

Description

The present invention relates to a bobbin holder for use mainly in a creel of a textile machine, particularly a spinning frame or a roving frame. Further, the present invention can widely apply not only to a textile machine, but also to general industrial machines by applying and then developing this theory as the following illustration. There is a possibility that a distinguished merit of the rationalization is obtained when it is applied to an automatic wavehouse, a successive transfer device, an automatic packing device, and the like.

A bobbin holder is one of the key parts of a textile machine which is presently in general use. In the bobbin holder, a bobbin is inserted from the lower side of a hanging member of the bobbin holder. Thereby, a pair of rockable elements aparting right and left, which is contained in an inner portion of a hollow in the hanging member, is opened and projected in the right and left lateral direction. A shoulder of the bobbin is engaged with the rockable elements. Also, when the bobbin is doffed from the bobbin holder, the projecting rockable elements automatically draw back into the hanging member in response to the doffing operation of the bobbin from the hanging member. Accordingly, the bobbin creel is simplified, and donning and doffing of the bobbin become easier.

Known bobbin holders of this type (US—A—3 743 211) defined in the preamble of claim 1 are articles which suspend bobbins at two points by means of a pair of rockable elements. Accordingly, the support of the bobbin becomes unstable and is difficult to be in a state in which the bobbin is suspended so as to accord with the center line of the hanger, and therefore when the roving is withdrawn, the rotation of the bobbin becomes non-smooth.

That is to say, it causes movements of the bobbin such as eccentric rotation or precession, so that the tension in the roving becomes uneven. For this reason, unevenness of yarn and breakage of roving occur. For preventing them, it is necessary to use a conical structure serving as an aligning compensating wedge jointly with the hanging member. However, the effect is not precise.

In a known bobbin holder for a textile machine comprising a hanging member suspended rotatably and rockably by an upper suspending structure, the hanging member is provided with three similar and radial extending longitudinal guide grooves offset in equal angles at its lower peripheral surface (DE—A—2 549 906). Three rockable elements are provided in a chamber continuing to the grooves, and a core is axially movable and independently inserted in the chamber so that it is coaxial with the hanging member at the middle axis portion thereof. The core is lockable at the upper and lower shifted end position and controls projecting and drawing back motions of the rockable elements. When the core is in a lower

position the rockable elements extend radially outwards all together from the guide grooves in three directions. When the core is in an upper position the rockable elements are held by a ring and are completely positioned in the chamber. With such bobbin holder it is possible to avoid eccentric rotation of the bobbin. However, if the weight of the bobbin increases and the bobbin holder is working under full load, the bobbin will move heavily and rove uneven because the rockable elements are not able to react sensitive and smooth on heavy loads.

The present invention relates to a bobbin holder which is fundamentally improved in construction and structure by considering the disadvantages of those conventional bobbin holders and exceeding from a conventional conception. The key point of those turnabout is the reform of fundamental structure to provide a self-aligning system having a function which aligns their own rotational axes of constituent elements to the predetermined vertical axis by reason of self-balancing action caused by gravitation when the bobbin holder is in working under full load and, in connection with this, to provide a self-aligning suspension system with similar radial three-point bobbin support using blades, in the suspending manner for the bobbin to be suspended.

The effects of the present invention which are better than that of the conventional bobbin holder are as follows:

(1) A bobbin is certainly vertically suspended by the bobbin holder which has a sensitive and proper self-aligning function, so that the bobbin is smoothly rotated around the center axis of the bobbin holder without producing improper rotation such as eccentric rotation or precession corresponding to draw-out velocity of roving. Accordingly, the tension of the roving becomes even and the bobbin holder of the present invention can satisfactorily prevent the occurrence of such unevenness of yarn or breakage of roving.

(2) The three-point support using a set of rockable elements has the same effect as the three-point supporting system using balls which is a sister article of the present system, and it can be considered that they are the same in the point of self-aligning function. In the rockable opening-closing system, as its merit, it is possible to enlarge the projecting length of the rocking members projecting from the outer surface of a cylinder of a hanging member. Therefore, it is commonly and generally applicable to every size of the bobbin's bore in comparison with the three-point bobbin supporting system using balls. Also, it has the same quality, intensity and endurance which fully satisfy even for the marked increase in size of packages and for the severe operating conditions as the three-point supporting system using balls.

(3) A rockable element can be manufactured by several methods and the freedom of payability and economical efficiency at the case of the mass production is broadened by various methods such as plastic molding, alloy-sintering and press

forming depending on the uses. Also, the forming of the hanging member is greatly simplified, so that a cost for the mass production is greatly decreased.

(4) In case that the center axis around which the rockable elements are swung is located in the lowest portion of the hanging member, it is useful for improving the essential characteristics such as certainty of working of the set of the rockable elements, continuation of accuracy, intensity, endurance and safety coefficient against load, and the safety and reliability progress greatly in comparison with the conventional article. For example, the critical value of the suspendable load is certainly increased several times in comparison with that of conventional articles and the endurance is increased above double in comparison with that of conventional articles.

(5) In case where a core consists of two members, reliability in changing a clutch is greatly improved and the remarkable effect on safety of donning and doffing operation of the bobbin is obtained. Also, accidental mis-change of the clutch which sometimes irregularly occurs in the case of the conventional three-point supporting system using balls, is eliminated by employing the dual-construction of the core. Further, the projecting length of the rockable elements can be optionally easily changed by changing the diameter of the core for controlling the rockable elements.

(6) In connection with altering an upper structure into self-aligning suspension system, the synergistic effect causing, as a whole, from working of the balancing aligning elements in the present invention, e.g. the control system for the rockable elements, the proper shape and construction of a cone-like inclined sliding contact surface for suspension, and the like, is a remarkably excellent feature of the present invention and conduces to much increase of damping function in suspension of the bobbin holder. As a result of this, "the metal member made in the form of the inverse conical shape for adjusting a centering" which is indispensable for the conventional article using two rockable elements, becomes useless. Moreover, if there is some superabundant clearance between the internal diameter of the inserting bore of the bobbin and the external diameter of the hanging member, the self-aligning function is not affected at all.

