitches, enabling the toothed tails 33 of the movable clutch 32 to gear with the teeth 36 in a drill 35 of the body 26, which prevents a return of the movable clutch 32 to the original position, followed by an upward shift of the vertical rod 42. Thus, the vertical rod 42 workable in association with the movable clutch 32 is moved upwardly along the body 26, so that the wings 47, 48 are raised up until they disappear through the lengthwise grooves 55, 56 into the body 26, so that the shoulders of the bobbin 62 comes out of engagement with the wings 47, 48 to permit withdrawal of the bobbin 62.

Subsequently, the operation of controlling the velocity of drawing thread from a suspending bobbin is as follows:

Normally, the velocity of rotation of a bobbin is proportional to that of drawing thread from a bobbin, but the rotation of a bobbin tends to accelerate gradually, finally overcoming the speed of drawing thread, causing tangle-ups on the bobbin and breakage of thread.

Such events owing to different speeds tend to happen more frequently as a bobbin is accelerated with decreasing thread on the bobbin.

To solve this problem, a bobbin hanger constructed in accordance with this invention is provided with a compressed spring aimed at controlling the speed of rotation of a bobbin, which spring is installed between cover 3 and cap body 11, assisted by a cylindrical coiled spring 23 between cap body 11 and bearing case 17 which spring is expansible in accordance with the decreasing weight of a bobbin. For example, when a bobbin is so heavy with much thread, a cylindrical coiled spring 23 and a conical coiled spring 24 are forcibly compressed, thereby putting a great brake on the body 26 carrying.
5

a bobbin to retard the rotation as a whole hanger. On the contrary, when a bobbin is light with thread, almost emptied, the springs 23, 24 naturally return to put reduced brake on the bobbin rotation, resulting in a reduction of unnecessary surplus tension on the thread. The cylindrical coiled spring 23 and the conical coiled spring 24 are required to be adjusted for any weight of a bobbin, which weight depends upon the size of a bobbin, by fastening or unfastening a nut 63 screwed on the hanger rod 1. The same procedure s is needed in accordance with strength of thread to be wound to eliminate possible breakages of thread, and produce the most appropriate brake on a bobbin.

An example of embodiments constructed in accordance with this invention has such structural features as have been hitherto described, and anyone skilled in the art would understand easily and clearly that a bobbin can be attached to and detached from a bobbin hanger of this invention by pushing up the slider fitted around the body, and that the bobbin hanger provided by this invention has quite unobvious internal structural features in view of the prior art, which are materialized into the adopted clutch mechanism wherein one of the mated clutches is slidable arranged in a bore of the body, coupled to a vertical rod journaling the wings which can pivot in a lower end portion of the body to hold the shoulders of the bobbin.

Thus, a bobbin can be hung onto and withdrawn from a bobbin hanger just by sliding a slider on the hanger body, permitting facilitated and quickened performance of bobbin hanging. Secondly, a bobbin hanger is applicable for bobbins of any size, where the securing of a bobbin is so firm that although a force unexpectedly exerts on the bobbins, they are quite free from detachment from the hanger. Thirdly, the thread is always drawn from a bobbin under constant tension whatever the bobbin may be fully charged or not by means of the two braking springs housed between cover and cap body, which springs are appropriately adjusted by means of a nut screwed on the hanger rod in accordance with the strength of thread and the desired speed of drawing, thereby producing a desirable braking force on bobbins in rotation. Fourthly, the operation of braking serves to prevent tangle-up, breakage, damages, of thread drawn from a bobbin.

I claim:
1. A bobbin hanger for a spinning machine comprising:
   a. a unitary body having a bore therein,
   b. a clutch fixedly attached to the upper portion of said bore,
   c. a second clutch slidable fitted in the lower portion of said bore,
   d. said first and second clutches having a plurality of tooth elements,
   e. said second clutch having toothed tails,
   f. said tooth elements operative to cause a slight angular displacement of said second clutch,
   g. a sliding vertical rod passing through said hanger body,
   h. said rod carrying a pair of movable wings,
   i. said body having a pair of slots through which said wings may extend,
   j. a stopper bar for spreading said wings upon downward movement of said rod.
2. A bobbin hanger for a spinning machine comprising:
   a. a body having a bore therein,
   b. a clutch fixedly attached to the upper portion of said bore,
   c. a second clutch slidable fitted in the lower portion of said bore,
   d. said first and second clutches having a plurality of tooth elements,
   e. said second clutch having toothed tails,
   f. said tooth elements operative to cause a slight angular displacement of said second clutch,
   g. a sliding vertical rod passing through said hanger body,
   h. said rod carrying a pair of movable wings,
   i. said body having a pair of slots through which said wings may extend,
   j. a stopper bar for spreading said wings upon downward movement of said rod,
   k. a hanging rod journaled by a bearing case housing steel balls and a race,
   l. a body cap on the top of said body,
   m. a cover,
   n. said cover having a bottom lid through which said body extends,
   o. spring means between said bottom lid and said body cap,
   p. second spring means between said bearing case housing and said body cap.