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(54) **BOBBIN HOLDER.**

(57) A bobbin holder in such a structure that tension to draw the roving can be kept constant by employing a slide bearing system, while noticing that bobbin-turning torque required for drawing the roving and roving bobbin load are proportional to the radius of the roving bobbin, so that braking torque (in equilibrium with torque for turning the bobbin) to act on the bobbin may consist of a friction force on the basis of weight of the roving bobbin and said braking torque may be variably adjusted with the bore diameter of said bearing and (or) frictional coefficient changed for combination, wherein major components are a narrow window opening (10H) as a bearing hole of a pivot housing (101) provided on the fixed part of the bobbin holder (BH) and a pivot (606) as a shaft for supporting the weight of the rotating part including a roving bobbin (Rb) and lying around said small opening (10H), in which the pivot housing (101) is in the shape of, for example, a cylinder equally divided into two segments each capable of being changed for combination.

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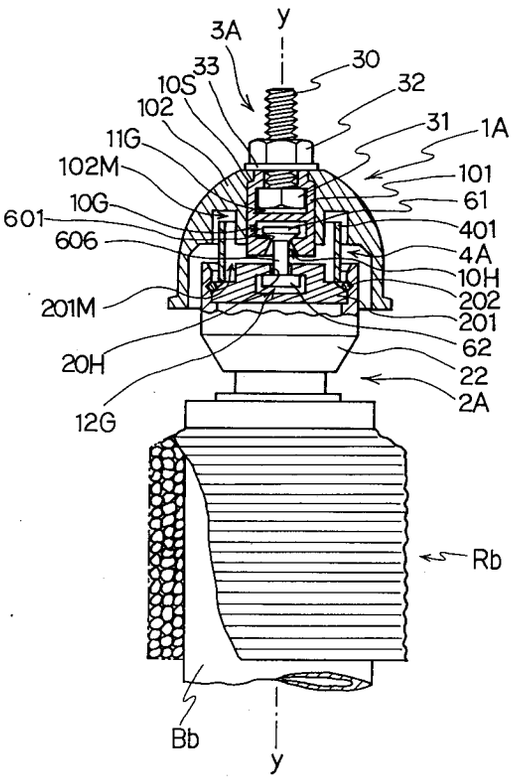
FIG. 1


y
3A
30
33
32
10S
102
31
1A
11G
102M
101
10G
61
601
401
606
4A
10H
202
201M
201
62
20H
22
2A
12G
Rb
Bb
y

TECHNICAL FIELD

The present invention relates to a bobbin holder. More particularly, it relates to a bobbin holder which is a principal functional part indispensable for roving and spinning processes in a spinning factory.

BACKGROUND ART

A conventional bobbin holder is of the structure wherein a rolling contact bearing structure portion of which the bearing itself is adapted to have a rotating-resistant value of substantially 0 is disposed axially of the bobbine holder; and a "braking mechanism", adapted to make a brake shoe 7Bd (see Fig. 7) to press against a rotating part by means of a coiled spring 3Bp separately provided, is provided with the bearing portion. Accordingly, unless the pressing force by the coiled spring is changed, the braking-torque b•k on the bearing side is substantially constant, where b is produced by multiplying the pressing force by a friction coefficient μ; k is the distance from the rotation center of the rotation part to the point of action of frictional force.

Thus, in view of the fact that T•R = b•k, or the braking-torque b•k on the bearing side maintains a close equivalence to the rotating-torque R•T on the roving bobbin side, which exerts on the rotating part as roving is withdrawn, the roving withdrawing-tension T increases in inverse proportion to a decrease in the outer radius R of a roving bobbin due to withdrawing of roving. This results in the so-called "two dimensional relation" between T and R. Practically, with roving bobbins now available, the radius R_f of a full bobbin is 3 to 6 times larger than the radius Ro of the empty bobbin. Accordingly, even if the roving withdrawing-tension T_f with a full bobbin (radius R_f) is set at 2.0g., the roving withdrawing-tension T_o with the empty bobbin (radius R_o) amounts really up to 6 to 12g., which exposes a defect of going far out of the optimum allowance (3.0 ± 1g.) according to spinning technology.

As shown in Fig. 7, in the conventional bobbin holder the space 4B in the periphery of the bearing portion is narrowed by being substantially filled with the bearing structure. A fly involving dust dragged into the space one after another is piled up and up, and finally, lead to a fatal phenomenon such that they are tightly wound around a pivot member 3Br. Further, reciprocating shock load produced by doffing and donning operation of a bobbin causes steel balls 5B to hit and damage upper and lower raceways 22R and 35R, and the hit damage progresses every time the doffing and donning operation of a bobbin is carried out. Thus, the factors accounting for a fatal defect acts synergetically, and a braking-torque is accumulatedly increased from the value initially set, resulting in a marked and continuative rise in the braking-torque b•k on the bearing side in an unexpectedly short period (1 to 2 years). This leads to an extreme reduction in effective life of the bobbin holder BH and to a sharp increase in problems which are fatal to both the quality of yarn and the productive operation. With the prior art, it is already hard to solve these problems, and particularly it is now impossible to automatize production steps, make them continuous and obtain finer and higher-grade yarn.

DISCLOSURE OF THE INVENTION

There is a close negative correlation between the twist coefficient of roving being supplied and the drafting characteristic of a spinning machine. Accordingly, a subject matter which should be urgently achieved for improving and stabilizing the quality of spun yarn is to develop a bearing structure capable of constantly and proportionally feeding relaxedly twisted roving at the very limit of allowance, with an appropriate tension for a long period of time. According to reliable data obtained from the group equipped with spindles in a scale of about ten thousand spindles, an expected value of roving withdrawing-tension T in each spindle or between spindles each other is restricted within the range of 3.0 ± 1.0g. throughout all counts of spun yarn and throughout all the kinds of spinning products. The main object of the present invention is to realize a novel bearing structure provided with a function capable of meeting above-mentioned technical requirement and put it to practical use, and to establish a comprehensive and rational system related to production or assembly, adjustment, maintenance, protection and the like.

