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

(11) EP 0 777 001 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
04.06.1997 Bulletin 1997/23

(51) Int. Cl.[6]: **D01H 13/04**

(21) Application number: **96119087.3**

(22) Date of filing: **28.11.1996**

(84) Designated Contracting States:
CH DE IT LI

(30) Priority: **18.03.1996 JP 61344/96**
18.03.1996 JP 61346/96
28.11.1995 JP 12569/95 U

(71) Applicants:
- **Kabushiki Kaisha Toyoda Jidoshokki Seisakusho**
  Aichi-ken (JP)
- **Kanpatsu Kogyo Co., Ltd.**
  Hirakata-shi, Osaka-fu (JP)

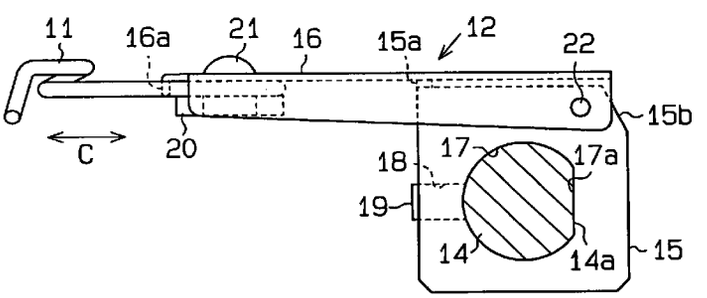
(72) Inventors:
- **Niimi, Kiwamu**
  Kariya-shi, Aichi-ken (JP)
- **Imai, Takashi**
  Kariya-shi, Aichi-ken (JP)
- **Ono, Isao**
  Hirakata-shi, Osaka-fu (JP)
- **Arita, Isao**
  Hirakata-shi, Osaka-fu (JP)
- **Kitamura, Yoji**
  Hirakata-shi, Osaka-fu (JP)

(74) Representative: **Tiedtke, Harro, Dipl.-Ing. et al**
Patentanwaltsbüro
Tiedtke-Bühling-Kinne & Partner
Bavariaring 4
80336 München (DE)

(54) Lappet for spinning machines

(57) A lappet has a fixed member (15; 29; 33) and a movable member (16; 30). The fixer member (15; 29; 33) is fixed to a support member (14; 28) for integral rotation. The support member (14; 28) extends parallel to a longitudinal direction of a rail (7) supporting a spindle (8) that carries a bobbin (B) on which a yarn (Y) is wound. The movable member (16; 30) has a guide (11) for guiding the yarn (Y) to the bobbin (B). The movable member (16; 30) is relatively rotatable to the fixed member (15; 29; 33) and integrally rotatable with the support member (14; 28) by way of the fixed member (15; 29; 33). The support member (14; 28) has a positioning surface (14a; 28a; 32a; 32b; 28b; 28c). The fixed member (15; 29; 33) has a fitting portion (17; 29c; 23) for mating with the support member (14; 28). The fitting portion (17; 29c; 23) has an engaging portion (17a; 29f; 23a; 29g; 29h; 33c) that engages the positioning surface (14a; 28a; 32a; 32b; 28b; 28c) to prevent a relative rotation of the fixed member (15; 29; 33) to the support member (14; 28).

Fig.1



EP 0 777 001 A1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to lappets used in spinning machines such as ring spinning frames, ring twisting frames, and draw twisting frames.

Description of the Related Art

A typical spinning machine repetitively lifts and lowers ring rails while it simultaneously lifts and lowers lappet angles, balloon control rings, and other parts to wind yarn about bobbins. A lappet is used to guide the yarn as it is drawn out of a roller part. The lappet guides the yarn so as to coincide the axis of the ballooning with the axis of the bobbin. When the yarn breaks as it is drawn, the operator removes the bobbin from the associated spindle to perform yarn ending. Accordingly, it is required to provide a structure that permits the lappet of each spindle unit to be moved independently to a retreating position during yarn ending and that permits the lappets of all spindle units to be moved simultaneously to the retreating position to carry out doffing.

To fulfill these requirements, each lappet is pivotally coupled to a lappet angle that extends parallel to the spindle rail. The lappet of each spindle unit pivots between a horizontal position (drawing position) and an upwardly pivoted retreating position (as described in Japanese Unexamined Utility Model Publication No. 4-78279). A pivoting force is applied to one end of the lappet angle to pivot the lappet between its drawing and retreating positions. Each lappet is arranged along the lappet angle at a position separated from the end of the angle. Thus, it is necessary to minimize the torsion acting on the lappet angle to permit positive movement of the lappets to their retreating positions, where the lappets do not interfere with doffing. However, due to the L-shaped cross-section of the lappet angle, the geometrical moment of inertia results in low torsional rigidity of the angle in comparison with a cylindrical pipe or cylindrical rod. If pipes or rods are used, their dimensions may be substantially the same as the L-shaped lappet angles. In long lappet angles, which support many spindle units, low torsional rigidity may interfere with the movement of the lappets. In addition, since it is necessary to pivotally couple the lappet angle to a base of the machine, a pivot shaft is employed to support the lappet angle. Thus, the supporting structure is complicated. When using long lappet angles that support many spindle units, it is further required that the middle of the lappet angle be pivotally supported to prevent deflection of the lappet angle. This further complicates the supporting structure.

Japanese Unexamined Utility Model Publication No. 63-7180 copes with the above problems. As shown in Fig. 35, a lappet 241 is coupled to a pipe 242, which has a cylindrical cross-section and substitutes for the lappet angle. The lappet 241 includes a body 243 and a restricting ring 244. The body 243 is provided with a pair of ring portions 243a, which pivotally receive the pipe 242, and a snail wire 245. The restricting ring 244 has a first restricting portion 246 and a second restricting portion 247. The body 243 pivots between restricting portions 246, 247. When engaged with the first restricting portion 246, the body 243 is located at the drawing position. When engaged with the second restricting portion 247, the body 243 is located at the retreating position. The restricting ring 244 is fixed to a predetermined position of the pipe 242 by a screw 248.

The torsional rigidity of the pipe 242 or a rod having a round cross-section is large when compared with a lappet angle that takes up about the same space. Accordingly, when applying a pivoting force to one end of the pipe 242, the lappets 241 of each spindle unit may be moved from the drawing position to the retreating position so that the lappets do not interfere with doffing.

Another type of lappet known in the prior art is shown in Figs. 36(a) and (b). Fig. 36(a) shows a lower perspective view of a lappet while Fig. 36(b) shows an upper perspective view of the same lappet. The lappet 241 has a movable body 249, which pivots about a lappet pipe 242, and a fixed member 250, which is fixed to the pipe 242. A snail wire 245 is provided at the distal portion of the movable body 249. A pair of rings 251 are defined at the basal portion of the movable body 249. A fixed member 250 is arranged between the rings 251. The fixed member 250 has projections 252, 253 which restrict the pivoting range of the movable body 249. Engagement with the projections 252, 253 located the movable body at the drawing and retreating positions. The fixed member 250 has a further projection 254. A threaded hole is provided in the projection 254 of the fixed member 250. The fixed member 250 is fixed to the pipe 242 by screwing a screw 248 into the hole. A bolt 255 and nut 256 are provided at the distal end of the lappet 241 to adjust the extending length of the snail wire 245.

However, in the lappet 241 shown in Fig. 35, the restricting ring 244, which positions the body 243 at the drawing position and the retreating position, pivots freely with respect to the pipe 242 before being secured to the pipe 242 by the screw 248. Accordingly, it is required that the restricting ring 244 be positioned at the predetermined position when installing each lappet 244 on the pipe 242. More specifically, it is required that the restricting ring 244 be fixed to the pipe 242 so that the body is located at the correct drawing position when engaged with the first receiving portion 246 of the ring 244. Thus, the installation of each lappet 241 is burdensome and time consuming.

Furthermore, the restricting ring 244 falls out freely from between the ring portions 243a of the body 243 before it is secured to the pipe 242. Thus, when installing the lappet 241 on the pipe 242, the restricting ring

244 must be positioned between the ring portions 243a of the body 243. The hole of the ring 244 must also be aligned with the holes of the ring portions 243a to allow the pipe 242 to be inserted through the holes. This positioning procedure is burdensome. In addition, the lappet 241 is required to be slid horizontally to a predetermined position on the pipe 242 after it is fit thereon. This results in the installation being further burdensome. Furthermore, the lappet 241 must be moved to the distal portion of the pipe 242 from the predetermined position on the pipe 242 to remove the lappet 241 for replacement. During the replacement, other lappets 241 that need not be replaced must also be removed from the pipe 242 to replace the lappet 241. Thus, replacement of the lappet 241 is extremely burdensome.

In the same manner as the lappet shown in Fig. 35, in the lappet 241 shown in Fig. 36, the fixed member 250, which positions the movable body 249 at the drawing position and the retreating position, pivots freely with respect to the pipe 242 before being secured to the pipe 242 by the screw 248. Accordingly, when installing each lappet 241 on the pipe 242, it is required that the movable body 249 be positioned at the correct drawing position with the body 249 engaged with the projection 252 of the fixed member 250. Thus, installation of the lappets 241 is burdensome and time consuming.

Furthermore, in the same manner as the lappet 241 shown in Fig. 35, in the lappet 241 shown in Fig. 36, the movable body 249 falls out freely from between the rings 251 of the body 249 before it is secured to the pipe 242. Thus, fitting the lappet 241 onto the pipe 242 is burdensome. In addition, positioning the lappet 241 along the longitudinal direction of the pipe 242 is burdensome. In the same manner as the lappet 241 of Fig. 35, lappets 241 that need not be replaced must also be removed from the pipe 242 to replace one lappet 241.

As described above, the installation and replacement of the lappets 241 shown in Figs. 35 and 36 is burdensome and time consuming. A typical ring spinning frame has 200 to 250 spindle units arranged on each side of its machine frame (400 to 500 spindle units in total). A large ring spinning frame may have as many as 400 to 500 spindle units arranged on each side of its machine frame (800 to 1000 spindle units in total). Accordingly, the installation and replacement of the lappets, each of which corresponds to one of the spindle units, is burdensome and costly.

SUMMARY OF THE INVENTION

Accordingly, it is an objective of the present invention to provide lappets for spinning machines that may easily be installed or replaced.

To achieve the above object, the lappet according to the present invention has a fixed member and a movable member. The fixer member is fixed to a support member for integral rotation. The support member extends parallel to a longitudinal direction of a rail supporting a spindle that carries a bobbin on which a yarn is wound. The movable member has a guide for guiding the yarn to the bobbin. The movable member is relatively rotatable to the fixed member and integrally rotatable with the support member by way of the fixed member. The support member has a positioning surface. The fixed member has a fitting portion for mating with the support member. The fitting portion has an engaging portion that engages the positioning surface to prevent a relative rotation of the fixed member to the support member.

BRIEF DESCRIPTION OF THE DRAWINGS

The features of the present invention that are believed to be novel are set forth with particularity in the appended claims. The invention, together with objects and advantages thereof, may best be understood by reference to the following description of the presently preferred embodiments together with the accompanying drawings in which:

Fig. 1 is a side view showing a lappet according to a first embodiment of the present invention;

Fig. 2 is a plan view showing the lappet;

Fig. 3 is a front view showing the lappet;

Fig. 4 is a partial cross-sectional view showing the lappet;

Fig. 5 is a partially cut-away side view schematically showing the supported state of the lappet and rings;

Fig. 6 is a partially cut-away cross-sectional view showing a lappet according to a second embodiment of the present invention;

Fig. 7 is a cross-sectional view taken along line 7-7 in Fig. 6;

Fig. 8 is a perspective view showing a fixed member;

Fig. 9 is a cross-sectional view showing a support shaft;

Fig. 10 is a plan view showing a lappet according to a third embodiment of the present invention;

Fig. 11 is a front view showing the lappet;

Fig. 12 is a partial cross-sectional view showing the lappet;

Fig. 13 is a side view showing a lappet according to a fourth embodiment of the present invention;

Fig. 14 is a plan view schematically showing the positioning method of the lappet;

Fig. 15 is a partial side view showing a further embodiment;

Fig. 16 is a partial side view showing a further embodiment;

Fig. 17 is a cross-sectional view showing a support shaft according to a further embodiment;

Fig. 18 is a perspective view showing a fixed member that is coupled to the support shaft of Fig. 17;

Fig. 19 is a side view showing a fixed member according to a further embodiment;

Fig. 20 is a partial cross-sectional side view showing a further embodiment;

Fig. 21(a) is a partial cross-sectional side view showing a further embodiment;

Fig. 21(b) is a partial plan view showing the lappet of Fig. 21(a);

Fig. 22 is a partial side view showing a further embodiment;

Fig. 23 is a partial side view showing a further embodiment;

Fig. 24 is a partial side view showing a further embodiment;

Fig. 25 is a partial side view showing a further embodiment;

Fig. 26 is a partial side view showing a further embodiment;

Fig. 27 is a partial side view showing a further embodiment;

Fig. 28 is a partial side view showing a further embodiment;

Fig. 29 is a partial cross-sectional side view showing a further embodiment;

Fig. 30 is a perspective view showing a further embodiment of the bracket;

Fig. 31 is a partial side view showing a lappet, which is provided with the bracket of Fig. 30, installed on the support shaft;

Fig. 32 is a cross-sectional view taken along line 32-32 in Fig. 31;

Fig. 33 is a partial cross-sectional side view showing a further embodiment;

Fig. 34 is a side view showing a bracket of the pillar;

Fig. 35 is a perspective view showing the prior art; and

Fig. 36 is a perspective view showing the prior art.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A lappet according to a first embodiment of the present invention will hereafter be described with reference to Figs. 1 to 5.

