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(54) Yarn false twisting device

(57) A device that achieves a reduction in the number of parts and reduces the space required by simplifying the arrangement of the rotating member that applies a twist to the yarn.

A drive motor directly linked to a shaft is arranged on a pair of drive pulleys for applying a twist to a processing yarn. The drive motor is incorporated inside a holder that holds the drive pulley so that it may freely rotate.

EP 0 837 164 A1

Description

Field of the Invention

The present invention relates to a yarn false twisting device that applies a twist to the yarn by sandwiching the yarn by a pair of rotating members.

Background of the Invention

One example of a yarn false twisting device is a belt type nip twister provided on a draw texturizing machine. As shown in Figure 6, a conventional type of nip twister (belt type false twister) 16 has an arrangement whereby a pair of continuous belts 1,2 are each wound between a drive pulley 4 and free pulley 5 and these continuous belts 1,2 intersect with each other at a predetermined angle. The drawn processed yarn Y_1 is sandwiched at the intersecting part 6 of these continuous belts 1,2 and a twist is imparted simultaneous with it being sent in one direction (downwards) due to each of the continuous belts 1,2 running in opposite directions. The shaft 7 of the drive pulley 4 extends outwards from the holder 8 and a roller 9 is mounted on that extended end. The rotational drive force is transmitted by a tangential belt 10 being coupled to that roller 9.

As shown in Figure 7, the tangential belt 10 is suitably wound on the pulley 12 of the drive motor 11 and a plurality of guide rollers 13 and extends in a direction at right angles to the shaft of the roller 9 of each of the spindles. The reciprocal running belts 10a,10b of this tangential belt 10 are positioned such that they are aligned in close proximity in the axial direction with the roller 9 and the rotational direction of the roller 9, in short, a Z-twist or S-twist of the processed yarn Y_1 is selected by the coupling of either of the running belts 10a,10b with the starter roller 14. Apart from this, a contact pressure application device that adjusts the contact pressure applied to the processed yarn Y_1 by moving the pulleys 4,5 suitable around the shaft 7, and a separating device that separates the belts 1,2 during yarn breakage or the like are provided inside the frame 15 arranged on the holder.

Another example of a yarn false twisting device has spinning nip rollers that produce a fasciated spun yarn. As shown in Figure 8, the nip rollers (roller type false twist device) 21 are provided on a spinning device 22 that spins a spun yarn Y_2. The spinning device 22 supplies sliver S directly to the draft part 23, wraps parallel fibers onto the periphery of a core of staple fibers by applying a twist at the exit of those front rollers 24 by an air jet nozzle 25 and nip roller 21 and forms a fasciated spun yarn Y_2. The spun yarn Y_2 is wound onto a package of predetermined shape by a winding system (not shown in the drawing) arranged on the lower part while being suitably traversed. The nip rollers 21 comprises a pair of roller members 28,29 arranged such that the shafts 26,27 intersect suitably, sandwiching the yarn Y_3 passing through the air jet nozzle 25 at the contact part of that periphery and apply a twist to the yarn. Pulleys 30 are mounted on the end of shafts 26,27 of each roller member 28,29 and due to the connection with a pulley 33 mounted on the output shaft 32 of the drive motor 31 via belts 34,35, are rotated in each respective direction. As rotational drive arrangements of these nip rollers, there is an arrangement comprising the drive motor 31 on each spindle as shown in Figure 8 as well an arrangement where a line shaft extends along the line of spindles with a single drive motor arranged on the frame end and that transmits rotational force to the shaft of the respective roller members by a timing belt with a clutch mounted on each and every spindle.

However, with these kinds of arrangements of the nip twister 16 and nip rollers 21, as the rotation of the drive motors 11,31 is transmitted to each of the shafts 7,26,27 by the belts 10,34,35, that arrangement is complicated and achieving a reduction in the number of parts or space required is difficult.

Furthermore, changing the direction (intersecting angle) of the shafts 7,26,27 may be performed in order to change the number of false twists but as it is necessary to change the extension direction and length of the belts 10,34,35 in association with this, it results in a overall design modification and lacks utility.

Yet further, if fly waste or the like is attached to the belts 10,34,35, uneven rotation is generated and leads to a decrease in quality of the processed yarn Y_2 or spun yarn Y_3.

