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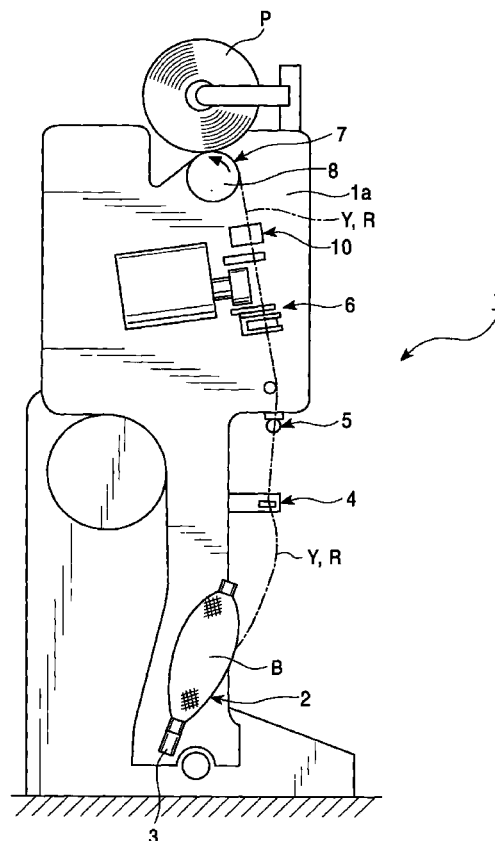
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(54) **Yarn splicing method for winding and winder**

(57) The present invention provides a yarn splicing method for a winder and a winder that can eliminate fluffs from the surface of a yarn joint. In a winder 1 having a splicing device 6 placed between a yarn supplying section 2 and a winding section 7, a yarn joint finishing device 10 comprising a liquid applying member 11 for applying a liquid to a yarn running path R and a fluff smoothing member 12 that comes in contact with the yarn running path R is provided in the splicing device 6 and its neighborhood. The liquid applying member 11 and fluff smoothing member 12 of the yarn joint finishing device 10 are integrated together using a contact surface member 13 that wets the liquid applying member and fluff smoothing member with a liquid. The yarn joint finishing device comprises two sets of the contact surface member 13, and the contact surface member 13 of each set can advance and withdraw between a standby position located away from the yarn running path R and a finished position at which the yarn running path R is sandwiched.

**FIG. 1**



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## Description

### Field of the Invention

**[0001]** The present invention relates to an improvement of yarn splicing in a winder for rewinding a spun yarn of a bobbin into an amount of yarn preferable for the subsequent process or into a package shape.

### Background of the Invention

**[0002]** A conventional method and apparatus for splicing a spun yarn applies a compressed fluid to both yarn ends (see Japanese Patent Publication Number 62-23699 and Japanese Patent Publication Number 62-47785).

**[0003]** Fibers F forming a spun yarn Y may protrude like fluffs from a yarn joint A obtained by the splicing method, as shown in Figure 6. A dyeing process and a weaving process, which are the subsequent processes, require fluffs to be eliminated from the surface of the yarn joint to improve the yarn joint for obtaining the high-grade of the finish.

**[0004]** Thus, an object of the present invention is to provide a yarn splicing method for a winder and a winder that can eliminate fluffs from the surface of the yarn joint.

### Summary of the Invention

**[0005]** In order to eliminate fluffs from the surface of the yarn joint, an aspect of the present invention provides a yarn splicing method for a winder for splicing a yarn between a yarn supplying section and a winding section, characterized by comprising applying a liquid to a yarn joint while smoothing down the yarn joint to lay fluffs down.

**[0006]** According to this aspect, by smoothing down the surface of the yarn joint to which the liquid has been applied in order to lay the fluffs down, the fluffs are persistently stuck to the yarn joint due to the adhesion of the liquid. Then, the yarn is wound and the liquid dries over time to set the yarn joint with the fluffs laid down thereto.