A plurality of pillars 1 are lifted or lowered by a lifting mechanism (not shown). As shown in Fig. 5, a support arm 2 is fixed to the upper end of each pillar 1. The pillars 1 are aligned in a direction perpendicular to the plane of the drawing. A ring rail 3 extending perpendicular to the plane of Fig. 5 is fixed to the upper surface of the support arms 2. A plurality of fitting holes 3b are defined along the ring rail 3. The holes 3b are arranged in the longitudinal direction of the rail 3 with a predetermined interval between each pair of adjacent holes 3b. A ring 5 is secured to the wall of each hole 3b. The ring is employed to guide a traveller 4. The rear side of the ring rail 3 is bent upward at a right angle to define a mounting portion 3a. A spindle rail 7 is arranged extending perpendicular to the plane of the drawing. A plurality of spindles 8 are provided along the spindle rail 7. The holes 3b are arranged in the longitudinal direction of the rail 7 with a predetermined interval between each pair of adjacent spindles 8. A bobbin B is removably mounted on each spindle 8. A balloon control ring 6, which is provided for each spindle 8, is fastened to the mounting portion 3a by a bolt 9. Each control ring 6 has a supporting portion 6a extending in a substantially horizontal direction from the ring 6. The supporting portion 6a is fixed to a mounting plate 10, which is fastened to the mounting portion 3a by the bolt 9.

A lappet 12, which is provided with a snail wire 11, is arranged above each balloon control ring 6. Each lappet 12 is supported in a manner such that it may be lifted and lowered. The snail wire 11 guides the yarn Y drawn out from a draft part (not shown). A plurality of pillars 13 are each supported in a manner such that they may be lifted and lowered independently from and synchronously with the pillars 1. A support shaft 14 is arranged extending parallel to the spindle rail 7 and pivotally supported by a bracket 13a fixed to the upper end of each pillar 13. The support shaft 14 is pivoted about its axis by a pivoting mechanism (not shown). Each lappet 12 is coupled to the support shaft 14 at a position corresponding to one of the spindles 8.

In this embodiment, a rod having a cylindrical

cross-section is employed as the support shaft 14. A flat portion 14a is provided on the peripheral surface of the shaft 14 to serve as a positioning surface. The flat portion 14a extends longitudinally along the entire shaft 14. The support shaft 14 is arranged so that its flat portion 14a becomes vertical during drawing of the yarn Y.

As shown in Figs. 1 to 4, each lappet 12 includes a bracket 15, which is secured to the support shaft 14 and supported in a manner that it pivots integrally with the shaft 14, and a body 16, to which the snail wire 11 is coupled. The bracket 15 is formed by casting metal or molding resin. The bracket 15 is constituted by a square pillar and a hole 17, which extends therethrough and corresponds to the cross-sectional shape of the support shaft 14. The hole 17 serves as a fitting portion. A flat abutting surface 17a, which abuts against the flat portion 14a of the support shaft 14, is defined on the wall of the hole 17. The abutting surface 17a is arranged so that it extends vertically and serves as an engaging portion, which engages the flat portion 14a. A threaded hole 18 is defined in the bracket 15 opposed to the abutting surface 17a. The bracket 15 is fixed to the support shaft 14 by screwing a screw 19, which serves as a fastener, into the threaded hole 18 after inserting the support shaft 14 through the hole 17. A screw having an end provided with a hexagonal hole for engagement with a fastening tool may be employed as the screw 19.

As shown in Fig. 3, the body 16 is formed by bending both sides of a metal plate downward at a right angle. The body 16 covers the upper part of the bracket 15. A pivot pin 22 arranged extending through the upper rear side of the bracket 15 pivotally supports the basal end of the body 16 with respect to the bracket 15. A pipe may be employed as the pivot pin 22.

The basal end of the snail wire 11, which is bent in a U-shaped manner, is secured to the bottom surface at the distal section of the body 16 by a nut 20 and a screw 21. By loosening the nut 20 and screw 21, the snail wire 11 may be moved in the directions indicated by arrow C in Fig. 1. The movement enables the snail wire 11 to be moved into or out of the body 16. A restricting portion 16a bent downward is provided at the distal end of the body 16. As shown in Fig. 2, the restricting portion 16a engages with the snail wire 11 in a manner such that the snail wire 11 extends in a direction perpendicular to the support shaft 14.

As shown in Figs. 1 and 4, an engaging projection 15a is defined on the upper front end of the bracket 15. A flat, downward inclined surface 15b is defined at the upper rear side of the bracket 15. The body 16 is held horizontally at the drawing position with the middle of its bottom surface engaged with the engaging projection 15a. When the body 16 is pivoted from the drawing position in a clockwise direction, as viewed in Fig. 1, abutment of the bottom surface of the body 16 against the inclined surface 15b restricts further pivoting. The restriction arranges the body 16 at a body retreating position.

The operation of the first embodiment will now be described. When the yarn Y is drawn, the flat portion 14a of the support shaft 14 extends vertically. In this state, the body 16, which is pivotally coupled to the bracket 15, extends horizontally and is held at the drawing position with its bottom surface abutted against the engaging projection 15a. The yarn Y drawn out from a draft part passes through the snail wire 11 and the traveller 4 and is then wound onto the bobbin B.

When the yarn Y breaks at a certain spindle unit, the operator removes the bobbin B from the associated spindle 8. The snail wire 11 interferes with the removal of the bobbin B when the body 16 of the lappet 12 is located at the drawing position. Thus, the operator pivots the body 16 in an upward direction (clockwise direction as viewed in Figs. 1 and 5) from the drawing position to the body retreating position and then removes the bobbin B. The upward pivoting of the body 16 about the pivot pin 22 is restricted as the body 16 reaches the body retreating position when the bottom surface of its basal portion abuts against the inclined surface 15b. When the operator releases the body 16, gravitational force returns the body 16 to the drawing position.

To perform doffing, the pivoting mechanism (not shown) pivots the support shaft 14 in a clockwise direction, as viewed in Fig. 1 and 5. The bracket 15 causes the body 16 to pivot integrally with the support shaft 14 and arranges the lappet 12 of each spindle unit at a lappet retreating position. After doffing is completed, the support shaft 14 is pivoted in a reverse direction to return the lappet 12 of each spindle unit at the drawing position. The flat portion 14a of the support shaft 14, formed by cutting off a portion of the peripheral surface of the cross-sectionally cylindrical shaft 14, does not interfere with the relative pivoting between the support shaft 14 and the bracket 13a of each pillar 13.

Each lappet is installed on the support shaft 14 before coupling the bracket 13a of the associated pillar 13 to the shaft 14. To install each lappet 12 on the support shaft 14, the shaft 14 is inserted through the hole 17 of the bracket 15 with the abutting surface 17a engaged with the flat portion 14a. The bracket 15 is then moved along the support shaft 14 to a predetermined position. At this position, the bracket 15 is fastened by the screw 19 and fixed to the support shaft 14 to install the lappet 12 on the shaft 14. The support shaft 14 may be inserted through the hole 17 only when the abutting surface 17a is engaged with the flat portion 14a. Thus, the bracket 15 may be fitted on the support shaft 14 at only one position. Accordingly, when coupling each bracket 12 to the support shaft 14, the positioning of the bracket 12 with respect to the shaft 12 is facilitated. This enables the body 12 of the associated lappet 12 to be easily arranged so that it extends in the predetermined direction.

When a predetermined number of lappets 12 are installed on the support shaft 14, both ends of the support shaft 14 are each coupled to one of the pillars 13 by the associated bracket 13a. When coupling the support

shaft 14 to the pillars 13, the shaft 14 is arranged so that the flat portion 14a extends vertically when the yarn Y is drawn. The flat portion 14a serves as a reference surface for positioning the support shaft 14 when coupling the shaft 14 to the pillars 13. This facilitates the positioning of the support shaft 14.

The advantageous effects of the first embodiment will be described below.

(a) By merely fitting the bracket 15 on the support shaft 14 with the abutting surface 17a engaged with the flat portion 14a, each bracket 15 may be arranged on the support shaft 14 with the body 16 extending in a substantially horizontal direction when arranged at the drawing position. This simplifies the positioning of each lappet 12 with respect to the support shaft 14 and thus facilitates the installation of each lappet 12.

(b) The flat portion 14a may be employed as a reference surface when coupling the support shaft 14 to the pillars 13. When the support shaft 14 is arranged at the drawing position, the flat portion 14a extends vertically. Thus, in comparison to when the flat portion 14a is inclined with respect to the vertical direction, the positioning of the support shaft 14 is facilitated by the employment of the flat portion 14a, which serves as a reference surface.

(c) The support shaft 14 has a geometrical moment of inertia that is substantially equal to that of a rod having a cylindrical cross-section. This is meritorious since the geometrical moment of inertia of the support shaft 14, which is constituted by a pipe or rod, is superior to that of the lappet angle employed in the prior art. More specifically, the torsion acting on the support shaft 14 may be decreased without enlarging the dimensions of the support shaft 14. Accordingly, the lappet 12 of each spindle unit may securely be moved to the retreating position by pivoting the support shaft 14 about its axis to perform doffing. This enables doffing to be performed without interference by the lappets 12.

(d) Each screw 19, which fastens the associated bracket 15 to the support shaft 14, is screwed into the bracket 15 at a position where the screw 19 causes the abutting surface 17a to apply a pressing force to the flat portion 14a. Thus, the fastening force of the screw 19 is used effectively as a force that fixes the bracket 15 to the support shaft 14.

(e) The flat portion 14a serving as a positioning surface extends along the entire length of the support shaft 14. This facilitates the production of the support shaft 14 in comparison with when forming positioning surfaces on the support shaft in correspondence with each lappet 12.

(f) The pivot pin 22 extending through each bracket 15 pivotally supports the body 16. Thus, when coupling the bracket 15 to the support shaft 14, the body 16 is not required to be held manually. This facilitates the coupling of each bracket 15 to the support shaft 14. Furthermore, since the bracket 15 and the body 16 are integral, the handling and storing of spare lappets 12 is simple.

(g) The body 16 of each lappet 12 is positioned at the drawing position when the body 16 is abutted against the engaging projection, which is formed on the upper surface of the bracket 15. This structure facilitates production in comparison with a structure in which the bottom surface of the body 16 abuts against the entire upper surface of the bracket 15 since the upper surface of the bracket 15 need not be machined accurately.

A second embodiment according to the present invention will hereafter be described with reference to Figs. 6 to 9.

In this embodiment, each lappet 12 has a fixed member 29 and a movable body 30. The fixed member 29 is fixed to a support shaft 28 to enable integral pivoting with the shaft 28. The movable body 30 is supported to enable pivoting in the directions indicated by arrow B in Fig. 6. The support shaft 28 corresponds to the support shaft 14 in the first embodiment. The fixed member 29 corresponds to the bracket 15 in the first embodiment. The movable body 30 corresponds to the body 16 in the first embodiment. The movable body 30 has an annular basal portion in which the fixed member 29 is held and through which the support shaft 28 is inserted. The pivoting range of the movable body 30 is restricted by projections 29a, 29b, which are defined on the fixed member 29. When engaged with the projection 29a, the movable body 30 is located at the drawing position and extends in a substantially horizontal direction. When pivoted upward from the drawing position, the movable body 30 becomes located at the retreating position as the body 30 engages the projection 29b.

The structure of the movable body 30 is basically the same as the prior art movable body 249 shown in Figs. 36(a) and (b). The snail wire 11 is coupled to the distal portion of the movable body 30. A restricting portion 30a is defined at the distal end of the movable body 30 to engage with and position the snail wire 11.

