(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 990 613 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
05.04.2000 Bulletin 2000/14

(51) Int. Cl.[7]: **B65H 67/06**, D01H 9/18

(21) Application number: **99118333.6**

(22) Date of filing: **15.09.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **30.09.1998 JP 27829198**

(71) Applicant:
MURATA KIKAI KABUSHIKI KAISHA
Kisshoin, Minami-ku Kyoto-shi 601 (JP)

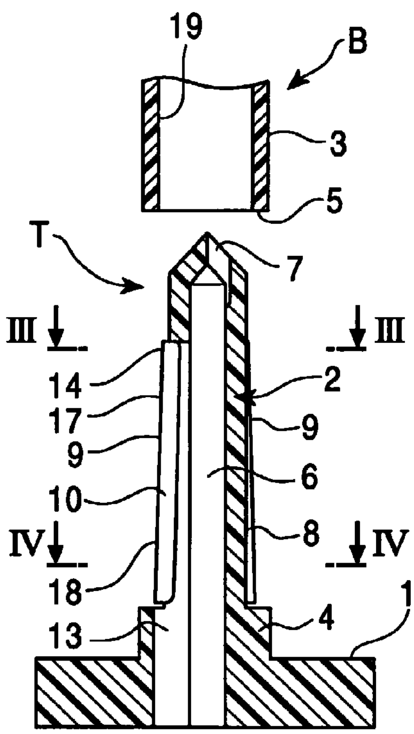
(72) Inventor: **Yokota, Itaru**
Yasu-gun, Shiga (JP)

(74) Representative:
Liedl, Christine, Dipl.-Chem. et al
Albert-Rosshaupter-Strasse 65
81369 München (DE)

(54) Bobbin transfer tray

(57) The present invention provides a bobbin transfer tray that has a simple structure and is easy to assemble. The present invention is intended for a bobbin transfer tray T having, on the outer circumferential surface 8 of a peg 2, pressing members pressing the core tube 3 of a bobbin B fit over a peg 2, wherein the pressing members consist of spring plates 9 covering the outer circumferential surface 8 of the peg 2, bent portions 10 are provided at both side edges of the spring plates in the circumferential direction, the peg 2 has slits 13 into which the bent portions 10 are inserted, fixed portions 16 that elastically hold the inner surfaces 15 of the slits using the bent portions 10 are formed at the top of the spring plates 9, and the lower parts of the spring plates 9 are projected outward radially from the peg 2.

FIG. 2



EP 0 990 613 A2

Description

Field of the Invention

[0001] The present invention relates to a tray that is used to transfer a bobbin to an automatic winder and so on.

Background of the Invention

[0002] A conventional bobbin transfer tray is known that supports a bobbin in an upright position to transfer it through the use of a conveyor or the like. This tray is adapted so that a bobbin is fit over a cylindrical peg secured in an upright position at the center of a discoid base, and transferred on a conveyor.

[0003] A tray is also known that is intended to increase the bobbin supporting performance of the tray by applying a pressing force to the core tube of a bobbin fit over a peg from inside the core tube. The trays of this type are disclosed in (1) Unexamined Japanese Patent Application Publication (Tokkai-hei) Number 6-211432, (2) Unexamined Japanese Patent Application Publication (Tokkai-hei) Number 6-158451, and (3) Japanese Utility Model Application Publication (Jikkou-hei) Number 3-8678.

[0004] However, because the trays disclosed in publications (1) and (3) are designed to apply a pressing force with pressing members to a bobbin using springs installed in a peg, the springs must be housed in a confined space inside the peg and engaged with the pressing members, thus making the structure of the tray complicated and its assembly difficult. A yarn end is sometimes entered in an inside of the peg by sucking from it, with a bobbin installed in a tray. In such a case, the yarn end may enter the inside of the peg, which serves as the suction path. It is therefore preferable that there be no obstructions in the peg on which yarn may be caught. Because the above-mentioned trays have pressing members designed to make line contact with the inner circumferential surface of the core tube, the bobbin supporting performance is unstable, causing the bobbin to vibrate easily.