Summary of the Invention

In order to solve the aforementioned problems, it is an object of the present invention to propose a yarn false twisting device incorporating a drive motor in the holder of at least one of a pair of rotating members for sandwiching the yarn and imparting a twist to the yarn.

A compact size may be achieved as a result of this arrangement. It is preferable for the drive motor to be directly linked to the drive shaft of the rotating member and furthermore, it is preferable for a drive motor to be arranged for the pair of rotating members.

Brief Description of the Drawing

Figure 1 is a front view including a partial section showing a first embodiment where the yarn false twisting device of the present invention is utilized on a nip twister of a draw texturing machine.

Figure 2 is a block diagram for explaining the drive motor of Figure 1.

Figure 3 is a front view including a partial section showing another embodiment where the yarn false twisting device of the present invention is utilized on a nip twister of a draw texturing machine.

Figure 4 is a perspective view showing the second embodiment where the present invention is utilized on

the nip rollers of a spinning machine.

Figure 5 is sectional view of the main part of Figure 4.

Figure 6 is a front view including a partial section showing a nip twister of the draw texturizing machine being a conventional yarn false twisting device.

Figure 7 is a perspective view showing the drive system of Figure 6.

Figure 8 is a perspective view showing the nip rollers of a spinning machine being a conventional yarn false twisting device.

Figure 9 is a front view including a partial section showing yet another embodiment where the yarn false twisting device of the present invention is utilized on a nip twister of a draw texturing machine.

Figure 10 is perspective view of the entire embodiment of Figure 9.

Detailed Description of the Preferred Embodiments

Hereafter, a first embodiment of the present invention will be described in accordance with the attached drawings.

Figure 1 shows a first embodiment where the yarn false twisting device of the present invention is utilized on a nip twister of a draw texturing machine.

A nip twister (belt type false twister) 41 is provided with a pair of rotating members (false twist application members) comprising a drive pulley 42 and free pulley 43 for sandwiching the processed yarn Y_1 and imparting a twist in the yarn Y_1 and a continuous belt 44 wound onto these. A drive motor 46 connected directly to a shaft (drive shaft) 45 is arranged on the drive pulley 42.

It should be noted that the meaning of connected directly in this case means that the rotor of the motor 46 is fixed directly to the drive shaft 45 and the drive shaft of the motor 46 is common with the drive shaft 45 of the rotating member.

A pair of rotating members are arranged such that the continuous belt 44 intersects with another continuous belt (not shown in the drawing) at a predetermined angle and imparts a twist while delivering the processed yarn Y_1 by sandwiching it in the intersecting part 6 of the pair of continuous belts.

The drive pulley 42 comprises a circular disk shaped member having winding surface 47 for the continuous belt 44 in the outer periphery and a shaft hole 48 for inserting the shaft 45 is formed in that shaft center. The shaft 45 extends to a length in one direction from the drive pulley 42 and is supported so as to be able to freely rotate by a holder 49. The holder 49 comprises an outer cylinder 50 and an inner cylinder 51 in contact with the inner wall of the outer cylinder 50. The inner cylinder 51 has a long shape which extends from either end of the outer cylinder 50.

An arm 52 extending in the radial direction of the outer cylinder 50 is formed on the end of and as a single unit with the drive pulley 42 side of the outer cylinder 50 and supports the free pulley 43 so that it is able to rotate freely. Bearings 53,54 that support both ends of the shaft 45 are arranged on both ends of the inner cylinder 51. The shaft 45 has a large diameter part from the drive pulley 42 end to the part which is slightly inserted in the outer cylinder 50 and a small diameter part from that position to the other end. The drive motor 46 is positioned on the shaft small diameter part inside the inner cylinder 51.