(7) Further, by forming a bearing structure of the present invention in a bearing structure having double bearing portions which are provided similarly and symmetrically to a pivot having two symmetrical end portions, one of the most important functions of a bobbin holder, namely, a rotational characteristic in constantly maintaining the desired torque for a long time, can be greatly improved and can become safer.

As a result, the endurance and the maintaining capacity for rotational torque are improved greatly and the dispersion thereof is minimized. Further, the probability for the occurrence of troubles in the rotational torque resulting from

pollution of the bearing portion which is difficult of prevention and which is caused by the fly waste, dirt and dust, metal powder and the like, can be reduced to the minimum. Therefore, both the performance and economical efficiency of the bobbin holder are raised to the maximum.

Furthermore, in the present invention, the bobbin holder of the present invention is suitable to mass production and is easy to handle, because of having the simple construction and a few parts, and being able to reduce in the dispersion at manufacturing and to easily obtain the required accuracy.

In the drawings

Fig. 1 is a front view showing the whole section, in an embodiment showing a fundamental structure of the bobbin holder according to the present invention. (The rockable elements are in a closed state.)

Fig. 2 is a perspective view which is in a developed form of Fig. 1, so that each element is separated according to the arrangement.

Fig. 3A, Fig. 3B and Fig. 3C show the system, the order of changing working and the changing process in a clutch-changing device which conducts the changing displacement and the locking working of a core for controlling rockable elements.

Fig. 4A and Fig. 4B correspond to Fig. 5A and Fig. 5B, respectively, and those Figures partially show the system and the states in the opening-closing working of rockable elements. (Fig. 5 show the E—E' section of Fig. 4 as plane views.)

Fig. 6 is an explanatory view showing a self-aligning function and a working state in respect to a vertical suspending structure according to the present invention. (A) in Fig. 6 is an explanatory view showing an attitude of original point of restoration in self-aligning function. (B), (C) and (D) in Fig. 6, respectively, are explanatory views showing the unbalanced states in the process of the restoration.

1: upper suspending structure, 2: lower suspending structure, 3: middle connecting structure, (2); hanging member, (4): clamping bolt, (5): core for controlling, (7): set of rockable elements, (7'), (7''), (7'''): rockable elements, (14): longitudinal guide groove, (15): bottom of hanging member, (16): bobbin, (23): rotor housing, (24): upper compression spring, (25): lower compression spring, (99): stopping key, (101): top clutch, (106): key bush, (108): bottom clutch, (201): top clutch body, (212): pivot, (205): top cap.

A bobbin holder shown as an embodiment of the present invention is swivelably, swingably, rotatably suspended and mounted to a creel for supplying a roving, of a spinning frame or a roving frame among textile machines. The outline with respect to, mainly, Claim 1 is described in and by the following statement.

As shown in Fig. 1, an inserting bore (22) of a bobbin (16) is engaged with the hanging member (2) of the bobbin holder and the bobbin (16) is inserted from the lower side. Next, a flange of a

collar (9) formed at the top of the hanging member (2) is pushed upward by means of a top end surface (21) of the bobbin (16) and the hanging member (2) is ascended at a required distance against the force of the built-in compression spring (24). Thereafter, the bobbin (16) is descended. At that time, a clutch-changing device built in the upper portion of the hanging member (2) acts instantaneously by the repulsive force of the compression spring (25), and at the same time, a core (5) which is placed in the center portion of the hanging member (2) and which has been located in an upper end, commences the sliding in the abdomen of the hanging member (2) and shifts down at a high speed toward the opposite lower end, and in the state where the core (5) is locking, the hanging member (2) is restored in a normal original point. At this time, a set (7) of three rockable elements (respectively, shown as (7') (7'') (7''')) in the hanging member (2), receives the control of the core (5), thereby the set (7) of three rockable elements (7') (7'') (7''') extends all together to radial directions such as three directions of (OX₁), (OX₂), (OX₃) from the outer surface of a cylinder of the hanging member (2). Next, the set of three rockable elements (7') (7'') (7''') receives the shoulder surface (20) of the bobbin (16) descending along the body (2), in the form of radial three-point support near the respective shoulder portion of an inclined slide-surface (107) (respectively, (107') (107'') (107''')) formed to a cone-like surface by a set of three rockable elements (7') (7'') (7''') which can be extended in three directions at the same angle. Therefore, the bobbin (16) is suspended in self-aligning suspension and is adapted to draw-out speed of the roving under braking of a predetermined torque, and the center axes of the hanging member (2) and the bobbin (16) are aligned with adjusting the draw-out tension of roving. Accordingly, the bobbin (16) can be smoothly rotated in a state in which the bobbin (16) and the hanging member (2) have a common vertical rotational axis (yy').

The fundamental construction, the structure, the working and the function of a hanging member (2) according to Claim 1 of the present invention are described in and by the following statement in detail.

The constituent elements are,

(a): the hanging member (2) constructing a main body of a bobbin holder and containing working elements in its proper positions,

(b): a core (5) for controlling the rockable elements which is inserted in the center portion of the axis of the hanging member (2) so as to concentrically slide upward and downward on a center axis (yy') at the center of the abdomen of the hanging member (2), and thereby a set of three rockable elements (7') (7'') (7''') being similar in shape is rocked outward and inward, similarly with respect to a center point (O) of the hanging member (2) in the directions (OX₁), (OX₂), (OX₃) extended with three equal angles,

(c): longitudinal guide openings (14) for guiding

the rockable elements said openings being arranged radially (OX₁), (OX₂), (OX₃) to the axis of the hanging member (2), and provided in the place divided equally in circle of the lower portion of the hanging member (2),

(d): the three similar rockable elements (7), respectively ((7') (7'') (7''')) which are placed with clearance in the hanging member (2) so as to project—draw back through the guide openings (14),

(e): a changing-locking device which shifts intermittently, reciprocally the core (5) per se toward upper end point and lower end point according to the pushing-up operation of the hanging member (2) and which locks the core (5) at the both end points, in order to control the projecting-drawing back of the rockable elements, after the bobbin is inserted to the hanging member (2), and

(f): the flange (9) which is provided in the upper side of a cylinder (8) of the hanging member (2), in order to push up the hanging member (2) by contacting with an upper end surface (21) of the bobbin (16).