[0005] Because the tray disclosed in the publication (2) has a structure in which multiple elastic plates are attached via screws to the surface of a peg, it is difficult to assemble the tray. The elastic plates have oblique notches at their top, and their diameter spirally increases when the plate's center is at a peg. At the same time that a bobbin is fit over the peg, the elastic plates roll inside, thus reducing their diameter, so that the resulting reactive force presses against the inner circumferential surface of a core tube. However, when a bobbin is fit, the upper edges of elastic plates tend to damage the lower end and inner circumferential surface of the core tube, resulting in reduced core-tube durability.

Summary of the Invention

[0006] The present invention is intended for a bobbin transfer tray having, on the outer circumferential surface of a peg, pressing members pressing a core tube of a bobbin fit over a peg from the inner circumference side, wherein the pressing members comprise spring plates covering the outer circumferential surface of the peg, bent portions are provided at both side edges of the spring plates in the circumferential direction, the peg has slits into which the bent portions are inserted, fixed portions that elastically hold the inner surfaces of the slits using the bent portions are formed at the top of the spring plates, and the lower parts of the spring plates are projected outward radially from the peg.

[0007] Such a structure allows the pressing members to be installed on the peg by one action, through the use of fixed portions, and allows the tray to be assembled easily. The outer circumferential surface of spring plates comes in surface contact with the inner circumferential surface of a core tube, to stabilize the supporting performance. The tray has a structure in which springs and the like do not need to be installed inside the peg, so yarn-end suction is not affected.

[0008] Preferably, the bent portions and slits are formed over the entire length of the spring plates in the height direction, and both side edges of the spring plates are fully inserted into the slits.

[0009] Such a structure allows both side edges of spring plates to be fully inserted into the slits, so that sharp spring-plate edges do not damage the lower end and inner circumferential surface of a core tube.

[0010] It is preferable that the middle area between the bent portions of the spring plates be curved along the outer circumferential surface of the peg, that the curvature at the top of the middle area be equal to that of the outer circumferential surface of the peg, and that the curvature of the inner circumferential surface just below the top differ from that of the outer circumferential surface of the peg.

[0011] Such a structure allows the lower part of the middle of spring plates to be tilted and fanned out in the length direction of the peg, and the lower part to be closed radially inward when the bobbin is fit, so that reactive force due to longitudinal deformation presses the bobbin. Because the lower part of the spring plates radially collapses from outside, thus deforming the plates in the circumferential direction when the bobbin is installed, the resulting reactive force also presses the bobbin. It is preferable that multiple spring plates of the same shape be provided in the circumferential direction of the peg, and that multiple slits be equally spaced in the circumferential direction of the peg.

Brief Description of the Drawing

[0012]

Figure 1 is a perspective view showing an embodiment of a bobbin transfer tray according to the present invention.
Figure 2 is a longitudinal section of a tray.
Figure 3 is the cross section of the tray, taken along line III-III in Figure 2.
Figure 4 is the cross section of the tray, taken along line IV-IV in Figure 2.
Figure 5 is a cross section of a tray with a bobbin installed, which is equivalent to the cross section taken along line IV-IV in Figure 2.
Figure 6 shows an unfinished spring plate.

Detailed Description of the Preferred Embodiments

[0013] Referring to the drawings, a preferred embodiment of the present invention is described below.

[0014] As shown in Figures 1 and 2, a bobbin transfer tray T, with a cylindrical peg 2 integrally provided in an upright position in the center of a discoid base 1, is adapted so that a core tube 3 of a bobbin B is fit over the peg 2 to support the bobbin B in an upright position. The base 1 and the peg 2 are formed monolithically from plastic. At the lower end of the peg 2, a step 4 having a larger diameter than the peg 2 is provided, on top of which is positioned the lower end 5 of the core tube 3.

[0015] The top of the peg 2 is formed into a cone shape. A center hole 6 is drilled from below in the base 1 and peg 2. The hole provides a suction path when a yarn end is found. A suction port 7 is provided to communicate through the top of the peg 2 with the center hole 6. When suction is provided through the center hole 6, with the bobbin fit over the peg 2, negative pressure propagates through the suction port 7 and core tube 3 to the top of the core tube 3, so that a yarn end at the top is sucked.