In the present embodiment, the drive motor 46 comprises a small brushless DC motor that generates a uniform torque from a low speed range to a high speed range and is arranged of a rotor (magnet) 55 mounted on the shaft 45 and a stator (solenoid) 56 arranged in the vicinity of outer radial direction of the rotor 55. A drive part 57 for suitably supplying exciting current to the winding (not shown in the drawings) of the stator 56 is provided in the inner cylinder 51. The rotor 55 is connected to the step part 58 formed on the shaft 45 with a reduced diameter. The stator 56 is supported a the inner cylinder 51 via a cylindrical bush 59. The bush 59 is fitted to the inner wall of the inner cylinder 51 and is positioned in the axial direction with the tip in contact with small stepped part 60 formed in the inner cylinder 51. A cup part 61 for supporting the stator 56 is formed on the inner wall of the bush 59. The drive part 57 is connected to the stator 56 in the vicinity of the stator 56 and that cable (electrical cable and control line) 62 extends to the other end of the inner cylinder 51 and extends to the exterior via a socket 63 arranged at the vicinity of the other end.

As shown in Figure 2, the dirve part 57 comprises five blocks being a power circuit 64, current control circuit 65, logic circuit 66, set comparison circuit 67 and power supply circuit 68, and sends and receives signals as shown by the bold arrows in the Figure. The power circuit 64 controls the current flowing in the winding of the stator 56 and applies an exciting current to the winding by transistors (not shown in the drawing) comprising the circuit repeating an ON-OFF sequence in a uniform order. By always detecting the current flowing in the winding, the current control circuit 65 controls the current that changes due to the load such that no unevenness is generated in the set rotational speed. The logic circuit 66 receives feedback signals from the magnetic element (hall element) arranged on the stator 56 and determines the excitation order of the winding by detecting the position of the rotor 56.

Furthermore, the motor rotation speed is detected by this feedback signal and executes commands (start/stop, brake/run etc.) to the motor. The set comparison circuit 67 compares the speed setting signal with the rotation speed signal of the motor and if the motor speed is higher than the set speed, decreases the output to the motor and if lower, increases the output to the motor. The power supply circuit 68 supplies from the commercial power source the necessary voltage for

driving each of the control circuits 64,67 and the motor. The information (output wave shape and the like) of the drive part 57 is sent to the control unit 69 that controls the operations of the nip twister 41 and continuously inspects the motor load and the like.

It should be noted that it is preferable for the drive motor 46 to be a brushless DC motor but an induction motor may be used.

Furthermore, the drive part 57 may arrange only the sensor part inside the inner cylinder 51 and all parts other than the sensor part of the drive part 57 on the exterior.

As also shown in Figure 1, the base frame 70 is arranged on the extended part of the inner cylinder 51. A contact pressure application device (not shown in the drawing) that adjusts the contact pressure on the processed yarn Y_1 by rotatably moving the entire device about the shaft 45 of the drive pulley 42, and a separation device (not shown in the drawing) that separates the pair of belts 43 when a yarn breakage occurs are arranged on the base frame 70. Furthermore, the other drive pulley which has been omitted from the drawing is comprised similarly to the drive pulley 42 described above.

In this way, as the drive motor 46 is directly linked to the shaft 45 of the drive pulley 43, there is no generation of uneven rotation, there is no need for a complicated transmission member such as the tangential belt or guide roller on a conventional nip twister, the arrangement of the entire device becomes a lot more compact, the number of parts are reduced and a reduction in space achieved. Furthermore, as the drive transmission efficiency is improved, a reduction in energy is achieved.

Yet further, by simply changing the mounting direction of the holder 49, the axial direction of the drive pulley 42 and free pulley 43 may be changed and the changing of the cross over angle of the continuous belts relating to the setting of the twist count, twisting tension and untwisting tension may be extremely easily performed. In short, the utility of the device is excellent.

The rotation state of the drive pulley 42 of each spindle may be continuously inspected thus preventing beforehand the occurrence of trouble such as that caused by abnormal rotation.

Furthermore, as a brushless DC motor has been utilized as the drive motor 46, the change in rotor rotation speed end load may be detected in real time by that output wave form thus reliably preventing problems.

Yet further, in the present embodiment, as the drive motor 46 is incorporated in the holder 49, there is no part which projects from the holder 49 a further reduction in the space used is achieved and the number of bearings 53,54 of the shaft 45 may be the least necessary (two) thus achieving an overall reduction in the number of parts. By arranging the drive motor 46 on each of the pair of drive pulleys 42, the rotation direction of the pulley (running direction of the continuous belt 43) may be easily changed and the selection of the twist direction (Z-twist or S-twist) may be easily performed.