The hanging member (2) consists of the above-mentioned six main constituent elements (a) to (f). A couple of two compression springs (24), (25) is used in the hanging member (2) as an accumulated working energy source. The clutch-changing locking device among the above-mentioned constituent elements which is employed in the present invention with a positioning key bush (106) as a system for shifting, displacing and locking the core (5) at the two end points, is proper, sure, durable and stable. It is proved that the clutch-changing locking device is one of the elements exerting great influence on the constitution of the bobbin holder, (see Fig. 3).

Both of Figs. 4B and 5B show a state in which the core (5) is locked at the upper end point. Figs. 4A and 5A show a state in which the core (5) is shifted downward and is locked at the lower end point. The state represented by Fig. 1, in which the rockable elements are opened, is the original point of one cycle of the working of the above device.

First, the bobbin (16) is inserted from the lower side of the cylinder (8) of the hanging member (2) and is pushed up. The hanging member (2) is pushed up to the upper end point thereof against the force of the built-in compression spring (24). Thereby, the core (5) corresponding to a bottom clutch (108) pushed down in order of Fig. 3B—Fig. 3C—Fig. 3A by a top clutch (101), is released from the locking between a deep groove (91) and a key provided in a key bush (106) and is immediately governed under the control of the top clutch (101). At that time, when the bobbin (16) is commenced to descend, the hanging member (2) descends depending on the descent of the bobbin (16). Since the top clutch (101) belongs in the different structure from that of the hanging member (2), the top clutch (101) is left from the hanging member (2) by a repulsive force of the compression spring (24), as shown in Fig. 3A. Next, a

shallow groove (92) of a bottom clutch (108) is guided along to an inclined surface of a top end of a key (99) which exists in a guide groove (98) of the top clutch (101). Finally, a bottom of the next shallow groove (92) is caught by the key (99) and is locked in the state of Fig. 3A. At this time, the core (5) is sifted down to the limit of the descent and becomes a locked state, and the bobbin (16) becomes a suspended and supported state. In the drawings, (13) is a groove for engaging a snap ring, (95) is a pointed inclined tooth of the top clutch and (106) is a main pipe of the key bush. Figs. 4A and 5A show the above-mentioned state, respectively. After that, similarly, every time the hanging member (2) is once reciprocated upward and downward, the clutch-changing locking device acts once according to the reciprocating motion of the hanging member (2). Thereby, reciprocating intermittently alternately between the upper end point and lower end point, the core (5) reciprocally circularly repeats the control for the swivel motions of concentration and projection of a set of three rockable elements (7') (7'') (7'''). (In Fig. 3, the working states are shown in detail.) According to this controlling motion, the three rockable elements (7') (7'') (7''') circularly repeat the change of functions of discharging→suspension→discharging→suspension, as shown in Fig. 4A⇒Fig. 4B, to a small diameter portion (20) of the shoulder of the bobbin (16). Thereby, the working function of donning⇒doffing to the bobbin (16), which is one of important functions of the bobbin holder according to the present invention, is achieved.

Further, the main contents of the present invention will be explained in detail.

Fig. 1 shows a whole view of a constitution and a constructure of a bobbin holder according to the present invention. As shown in drawings, the core (5) is shifted up toward the upper end point. Accordingly, the three rockable elements (7') (7'') (7''') gathering concentrically together, are in a state of being entirely drawn back (shut) in a cylinder (8) and are in a state in which the bobbin (16) can be donned. In that state, by pushing up the bobbin (16) after the bobbin (16) is inserted from the lower portion of the hanging member (2), the whole hanging member (2) is ascended against the force of the compression spring (24). Receiving this working, the clutch-changing device (see Fig. 3) built in the hanging member (2) commences the changing working in (B)→(C)→(A) order, and becomes an attitude of bobbin-suspension that the rockable elements (7') (7'') (7''') extend radially as shown in Fig. 4A or Fig. 5A. That is to say, the three rockable elements (7') (7'') (7''') provided to the lower portion of the hanging member (2), form a type of a hanging construction so as to rock to open or close in the upward direction around the lower round end surfaces thereof and the round rockable bearing portion formed at the bottoms (15) of the grooves extending to the longitudinal guide openings (14') (14'') (14''') provided at the three positions of the lower portion of the cylinder (8) of

the hanging member (2). Accordingly, the shift changing working of the core (5) shown in Fig. 3 is commenced by the pushing-up operation of the hanging member (2), and the core (5) is compulsorily descended concentrically with the axis (yy') of the hanging member (2), from the upper side of the set (7) of the rockable elements toward the medium of them. Therefore, while the set of three rockable elements (7') (7'') (7''') is in the state of shutting, drawing back and concentrating in the cylinder (8) and is controlled by a conical surface of the top of the core (5), the elements are rocked around each axis (31) to the boundary limited by the inner wall of the cylinder (8) under the guidance of the longitudinal guide openings (14) radiating trisectionally at the lower peripheral surface of the hanging member (2) as shown in Figs. 4A and 5A, and they extend outward and show the state of being opened upward.