**[0007]** In order to enable the fluffs to be reliably eliminated, an aspect of the present invention provides a yarn splicing method for a winder, characterized in that the yarn tension during the smoothing is larger than the yarn tension prior to splicing.

**[0008]** According to this aspect, the yarn joint that has been wound with a high tension before drying has this tension remaining therein, thereby preventing the fluffs from rising from its surface.

**[0009]** In order to eliminate fluffs from the surface of the yarn joint, an aspect of the present invention provides a winder having a yarn splicing device placed between a yarn supplying section and a winding section, characterized in that a yarn joint finishing device

comprising a liquid applying member for applying a liquid to a yarn running path and a fluff smoothing member that comes in contact with the yarn running path is provided in the splicing device and its neighborhood to allow the yarn joint finishing device to operate on a yarn after splicing.

**[0010]** According to this aspect, by using the liquid applying member to apply a liquid to the yarn joint while using the fluff smoothing member to smooth down the yarn joint, the fluffs on the yarn joint can be laid down and persistently stuck to the yarn joint due to the adhesion of the liquid. Then, the yarn is wound and the liquid dries over time to set the yarn joint with the fluffs laid down thereto.

**[0011]** The yarn joint finishing device operates on the yarn only during a splicing operation (after the completion of splicing), and does not operate on it during normal winding. Accordingly, the liquid application and smoothing operations are performed only on the yarn joint and its adjacent portions at most.

**[0012]** In order to simplify the device, an aspect of the present invention provides a winder, characterized in that the liquid applying member and fluff smoothing member of the yarn joint finishing device are integrated together using a contact surface member that wets the liquid applying member and fluff smoothing member with a liquid.

**[0013]** According to this aspect, the yarn joint is moved while in contact with the contact surface member to enable both liquid application and smoothing to be simultaneously completed.

**[0014]** In order to enable the fluffs to be reliably eliminated, an aspect of the present invention provides a winder, characterized in that the yarn joint finishing device comprises two sets of the contact surface member, and in that the contact surface member of each set can advance and withdraw between a standby position located away from the yarn running path and a finished position at which the yarn running path is sandwiched.

**[0015]** According to this aspect, the yarn joint being moved is sandwiched by the two sets of contact surface members to enable both liquid application and smoothing to be simultaneously completed for the entire yarn joint.

### Brief Description of the Drawings

#### [0016]

Figure 1 is an overall side view showing a first embodiment of a winder according to the present invention.

Figure 2 is an enlarged view of a yarn joint finishing device provided in the winder according to the first embodiment. Figure 2A is a top view showing a finished state. Figure 2B is a side view showing the finished state.

Figure 3 is an enlarged top view showing a standby

state of the yarn joint finishing device provided in the winder according to the first embodiment.

Figure 4 is a schematic drawing of a water supply device provided in the winder according to the first embodiment.

Figure 5 is a perspective view showing a second embodiment of a winder according to the present invention and showing an enlarged view of the neighborhood of a yarn joint finished device that is an integral part.

Figure 6 is an enlarged front view of a conventional yarn joint.

#### Detailed Description of the Preferred Embodiments

**[0017]** A yarn splicing method for a winder and a winder according to the present invention are described below based on the embodiments.

**[0018]** Figures 1 to 4 show a first embodiment of a winder according to the present invention. Figure 1 is a side view showing the entire winder. Figures 2 and 3 show enlarged views of a yarn joint finishing device. Figure 2A is a top view showing a finished state. Figure 2B is a side view showing the finished state. Figure 3 is a top view showing a standby state. Figure 4 is a schematic drawing of a water supply device.

**[0019]** As shown in Figure 1, a winder 1 comprises a bobbin peg 3 of a yarn supplying section 2 for supporting a bobbin B, a yarn guide 4 for guiding the yarn Y, a tenser 5 for applying an appropriate tension to the yarn Y, a splicing device 6 for splicing a yarn end on the bobbin B and a yarn end on a package P, and a winding drum 8 of a winding section 7 for winding the yarn Y around the package P, arranged in this order from bottom to top along a running path R for the yarn Y. An improvement is that a yarn joint finishing device 10 is placed between the splicing device 6 and the winding drum 8 and close to the splicing device 6. The splicing device 6 carries out splicing by applying a compressed fluid to both yarn ends (see Japanese Patent Publication Number 62-23699 and Japanese Patent Publication Number 62-47785).