As shown in Fig. 8, the fixed member 29 has a pair of ring portions 29c, through which the support shaft 28 is fitted, and a plate portion 29d, which connects the ring portions 29c. The ring portions 29c intersect perpendicularly with the sides of the plate portion 29d and are formed integrally with the portion 29d. The fixed member 29 is formed by pressing a steel plate. The production cost of the pressed fixed member 29 is inexpensive in comparison with the bracket 15 of the first embodiment, which is formed by casting metal or molding resin. As shown in Figs. 6 and 7, a hole 29e extends

through the plate portion 29d toward the axis of the support shaft 28 to enable insertion of the screw 19.

The mounting structure of the lappet will now be described in detail. As shown in Fig. 9, a rounded groove 28 extends axially along the support shaft 28. The groove 28 is employed as a positioning surface for positioning of the distal end of the screw 19. A cross-sectional view of the support shaft 28 shows it to have a crescent shape. As shown in Fig. 8, each ring portion 29c of the fixed member 29 has an arched projection 29f which comes into planar contact with the groove 28a. This structure enables the fixed member 29 to be positioned with respect to the support shaft 28 when inserting the shaft 28 through the member 29.

A commercially available hexagonal nut (e.g., an M6 nut classified under Japanese Industrial Standard (JIS) B 1181) 31 is arranged between the inner surface 29d and the support shaft 28 at a position corresponding to the hole 29e. A screw 19 provided with a hexagonal hole (e.g., an M6 nut classified under JIS B1177) is screwed into the nut 31. The distal end of the screw 19 engages the groove 28a of the support shaft 28.

Accordingly, the fixed member 29 is positioned and fixed with respect to the support shaft 28 by tightening the screw 19 with a hexagonal wrench. The sides of the nut 31 engages with the inner surface of both ring portions 29c so as to prevent rotation of the nut 31. When tightening of the screw 19 is completed, the head of the screw 19 is substantially aligned with the outer surface of the plate portion 29d.

The installation of the above lappet 12 will now be described. The support shaft 28 is first held so that its groove 28a is arranged on one side. The fixed member 29 and the movable body 30 are fit onto the support shaft 28 with the holes in the basal portion of the body 30 aligned with the holes in the ring portion 29c of the member 29. The nut 31 is arranged between the inner surface of the plate portion 29d of the fixed member 29 and the surface of the support shaft 28. The sides of the nut 31 prevent rotation of the nut 31 when arranged within the fixed member 29. Thus, the nut 31 is arranged in a substantially fixed state. The screw 19 is then inserted through the hole 29e and screwed into the nut 31. As the screw 19 tightens the nut 31, the distal end of the screw 19 engages the groove 28a of the support shaft 28 with the lappet 12 held extending horizontally. When the tightening of the screw 19 is completed, the lappet 12 is fixed to and positioned with respect to the support shaft 28.

In the same manner as in the first embodiment, in this embodiment, the fixed member 29 is positioned with respect to the support shaft 28 by inserting the shaft 28 therethrough with the projection 29f in each ring portion 29c aligned with the groove 28a. This simplifies the positioning of each lappet 12 with respect to the support shaft 28 and thus facilitates the installation of each lappet 12.

A third embodiment according to the present invention will hereafter be described with reference to Figs. 10-12. The lappet 12 of this embodiment differs from that of the first embodiment in that the bracket 15 is formed from sheet metal and in that the bracket 15 is detachable from the support shaft 14 in a direction lateral to the shaft 14. Parts that are identical to those employed in the first embodiment are denoted with the same numeral.

As shown in Fig. 10, the bracket 15, which is made of sheet metal, is substantially U-shaped. The bracket 15 includes a pair of side plates 15d and a front plate 15c connecting the side plates 15d. An engaging projection 15a is defined at the upper end of the front plate 15c. An inclined surface 15b is defined on the rear upper portion of each side plate 15d. A fitting portion 23, through which the support shaft 14 is fitted, is defined on each side plate 15. Each fitting portion 23 has an opening 24 which extends downward. The opening 24 enables the bracket 15 to be attached to or detached from the support shaft 14 in a direction lateral to the shaft 14. The fitting portion 23 includes an abutting surface 23a, which abuts against the flat portion 14a of the support shaft 14, and an arched surface 23b, which extends continuously from the upper end of the abutting surface 23a. The abutting surface 23a serves as an engaging portion that engages with the flat portion 14a.

A hole 25 extends through the front plate 15c of the bracket 15 toward the axis of the support shaft 14. The screw 19 is inserted through the hole 25. A projection 27 projects from the inner surface of the front plate 15c at a predetermined position above the hole 25. The projection 27 engages a nut 26, which is arranged between the front plate 15c and the support shaft 14. The engagement between the projection 27 and the nut 26 enables positioning of the nut 26. The projection 27 is formed by pressing out the front plate 15c. When the nut 26 engages the projection 27 and the inner surfaces of both side plates 15d, the threaded hole of the nut 26 is aligned with the hole 25.

When coupling the bracket 15 to the support shaft 14, the opening 24 is fitted onto the shaft 14 from above and then moved downward. The bracket 15 is positioned at a predetermined angle with respect to the support shaft 14 by the abutment between its abutting surface 23a and the flat portion 14a of the support shaft 14. In this state, the bracket 15 moves freely in the axial direction of the support shaft 14. This enables adjustment of bracket 15 to a predetermined position corresponding to the associated spindle 8. The nut 26 is then arranged between the support shaft 14 and the front plate 15c. The screw 19 is inserted through the hole 25 and screwed into the nut 26. By tightening the screw 19 into the nut 26, the bracket 15 becomes fixed to the support shaft 14. This installs the lappet 12 at a predetermined position with respect to the support shaft 14. The threaded hole of the nut 26 is aligned with the screw 19 by arranging the nut 26 between the front plate 15c and the support shaft 14 at a position where the nut 26 engages the projection 27. This facilitates screwing the screw 19 into the nut 26.

In addition to the advantageous effects of the first embodiment, the effects described below may also be obtained in this embodiment.

(h) The bracket 15 is provided with a fitting portion 23, in which the support shaft 14 is fitted. The lower part of the fitting portion 23 includes an opening 24. The opening 24 enables attachment and detachment of the bracket 15 in a direction perpendicular to the axial direction of the support shaft 14. Accordingly, this structure eliminates the necessity to move the lappet 12 between the end of the support shaft 14 and its predetermined position when the lappet 12 is coupled to or removed from the support shaft 14. Thus, in comparison with the first and second embodiments, the installation and removal of the lappet 12 is facilitated. Furthermore, during replacement of each lappet 12, lappets 12 that are not required to be replaced need not be removed from the support shaft 14. This facilitates the replacement of the lappet 12.

(i) The bracket 15 is made of sheet metal. Accordingly, the production cost is inexpensive in comparison to a bracket made by casting metal or molding resin. The inner surface of the front plate 15c of the bracket 15 is provided with a projection 27 to position the nut 26. The nut 26 is positioned appropriately by arranging the nut 26 between the inner surface of the front plate 15c and the support shaft 14 and at a position where the nut 26 engages the projection 27. This facilitates screwing the screw 19 into the nut 26.

(j) The opening 24 of the fitting portion 23 extends in a downward. Accordingly, the bracket 15 may easily be positioned at a predetermined angle with respect to the support shaft 14 by fitting the bracket 15 onto the shaft 14 from the opening 24. Furthermore, the screw 19 used to fasten the bracket 15 may be tightened or loosened from the front side of the bracket 15. Thus, the operator may visually confirm the position of the head of the screw 19 when using a tool to tighten or loosen the screw 19. This facilitates the coupling and removal of the lappets 12.

A fourth embodiment according to the present invention will hereafter be described with reference to Figs. 13 and 14. The fourth embodiment differs from the third embodiment in that the lappet 12 may be secured to the support shaft 14 without using a fastener such as a screw to fix the bracket 15 to the shaft 14. Parts that are identical to those employed in the third embodiment are denoted with the same numeral.

As shown in Fig. 13, an elastic body is employed as the bracket 15. In this embodiment, the bracket 15 is made of a polyacetal resin. The bracket 15 is a substantially pillar-like block with a fitting portion 23 and an opening 24 defined therein. A pair of clamping plates 126a, 126b extending downward about the fitting portion 23 are defined on each side of the bracket 15.

The opening 24 includes an inner side (the side closer to the fitting portion 23), which is more narrow than the outer diameter of the support shaft 14, and an outer side, which is wider than the outer diameter of the shaft 14. The curvature of the arched surface 23b in the fitting portion 23 is slightly greater than the curvature of the support shaft 14. Accordingly, then the bracket 15 is fitted on the support shaft 14 at a predetermined position, the clamping plates 126a, 126b are slightly opened by the support shaft 14. The reaction force of the slightly opened clamping plates 126a, 126b ensures the clamping of the support shaft 14 with the plates 126a, 126b.

When coupled to the support shaft 14, the lappet 12 of the above structure functions in the same manner as the lappets 12 employed in the first, second, and third embodiments. To couple each lappet 12 to the support shaft 14, the distal ends of the clamping plates 126a, 126b are engaged with the support shaft 14 from above. The bracket 15 is then pressed downward to deflect the clamping plates 126a, 126b and engage the fitting portion 23 with the support shaft 14. The abutting surface 23a may not abut against the fiat portion 14a of the support shaft 14 despite the arched surface 20b being engaged with the shaft 14. In such case, the bracket 15 may be pivoted about the support shaft 14 until the abutting surface 23a abuts against the flat portion 14a. This positions the bracket 15 at a predetermined angle with respect to the support shaft 14.

In this state, the bracket 15 is not yet positioned in the axial direction of the support shaft 14. Each lappet 12 may be positioned axially one at a time when its bracket 15 is fit into the support shaft 14. However, a positioning fixture may be employed to simultaneously position a plurality of lappets 12 in the axial direction of the support shaft 14 after coupling the lappets 12 to the shaft 14. This facilitates the axial positioning of the lappets 12.

For example, a fixture 128 having a plurality of recesses 127 may be used to clamp the sides of each bracket 15. The interval between each pair of adjacent recesses 127 corresponds to the interval between each pair of associated spindles. A guide section 127a, which widens toward its outer end, is defined in the outer end of each recess 127. After each lappet 12 is coupled to the support shaft 14 in the proximity of its predetermined axial position, the fixture 128 is moved from the front side of the lappets 12 toward the rear side of the lappets 12 (toward the right, as viewed in Fig. 14, or toward a direction perpendicular to the axis of the shaft 14). This engages the recesses 127 with the associated brackets 15. As a result, the brackets 15 of lappets 12 separated from their predetermined position are moved to the predetermined position as they are guided by the guide portion 127a to engage the associated recesses 127.

The advantageous effects obtained in the third

embodiment excluding the effect described in (i) are also obtained in this embodiment. Furthermore, the advantageous effects described below may also be obtained in the fourth embodiment.

(k) The lappets 14 may be coupled to the support shaft 14 at predetermined positions and fastened to the shaft 14 without using fasteners such as screws. This facilitates the installation of the lappets 12.

(l) The employment of the fixture 128 enables a plurality of lappets 12 to be positioned simultaneously. This facilitates the installation of the lappets 12.

Although several embodiments of the present invention have been described herein, it should be apparent to those skilled in the art that the present invention may be embodied in many other specific forms without departing from the spirit or scope of the invention. In particular, the present invention may be modified in the forms described below.

(1) In the first embodiment, the flat portion 14a of the support shaft 14 is arranged extending vertically at the rear side of the lappet 12 when drawing the yarn Y. However, the flat portion 14a may be arranged extending vertically at the front side of the lappet 12, as shown in Fig. 15(a). The flat portion 14a may also be arranged extending horizontally, as shown in Fig. 15(b), or otherwise arranged extending obliquely. This enables the advantageous effects of the first embodiment to be obtained. However, it is preferable that the flat portion 14a of the support shaft 14 be supported by the pillars 13 so that it extends either horizontally or vertically when the yarn Y is drawn out. This facilitates the positioning of the support shaft 14 when coupling the support shaft 14 to the pillars 13. In any case, the abutting surface 17a of the hole 17 of the bracket 15 is arranged in correspondence with the flat portion 14a.

(2) In the first embodiment, the positioning surface of the support shaft 14 consists of a single flat surface, that is, the flat portion 14a. However, the positioning surface may be constituted by two or more flat surfaces. For example, as shown in Fig. 16(a), a flat portion 32a having two flat surfaces may be provided in the support shaft 14. As shown in Fig. 16(b), the positioning surface may also be provided with a curved surface 32b having a curvature differing from other portions of the wall of the hole 17 (the curvature is smaller than other portions in the drawing). In such cases, the shape of the hole 17 of the bracket 15 corresponds to the outer shape of the support shaft 14. Furthermore, the cross-sectional shape of the support shaft 14, 28 may be triangular, rectangular, pentagonal, or polygonal with more than five sided. In this case, at least one side of the polygon may be employed as the positioning surface.