As one of main features of the self-aligning suspension system according to the present invention with the similar three contacting points which are arranged radially (OX₁), (OX₂), (OX₃) with equally divided angles, it is constructed that while the situation of the loads received by each three rockable elements is maintained in the relations $V_1=V_2=V_3$, all directions of the forces are concentrated to the center axis (O) of the hanging member (2) corresponding to the axis (yy'), the forces from three directions become entirely equilibrium, and in this time, the relation of contacting forces at the contact points between each rockable element (7'), (7'') (7''') and the core (5) is in relation of dead-point in the direction of axis (yy'). Also, it was conformed, as an experimented result, that the practical optimum value of the vertical angle of the inclined surface of the bobbin-supporting portion (107) which is formed to a cone-like shape in the set (7) of the rockable elements, exists between 90°—60°. Thus, the core (5) which has reached to the end point of the control action takes place at the lowest end point and is locked by the master key (99) provided to the key bush (106) fixed to the upper portion of the hanging member (2). The bobbin (16) descending along the hanging member (2), immediately after the above-mentioned situation is completed, is received to stop with the small diameter portion (20) of the shoulder of the bobbin by the inclined slide-surface (107') (107'') (107''') formed to a cone-like surface by a set of three rockable elements which are in the open state as shown in Fig. 4A. Receiving gravitation, immediately after the above-mentioned situation, and repeating bit by bit various balancing displacement of the contact points as shown in Fig. 6, the bobbin (16) is sensitively aligned and instantly restored to the original point (A) where is the perfect balanced state. (B), (C) and (D) of Fig. 6 respectively show the unbalanced attitudes of the bobbin (16) immediately after being suspended, and express the typical attitudes in the process of the self-aligning working. (δ) means an eccentric amount. (Each shows as (δ'), (δ'') or (δ''') respectively).

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(A) in Fig. 6 shows the foundational normal suspending attitude which is in the original point. That is to say, the suspending attitude in the state that both center axes (bb') and (PR) of the bobbin (16) and the hanging member (2) are aligned and accorded together by a balancing action of the gravitation and own a common vertical axis (yy'). Each (B), (C) and (D) of Fig. 6 shows the instantaneous change of the attitude in the process of the damping motion for restoration after receiving some external force or immediately after the completion of the bobbin-suspending-operation. (B) in those drawings shows the unbalance state that the bobbin (16) is supported by only one point of the left rockable element, and contrarily, (C) shows the state with only one point of the right rockable element. Also, (D) shows the unbalance state that they are suspended in the state in which both center axes (bb') and (PR) are eccentric. Though those illustrations are simplified to two dimensions in the relation with only two rockable elements, the real aligning action in the radial three-point supporting system according to the present invention is a combined system in three dimensions and in a principle thereof, they are three-dimentionalized. In the device of the present invention, the above-mentioned unstable attitude of the bobbin which is complicatedly suspended, with inclination, or eccentric unbalance, between the center axis (bb') of the bobbin (16) and the center axis (PR) of the hanging member, is not permitted even a moment. That is to say, the restoring forces (t) and (Q) in a direction toward the original point act rapidly and dampingly due to the balancing aligning action by gravitation, the bobbin restores immediately to the state of (A) which is the original point of this device, and the normal attitude is surely kept.

Saying the relation of the construction and the functions of the core which controls opening and closing of the set (7) of the rockable elements according to the present invention, when the core (5) is separated to two pieces of a core per se and a bottom clutch (108) as shown in figures and a spindle portion (105) which is the lower part of the bottom clutch (108) is supported by a step (104) of a core hole perforated to the center of the core (5) in the form of a bearing, the torque resistance can be held down to the minimum and the clutch-changing device can be operated safely and smoothly. Further, a flange (103) is formed at the top of the cylinder in the core (5) and the top surface of the spring (25) for operating the core is supported by the lower end surface of the flange. As a result, the bottom clutch (108) always resists against the spring pressure, and acts in a pressing down direction of the core (5) due to a counteraction against the above pressure. From the above-mentioned relation, the core (5) and the top clutch (101) become the following through the spindle portion (105). That is to say, the most preferable feature is constructed as mentioned below. As to the direction (yy') of the ascent and descent of the core (5), both of them act as one body entirely. As

to the direction of rotating, the core (5) hardly rotates together due to the rotating resistance at the contacting surface with the spring (25). On the contrary, the bottom clutch (108) can begin the smooth rotating motion immediately.

Concerning the construction and feature of the core (5) according to the present invention, such system that the bottom clutch (108) portion and the core (5) are formed to one body entirely, also, is included.

If rockable elements are required to be held stably in a state of normally opened or normally closed when the core (5) shifts to the upper end and the set of the rockable elements is in a state that it can be closed, there are some counterplans, e.g. inserting a compression spring (or elastic elements like as foamed resins) into the center portion of the hanging member, enclosing another magnetized member, magnetizing the rockable elements per se. If those methods are considered, the above-mentioned conditions are surely satisfied and the stable operating feeling is obtained.

Further, in an embodiment of this invention, the rockable suspension and rotational situation in an upper structure of the bobbin holder are formed as follows:

As shown in Fig. 1 and Fig. 2, in two chambers (82) (83) provided on upper and lower portions of the center axis of a pivot housing (204) combined with a top cap (205), the ceiling portion of the inner surface of an upper first chamber (83) is formed to a spherical seating and the neck portion of a clamping bolt inserted with clearance in the first chamber (83) is formed like a hemisphere as shown in the drawings. The clamping bolt (4) and the pivot housing (204) are connected and combined by engaging a neck portion with the spherical seating in relationship of suspending so that they can swing together in a predetermined angle range (about 5°—10°). In that case, by the shape of the lower half portion of the inner surface of the first chamber (83) with a form of a head portion (hexagon, square, or the like) of the clamping bolt (4) and remaining some clearance for rocking at the whole periphery of the inner surface facing against the clamping bolt, a connecting relationship between the clamping bolt (4), the pivot housing (204) and the top cap (205) combined with it, can be in a limitedly connected state in which they become a stopper only in a direction of rotating, while keeping a rockably suspended state. By those construction, a working of mounting or demounting the bobbin holder to a creel becomes very easy, and a suspending attitude of the bobbin holder as a whole can be kept ideally. Further, a lower second chamber (82) is formed to a secondary bearing portion which receives and encloses the neck portion of the upper end of a pivot (202) in a bearing form and is approximately the same as the third chamber (81) formed to a primary bearing portion. The third chamber (81) enclosing the lower end neck portion of the pivot (202) places in the center portion of the body (201) formed with a top clutch (101) in one body

mounted fixedly on the rotor housing (23). The rotor housing (23) is formed so as to slidably suspend the upper periphery of the hanging member (2) from outside in the direction of the axis (yy') and to contain a spring (24). The third chamber (81) forms a primary bearing structure for rotational torque.