**[0020]** As shown in Figures 2 to 4, the yarn joint finishing device 10 eliminates from the surface of a yarn joint A, fluffs (see Figure 6) comprising fibers F, and comprises a liquid applying member 11 for applying a liquid to the yarn running along the yarn running path R and a fluff smoothing member 12 that comes in contact with the yarn Y running along the yarn running path R. In the yarn joint finishing device 10, the main parts of the liquid applying member 11 and fluff smoothing member 12 are integrated together using two sets of contact surface members 13, 13, which will be described below. The yarn joint finishing device 10 comprises a fixed member 14 joined with a body locking frame 1a of the winder 1, two sets of rolling arms 16, 16 rollingly journaled 15 to the fixed member 14, the contact surface member 13 attached to each of the rolling

arms 16, an intermediate member 18 coupled to the rolling arms 16, 16 via coupling rods 17, 17, an operation member 19 comprising an air cylinder or a solenoid and joined with the fixed member 14 to operate the intermediate member 18 so as to advance and withdraw, and a liquid supply device 20 for supplying a liquid to the contact surface members 13, 13. The yarn joint finishing device 10 is adapted to allow the two sets of the contact surface members 13, 13 to advance and withdraw in an interlocking manner between a standby position (shown in Figure 3) located away from the yarn running path R and a finished position (shown in Figure 2) at which the running path R is sandwiched when the operation device 19 is used to roll the rolling arms 16, 16.

**[0021]** The water supply device 20 comprises a compressed air pipe 23 having an opening and closing valve 22, a liquid storage tank 24, a mixing member 25 on the upstream side connected to the compressed air pipe 23 and liquid storage tank 24, and a water supply pipe 21 extending from the downstream side of the mixing member 25. When the opening and closing valve 22 is opened to supply compressed air to the mixing member 25, the suction force of the compressed air passing through the mixing member 25 causes a liquid (for example, water) to be sucked from the liquid storage tank 24, so that a mixture of the liquid and air is delivered to the water supply pipe 21. The water supply device 20 opens the opening and closing valve 22 in response to a splicing operation by the splicing device 6 to supply a required amount of the mixture of the liquid and air to the contact surface members 13, 13.

**[0022]** The contact surface member 13 comprises an intermediate layer 13a comprising a sponge layer having a water absorption capability and an appropriate elasticity or a massive non-woven cloth layer and a surface layer 13b comprising a woven or non-woven cloth having a water absorption capability, an appropriate elasticity, and abrasion resistance. The terminal 21a of the flexible water supply pipe 21 extending from the water supply device 20 is opened into the intermediate layer 13a so that the supplied liquid is used for wetting.

**[0023]** Next, an operation of the yarn joint finishing device 10 is explained. While the splicing device 6 is not carrying out splicing, the two sets of the contact surface members 13, 13 stand by at the standby position (shown in Figure 3) located away from the yarn running path R and are thus prevented from coming in contact with the yarn Y. When the splicing device 6 is to execute splicing, the two sets of the contact surface members 13, 13 are moved to the finished position (shown in Figure 2), at which the contact surface members 13, 13 sandwich the yarn Y. After the completion of splicing, the yarn Y runs to allow the contact surface members 13, 13 to operate on the yarn joint A (see Figure 6). In the two sets of the contact surface members 13, 13 formed by integrating the liquid applying member 11 and the fluff smoothing member 12 together, the inter-

mediate layer 13a and the surface layer 13b are wet due to the mixture of the liquid and air supplied from the liquid supply device 20 beforehand. Thus, by providing the liquid to the entire yarn joint A via the surface layers 13b, 13b involved in sandwiching while smoothing down the entire yarn joint A using the surface layers 13b, 13b, the fluffs comprising the rising fibers F can be laid down to the yarn joint. The fluffs are persistently stuck to the yarn joint due to the adhesion of the liquid. Then, the yarn is wound and the liquid dries over time to set the yarn joint with the fluffs laid down thereto.