A so-called "thrust bearing method based on sliding-contact" according to the present invention is based on a property such that the "rotational friction torque B•K" varies in proportion with an increase or decrease in a load P of rotating part (hereinafter referred to as "roving bobbin weight"), which load consists mainly of the weight of a roving bobbin varying in proportion to the radius R of the roving bobbin. Further, the sliding-contact thrust bearing possesses novel features while utilizing the related arts disclosed in Japanese Patents Nos. 996924 and 995381, Japanese Patent Application No. 162304/1984 and the like which are associated with the present invention. Thus, the method has been intensively developed as a highly innovative art. By virtue of the present invention, a way has been opened for application of a braking property inherent to the sliding-contact

thrust bearing to a bobbin holder BH, while a basic system has been accomplished for enhancing the reliability of bearing function of the bobbin holder BH to the highest level.

Thus, according to the present invention, there is provided a bobbin holder comprising a rotatable portion which is rotated by a bobbin-rotating-torque T•R varying in proportion with variation in the radius of a roving bobbin as the roving is withdrawn from the roving bobbin while suspending the roving bobbin (refer to Fig. 1), a fixing portion for fixing the bobbin holder to a creel bar or the like, and a suspending mechanism for rotatably and pivotally suspending the rotatable portion from the fixing portion,

wherein the suspending mechanism comprises a pivot member having a partially conical step portion formed at least in either of the rotatable portion and the fixing portion, and an engaging bore formed in the other of the two for engaging with the partially conical step portion to support the weight P of the rotatable portion (roving bobbin weight) so as to generate a frictional force proportional to the roving bobbin weight P in cooperation with the partially conical step portion, thereby generating a braking-torque B•K working on the rotatable portion and varying in proportion with an increase or decrease in the roving bobbin weight P proportional to the radius R of the roving bobbin, the bobbin-rotating torque T•R being well-balanced with the braking-torque B•K such that a roving withdrawing-tension T always becomes substantially constant.

Further, the bobbin holder of the present invention is so arranged that at least a portion of a member constituting the periphery of the engaging bore is made appropriately replaceable so as to enable to alter the bore of the engaging bore as far as the pivot member is engageable therewith and/or in a coefficient of friction of the member constituting the periphery of the engaging bore, whereby the braking-torque B•K can be variably adjusted.

To realize such arrangement, developed is, for example, a "selective combination (or recombination) mating system" based on an originally-devised semi-cylindrical bearing member which is formed of, a bisected and molded half so that the bore-diameter of the bearing (engaging bore) can be properly altered as far as the pivot member can be engaged therewith, while at the same time the coefficient of friction can be properly selected, whereby a bearing arrangement capable of setting stepwise the braking-torque B•K of the sliding-contact bearing to a desired level is completed. With the bearing arrangement, the urgent subject matter, or variably setting the tension of roving being supplied has been attained.

According to Couloms' law, the braking-torque B•K in the "sliding-contact thrust bearing" of the present invention is represented by the following equation (1):

$$B \cdot K = P \cdot d/2 \cdot \mu \quad (1)$$

Further, since the rotating torque T•R applied to the rotatable portion because of withdrawing of the roving from the surface of the roving bobbin Bb having radius R (refer to Fig. 1) maintains a perfect equilibrium with the braking-torque B•K, the following equation (2) is valid:

$$T \cdot R = P \cdot d/2 \cdot \mu \quad (2)$$

Here, making the value $d/2 \cdot \mu$ constant (hereinafter referred to as "resistance coefficient K") leads to the following equation (3) with respect to the roving withdrawing-tension T:

$$T = P/R \cdot K \quad (3)$$

On the other hand, since the roving bobbin weight P continues to decrease gradually in proportion with a gradual decrease in the radius R of the roving bobbin due to withdrawing of the roving, the ratio of P to R (P/R) can be considered to be substantially constant. Accordingly, throughout the process from when the roving bobbin is full (the radius of the roving bobbin is R_f) to when it is empty (the radius of the roving bobbin is R_o),the roving withdrawing-tension T can be set specific and constant.

In addition to the above function, these has been realized means capable of easily and rationally specifying or adjusting the value K ($K = d/2 \cdot \mu$) in the equation (3) for setting the roving withdrawing-tension T to a desired value by providing a bearing member having a bore-diameter d of the engaging bore of the bearing side which can be altered within the range allowing engagement with the pivot member having a predetermined diameter, and a friction coefficient μ inherent to the bearing member, for example, semi-cylindrical and molded halves having the same bore-diameter d and same or different friction coefficient μ.

As will be described with reference to Fig. 3, in the bobbin holder of the present invention, the roving withdrawing-tension T has a so-called "three dimensional relation" with the bore-diameter d of the engaging bore on the bearing side and the friction coefficient μ of the bearing member serving as a parameters. Fig. 3 is a schematic diagram showing an example of characteristic graph providing as an aim for setting conditions for functions of the bearing member, wherein an em-

pirical value "braking – torque coefficient OB (OB = $\tan\theta$ = P/R•μ)" is represented in a coordinate system in which bore – diameter d of the bearing member is represented in terms of X – axis while the roving withdrawing – tension T is represented in term of Y – axis.

When a bearing bore – diameter d_1 is to be determined for basically setting a roving withdrawing – tension T_{11} on the basis of this graph, a line $T_{11} - C_{11}$ is drawn parallel to the X – axis from T_{11}, and a point of intersection C_{11} of the line $T_{11} - C_{11}$ with an oblique line OB_1 represent – ing a friction coefficient initially selected is or – thogonally projected on the X – axis to find the bearing bore – diameter d_1.