The double bearing structure system for rotational torque provided at the symmetric neck portions of the both ends of the bearing pivot (202) which connects the third chamber (81) with the second chamber (82) in rotatable and rockable state, has greatly resulted in improvement of the capacity to the contents of the present invention. That is to say, by adjusting in principle the both draw-out resistance torques to be similar beforehand, when a sudden accident happens in the torque of the one side of them by a some cause (the invasion or pollution by fly waste, dirt, metal, sand and the like), the rotational torque value in practical use can continue an ordinary value, so far as the other maintains a predetermined torque. On the analogy of the actual results that the bearing durability of the single slide bearing of this type passed safely the six millions rotations test under 3 kg load, it is clear that by using the development and the structure of the present invention, the reliability of a bobbin holder for textile machine has been greatly improved to higher stage.

Further, while the above-mentioned rotor housing (23) places at the middle position between different functional structures which exist in the uppermost portion of and the lowest portion of the bobbin holder and connects for suspending them in balanced aligning state, the rotor housing (23) composes the ordinary bearing structure part receiving the neck portion at the lower end of the pivot (202) through the top clutch fixed in the rotor housing (23). On the other hand, the rotor housing (23) guides and controls the reciprocating slide motion of the hanging member (2) at the pushing-up operation of the hanging member for starting of clutch-changing device contained in the hanging member (2), and immediately after the restoration of action, it is combined closely and keeps the aligned suspended state together. At that time, the hanging member (2) and the rotor housing (23) are functionally combined at the taper contact surface which complements the self-alignment efficiency of the bobbin holder of the present invention to a high degree.

The bobbin holder according to this invention can be used as a roving holder for supply of the roving to a textile machine. Also, in a modernized textile mill, this invention has high utility value for rationalization of not only various automatic devices for donning and doffing a bobbin, transferring a bobbin, distributing a bobbin, arranging a bobbin and the like, but also a series of automatic devices from case-packaging to automatic warehouse.

Further, in other industrial fields, this invention can be utilized not only in an automatic device which is analogous to the above-mentioned

device, but also, for example, in a continuous automatic device in a bearing producing factory, from washing, anti-corrosive step to case-packaging.

This invention has a high latent possibility for automatization or continuization in various fields.

Claims

1. Bobbin holder, mainly for a textile machine, comprising a hanging member (2) suspended rotatably and rockably by an upper suspending structure (1), said hanging member being provided with a set of similar and radial extending longitudinal guide grooves (14) offset in equal angles at the lower peripheral surface of said hanging member (2), a set of rockable elements (7) rockable movably provided in a chamber continuing to said grooves, a core (5) axially movable and independently inserted in said chamber so that said core is coaxial with said hanging member, said core (5) being lockable at the upper and lower shifted end position, respectively, and controls projecting and drawing back motions of said rockable elements (7) so that when said bobbin (16) is held, portions of said rockable elements extend radially outwards all together from the guide grooves (14) in different directions, characterized in that said set is composed of three rockable elements (7', 7'', 7''') each have at their lower end a separate rockable axis (31), that there are provided three corresponding guide grooves (14) offset in equal angles, that said bobbin holder has self-aligning suspension in which said bobbin (16) is supported slidably by three radial contacting points at inclined slide-surfaces (107', 107'', 107''') of upper shoulder portions of a surface of a cone-like shape formed by said three rockable elements (7', 7'', 7'''), and that said core (5) in its lower end position is inserted between said rockable elements (7) in order to lock in their outwardly extending position.

2. Bobbin holder as claimed in claim 1, characterized in that at the lower end of each of the three rockable elements (7) a rocking shaft portion (31) is provided and that rockable bearing portions are provided at the bottoms of said guide grooves (14), respectively, each rocking element (7) being inserted rockably in a limited rocking angle range, whereby the set of three rockable elements is constructed in an upwardly open-close form, which are rocked and locked symmetrically similarly in the 120° radial directions (OX₁, OX₂, OX₃) concentric with the axis (yy') of said hanging member (2) by said motion of said core (5) in the abdomen sliding up or down and shifting concentrically and independently.

3. Bobbin holder as claimed in claim 1 or 2, characterized in that vector components of the load against each rockable element (7) and to said core (5) to act to said center axis (yy') perpendicularly and concentrate toward the center. (0) equally in direction of

mounted fixedly on the rotor housing (23). The rotor housing (23) is formed so as to slidably suspend the upper periphery of the hanging member (2) from outside in the direction of the axis (yy') and to contain a spring (24). The third chamber (81) forms a primary bearing structure for rotational torque.

The double bearing structure system for rotational torque provided at the symmetric neck portions of the both ends of the bearing pivot (202) which connects the third chamber (81) with the second chamber (82) in rotatable and rockable state, has greatly resulted in improvement of the capacity to the contents of the present invention. That is to say, by adjusting in principle the both draw-out resistance torques to be similar beforehand, when a sudden accident happens in the torque of the one side of them by a some cause (the invasion or pollution by fly waste, dirt, metal, sand and the like), the rotational torque value in practical use can continue an ordinary value, so far as the other maintains a predetermined torque. On the analogy of the actual results that the bearing durability of the single slide bearing of this type passed safely the six millions rotations test under 3 kg load, it is clear that by using the development and the structure of the present invention, the reliability of a bobbin holder for textile machine has been greatly improved to higher stage.