**[0024]** In the winder 1, the tenser 5 can be remote-controlled to set the tension of the yarn Y during smoothing between the contact surface members 13, 13 involved in sandwiching, larger than the tension prior to splicing. In this case, the yarn joint that has been wound with a high tension before drying has this tension remaining therein, thereby preventing the fluffs from rising from its surface.

**[0025]** The position at which the yarn joint finishing device 10 is placed is not limited to the outlet side (downstream side) of the splicing device 6, but may be the inlet side of the splicing device 6 if a yarn clearer placed on the inlet side of the splicing device 6 runs along the yarn joint in the reverse direction for splice monitoring.

**[0026]** Figure 5 shows a second embodiment. In a yarn joint finishing device 30 placed on the winder, the contact surface member 13 having both functions of a liquid applying member and a fluff smoothing member is placed close to the yarn running path R formed after splicing by the splicing device 6. By rolling a yarn handling lever 6a provided in the splicing device 6, in the direction shown by arrow C, the spliced yarn Y is moved so as to come in contact with the contact surface member 13. Then, by applying a liquid to the running yarn joint A while smoothing down the yarn joint A, the fluffs are laid down to the yarn joint A. The contact surface member 13 is substantially identical to that in the above embodiment and is supplied with a required amount of mixture of air and the liquid by the liquid supply device 20 (see Figure 4).

**[0027]** The aspects of the present invention can set the yarn joint with the fluffs laid down thereto to eliminate the fluffs from the surface of the yarn joint, thereby improving the yarn joint. Besides, action can be taken only for the required yarn joint.

**[0028]** The aspect of the present invention can reliably lay down the fluffs to the surface of the yarn joint by making the yarn tension during the smoothing than the yarn tension prior to splicing, thereby enabling the fluffs to be reliably eliminated from the surface of the yarn joint in order to improve the yarn joint.

**[0029]** The aspects of the present invention can simultaneously complete both liquid application and smoothing by integrating the liquid applying member with the fluff smoothing member, thereby simplifying the device.

**[0030]** The aspect of the present invention can simultaneously complete both liquid application and smoothing by using the two contact surface members to sandwich the yarn, thereby enabling the fluffs to be reliably eliminated from the surface of the yarn joint in order to improve the yarn joint.

## Claims

1. A yarn splicing method for a winder for splicing a yarn between a yarn supplying section and a winding section, characterized by comprising applying a liquid to a yarn joint while smoothing down the yarn joint to lay fluffs down.
2. A yarn splicing method for a winder as in Claim 1, characterized in that the yarn tension during the smoothing is larger than the yarn tension prior to splicing.
3. A winder having a splicing device placed between a yarn supplying section and a winding section, characterized in that a yarn joint finishing device comprising a liquid applying member for applying a liquid to a yarn running path and a fluff smoothing member that comes in contact with the yarn running path is provided in the splicing device and its neighborhood to allow the yarn joint finishing device to operate on a yarn after splicing.
4. A winder as in Claim 3, characterized in that the liquid applying member and fluff smoothing member of the yarn joint finishing device are integrated together using a contact surface member that wets the liquid applying member and fluff smoothing member with a liquid.
5. A winder as in Claim 4, characterized in that the yarn joint finishing device comprises two sets of the contact surface member, and in that the contact surface member of each set can advance and withdraw between a standby position located away from the yarn running path and a finished position at which the yarn running path is sandwiched.