(3) The rounded groove 28a employed as a positioning surface of the support shaft 28 may be replaced by a groove 28a having a V-shaped groove as shown in Fig. 17(a), or a flat portion 28c as shown in Fig. 17(b). When the groove 28b shown in Fig. 17(a) is provided in the support shaft 28, each ring portion 29c of the fixed member 29 is provided with a triangular projection 29h, as shown by the double-dotted lines in Fig. 18. When the flat portion 28c shown in Fig. 17(b) is provided in the support shaft 28, each ring portion 29c of the fixed member 29 is provided with a flat abutting surface 29g, as shown by the solid lines in Fig. 18.

(4) In the second embodiment, the groove 28a of the support shaft 28 and the projections 29f of the fixed member 29, are arranged at the left side of the support shaft 28, as viewed in Fig. 6. However, the groove 28a and the projection 29f may be provided at the right side of the support shaft 28. In this case, the screw 19 is abutted against the right side of the support shaft 28. This presses the projections 29f against the groove 28a and further ensures the positioning of the fixed member 29 with respect to the fixed member 29.

(5) In the second embodiment, instead of pressing a steel plate to form the fixed member 29, a resin may be molded to form the member 29. For example, as shown in Fig. 19, a substantially cylindrical fixed member 33 may be made of a synthetic resin. A portion of the fixed member 33 is notched. Fastening plates 33a, 33b are provided on each side of the notch. A projection 33c projects from the inner cylindrical surface of the fixed member 33. Stoppers 33d, 33e project from the outer cylindrical surface of the fixed members 33. The fixed member 33 is positioned roughly with respect to the support shaft 28 by fitting the member 33 onto the shaft 28 with the projection 33c engaged with the groove 28a of the shaft 28. A bolt 34a is inserted through the fastening plates 33a, 33b and screwed into a nut 34b to position and fix the fixed member 33 with respect to the support shaft 28. The pivoting range of the movable body 30 is restricted by the stoppers 33d, 33e.

(6) In the first, second, and third embodiments, the screw 19 may be screwed into an arbitrary location on the bracket 15 or the fixed member 29 if the distal end of the screw 19 may be abutted against the support shafts 14, 28. When the bracket 15 includes an opening 24 as in the third embodiment, it is preferable that the screw 19 be screwed into the bracket 15 at a position enabling the abutting sur-

face 23a to apply a pressing force to the flat portion 14a of the support shaft 14. This allows the fastening force of the screw 19 to be used effectively as a force to fasten the bracket 15 to the support shaft 14.

(7) Instead of providing an engaging projection 15a for the bracket 15 as in the first embodiment, the body 16 may be held at the drawing position with the bottom surface of the body 16 engaged with the entire upper surface of the bracket 15, as shown in Fig. 20. This structure may also be applied in the second, third, and fourth embodiments, and the modified forms of paragraphs (1) and (2) above.

(8) When the bracket 15 includes the opening 24 as in the third and fourth embodiments, the positioning surface of the support shaft 14 (such as the flat portion 14a) may be provided at only the locations corresponding to the installing position of each lappet 12. In this case, if the width of each positioning surface matches the width of the associated bracket 15, the bracket 15 of each lappet 12 may be positioned accurately with respect to the axial direction of the support shaft 14 by merely fitting the bracket 15 onto the shaft 14 where the positioning surface is defined.

(9) In the above modified forms of paragraphs (1), (2), and (7) above, the bracket 15 may be formed by pressing a steel plate as in the second embodiment or may be formed from sheet metal as in the third embodiment. In either case, the screw 19 is screwed into the nut 26.

(10) In the first embodiment, the body 16 is pivotal about the pivot pin 22 with respect to the bracket 15. However, as shown in Figs. 21(a) and 21(b), an arch-like guide hole 35 may be provided in each side plate 15d, which is formed from sheet metal. The body 16 is connected to the bracket 15 by a support pin 36, which extends through the guide holes 35. A round engaging surface 37 is defined on the lower surface of the body at its proximal end. Movement of the pivot pin 36 along the guide holes 35 pivots the body 16 with respect to the bracket 15. The structure including the guide holes 35 and the pivot pin 36 may also be employed in the block-like bracket of the first embodiment.

(11) The structure of the second embodiment may be applied to the prior art lappet 241 shown in Figs. 35, 36(a), and 36(b). In this case, the positioning surface extends longitudinally along the entire length of the pipe 242. The shape of the holes of the restricting ring 244 and the fixed member 250 matches the outer shape of the pipe 242.

(12) The weight of the body 16 (or the movable body 30) returns the body 16 (or the movable body 30) to the drawing position. Instead of using gravitational force to return the body 16 (or the movable body 30), an urging means for urging the body 16 (or the movable body 30) toward the drawing position, such as a torsion coil spring, may be arranged between the body 16 (or the movable body 39) and the bracket 15 (or the fixed member 29). Furthermore, the pivot pin 22 pivotally supporting the body 16 may be provided at an arbitrary position on the bracket 15.

(13) In the third embodiment, the bracket 15 is made of sheet metal. However, the bracket 15 may be block-like and formed by casting metal or molding resin, as in the first embodiment. In this case, as shown in Fig. 22(a), the bracket 15 is constituted by a substantially rectangular pillar-like block and includes the fitting portion 23 and the opening 24. The threaded hole 18, into which the screw 19 is screwed, is provided in the bracket 15 to substitute the hole 25. This eliminates the necessity of the nut 26 and thus simplifies the installation of the lappets 12 to the support shaft 14. The advantageous effects of the third embodiment excluding the effect described in (i) may also be obtained in this embodiment.

As shown in Fig. 22(b), the support shaft 14 may be supported by the pillars 13 so that the flat portion 14a extends vertically at the front side of the support shaft 14 when located at the drawing position. In this case, the abutting surface 23a in the fitting portion 23 of the bracket 15 is provided at the front side. The advantageous effects of the modified form of Fig. 22(a) are also obtained in the modified form of Fig. 22(b). However, the modified form of Fig. 22(a), in which the screw 19 presses the support shaft 14 from the other side of the flat portion 14a, is more preferable than the modified form illustrated in Fig. 22(b), in which the screw 19 presses the flat portion 14a of the support shaft 14, since the abutting surface 23a abuts more securely to the flat portion 14a.

(14) As shown in Fig. 23(a), the arched surface 23b may be provided extending continuously from both ends of the abutting surface 23a, which extends vertically at the rear side of the block-like bracket 15. A rear surface 130a of the opening 24 extends parallel to and in front of the abutting surface 23a. A front surface 130b of the opening 24 extends parallel to the rear surface 130a. The width of the opening 24 is equal to that of the modified form illustrated in Fig. 22(a). A guide surface 131a and a round surface 131b extend between the front surface 130b and the upper arched surface 23b. The guide surface 131a extends in a direction perpendicular to a normal Ln, which extends from the arched surface 23b. The round surface 131b

smoothly connects the guide surface 131a and the front surface 130.

In the modified form of Fig. 23(a), the pair of arched surfaces 23b holds the bracket 15 at its predetermined position and prevents relative movement of the bracket 15 with respect to the support shaft 14 even when the screw 19 becomes slightly loose. Even when the longitudinal dimension Ls of the bracket 15 and the length of the bracket 15 at the rear side (the right side in Fig. 23(a)) of the abutting surface 23a are both uniformed along the entire height of the bracket 15, the length of the bracket 15 at the rear side of the opening 24 may be extended. This strengthens the bracket 15.

The modified form illustrated in Fig. 23(b) is similar to the modified form of Fig. 23(a). In the modified form of Fig. 23(b), the fitting portion 23 is constituted entirely by the arched surface 23b. The flat portion 14a is also arranged at the front side of the support shaft 14 with the screw 19 abutting against the portion 14a.

(15) In the modified form shown in Fig. 24, the opening 24 opens toward the rear in the bracket 15 and the screw 19 is screwed into the bracket 15 from the lower side of the bracket 15. The screw 19 may otherwise be screwed into the bracket 15 from the upper side of the bracket 15. If the screw 19 is screwed into the upper side of the bracket 15, it is preferable that a hole be provided extending through the body 16 for insertion of a screw driver.

(16) In the modified form shown in Fig. 25, a cylindrical rod that does not include the flat portion 14a is employed as the support shaft 14. The shape of the fitting portion 23 corresponds to the outer shape of the support shaft 14. Furthermore, the bracket 15 is not provided with the engaging projection 15a.

(17) In the fourth embodiment, the abutting surface 23a of the bracket 15 may be arranged at the upper side of the fitting portion 23, as shown in Fig. 26(a), or at the front side of the fitting portion 23, as shown in Fig. 26(b). This does not change the advantageous effects of the fourth embodiment.

(18) In the fourth embodiment, the opening 24 may be provided at the rear side of the bracket 15, as shown in Fig. 27. In this case, a flexible clamping plate 126c may be provided at the lower side of the fitting portion 23.

(19) In the fourth embodiment, the positioning surface may be excluded from the support shaft 14 and the fitting portion 23 of the bracket 15 may be constituted entirely by the arched surface 23b, as shown in Fig. 28.

(20) In the fourth embodiment and the modified forms of paragraphs (17)-(19), an elastomer or rubber such as ethylene propylene rubber (EPR) may be employed as the material of the bracket 15.

(21) In the modified forms of paragraphs (14)-(16), the bracket 15 may be formed of sheet metal as in the third embodiment. In this case, the nut 26 may be provided to fasten the screw 19. Furthermore, in the modified forms of paragraphs (13)-(15) and paragraphs (17)-(19), the engaging projection 15a may be eliminated from the bracket 15.

(22) The structure of the third embodiment, in which the pivot pin 22 enables the body 16 to pivot about the bracket 15, may be replaced by the structure of the modified form of paragraph (10), in which the guide holes 35 and the pivot pin 36 are employed, as shown in Fig. 29. The structure of the modified form of paragraph (10) may also be employed in the fourth embodiment.

(23) Figs. 30-32 shown a modified form in which the bracket 15 provided with the body 16 and the opening 24. A pair of guide plates 135 extend toward each other from the side plates 15d. Each guide plate 135 has an arched portion 135a. The center of curvature of each arched portion 135a coincides with the center of curvature of the arched surface 23b. A restriction 135b is defined at the front end of each guide plate 135. A notch 135c is provided at the lower part of each guide plate 135. An arched engaging surface 16b, the curvature of which is equal to the curvature of the arched surface 23b of the fitting portion 23, is defined on the bottom surface of each side plate of the body 16. A T-shaped engaging plate 136 is provided at the middle of the basal portion of the body 16. The engaging plate 136 moves along the inner sides of the guide plates 135 as the body 16 is pivoted with the engaging surface, 16b abutted against the support shaft 14.

When coupling the body 16 to the bracket 15, the engaging plate 136 is first inserted into the bracket 15 through the notches 135c. The body 16 is then pivoted to a position corresponding to the upper part of the bracket 15. The bracket 15 is fixed to and positioned with respect to the support shaft 14 by tightening the screw 19. The pivoting of the support shaft 14 causes the body 16 to pivot integrally with the shaft 14 in the same direction. The body 16 may be pivoted about the support shaft 14 independently from the bracket 15. Thus, the body 16 may be arranged freely at the retreating position when performing yarn ending.

(24) In the third embodiment, as shown in Fig. 33, the projection 27 used to position the nut 26 may be provided below the hole 25, through which the screw 19 is inserted. After fitting the bracket 15 onto the support shaft 14, the nut 26 is lowered into the

space between the front plate 15c and the support shaft 14. The nut 26 falls to a position where it engages the projection 27 and is held in a state in which its hole is aligned with the hole 25. Accordingly, it is not necessary to hold the nut 26 manually when screwing the nut 19 into the nut 26. This facilitates the coupling of the bracket 15 to the support shaft 14.

(25) The screws 19 may be replaced by bolts to serve as fasteners.

(26) Pipes having a circular cross-section or pipes having a deformed portion, which serve as a positioning surface, may be employed as the support shafts 14, 28.

(27) When the bracket 15 is provided with the opening 24, the lappet 12 may be coupled to the support shaft 14 after coupling the shaft 14 to the pillars 13.