Further, while the above-mentioned rotor housing (23) places at the middle position between different functional structures which exist in the uppermost portion of and the lowest portion of the bobbin holder and connects for suspending them in balanced aligning state, the rotor housing (23) composes the ordinary bearing structure part receiving the neck portion at the lower end of the pivot (202) through the top clutch fixed in the rotor housing (23). On the other hand, the rotor housing (23) guides and controls the reciprocating slide motion of the hanging member (2) at the pushing-up operation of the hanging member for starting of clutch-changing device contained in the hanging member (2), and immediately after the restoration of action, it is combined closely and keeps the aligned suspended state together. At that time, the hanging member (2) and the rotor housing (23) are functionally combined at the taper contact surface which complements the self-alignment efficiency of the bobbin holder of the present invention to a high degree.

The bobbin holder according to this invention can be used as a roving holder for supply of the roving to a textile machine. Also, in a modernized textile mill, this invention has high utility value for rationalization of not only various automatic devices for donning and doffing a bobbin, transferring a bobbin, distributing a bobbin, arranging a bobbin and the like, but also a series of automatic devices from case-packaging to automatic warehouse.

Further, in other industrial fields, this invention can be utilized not only in an automatic device which is analogous to the above-mentioned

device, but also, for example, in a continuous automatic device in a bearing producing factory, from washing, anti-corrosive step to case-packaging.

This invention has a high latent possibility for automatization or continuization in various fields.

Claims

1. Bobbin holder, mainly for a textile machine, comprising a hanging member (2) suspended rotatably and rockably by an upper suspending structure (1), said hanging member being provided with a set of similar and radial extending longitudinal guide grooves (14) offset in equal angles at the lower peripheral surface of said hanging member (2), a set of rockable elements (7) rockable movably provided in a chamber continuing to said grooves, a core (5) axially movable and independently inserted in said chamber so that said core is coaxial with said hanging member, said core (5) being lockable at the upper and lower shifted end position, respectively, and controls projecting and drawing back motions of said rockable elements (7) so that when said bobbin (16) is held, portions of said rockable elements extend radially outwards all together from the guide grooves (14) in different directions, characterized in that said set is composed of three rockable elements (7', 7'', 7''') each have at their lower end a separate rockable axis (31), that there are provided three corresponding guide grooves (14) offset in equal angles, that said bobbin holder has self-aligning suspension in which said bobbin (16) is supported slidably by three radial contacting points at inclined slide-surfaces (107', 107'', 107''') of upper shoulder portions of a surface of a cone-like shape formed by said three rockable elements (7', 7'', 7'''), and that said core (5) in its lower end position is inserted between said rockable elements (7) in order to lock in their outwardly extending position.

2. Bobbin holder as claimed in claim 1, characterized in that at the lower end of each of the three rockable elements (7) a rocking shaft portion (31) is provided and that rockable bearing portions are provided at the bottoms of said guide grooves (14), respectively, each rocking element (7) being inserted rockably in a limited rocking angle range, whereby the set of three rockable elements is constructed in an upwardly open-close form, which are rocked and locked symmetrically similarly in the 120° radial directions (OX₁, OX₂, OX₃) concentric with the axis (yy') of said hanging member (2) by said motion of said core (5) in the abdomen sliding up or down and shifting concentrically and independently.

3. Bobbin holder as claimed in claim 1 or 2, characterized in that vector components of the load against each rockable element (7) and to said core (5) to act to said center axis (yy') perpendicularly and concentrate toward the center (0) equally in direction of



$\overrightarrow{X_1O}$, $\overrightarrow{X_2O}$ und $\overrightarrow{X_3O}$.

and their composite vector acts for aligning and balancing entirely, at same time, the vector components in the direction of said vertical longitudinal axis (yy') being always zero.

4. Bobbin holder as claimed in any one of claims 1 to 3, characterized in that said core (5) is divided by means of a rotational changing clutch (108) into two segments comprising of an upper structure and a controlling core as a lower structure, both segments act in a limited state like one body together by spring pressure in the directions of shifting up-down concentrically with the hanging member (2) axis (yy'), to the contrary both members hold a relation in which both of them act concentrically and freely together, only in one rotational direction.

5. Bobbin holder as claimed in any one of the preceding claims, characterized in that said bobbin holder being formed by combining and connecting totally an upper suspending structure (1), a middle connecting structure (202) and said lower hanging member (2), all of which have an own rotational axis, that said above-mentioned elements have, when suspended, a common vertical axis ($y-y'$), that said lower hanging member (2) being joined with said connecting structure (202), that both said upper suspending structure (1) and said middle connecting structure (202) being connected by a bearing pivot, that said joined parts at the both ends of said pivot are formed in connecting parts of an independent bearing system, that further a clamping bolt set (4) being inserted at the top portion of the axis of said upper suspending structure (1), whereby in the situation that a bobbin (16) is suspended and working, the balancing action caused by natural gravitation is obtained and all of the peculiar axes of all parts, including said self-aligning suspension (7, 107) of the bobbin (16) converge automatically all together to a common vertical axis ($y-y'$) and that independent torque bearing structure parts (81 and 82) are formed and provided double at said upper suspending structure (1) and said lower hanging member (2) and at symmetric neck positions of both ends of a pivot of said connecting structure (202) in a rockable, suspendable and rotatable state, the rotational torque value of said upper and lower two bearing structure parts (81 and 82) are approximately the same.

6. Bobbin holder as claimed in claim 5, characterized in that said clamping bolt (4) is inserted independently in a pivot housing (204) at the top portion of the axis ($y-y'$) is swivelable and swingable to said upper suspending structure (1) and is formed to an anti-rotatable structure which has some necessary clearance only in a rotational direction.