FIG. 1

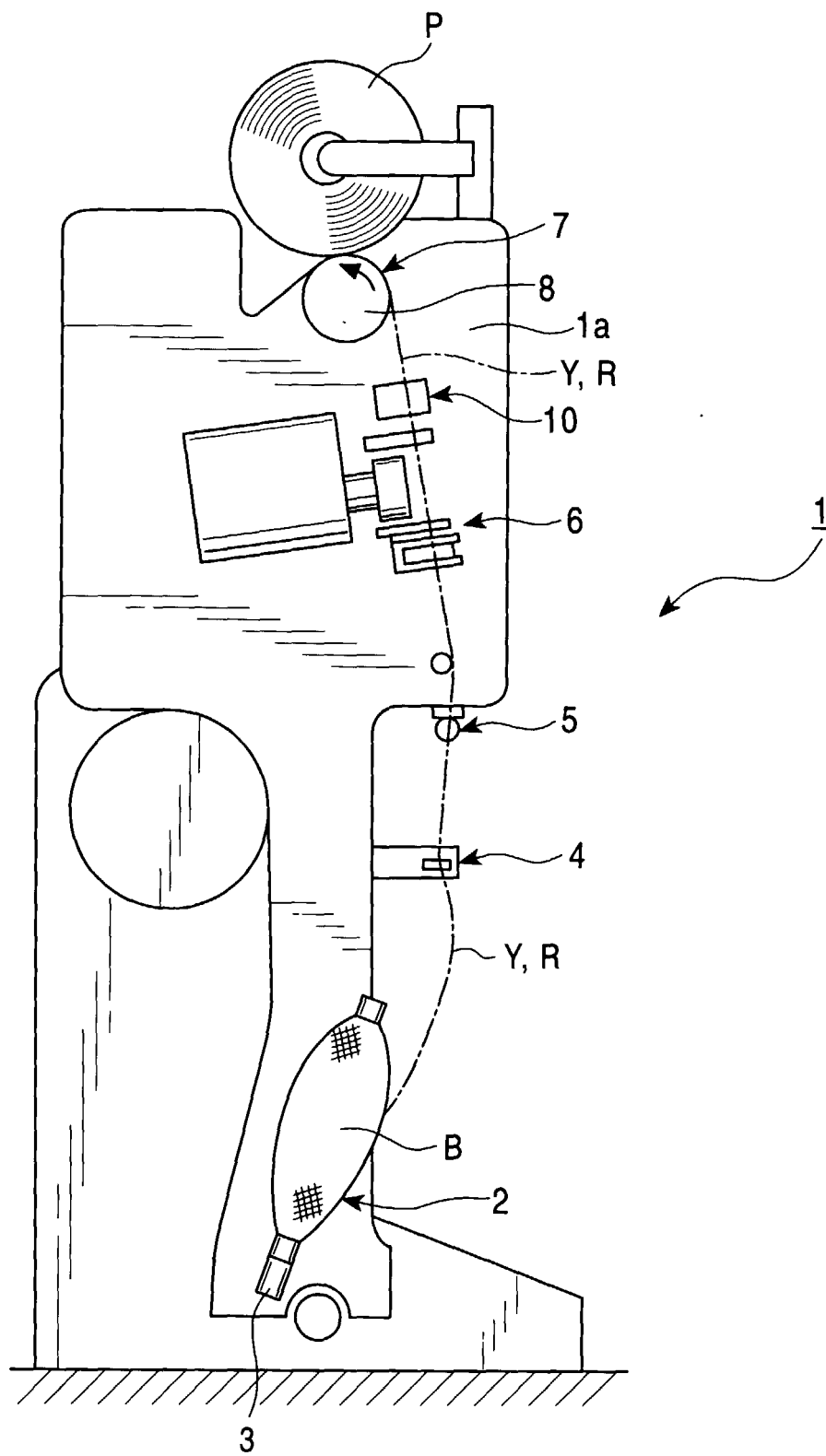


FIG. 2A

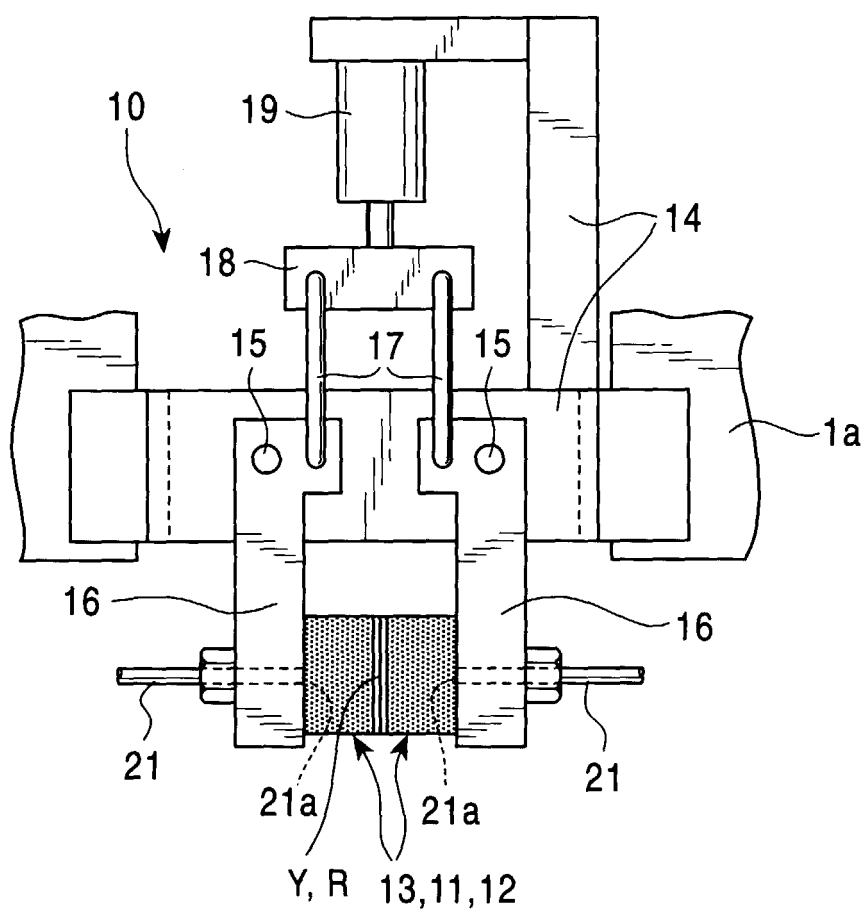