In turn, when a braking – torque value is to be fine – adjusted by replacing one of the two semi – cylindrical and molded halves sharing the bearing bore thus determined with another one to alter only the braking – torque coefficient inherent to the bearing member from $\tan\theta 1$ to $\tan\theta 2$, a line seg – ment $d_1 - c_{11}$ is extended to give a line segment $d_1 - c_{12}$, and a point of intersection c_{12} of the line segment $d_1 - c_{12}$ with an oblique line OB_2 is or – thogonally projected on the Y – axis to find a point T_{12} which is a roving withdrawing – tension T_{12} resulting from the fine adjustment. Other adjust – ments are achieved likewise. Thus, as a result of the present invention, a selection system has been prepared and established for arbitrary and stepwise adjustment to keep the roving withdrawing – tension T constant.

Further, in the present invention, a space large enough is formed in the periphery of the bearing member, and an originally – devised dustproof band area composed of rotatable and concen – trically partitioned spaces is provided in the space for assuredly protecting the bearing function for a long period (10 years or more). Specifically, formed is a circular annular space with the suspending mechanism assuming the axis thereof, which space comprises an upper circular annular groove formed in a top of an inner wall of the fixing portion of the bobbin holder and a lower circular annular groove formed in a top end of the rotatable portion, which grooves face vertically opposite to each other in a substantially symmetrical relation; and put freely in the circular annular space and on the bottom of the lower circular annular groove is a dustproof cyl – inder substantially isolating the suspending mechanism from the outside of the bobbin holder, both upper and lower portions of which ring are overlapped remaining a clearance with the above – mentioned two grooves. The dustproof ring com – pletely embraces the suspending mechanism while concentrically partitioning the circular annular space into a plurality of spaces.

It has been verified that this structure pos – sesses an outstanding dustproof effect based on an active dust – collecting phenomenon by interwin – ding of fly going toward the bearing portion; that is, for example, shown in Fig. 2, fly and dust coming into a peripheral space a gathers other fly to form matted and ball – like – shaped matters having a dust – collecting – effect while a suspended rotor 2A rotates slowly, and most of the ball – like – shaped matters remain in the chamber a with the help of a thin cylinder 401, and the same dust collecting phenomenon as the above also behaves in next spaces b_1 and b_2.

It should be noted that a coiled spring 402 can be mounted in the space to incorporate a braking mechanism for a special purpose into the ar – rangement of the invention (refer to Fig. 2). In this case the upper and lower parallel faces are adaped to effectively serves as friction faces.

In the bobbin holder of the present invention, realized is connecting means allowing easy doffing and donning and capable of remarkably improving the durability and close fitting property of the con – necting portion.

Specifically, in the constitution of the connect – ing means, the rotatable portion of the bobbin holder comprises a suspended body for suspend – ing the bobbin, which suspened rotor has a cylin – drical chamber opened in a top end thereof, a substantially cylindrical block fitted into the cylin – drical chamber, a circular annular recess, sub – stantially rectangular in section, of which three sides are formed of a slope formed on the entire outer circumference of the block at the upper edge thereof and a groove of V – shaped section formed on the entire inner circumference of the cylindrical chamber at a location corresponding to the slope, and a C – shaped snap ring resiliently closely fitted into the circular annular recess, whereby the weight of the rotatable portion is uniformly dispersed over the entire circumference of the C – shaped snap ring, while the three parts (the suspended rotor, the block and the C – shaped snap ring) are integrated using the weight of the rotatable portion exquisitely to make the connection secured and close.

BRIEF EXPLANATION OF THE DRAWINGS

Fig. 1 is a sectional view showing an embodi – ment of a sliding – contact thrust bearing struc – ture in a bobbin holder of the present invention;

Fig. 2 is a sectional view showing another em – bodiment of a sliding – contact thrust bearing in a bobbin holder of the present invention, wherein a rotatable isolation band area com – posed of self – cleaning partitioned chambers, and the pivot shown in Fig. 1 is invertedly pro – vided;

Fig. 3 is a schematic diagram showing the correlation among roving withdrawing-tension T, bearing bore-diameter d and friction coefficient μ of a bearing member, based on which are set functional conditions associated with the bearing member in the bobbin holder shown in Fig. 1;
Fig. 4 is a plan view showing an original C-shaped snap ring for use in a bobbin holder of the present invention;
Fig. 5 is a sectional view showing an example of a integrated structure using the C-shaped snap ring showin in Fig. 4;
Fig. 6 is a sectional view for illustrating vector distribution of the force exerted inside the integrated structure shown in Fig. 5 by the load applied to the rotatable portion and a balanced condition of the vector distribution;
Fig. 7 is a sectional view showing an example of a conventional bearing arrangement based solely on rolling contact system and provided with a braking mechanism.

DENOTATION OF NUMERALS

1A
upper structure
2A
suspended rotor
3A
bolt for mounting to a creel
4A
space in the periphery of the bearing
61
pivot head
62
pivot base
d_S
diameter of a wire forming a snap ring
D_H
inside diameter of the top portion of a cylinder
D_S
operative diameter of a snap ring
D_C
free diameter of a snap ring
T
roving withdrawing-tension
d
bearing bore-diameter
P
roving bobbin weight
F
internal force
OB
braking-torque coefficient ($\tan\theta$)
a, b_1, b_2 and c
annular dustproof spaces
Bb
bobbin
BH
bobbin holder
Rb
roving bobbin
101
pivot housing
102
top cap
201
block
202
C-shaped snap ring
303
junction pin
401
thin cylinder
402
brake spring
601
circumferential contacting face
606
pivot
10G
intermediate chamber
11G
upper chamber
12G
lower chamber
10H
small bore of intermediate chamber
20H
small bore of lower chamber
20E
section of a wire forming C-shaped snap ring
22G
V-shaped groove
22U
annular recess
102M
upper circular annular groove
202M
lower circular annular groove

BEST MODE FOR EFFECTING THE INVENTION

The present invention will be described in detail by way of an embodiment with reference to the drawings.