Patentansprüche

1. Bobinenhalter, besonders für eine Textilmaschine, der ein Hängeteil (2) aufweist, das drehbar

und schwingbar an einer oberen Aufhängung (1) aufgehängt ist, wobei das Hängeteil mit einem Satz von gleichen sich radial erstrecken den in Längsrichtung verlaufenden Führungsnuten (14) versehen ist, die gleichwinklig an der unteren peripheren Fläche des Hängeteils (2) angeordnet sind, und der einen Satz Schwingenelemente (7) aufweist, die schwingbar beweglich in einer an diese Nuten anschliessenden Kammer vorgesehen sind, sowie einen Kern (5), der axial beweglich und unabhängig in dieser Kammer angeordnet ist, so dass dieser Kern coaxial mit dem Hängeteil ist, wobei dieser Kern (5) in den oberen und unteren Endpositionen verriegelbar ist und die Vor- und Rückwärtsbewegungen der Schwingenelemente (7) steuert, sodass, wenn die Bobine (16) gehalten wird, Teile dieser Schwingenelemente sich zusammen radial nach aussen von den Führungsnuten (14) in verschiedenen Richtungen erstrecken, dadurch gekennzeichnet, dass dieser Satz aus drei Schwingenelementen (7', 7'', 7''') besteht, die jeweils an ihrem unteren Ende eine eigene Schwingachse (31) haben, dass drei in gleichen Winkeln versetzte Führungsnuten vorgesehen sind, dass der Bobinenhalter mit einer selbstausrichtenden Aufhängung versehen ist, in der die Bobine (16) gleitend von drei radialen Berührungspunkten an geneigten Gleitflächen (107', 107'', 107''') von oberen Schulterteilen einer konisch geformten Fläche, die durch die drei Schwingenelemente (7', 7'', 7''') gebildet wird, gehalten wird, und dass der Kern (5) in seiner unteren Endstellung zwischen die Schwingenelemente (7) eingeschoben ist, um ihre sich nach aussen erstreckende Stellung zu verriegeln.

2. Bobinenhalter nach Anspruch 1, dadurch gekennzeichnet, dass am unteren Ende jedes der drei Schwingenteile (7) eine Schwingachse (31) vorgesehen ist und dass diese schwingbaren Lagerungsteile an den Böden der Führungsnuten (14) vorgesehen sind, und dass jedes Schwingenteil (7) schwingend in einer begrenzten Schwingwinkelbereich eingeschoben ist, wodurch der Satz der drei Schwingenelemente eine nach oben offene geschlossene Konstruktion erhält, und diese Elemente in gleicher Weise symmetrisch in den radialen 120° Richtungen (OX_1 , OX_2 , OX_3) geschwungen und verriegelt werden, die mit der Achse (yy') des Hängeteils (2) konzentrisch durch die Bewegung des Kerns (5), im Unterteil verläuft, der nach oben und unten gleitet und sich konzentrisch und unabhängig verschiebt.

3. Bobinenhalter nach einem der Ansprüche 1 oder 2, dadurch gekennzeichnet, dass Vektorkomponenten der Last, die auf jedes Schwingenelement (7) und den Kern (5) einwirken, auf die Mittelachse (yy') rechtwinklig einwirken und sich auf den Mittelpunkt (0) gleichmässig in den Richtungen

$\overrightarrow{X_1O}$, $\overrightarrow{X_2O}$ und $\overrightarrow{X_3O}$

konzentrieren und dass ihr Kombinationsvektor gleichzeitig die Vektorkomponenten in der richtung der vertikalen Längsachse (yy'), die immer Null ist, ausrichtet und ausgleicht.



4. Bobinenhalter nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, dass der Kern (5) durch eine Drehkupplung (108) in zwei Segmente unterteilt wird, die eine obere Struktur und einen Steuerkern als untere Struktur aufweisen, wobei beide Segmente in einem begrenzten Zustand durch Federkraft als ein Körper wirken und in den Richtungen der Verschiebung nach oben und nach unten konzentrisch mit der Achse (yy') des Hängeteils (2) zusammenwirken, während beide Teile in einem Verhältnis zueinander stehen, in dem sie konzentrisch und frei nur in einer Drehrichtung zusammenwirken.

5. Bobinenhalter nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, dass dieser Bobinenhalter durch Zusammenfügen einer oberen Aufhängungsstruktur (1) mit einer mittleren Verbindungsstruktur (202) und dem unteren Hängeteil (2) gebildet wird, von denen alle eine eigene Drehachse haben, und dass die vorgenannten Teile, wenn sie aufgehängt sind, eine gemeinsame vertikale Achse (y—y') haben, und dass das untere Hängeteil (2) mit der Verbindungsstruktur (202) verbunden wird, und dass die obere Aufhängung (1) und die mittlere Verbindungsstruktur (20) durch einen Lagerzapfen verbunden werden, und dass die an beiden Enden des Lagerzapfens zusammengefügte Teile als Verbindungsstücke eines unabhängigen Lagersystems geformt sind, und dass weiterhin ein Satz Spannschrauben (4) am oberen Teil der Achse der Aufhängung (1) eingefügt wird, wodurch, wenn eine Bobine (16) herabhängt und arbeitet, eine Ausgleichswirkung durch natürliche Gravitation erreicht wird und alle einzelnen Achsen aller Teile, einschliesslich der selbstausrichtenden Aufhängung (7, 107) der Bobine (16) automatisch in eine gemeinsame vertikale Achse (y—y') konvergieren, und dass einzelne Drehmomentlager (81, 82) geformt und in doppelter Ausführung an der oberen Aufhängung (1) und an dem unteren Hängeteil (2) und an symmetrischen Einschnürungen beider Enden eines Zapfens der Verbindungsstruktur (202) in einem schwingbaren, aufhängbaren und drehbaren Zustand vorgesehen sind, in dem das Drehmoment der beiden oberen und unteren Lagerstrukturen (18, 82) etwa gleich ist.