FIG. 2B

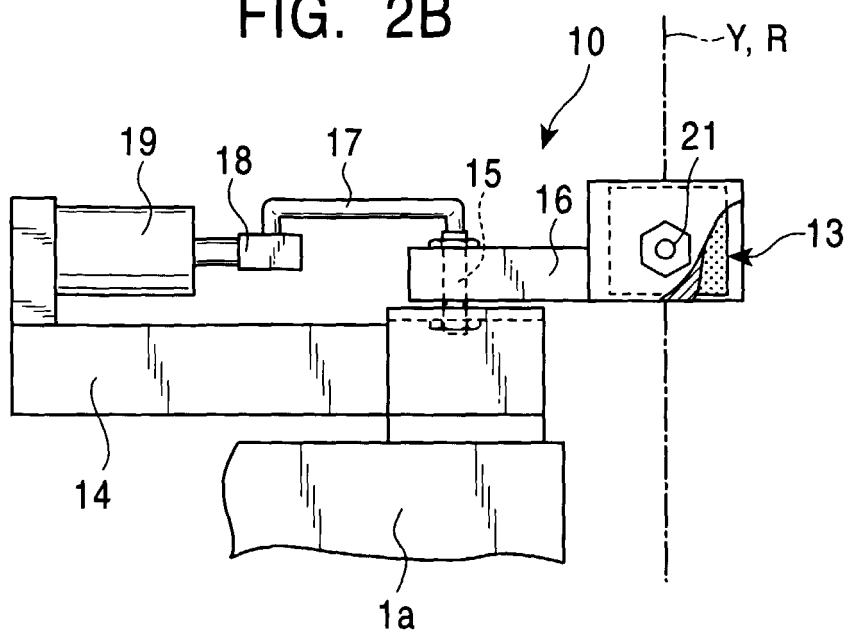


FIG. 3