In the present invention, a conventional bearing structure and its peripheral space is modified and converted into a novel "original thrust bearing structure based on a sliding-contact method" thereby radically improving functional characteristics of the bearing itself. Referring to Fig. 1, an upper structure 1A comprises an assembled construction wherein a bolt 30 and a thrust bearing (hereinafter referred to as "pivot") 606 are made separate and independent according to a new idea,

and coaxially and jointedly housed in a coupler (hereinafter referred to as "pivot housing") 101 comprising an original bearing member composed of bisected and molded halves.

In detail, the pivot housing 101 is formed by mating two bisected cylindrical and molded members obtained by splitting a cylindrical member along the axis thereof. In the body of the pivot housing 101, an upper chamber 11G and an intermediate chamber 10G are coaxially and serially formed. The upper chamber 11G accommodates a bolt head 31 fixedly, while the intermediate chamber 10G accomodates rotatably and pivotally the upper end of the pivot 606, or the pivot head 61 shaped to have a conical or a similarly curved surface, whereby a bolt 3A and the pivot 606 are coaxially jointed with each other with intervention of the pivot housing 101. The pivot housing 101 is pressed from below to fit into a top cap 102 along the axis y – y of the top cap 102, and further, the top cap 102 and the pivot housing 101 are fastened by means of a bolt 30, a washer 33 and a nut 32 to integratedly form the upper structure 1A. In a lower structure, on the other side, a lower chamber 12G, which is digged in the center of a block 201 disposed on the top of a suspended rotor 2A, accommodates an enlarged bottom base 62 of the pivot 606 along a small window 20H opening extending upwardly and coaxially with the axis y – y. When the bobbin holder HB thus constructed is suspended from the creel, the suspended rotor 2A is completely suspended and holded through the pivot 606 of which the head 61 is embraced in the intermediate chamber 10G of the pivot housing 101, and a frictional force is generated between a circumferential contacting face 601 of the bearing bore having a predetermined bore – diameter d and formed in the center of the bottom of the intermediate chamber and the conical face of the pivot head 61 of the pivot 606, whereby the braking – torque ($B \cdot K = P \cdot d/2 \cdot \mu$) which is inherent to "sliding – contact bearing structure", completely works.

In this case, although the block 201 defining the lower chamber 12G can be of the monolithic type or the bisected type, the latter is preferable in view of superior effectiveness and convenience in function, molding and assembling. The top end face of the lower chamber 12G can be made substantially conical for allowing pivotal movement thereat. In addition, it is also possible to form a bearing structure wherein the lower and intermediate chambers 2G, 10G shown in Fig. 1 are inversed as shown in Fig. 2. Otherwise, it has been verified that the bearing structure, wherein the lower chamber 12G is made similar in shape to the intermediate chamber 10G; the chambers 12G, 10G share the pivot 606 of which opposite ends are made similar each other in shape; and two rotatable and slidable portions are coaxially disposed one above the other, is optimal for use as the bearing in the bobbin holder BH. That is because either smaller one in generated frictional force of the two rotatable and slidable portions, slides and rotates, and if there occures an increase in the frictional force exerting on the sliding and rotating portion by some reason, the other portion begins to slide and rotate in compensation for the former, thereby maintaining the braking – torque constant.

Fig. 5 shows an embodiment of an original arrangement for fixedly and closely integrating a predetermined portion of a cylinder 22 formed in the top portion of the suspended rotor 2A with the block 201 fitted into the cylinder 22 from above. A conical face G_1 formed on the shoulder of the block 201 and a V – shaped groove 22G formed in the inner wall of the cylinder 22 so as to cross the axis y – y at right angles cooperate to share the lower edge portion G_2 thereof and form an annular recess 22U having a rectangular section (formed of three faces G_1, G_3 and G_4) of which the bottom face G_3 is made to have a width equivalent to the diameter d_S of a wire forming a C – shaped snap ring 202 (refer to Fig. 4) to be described later. The C – shaped snap ring 202 originally formed of the wire having the diameter d_S has a free outer diameter D_c (outer diameter in unforced condition) and is fitted into the annular recess 22U along the inner wall of the cylinder while being bent so as to reduce the free outer diameter D_c, whereby a structure wherein the cylinder 22, the block 201 and the C – shaped snap ring 202 are closely integrated each other can be implemented with well – balancing in terms of vectors of the internal force working on the three orthogonally crossed circumferential faces including the two circumferential slopes G_1 and G_4 of the annular recess 22U and the bottom circumferential face G_3 according to statics principle.

The outer diameter D_S of the C – shaped snap ring 202 when fitted into the annular recess 22U is substantially the sum of the inner diameter D_H of the cylinder 22 and the wire diameter of the C – shaped snap ring d_S and made the same or smaller than the free diameter D_c, or $D_c \geqq D_S \fallingdotseq D_H + d_S$.

With such structure, a close integration and secured coupling of the suspended rotor 2A, the block 201 and the C – shaped snap ring 202 can be obtained with skillfully utilizing the roving bobbin weight P.

Fig. 6 is a sectional view illustrating a vector distribution of the force derived from the roving bobbin weight P and exerting on the pressure – contacted circumferential faces G_1, G_3 and G_4 shown in Fig. 5. Specifically, it shows a well –

balanced distribution of vector F derived from the roving bobbin weight P in terms of orthogonal coordinate system X – Y passing through the three pressure – contact points P_1, P_2 and P_3 with the center O of the cross section of the wire forming the C – shaped snap ring 202 assumed as the original. Another internal force F_o working on the point O which is derived from the restoring force of the C – shaped snap ring 202 causes the ring 202 to be assuredly closely fitted into the annular recess 22U and will not permit it to come out of the recess 22U even when the roving bobbin weight P of roving is not imposed.