(28) When the middle section of each support shaft 14, 28 is supported by the bracket 13a of the pillar 13 in addition to the ends Of the shafts 14, 28, the bracket 13a may have a two-part structure, as shown in Fig. 34. In this case, the support shaft 14, 28 is provided between the two parts of the bracket 13a by way of a bearing, which is fitted onto each shaft 14, 28. A bolt 138 than fastens the two parts of the bracket 13a to each other and enables each shaft 14, 28 to be pivotally held by the bracket 13a. Each support shaft 14, 28 may otherwise be held directly by the bracket 13a.

(29) The application of the present invention is not limited to ring spinning frames. The present invention may also be applied to ring twisting frames and draw twisting frames.

(30) The projecting length of the snail wire 11 may be variable. For example, a screw-rack type snail wire may be employed. Contrarily, a fixed type snail wire may be employed.

Therefore, the present examples and embodiments are to be considered as illustrative and not restrictive and the invention is not to be limited to the details given herein, but may be modified within the scope of the appended claims.

A lappet has a fixed member (15; 29; 33) and a movable member (16; 30). The fixer member (15; 29; 33) is fixed to a support member (14; 28) for integral rotation. The support member (14; 28) extends parallel to a longitudinal direction of a rail (7) supporting a spindle (8) that carries a bobbin (B) on which a yarn (Y) is wound. The movable member (16; 30) has a guide (11) for guiding the yarn (Y) to the bobbin (B). The movable member (16; 30) is relatively rotatable to the fixed member (15; 29; 33) and integrally rotatable with the support member (14; 28) by way of the fixed member (15; 29; 33). The support member (14; 28) has a positioning surface (14a; 28a; 32a; 32b; 28b; 28c). The fixed member (15; 29; 33) has a fitting portion (17; 29c; 23) for mating with the support member (14; 28). The fitting portion (17; 29c; 23) has an engaging portion (17a; 29f; 23a; 29g; 29h; 33c) that engages the positioning surface (14a; 28a; 32a; 32b; 28b; 28c) to prevent a relative rotation of the fixed member (15; 29; 33) to the support member (14; 28).

Claims

1. A lappet having a fixed member (15; 29; 33) and a movable member (16; 30), said fixer member (15; 29; 33) being fixed to a support member (14; 28) for integral rotation, said support member (14; 28) extending parallel to a longitudinal direction of a rail (7) supporting a spindle (8) that carries a bobbin (B) on which a yarn (Y) is wound, said movable member (16; 30) having guide means (11) for guiding the yarn (Y) to the bobbin (B), wherein the movable member (16; 30) is relatively rotatable to the fixed member (15; 29; 33) and integrally rotatable with the support member (14; 28) by way of the fixed member (15; 29; 33), **characterized by that** said support member (14; 28) has a positioning surface (14a; 28a; 32a; 32b; 28b; 28c), said fixed member (15; 29; 33) has a fitting portion (17; 29c; 23) for mating with the support member (14; 28), and said fitting portion (17; 29c; 23) has an engaging portion (17a; 29f; 23a; 29g; 29h; 33c) that engages said positioning surface (14a; 28a; 32a; 32b; 28b; 28c) to prevent a relative rotation of the fixed member (15; 29; 33) to the support member (14; 28).

2. The lappet as set forth in claim 1, **characterized by that** said fitting portion includes a hole (17; 29c) conforming with said support member (14; 28).

3. The lappet as set forth in Claim 1, **characterized by that** said fitting portion (23) has an opening (24) for allowing the passage or the support member (14), said fixed member (15) is arranged to move perpendicularly to a longitudinal direction with respect to the support member (14) so as to be detachably attached to the support member (14).

4. The lappet as set forth in Claim 3, **characterized by that** said fixed member (15) is made of an elastic material, wherein the fixed member (15) is arranged to clamp the support member (14) by the elasticity thereof to be positioned in a predetermined position of the support member (14) when the fitting portion (23) is attached to the support member (14).

5. The lappet as set forth in any one of Claims 1-4 **characterized by** a fastener (19; 34a; 34b) for

securing the fixed member (15; 29; 33) to the support member (14; 28).

6. The lappet as set forth in Claim 5, **characterized by that** said fastener (19) is attached to the fixed member (15) so as to abut portions other than said positioning surface (14a; 28a; 32a; 32b; 28b; 28c) of the support member (14; 28).

7. The lappet as set forth in Claim 6, **characterized by that** said fastener (19) is arranged at a position to urge the engaging portion (17a; 29f; 23a; 29g; 29h) against the positioning surface (14a; 28a; 32a; 32b; 28b; 28c) based on tightening of the fastener (19).

8. The lappet as set forth in Claims 3 or 4, **characterized by that** said opening (24) of the fitting portion (23) is directed downward, and a fastener (19) for securing the fixed member (15) to the support member (14) is tightened toward the support member (14) from a front portion of the fixed member (15).

9. The lappet as set forth in any one of Claims 3, 4 and 8, **characterized by that** said positioning surface (14a; 32a; 32b) is formed in a position in association to a position to which the fixed member (15) is attached.

10. The lappet as set forth in any one of the preceding claims, **characterized by that** said fixed member (15; 29; 33) is formed by one of metal casting and resin molding.

11. The lappet as set forth in any one of Claims 5-8 **characterized by that** said fixed member (15; 29) is made of a sheet metal, wherein said fixed member (15; 29) has a plate portion (29d; 15c) facing the support member (14; 28) when the fixed member (15; 29) is fitted to the support member (14; 28), and said fastener (19) is screwed into a nut (31; 26) arranged between said plate portion (29d; 15c) and said support plate (14; 28), whereby said fixed member (15; 29) is secured to the support member (14; 28).

12. The lappet as set forth in Claim 11, **characterized by that** said plate portion (15c) has a projection (27) engaging the nut (26) disposed between the plate portion (15c) and the support member (14) so as to position the nut (26).

13. The lappet as set forth in any one of the preceding claims, **characterized by that** said positioning surface (14a; 32a; 28c) is substantially flat.

14. The lappet as set forth in any one of Claims 1-12, **characterized by that** said positioning surface (28a; 28b) includes a groove formed in the support member (28).

15. The lappet as set forth in any one of the preceding claims, **characterized by that** said positioning surface (14a; 28a; 32a; 32b; 28b; 28c) extends along the entire length of the support member (14; 28).

16. The lappet as set forth in any one of the preceding claims, **characterized by that** said support member (14; 28) is one of a pipe and a rod.

17. The lappet as set forth in any one of the preceding claims, **characterized by that** said movable member (16) is pivotally supported on the fixed member (15).

18. The lappet as set forth in Claim 3, **characterized by that** said movable member (16) is pivotally supported on the fixed member (15), said fixed member (15) is secured to the support member (14) by a screw (19) to urge the engaging portion (23a) against the positioning surface (14a) based on tightening of the screw (19) when the fitting portion (23) is fitted to the support member (14).

19. The lappet as set forth in Claim 18, **characterized by that** said support member (14) is one of a pipe and a rod having a circular cross section, said positioning surface (14a) is substantially flat and formed in a position in association to a position to which the fixed member (15) is attached, said engaging portion (23a) vertically extends from a rear portion of the fixed member (15), said opening (24) is defined between a rear surface (130a) extending downward from a rear end of the fitting portion (23) and a front surface (130b) parallel to the rear surface (130a) so that the rear surface (130a) is positioned parallel to the engaging portion (23a) forward of the engaging portion (23a), and a guide surface (131a) and a round surface (131b) are positioned between the front surface (130b) and a front end of the fitting portion (23), wherein said guide surface (131a) extends perpendicular to a line (Ln) normal to the rear end of fitting portion (23), and wherein the round surface (131b) connects the guide surface (131a) and an upper end of the front surface (130b).

20. The lappet as set forth in Claim 1, **characterized by that** said positioning surface (28a; 28b; 28c) includes one of a groove and flat surface, said fixed member (29) has a pair of ring portions (29c) parallelly disposed to each other and defining the fitting portion, said ring portions (29c) being connected by a plate portion (29d), each of said ring portions (29c) has the engaging portion (29f; 29g; 29h) defined by one of a projection and a flat surface both capable of engaging the positioning surface

(28a; 28b; 28c) in a manner of the surface contact, said plate portion (29d) has a through hole (29e), a nut (31) is disposed corresponding to the through hole (29e) between the plate portion (29d) and the support member (28), and a screw (19) is provided to secure the fixed member (29) to the support member (28), said screw (19) being screwed up to the nut (31) through the through hole (29e) when the ring portion (29c) is fitted to the support member (28).