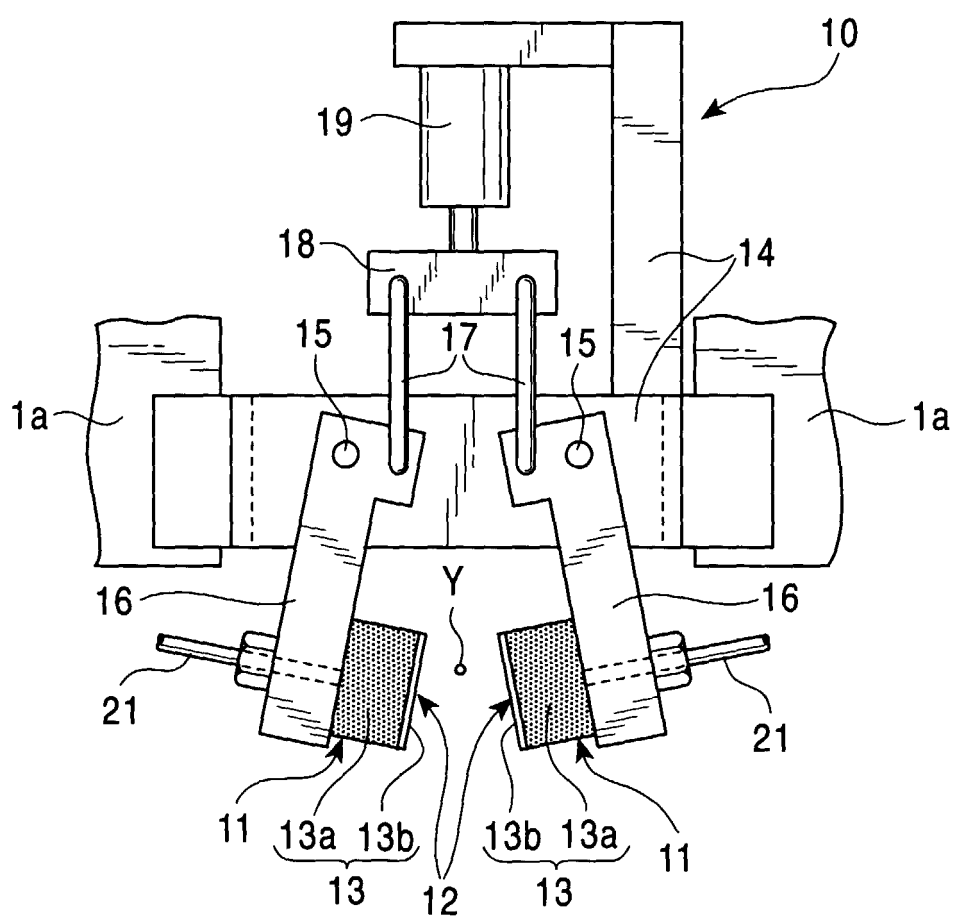


FIG. 4

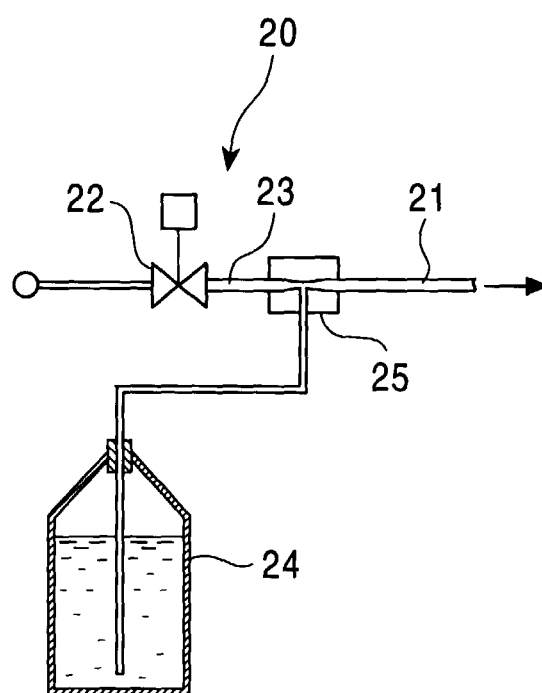