6. Bobinenhalten nach Anspruch 5, dadurch gekennzeichnet, dass die Spannschraube (4), die einzeln in ein Zapfengehäuse (204) am oberen Teil der Achse (y—y') eingeschoben ist, gegen die obere Aufhängung (1) schwenkbar und an einer nicht drehbaren Struktur ausgebildet ist, die nur in Drehrichtung ein gewisses Spiel aufweist.

Revendications

1. Support de bobine, en particulier pour une machine textile, comprenant un élément suspendu (2) fixé de manière rotative et pivotante à une structure supérieure de suspension (1), ledit élément suspendu étant muni d'un jeu de gorges de guidage longitudinales (14) similaires et radialement disposées équiangulairement à la pé-

phérie inférieure dudit élément suspendu (2), comprenant également un jeu d'éléments basculables (7) disposés dans une chambre contigüe auxdites gorges, et un noyau (5) axialement déplaçable et intégré séparément dans ladite chambre afin de rendre ce noyau coaxial audit élément suspendu, ledit noyau (5) pouvant être verrouillé aux positions limites de déplacement supérieure et inférieure et il contrôle les mouvements de va-et-vient des éléments basculables (7) afin que, lorsque la bobine (16) est maintenue, des parties desdits éléments basculables s'écartent ensemble radialement vers l'extérieur dans différentes directions par rapport aux gorges de guide (14), caractérisé en ce que ledit jeu est composé de trois éléments basculables (7', 7'', 7''') chacun comportant à son extrémité inférieure un pivot (31) individuel, et qu'il est prévu trois gorges de guidage (14) équiangulairement disposées, et que la suspension dudit support de bobine est à alignement automatique et reçoit la bobine (16) de manière coulissante sur trois points de contact radiaux prévus sur des surfaces inclinées (107', 107'', 107''') d'un épaulement supérieur d'une surface conique formée par les trois éléments basculables (7', 7'', 7'''), et que dans sa position limite inférieure ledit noyau (5) est disposé entre les éléments basculables (7) afin de les verrouiller dans leur position extérieure.

2. Support de bobine suivant la revendication 1, caractérisé en ce que à l'extrémité inférieure de chacun des trois éléments basculables (7) est prévu un pivot (31), et que des appuis pivotants sont prévus au fond des gorges de guidage (14), et que chaque élément basculable (7) est inséré dans une gamme basculable limitée ce qui assure une conception des éléments basculables s'ouvrant et se fermant à la partie supérieure, ces éléments basculables étant pivotés et verrouillés de manière symétrique à 120° dans les directions radiales (OX₁, OX₂, OX₃) et concentriquement à l'axe (yy') de l'élément suspendu (2) par le mouvement du noyau (5) coulissant réciproquement vers le haut et le bas dans la partie inférieure et se déplaçant de manière concentrique et indépendante.

3. Support de bobine suivant l'une des revendications 1 ou 2, caractérisé en ce que des composantes vectorielles de la charge agissant sur chacun des éléments basculables (7) et sur le noyau (5) centrent l'axe (yy') perpendiculairement et se concentrent au centre (0) de manière équivalente dans les directions

$$\overrightarrow{X_1O}, \overrightarrow{X_2O} \text{ et } \overrightarrow{X_3O}$$

tandisque, au même moment, leur vector composite aligne et équilibre entièrement les composantes vectorielles dans la direction de l'axe verticale longitudinale (yy') qui est toujours zéro.

4. Support de bobine suivant l'une des revendications 1 à 3, caractérisé en ce que le noyau (5) est divisé au moyen d'un accouplement (108) en deux segments composés d'une structure supérieure et d'un noyau de contrôle en tant que



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structure inférieure, les deux segments agissant dans un état limité comme un corps unique sous effort élastique dans les directions de déplacement haut est bas de manière concentrique à l'axe (yy') de l'élément suspendu (2), tandis que les deux parties sont engagées dans une relation l'une par rapport à l'autre dans laquelle elles coopèrent concentriquement et librement uniquement dans une seule direction de rotation.

5. Support de bobine suivant l'une ou l'autre des revendications précédentes, caractérisé en ce que ledit support de bobine est formé en combinant et joignant totalement une structure de suspension supérieure (1), une structure centrale de liaison (202) et ledit élément suspendu inférieur (2), tous ces éléments ayant leur propre axe de rotation, et que, lorsqu'ils sont suspendus, les éléments ci-dessus ont un axe vertical (y—y') commun, que l'élément suspendu inférieur (2) est fixé à la structure de liaison (202), que la structure de suspension supérieure (1) et la structure centrale de liaison (202) sont liées par un axe de pivot, que les parties liées aux deux extrémités dudit pivot forment un système de support indépendant, et que un jeu de vis de serrage (4) est inséré à la partie supérieure de l'axe de ladite

structure de suspension supérieure (1), ce qui fait que, lorsque la bobine (16) est suspendue et travaille, il est obtenu un effet d'équilibrage causé par de la gravitation naturelle, et l'ensemble des axes individuels de toutes les pièces, y compris la suspension auto-alignante (7, 107) de la bobine, convergent automatiquement en un axe vertical (y—y') commun, et que des coussinets de pivotement (81 et 82) sont prévus en double à la structure de suspension supérieure (1) et à l'élément suspendu inférieur (2) et à des positions symétriques d'étranglement aux deux extrémités d'un pivot de la structure de liaison (202) dans un état pivotable, suspendu et rotatif, la valeur du couple de rotation des deux coussinets de pivotement (81 et 82) supérieur et inférieur étant approximativement la même.

6. Support de bobine suivant la revendication 5, caractérisé en ce que la vis de serrage (4) insérée individuellement dans un boîtier de pivot (204) prévu à la partie supérieure de l'axe (y—y'), est pivotable et orientable vers ladite structure de suspension supérieure (1) et a la forme d'une structure anti-rotative avec un certain jeu uniquement dans la direction de rotation.

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