Fig.1

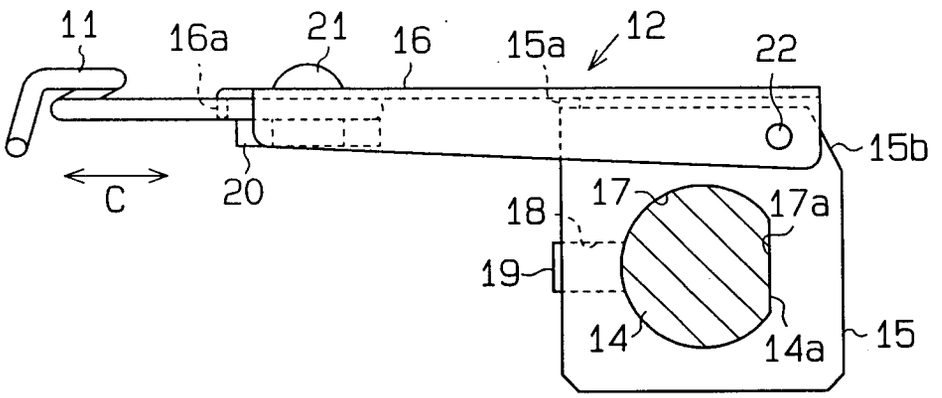


Fig.2

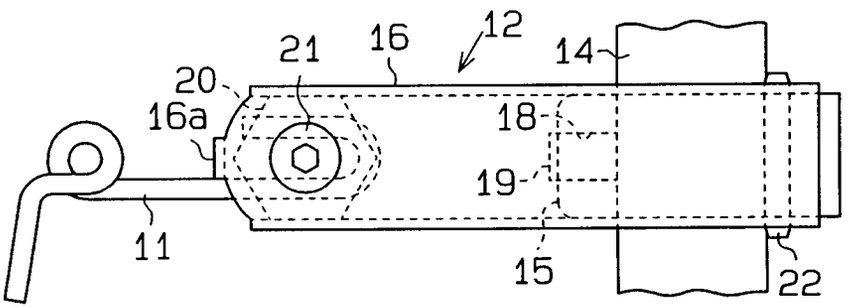


Fig.3

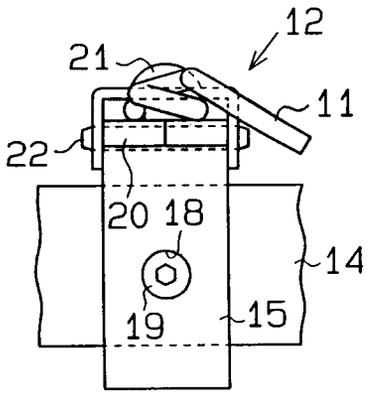


Fig.4

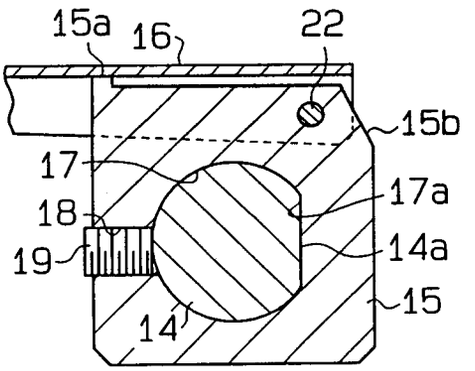


Fig.5

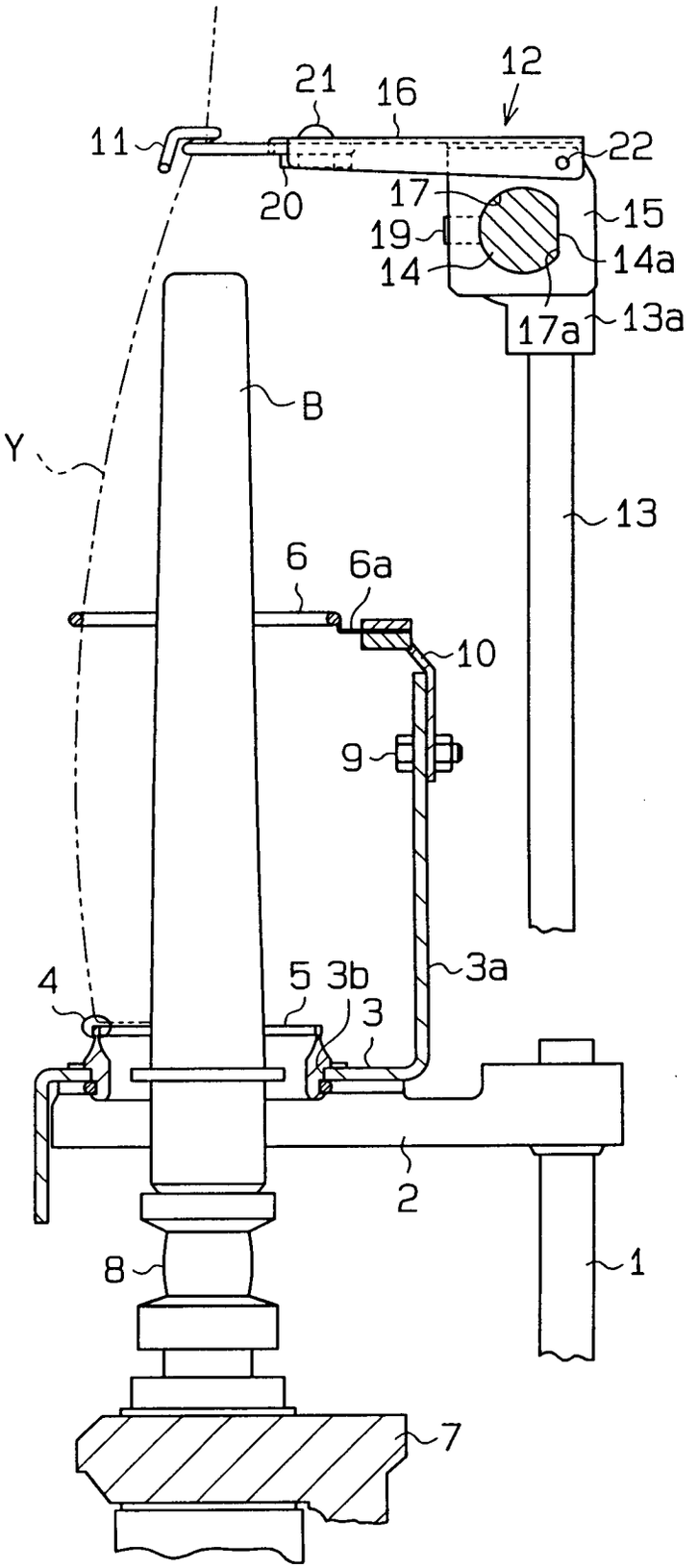

12
21
16
11
22
20
17
15
19
14a
14
17a
13a
B
Y
13
6
6a
10
9
3a
4
5
3b
3
2
8
1
7

Fig.6

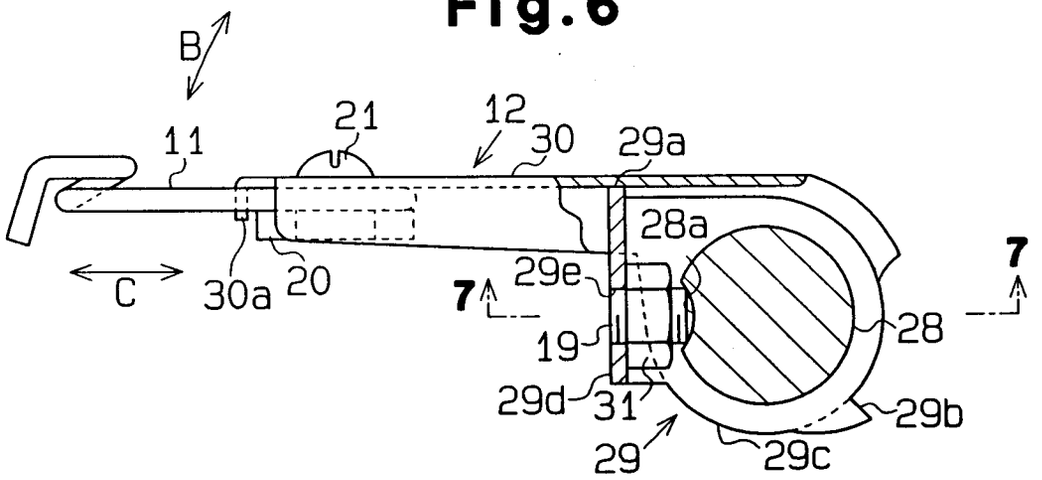


Fig.7

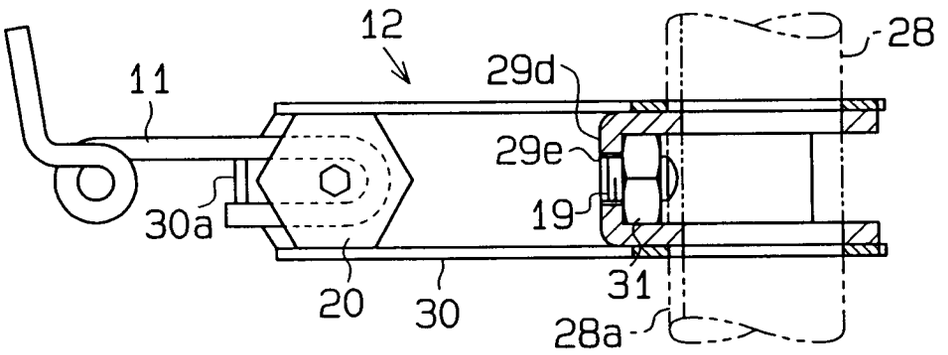


Fig.8

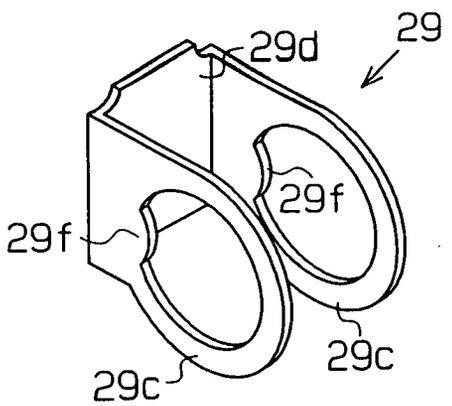


Fig.9

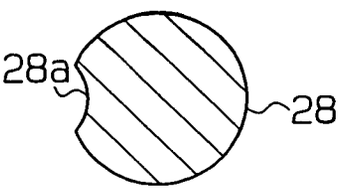


Fig.10

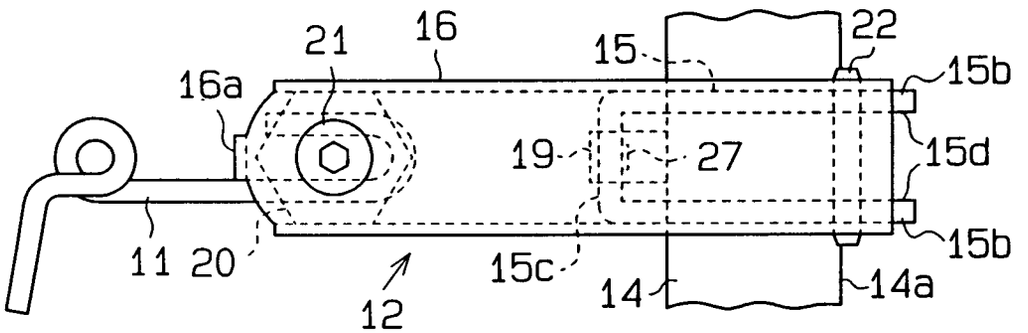


Fig.11

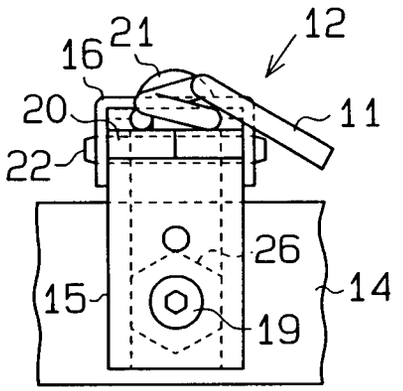


Fig.12

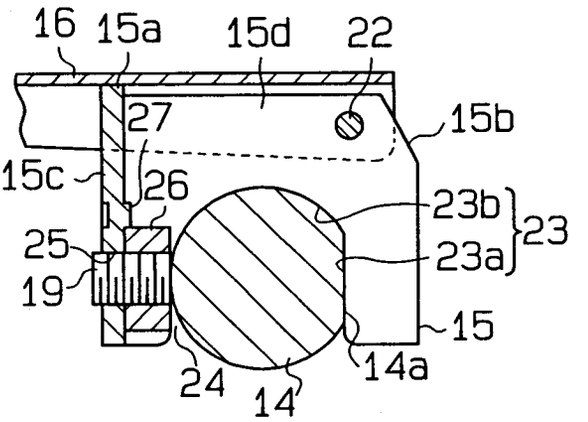


Fig.13

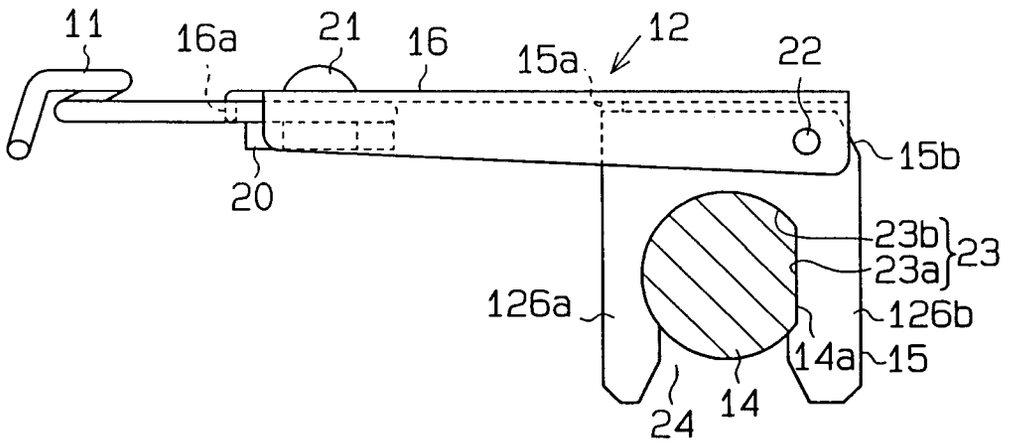

11
16a
21
16
15a
12
22
15b
20
23b
23a
23
126a
126b
14a
15
24
14

Fig.14

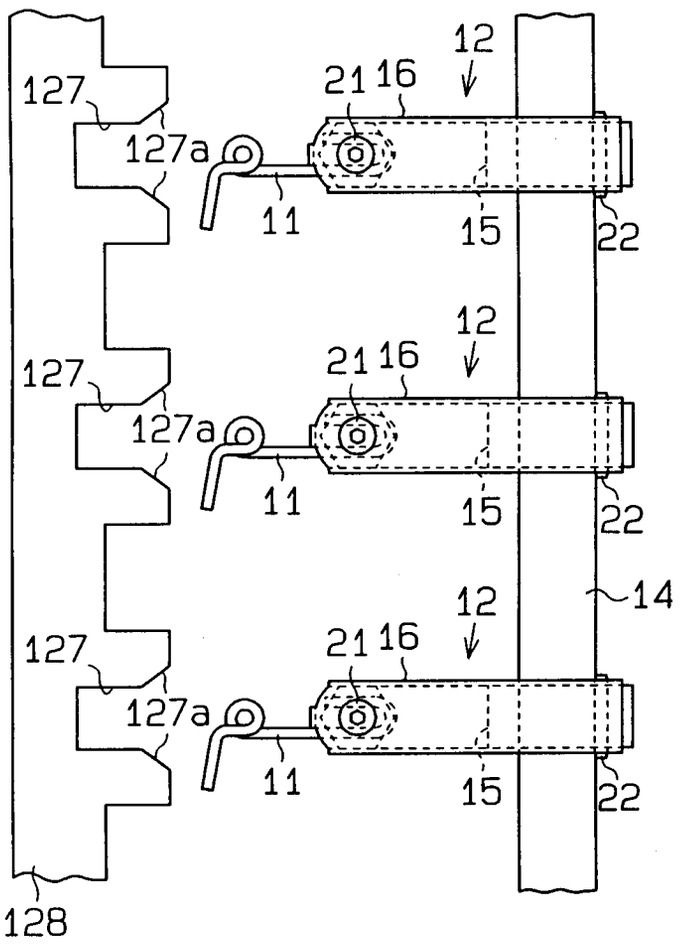

12
21
16
127
127a
11
15
22
14
128

Fig.15(a)