Fig. 2 shows an embodiment of an originally – arranged dustproof structure in the present invention which exhibits a high effect of preventing entrance of fly and dust toward the bearing. The inner top end face of the top cap 102 and the top end face of the suspended rotor 2A face opposite and parallel to each other horizontally. The two faces are formed with upper and lower circular annular grooves 102M and 201M with the axis y – y assuming a center thereof, respectively. The two circular annular grooves 102M and 201M are disposed substantially vertically symmetric so as to define a space around the bearing portion with the pivot 606 assumed as an axis. In the space, there is freely put a thin cylinder 401 having a predetermined height for remaining a gap between a top end of the cylinder 401 and a ceiling of the upper circular annular groove 102M. Thereby, the upper and lower portions of the cylinder 401 are overlapped remaining a clearance with the upper and lower circular annular grooves 102M and 201M, respectively. The circumferental wall of the thin cylinder 401 slowly rotating in the space around the pivot 606 and the un – rotating wall (inner wall of the top cap 102) facing opposite thereto define concentrically partitioned dustproof spaces a, b_1, b_2 and c which causes the fly to interwind. The dustproof spaces form an annular dustproof band area which encloses the bearing structure and actively prevents from and cuts off the ambient atmosphere with well – utilizing the interwinding phenomenon of the fly.

APPLICABILITY TO INDUSTRY

The functional innovation of the bearing portion in the bobbin holder of the present invention remarkably contributes to improvement in a bobbin holder itself. That is, it has been verified that dispersion of the roving withdrawing – tension T in a spindle or between spindles is stably confined to the range of ± 0.5g with respect to a specific standard value for a long period (semipermanently according to practical experiments). Particularly, it is worth noting the results of the invention such that has been realized a safe, sure and stable feeding of extra relaxedly twisted roving and extra fine roving which has heretofore been considered to be practically impossible.

In pursuit of steadily matching with the progress of rationalization of a equipment in spinning factories such as larger package, higher speed, further automatization, further continuous operations and so forth, the present invenion opens the door for higher technology and is expected, at present, to highly contribute to overall technology, in other words, to improve the quality of yarn, stabilize the operations and enhance the serviceability ratio of new equipement. More specifically speaking,

(1) It has practically been verified that the present invention enables to marvelously prolong the effective life of a bearing to a semipermanent period by a remarkably enhanced bearing capability for load, highly improved durability, increased reliability and safety to a marked level, and an excellent tenacity along with a restorability against operational shock load to a bobbin;

(2) A bobbin holder of "maintenance free" for a long period (15 years or more) has been realized by additionally providing an orignally – devised superior fly proof structure to avoid fatal deterioration of bearing functions;

(3) Roving withdrawing – tension control in a factory can be completely intensified by rationally optimizing the roving withdrawing – tension T with ease as well as by the previous items (1) and (2);

(4) Indefinite contribution to cost reduction has been made by rationalizing and simplfying the bearing arrangement thereby promoting normalization and standardization for more general purposes, as well as by enabling automatization of assembly of parts;

(5) The integrated structure by means of an originally – devised C – shaped snap ring possesses load dispersing effect based on the balance of force and is hence far superior in all properties such as load characteristic, durability as well as convenience, safety and reliability to a conventional structure by means of pin 303, calking or the like. Therefore, it is expected from now on to be applied to general industrial fields, particularly to a plastic molding field broadly; and

(6) The results of the present invention are not limited to the application herein described, and can be widely utilized as a precise bearing for special purpose in general industrial machines or devices (electronic devices, especially).

Claims

1. A bobbin holder comprising a rotatable portion which is rotated by a bobbin-rotating-torque (T•R) varying in proportion with a variation in the outer diameter of a roving bobbin as the roving is withdrawn from the roving bobbin while suspending the bobbin, a portion for setting the bobbin holder to a suspension creel or the like, and a suspending mechanism for rotatably and pivotally suspending a rotatable portion from the setting portion, wherein the suspending mechanism comprises a pivot member having a partially conical step portion formed at least in any one of the rotatable portion and the setting portion, and an engaging bore formed in the other of the two for engaging with the partially conical step portion to support weight (P) of the rotatable portion so as to generate a frictional force proportional to the weight (P) of the rotatable portion, in cooperation with the partially conical step portion, thereby generating a braking-torque (B•K) working on the rotatable portion and varying in proportion to an increase or decrease in the weight (P) proportional to the radius (R) of the roving bobbin; and wherein at least a portion of a member constituting the periphery of the engaging bore is made properly replaceable so as to enable alteration or adjustment in the bore-diameter (d) of the engaging bore as far as the pivot member is engageable therewith and/or in the coefficient of friction (μ) of the member constituting the periphery of the engaging bore,

   whereby the bobbin-rotating torque (T•R) is made well-balanced with the braking-torque (B•K) such that a roving withdrawing-tension (T) is always made substantially constant.

2. A bobbin holder of claim 1, wherein a circular annular space of which the axis is assumed by said suspension mechanism is defined by an upper circular annular groove formed in a top inner wall of the fixing portion and a lower circular annular groove formed in a top end face of said rotatable portion, which grooves face vertically opposite to each other in a substantially symmetrical relation; and wherein a dustproof cylinder for substantially isolating the suspending mechanism from the outside of the bobbin holder is put freely maintaining in the circular annular space and on the bottom of the lower circular annular groove of the rotatable portion and both upper and lower portions of which cylinder are overlapped remaining a clearance with the two grooves, and which cylinder completely embraces the suspending mechanism while partitioning the circular annular space into a plurality of spaces.