[0016] Pressing members -- in this embodiment, spring plates 9 -- are provided to press the core tube 3 from inside on the outer circumferential surface 8 of the peg 2. The three spring plates 9 are installed along the circumferential direction of the peg 2 and curved in the circumferential direction so that the spring plates 9 almost entirely cover the lower part of the outer circumferential surface 8, with the upper part of the surface left partially uncovered.

[0017] The spring plates 9 are formed by curving rectangular stainless steel plates as shown in Figure 6. In particular, both of their side edges are bent at the chain lines over their entire length in the height direction, toward the side of the peg 2, to form bent portions 10 having a predetermined bend length L. The intermediate part 12 between the bent portions 10 is curved along the outer circumferential surface 8 of the peg 2, as described later.

[0018] As shown in Figures 3 and 4, slits 13 are formed in the peg 2 along its circumferential direction at intervals of 120 degrees. The slits 13 are intended for insertion of the bent portions 10 of the spring plates 9. The slits 13, which are formed from the bottom of the tray T to the top of the peg 2 along the axis of the tray T, pass through the radius or thickness direction of the peg 2, thus opening the center hole 6 to the side. The slits 13 receive both side edges or the bent portions 10 of the spring plates 9, which extend over the entire length in the height direction of the spring plates 9. However, the slits 13 do not pass through the radius direction of the peg 2 at the step 4, so that a predetermined wall thickness remains on the side of the outer circumference of the step 4. Because the radial thickness H of the peg 2 is greater than the bend length L of the bent portions 10, the slits 13 have a depth H from the outer circumference 8 that is greater than the bend length L.

[0019] As shown Figure 3, at the intermediate part 12 at the top 14 of the spring plates 9, the curvature R_1 of the inner circumferential surface 20 of the spring plates 9 is equal to the curvature R_0 of the outer circumferential surface 8 of the peg 2. Thus, the top 14 of the intermediate parts 12 of the spring plates 9 are in close contact at their top with the outer circumferential surface 8 of the peg 2. The bent portions 10 at the top 14 of the spring plates 9 are inserted into the slits 13, thus elastically holding the internal surfaces of the slits 13. The bent portions 10 at the top 14 therefore provide fixed portion 16 to be secured to the peg 2.

[0020] The spring plates 9 are so thin that the difference in level between the outer circumferential surface 8 of the peg 2 and the outer circumferential surface 17 of the spring plates 9 is virtually negligible. Because the depth H of the slits 13 is greater than the bend length L of the bent portions 10, the bent portions 10 do not enter the center hole 6 completely and stop on the way. Thus, there are no obstructions in the center hole 6 on which yarn may be caught.

[0021] As shown in Figure 4, the curvature R_2 of the inner circumferential surface 20 of the spring plates 9 is smaller than the curvature R_0 of the outer circumferential surface 8 of the peg 2 at the lower part 18 from the top 14 of the intermediate part 12 of the spring plates 12. Thus, the lower part 18 of the intermediate part 12 of the spring plates 9 is separated from the outer circumferential surface 8 of the peg 2, and both sides in the circumferential direction are in contact with the outer circumferential surface 8 of the peg 2. As described above, the bent portions 10 of the lower part 18 of the spring plates 9 is inserted into the slit 13. However, the bent portions 10 does not actually hold the inner surface 15 of the slit 13, and only the edge of the bent portions 10 is in contact with the inner surface 15. In this way, the lower part 18 is able to freely move radially and elastically deform to come in close contact with the peg 2.

[0022] Strictly speaking, the spring plates 9 are curved so that the curvature of their inner circumferential surface is exactly equal at the top to that of the outer circumferential surface 8 of the peg 2, and becomes progressively smaller in the downward direction. However, due to machining error, the tops of the spring plates 9 are almost entirely secured in close contact with the outer circumferential surface 8 of the peg 2, and their lower parts are projected away from the outer circumferential surface 8 of the peg 2, so that the lower part can freely and elastically deform. As shown in Figures 1 and 2, after the spring plates 9 are installed, the spring plates 9 tilt and are farther from the peg 2 at their lower parts, so that the three spring plates 9 fan out along the length of the peg 2, thus forming a virtually tapered surface.