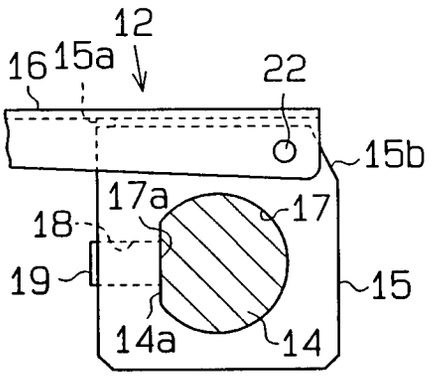


Fig.15(b)

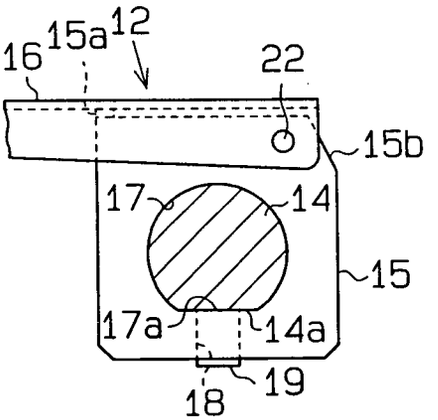


Fig.16(a)

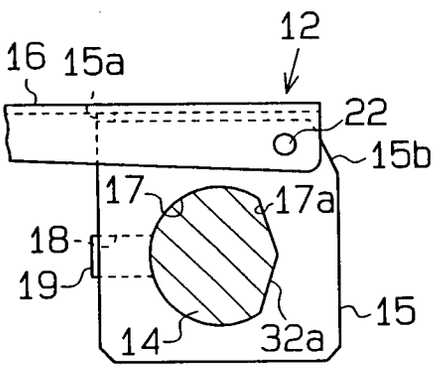


Fig.16(b)

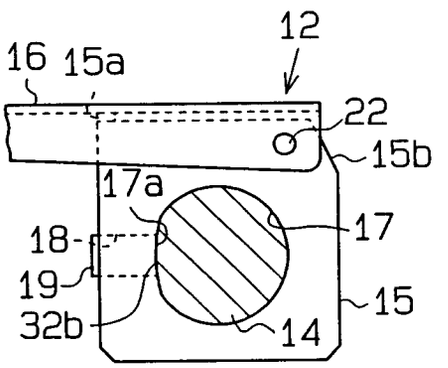


Fig.17(a)

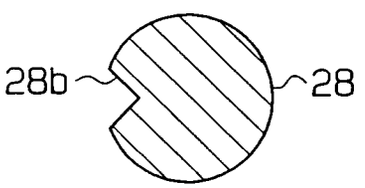


Fig.17(b)

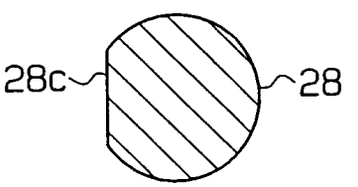


Fig.18

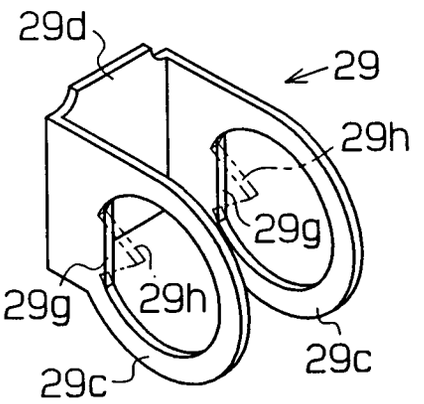


Fig.19

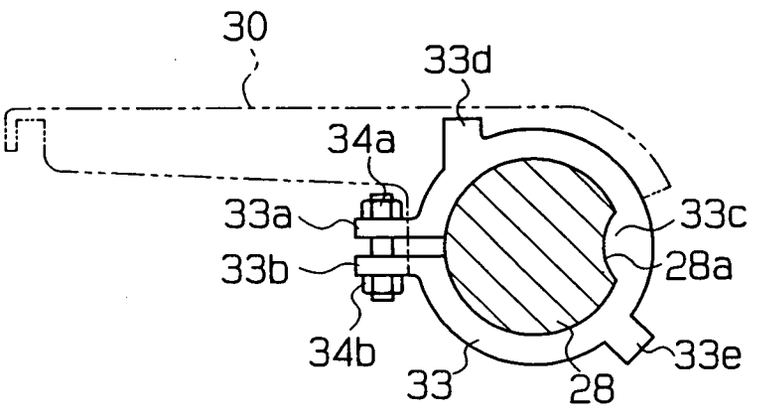


Fig.20

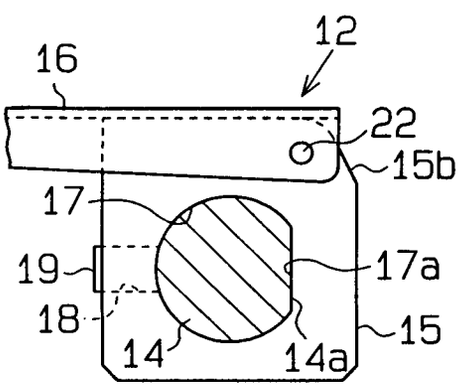


Fig.21 (a)

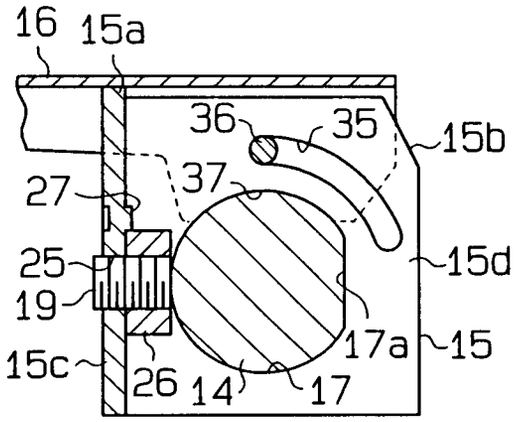


Fig.21 (b)

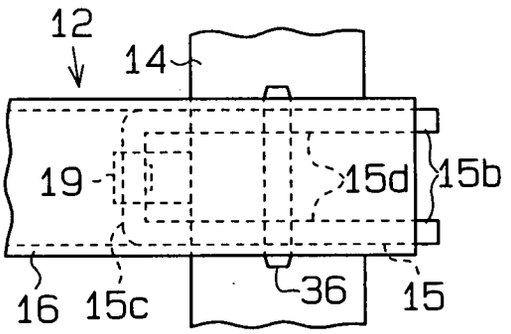


Fig.22 (a)

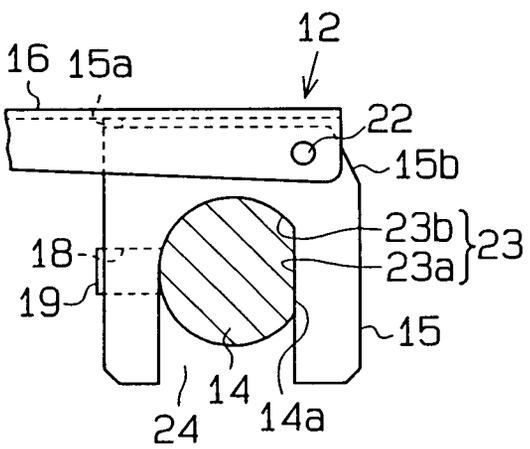


Fig.22 (b)

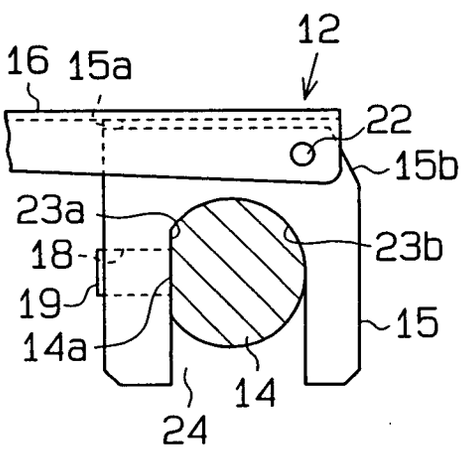


Fig.23(a)

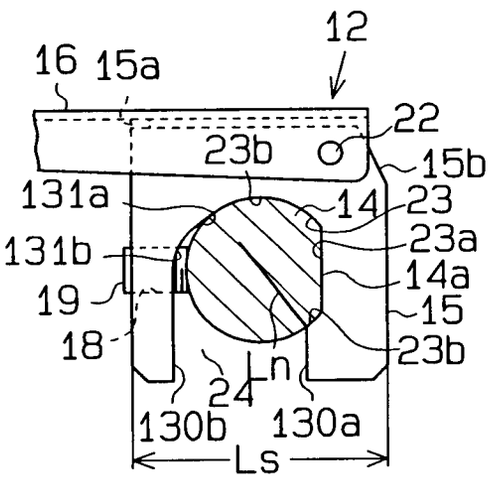


Fig.23(b)

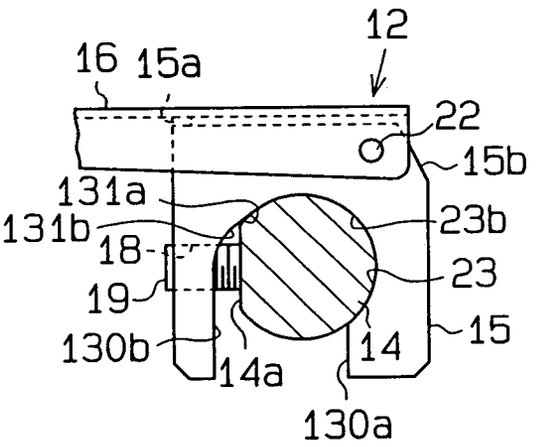


Fig.24

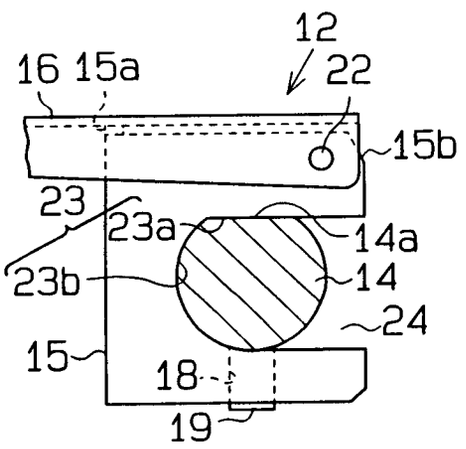


Fig.25

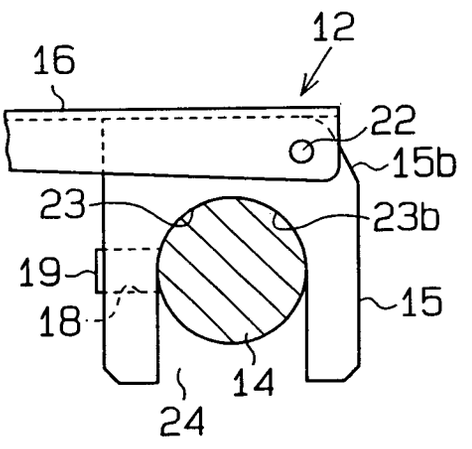


Fig.26(a)

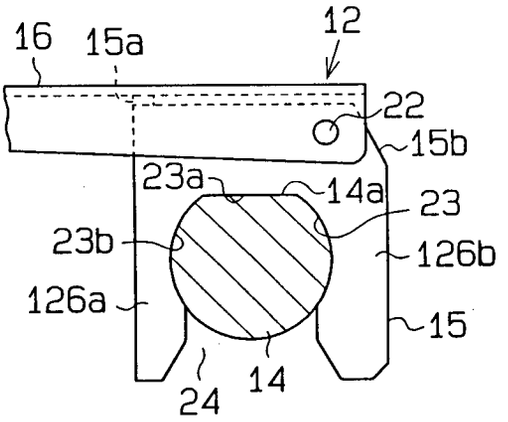


Fig.26(b)