3. A bobbin holder of claim 1, wherein said rotatable portion comprises a suspended body for suspending the bobbin which has a cylindrical partitioned chamber opened in a top end face of the suspended body, a substantially cylindrical block fitted into the cylindrical partitoned chamber, a circular annular recess, substantially rectangular in section, of which three sides are formed of a substantially sloping face formed on the entire outer circumference of the block at the upper edge thereof and a groove of a substantially V-shaped section formed on the entire inner circumference of the clylindrical partitioned chamber at a location coincident with the sloping face, and a C-shaped snap ring made of a wire material and resiliently closely fitted into the circular annular recess.

FIG. 1

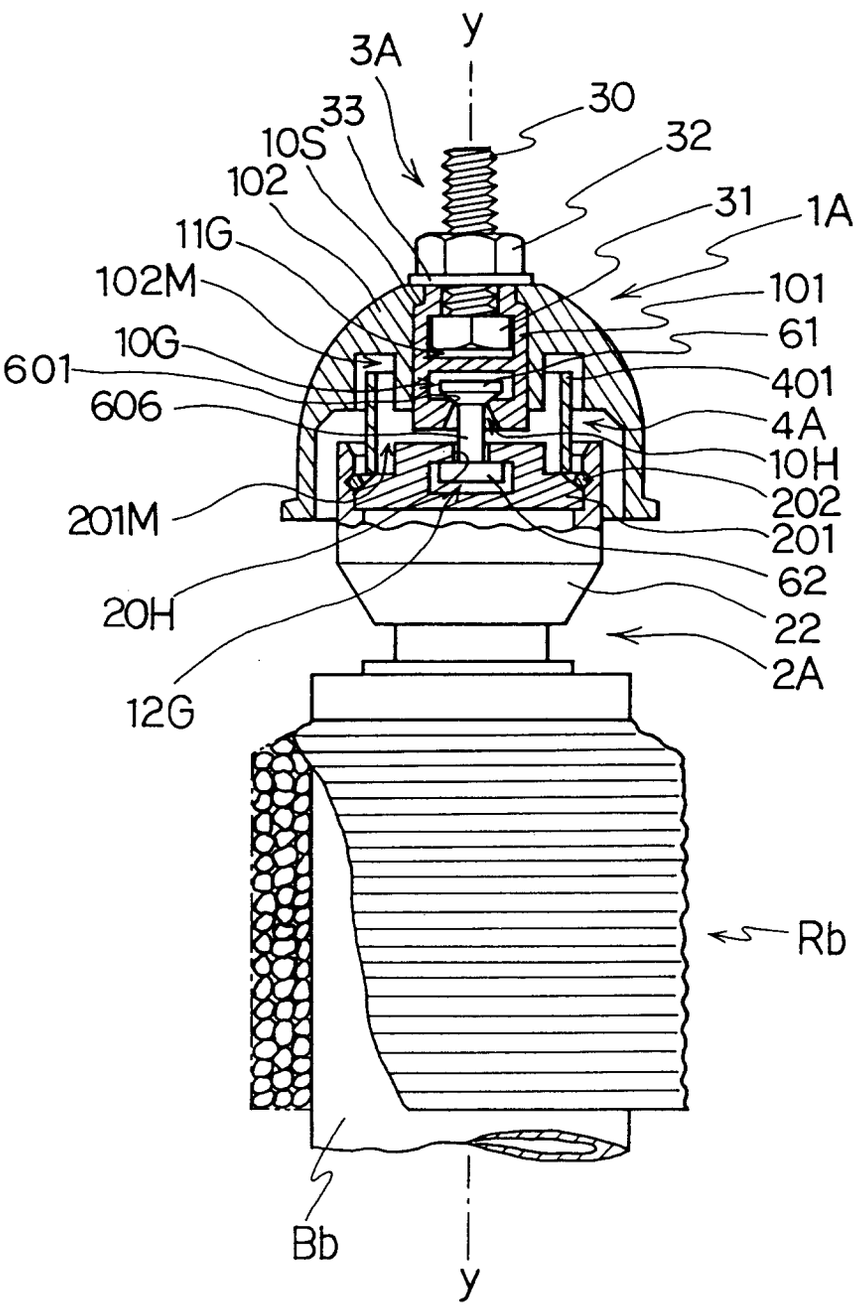

y
3A
30
33
32
10S
102
31
1A
11G
102M
101
61
10G
601
401
606
4A
10H
202
201M
201
62
20H
22
2A
12G
Rb
Bb
y