[0023] The effect of the embodiment is described below.

[0024] To assemble the tray T, it is only necessary to install the three spring plates 9 on the outer circumferential surface 8 of the peg 2. Holding the spring plates 9 against the outer circumferential surface 8 of the peg 2 and pressing the intermediate part 12 of the spring plates 9 causes the spring plates 9 to elastically deform, so that their curvature increases and both their bent portions 10 are naturally inserted into the slits 13, thus bringing the spring plates 9 into close contact with the outer circumferential surface 8 of the peg 2. In this way, the spring plates, which can be inserted into the slots by one action, facilitate tray assembly and eliminate the difficult operations involved in the assembly of conventional trays.

[0025] When the bobbin B is fit over the peg 2 from above to use the tray T, the inner circumferential surface 19 of the core tube 3 comes in contact with the outer circumferential surface 17 of the spring plates 9. Because there is little difference in level between the inner circumferential surface 8 of the peg 2 and the outer circumferential surface 17 of the spring plates 9, the bobbin B is not caught on the way.

[0026] As fitting of the bobbin B progresses, the lower parts 18 of the spring plates 9 are gradually pressed and deformed radially inward. The bobbin B rests against the step 4, thus completing bobbin B fitting.

[0027] Figure 5 shows the condition of the lower parts 18 of the spring plates 9 upon completion of fitting. Because the lower parts 18 of the spring plates 9, which are tilted and fanned out, close radially inward at their tops 14, the resulting reactive force presses the bobbin B from inside. The spring plates 9, when longitudinally deformed, provide pressure.

[0028] At the same time that the bobbin B is fit, the inner circumferential surface 19 of the core tube 3 radially collapses the spring plates 9 from outside at the outer circumferential surface 8 of the peg 2, so that they come in close contact with the peg 2. Because the curvature R_2 of the inner circumferential surface of the spring plates 9 changes so that it equals the curvature R_0 f the outer circumference of the peg 2, such deformation in the circumferential direction also provides a pressing force.

[0029] Because deformation in both the longitudinal and circumferential directions provides a pressing force, as described above, even a simple structure provides excellent bobbin supporting performance. The outer circumferential surface 17 of the spring plates 9 ensures stable support and prevents bobbin B vibration, because the outer surface 17 of the spring plates 9 comes in surface contact with the inner circumferential surface 19 of the core tube 3. The spring plates 9 are provided around almost the entire circumference of the peg 2, thus providing a pressing force due to surface contact with the entire circumference.

[0030] In Figure 5, when the core tube 3 collapses the spring plates 9, the inner circumferential surface 20 of the spring plates 9 comes in surface contact with the outer circumferential surface 8 of the peg 2. However, the spring plates 9 may be slightly away from the outer circumferential surface 8 of the peg 2. That is, the spring plates 9 serve their purpose if they can be deformed from their normal shape. In Figure 5, the inner circumferential surface 19 of the core tube 3 is also in close contact with the entire outer circumferential surface 17 of the spring plates 9. However, the inner circumferential surface 19 may be slightly away from the outer circumferential surface 17.

[0031] The curvature R_2 of the inner circumferential surface of the spring plates 9 may normally be greater than the curvature R_0 of the outer circumferential surface 8 of the peg 2. In short, the curvature R_2 poses no problem if it differs from the curvature $R_{0.}$ As shown in Figure 4, for the embodiment, the curvature R_2 is smaller than the curvature $R_{0.}$ Thus, the center of the spring plates 9 in the circumferential direction is the farthest point from the peg 2. However, if the curvature R_2 is greater than the curvature R_0 , both sides of the spring plates 9 are the farthest points from the peg 2. When the bobbin B is fit over the peg 2, the structure is as shown in Figure 5. In such a case, a pressing force is applied to the core tube 3 from both sides of the spring plates 9.