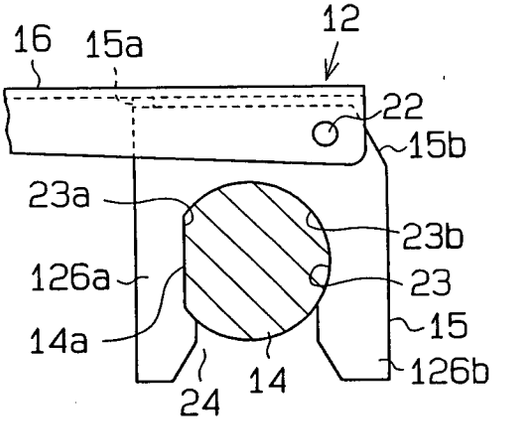


Fig.27

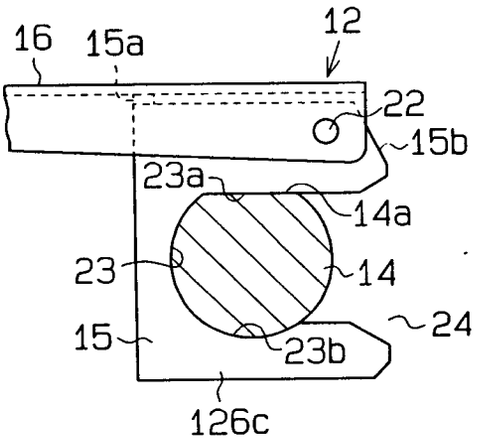


Fig.28

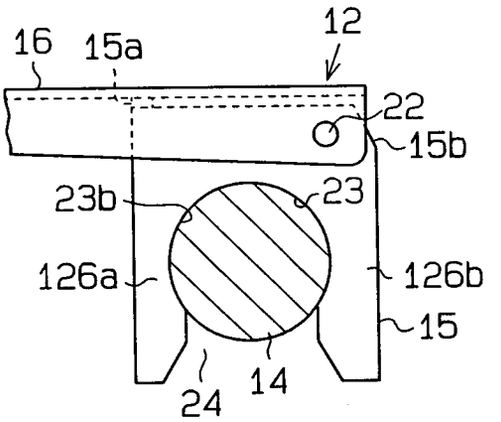


Fig.29

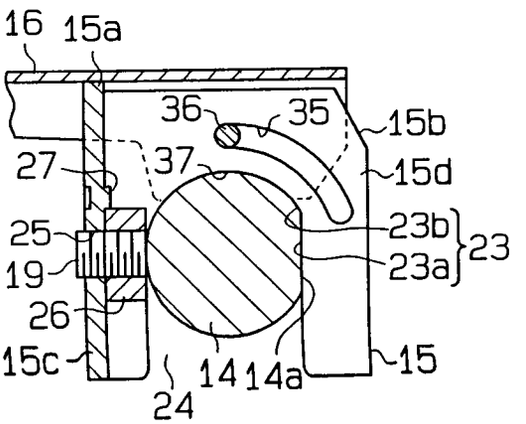


Fig.30

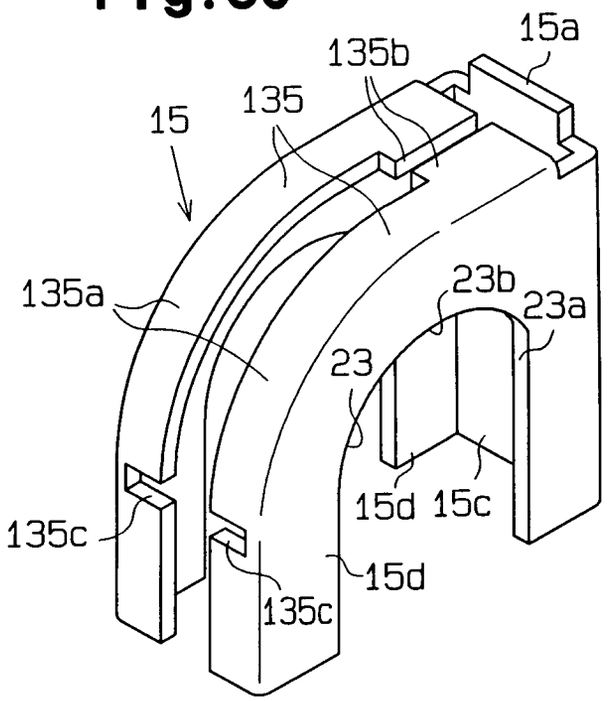


Fig.31

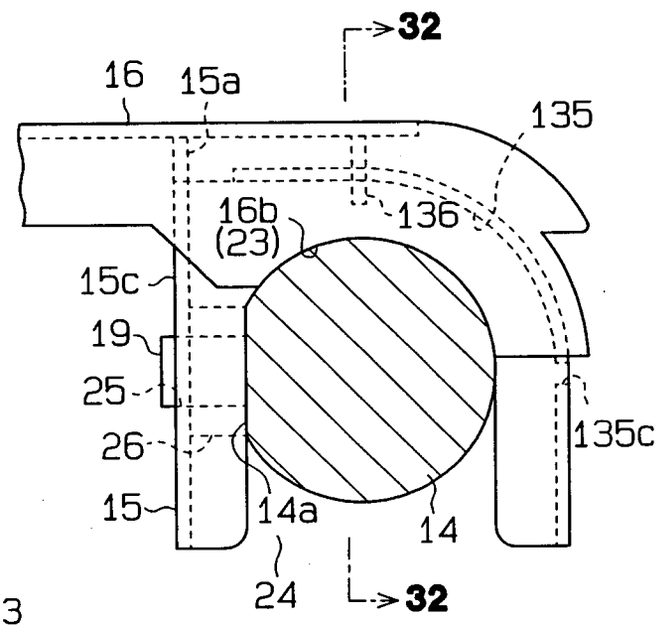


Fig.32

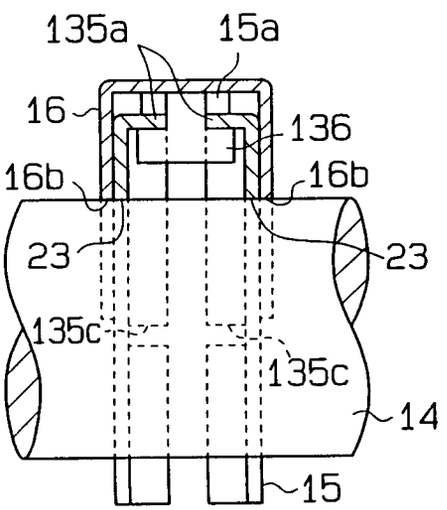


Fig.33

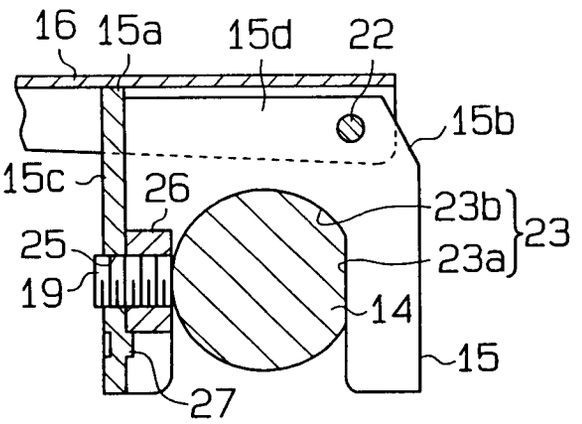


Fig.34

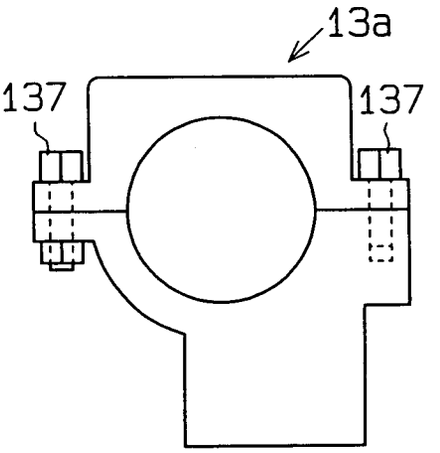


Fig.35

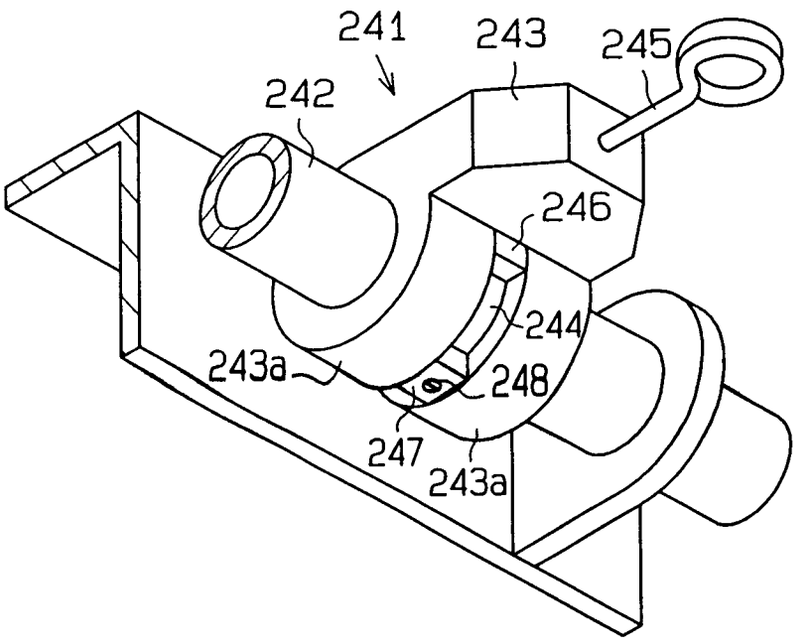


Fig.36(a)

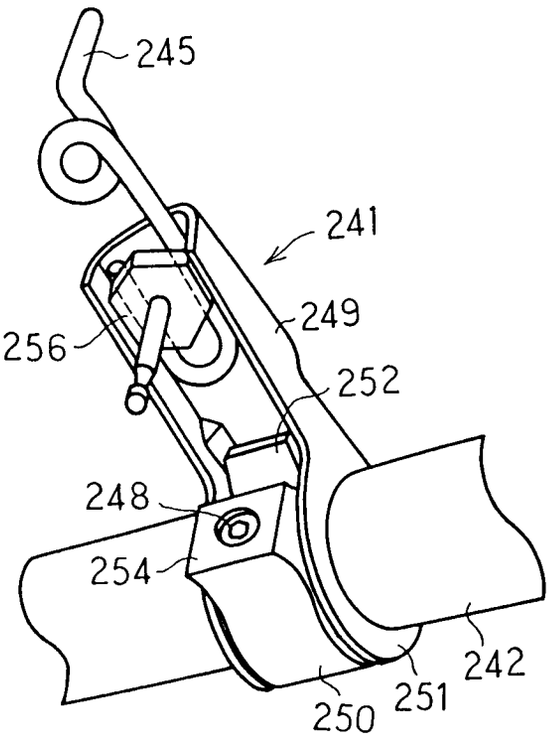
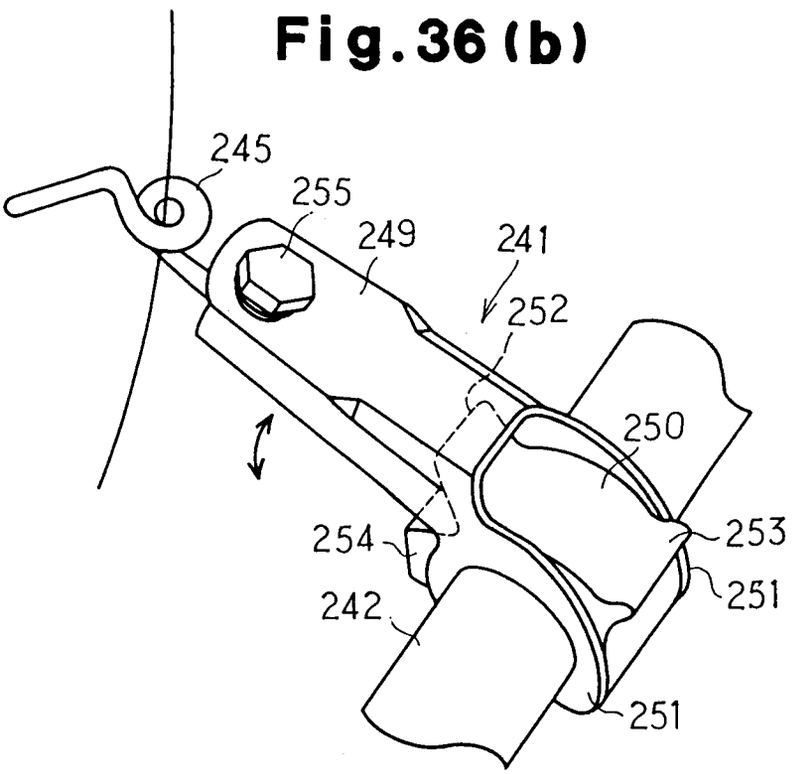


Fig.36(b)



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 11 9087

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X,D	JP 63 007 180 U (...) * figures *	1	D01H13/04
A	DE 86 29 229 U (SAURER-ALLMA GMBH) * figure 1 *	1	
A	FR 1 235 928 A (SOCIETE ALSACIENNE DE CONSTRUCTIONS MECANIQUES) * the whole document *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

D01H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 March 1997	Tamme, H-M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)