FIG. 2

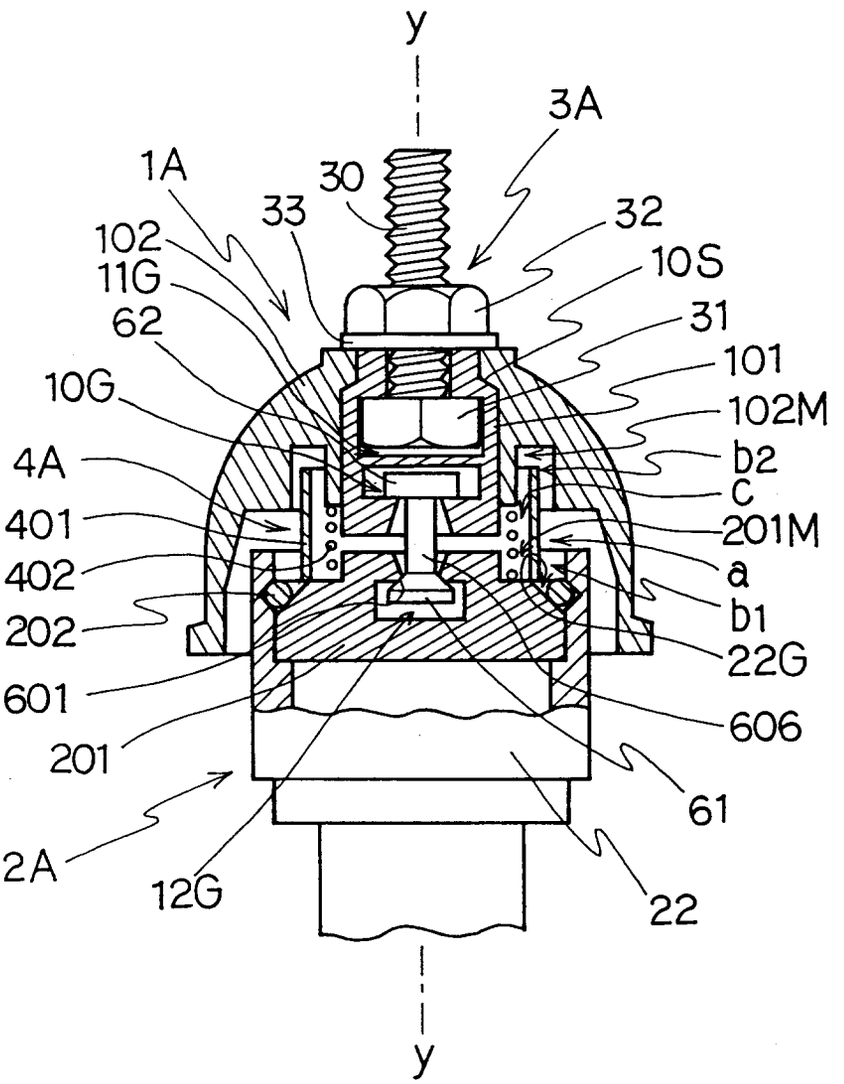

y
3A
1A
30
33
32
102
10S
11G
31
62
101
10G
102M
4A
b2
c
401
201M
402
a
202
b1
22G
601
606
201
61
2A
12G
22
y

FIG. 3

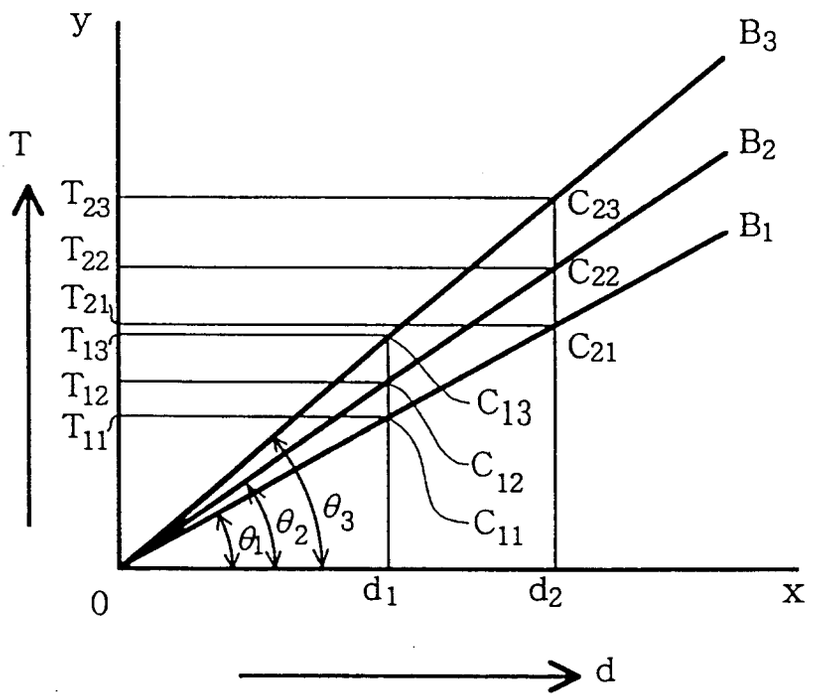

y
T
T_{23}
T_{22}
T_{21}
T_{13}
T_{12}
T_{11}
B_3
B_2
B_1
C_{23}
C_{22}
C_{21}
C_{13}
C_{12}
C_{11}
θ_1
θ_2
θ_3
0
d_1
d_2
x
d