[0032] The structure according to the present invention is characterized in that the sharp edges of the spring plates 9 do not damage the bottom 15 or the inner circumferential surface 19 of the core tube 3, because both side edges of the spring plates 9 and both their bent portions 10 completely enter the slits 13. In combination with this, the round corners of the spring plates 9 enable safer assembly and easy handling.

[0033] Because the bent portions 10 do not protrude into the center hole 6, there are no obstructions in the center hole 6, thus ensuring stable suction. In addition, a yarn end can be smoothly removed from the center hole 6 if it has entered the hole. In such a case, if the yarn end penetrates the center hole 6 relatively deeply, the yarn end is easy to remove because it does not escape through the slits 13.

[0034] Japanese Utility Model Application Publication

(Jikkou-hei) Number 3-8678 discloses that the head of a plastic peg is expanded radially outward and a longitudinal cut is made in the peg to allow the peg to deform in the direction of radial shrinkage, thus providing a pressing force. In such a case, a yarn end is likely to escape through a slit and enter the gap between the peg and a core tube, so that the end is captured therebetween. Because a tray according to the present invention does not pose such a problem, a yarn end can smoothly removed.

[0035] The present invention can be used in other modes.

[0036] The present invention provides the following advantages:

(1) The present invention provides a simple structure and facilitates assembly.

(2) The present invention eliminates any obstruction in a peg.

(3) The present invention provides excellent bobbin supporting performance, thus preventing bobbin vibration.

(4) The present invention prevents damage to the core tube.

Claims

1. A bobbin transfer tray having, on the outer circumferential surface of a peg, pressing members pressing a core tube of a bobbin fit over a peg, wherein the pressing members comprise spring plates covering the outer circumferential surface of the peg, bent portions are provided at both side edges of the spring plates in the circumferential direction, the peg has slits into which the bent portions are inserted, fixed portions that elastically hold the inner surfaces of the slits using the bent portions are formed at the top of the spring plates, and the lower parts of the spring plates are projected outward radially from the peg.

2. A bobbin transfer tray according to claim 1, wherein the bent portions and slits are formed over the entire length of the spring plates in the height direction, and both side edges of the spring plates are fully inserted into the slits.

3. A bobbin transfer tray according to claim 2, wherein the middle area between the bent portions of the spring plates is curved along the outer circumferential surface of the peg, the curvature at the top of the middle area is equal to that of the outer circumferential surface of the peg, and the curvature of the inner circumferential surface just below the top differs from that of the outer circumferential surface of the peg.

4. A bobbin transfer tray according to any one of claims 1 through 3, wherein the depth of the slits from the outer circumferential surface of the peg is greater than the length of the bent portions of the spring plates.