FIG. 5

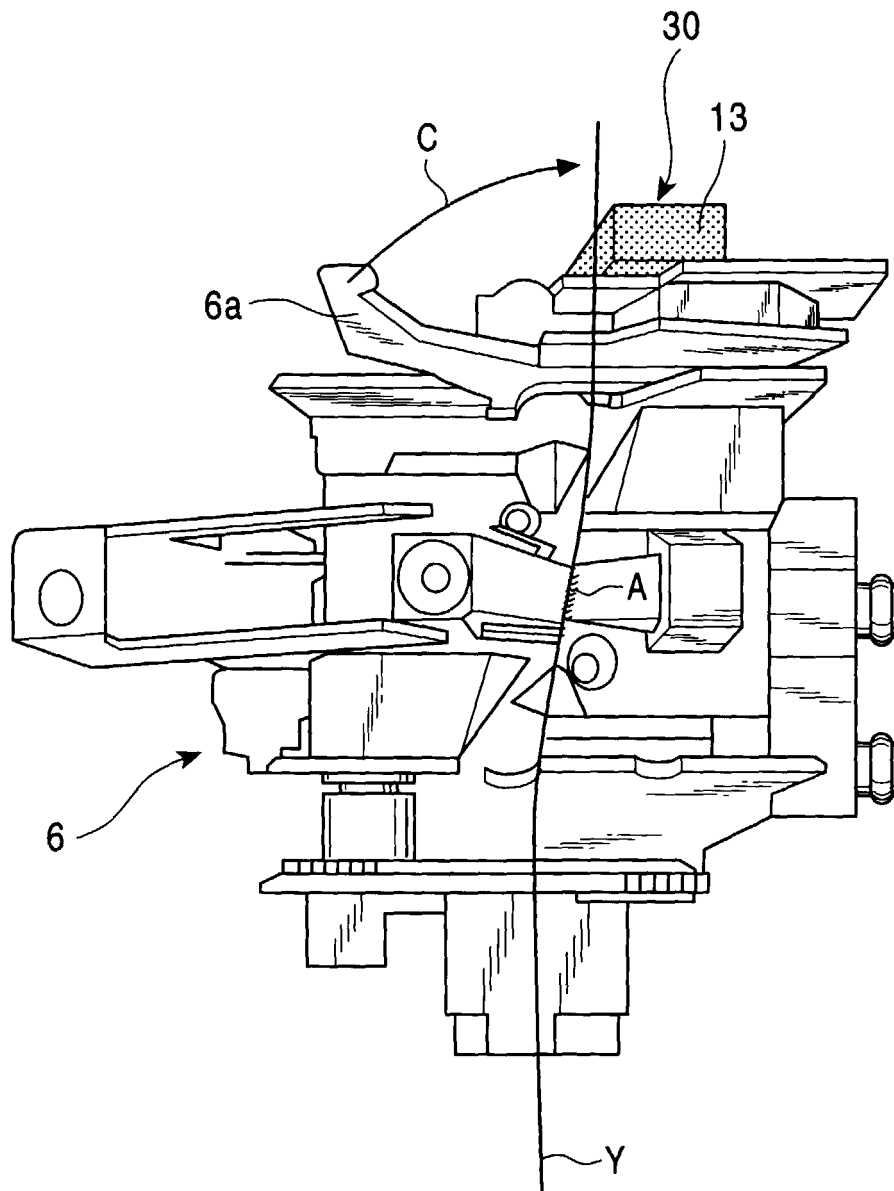


FIG. 6  
PRIOR ART