FIG. 4

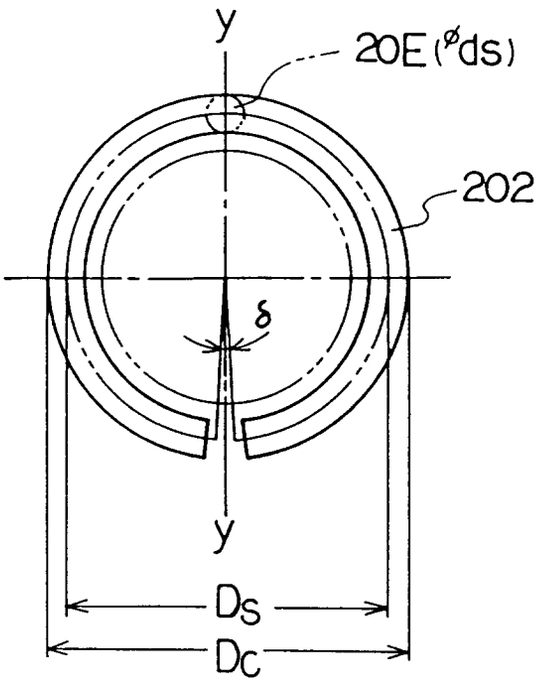

y
20E(ϕds)
202
δ
y
Ds
Dc

FIG. 5

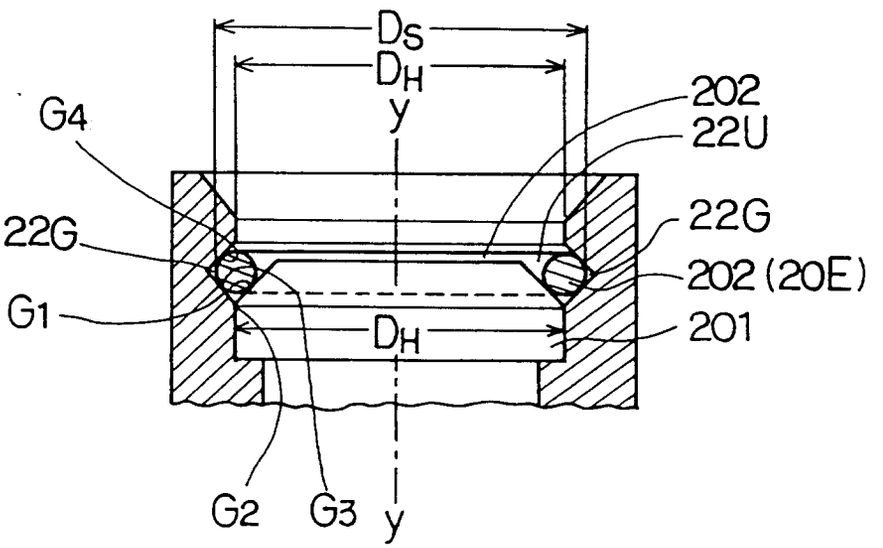

Ds
DH
y
G4
202
22U
22G
22G
202 (20E)
G1
DH
201
G2
G3
y

FIG. 6

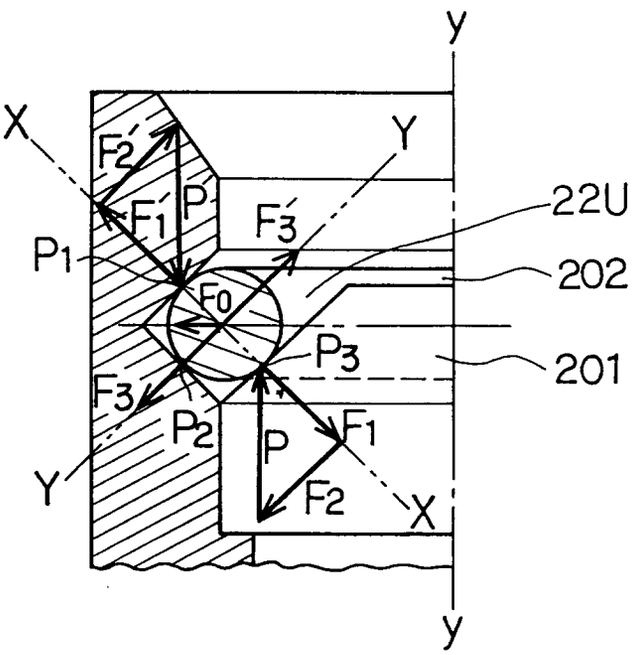
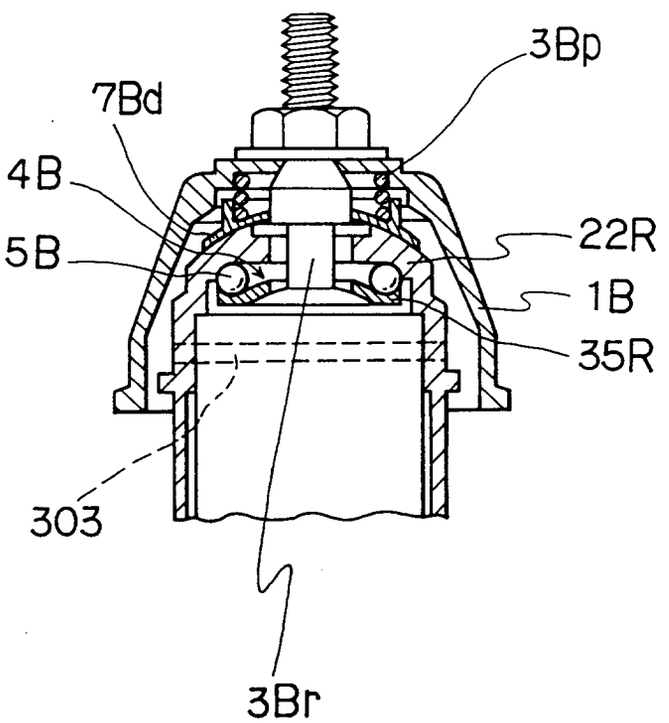


FIG. 7



INTERNATIONAL SEARCH REPORT

International Application No PCT/JP92/00667

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl[5] D01H1/18

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC	D01H1/18, B65H49/20-49/22

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

Jitsuyo Shinan Koho 1926 - 1992
Kokai Jitsuyo Shinan Koho 1971 - 1992

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
Y	JP, A, 51-55434 (NTN Toyo Bearing Co., Ltd.), May 15, 1976 (15. 05. 76), & US, A, 4,015,797 & FR, B1, 2290380 & DE, A1, 2549906	1, 2
Y	JP, B2, 54-29630 (Zenzaburo Tsukumo), September 25, 1979 (25. 09. 79), (Family: none)	1, 2
Y	JP, A, 60-148870 (Zenzaburo Tsukumo), August 6, 1985 (06. 08. 85), Lines 11 to 20, upper left column, page 3 (Family: none)	2
A	JP, A, 60-148870 (Zenzaburo Tsukumo), August 6, 1985 (06. 08. 85), (Family: none)	3

* Special categories of cited documents: [10]

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
August 11, 1992 (11. 08. 92)	September 1, 1992 (01. 09. 92)
International Searching Authority	**Signature of Authorized Officer**
Japanese Patent Office	