FIG. 1

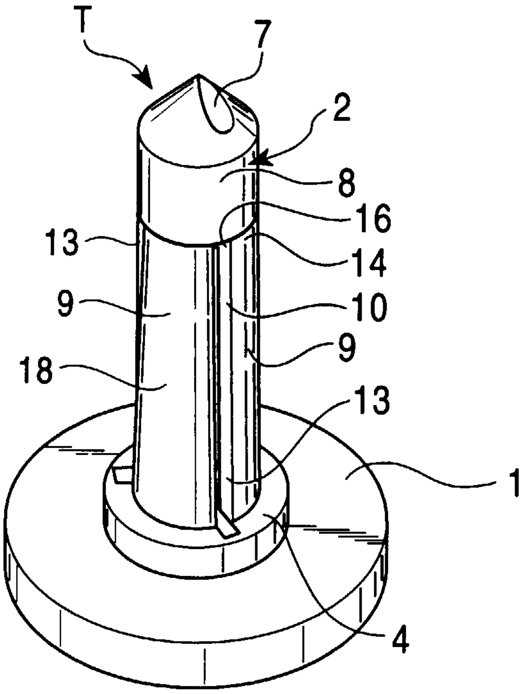


FIG. 2

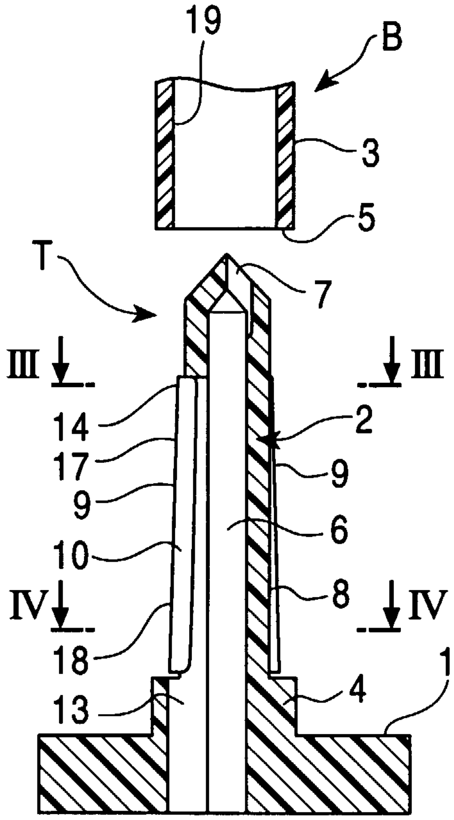

19
B
3
5
T
7
III
III
14
2
17
9
9
6
10
8
IV
IV
18
1
4
13

FIG. 3

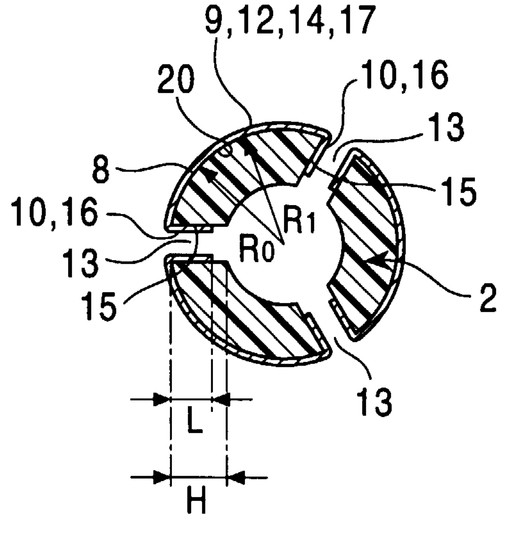

9,12,14,17
20
10,16
13
8
15
10,16
R1
R0
13
2
15
13
L
H

FIG. 4

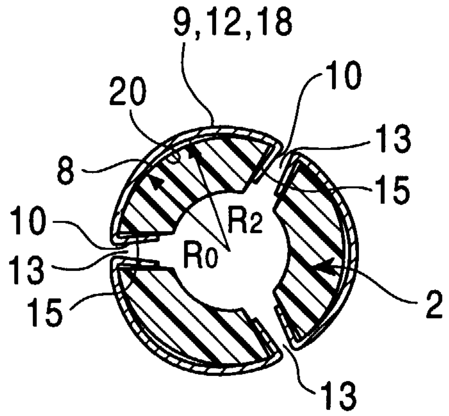

9,12,18
20
10
13
8
15
10
R2
R0
13
2
15
13

FIG. 5

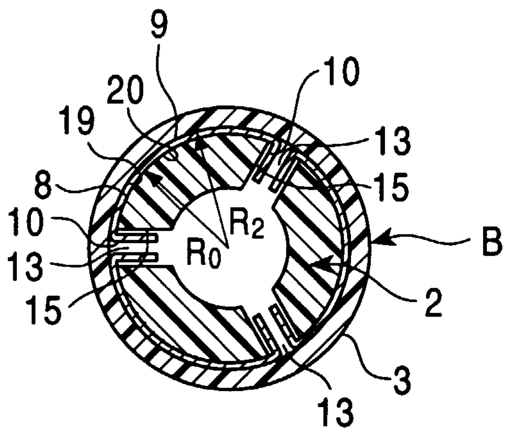

9
10
20
19
13
15
8
R2
10
B
13
R0
2
15
3
13

FIG. 6