Figure 3 shows another embodiment of the present invention with this nip twister 101 comprising an arrangement similar to the previous embodiment of a pair of rotating members comprising a drive pulley 42 and free pulley (not shown in the drawing) and continuous belts (not shown in the drawing) wound between these and arranged with a drive motor (brushless DC motor) 103 directly linked to a shaft (drive shaft) 102 of a drive pulley 42. A holder 104 of the shaft 102 is arranged with an outer cylinder 106 supported on a base frame 105 and an inner cylinder 107 shorter than the outer cylinder 106. The end of the inner cylinder 107 is contained by a bolt 108 being screwed into it.

An arm 109 extending in the radial direction of the outer cylinder 106 is formed as a single unit with the outer cylinder 106. The shaft 102 is formed shorter than that of the previous embodiment with the space between the bearings 110,111 arranged at close to both ends of the inner cylinder 107 also being shorter. Also the small diameter part 102a of the shaft 102 is formed from the position close to the attachment with the drive pulley 42. A rotor 112 and a stator 113 of the drive motor 103 are arranged on this small diameter part 102a.

Furthermore, the entire length of the drive motor 103 is longer than the previous embodiment and the length is proportional to approximately 2/3 of the shaft small diameter part 102a. The bush 114 that holds the stator 113 is approximately the same length as the drive motor 103. Also, the sensor part 115 of the drive part is arranged inside the inner cylinder 107.

In the present embodiment, due to the shaft 102 (gap between the bearings) being shorter and the drive motor 103 being longer and located towards the pulley side, it is more preferable than the previous embodiment with respect to compatibility with high speeds. All other arrangements and effects are the same as the previous embodiment.

Next, the second embodiment whereby the present invention is used on nip rollers of a spinning machine will be described.

As shown in Figures 4 and 5, a spinning system 72 that spins a spun yarn Y_2 is provided on each spindle 71 of the spinning machine. The spinning system 72 is comprised of a draft part 23 that draws out the continuously supplied sliver at a predetermined ratio (for example, 100 times), and a air jet nozzle 25 and nip rollers 73 that apply a twist in opposite directions to each other at the exit of the front roller 24. The air jet nozzle 25 bundles the drafted sliver due to the high speed rotating current (air jet). The nip rollers (roller type false twister) 73 comprise a pair of roller members (rotating members) 28,29 and the shafts (drive shafts) 74,75 of those are supported on a support rail 76 extending in the direction of the aligned spindles in a crossed-over state. The bundled sliver is sandwiched between the pair of roller members 28,29 and a fasciated spun yarn Y_2 is

formed by the wrapping of parallel fibers around the periphery of the core staple fibers due to the imparting of a twist in the direction opposite the air rotation direction of the nozzle 25. Furthermore, drive motors (brushless DC motors) 77,78 are arranged directly linked to each of the shafts 74,75 of these roller members 28,29.

It should be noted that the spun yarn Y_2 is wound on the package of a predetermined shape while being traversed by a winding system (not shown in the drawing).

A delivery roller 81 that sandwiches the spun yarn Y_2 by an upper and lower roller 79,80 and a guide roller 82 that guides the yarn path from the sloping direction to the lower winding system are arranged in the space downstream from the spinning system 72. The winding speed of the winding system is set so as to be approximately equivalent to the spinning speed of the spinning system 72 and a arrangement which prevents too much tension being applied to the yarn is present between the guide roller 82 and package.

A yarn clearer 83 for removing defects of the spun yarn Y_2 is arranged below the guide roller 82 and a detection groove 83a connects with the yarn path at the front side of the cover plate 95 arranged in the direction in which the spindles are arranged.

As shown in Figure 5, the roller members 28,29 comprise flange plates 84 forming end surfaces at both shaft ends, thin rubber cylinders 85 that span between the outer periphery of both flange plates 84 and which are suitably swollen in the radial direction, shafts 74,75 which extend in one direction and which pass through a stay 86 directly connecting both pairs of flange plates 84, and a holder 88 that holds the extended part of the shafts 74,75 via a pair of bearings 87, and overall, has a holler rubber roller shape. The shafts 74,75 are fixed by a bolt 89 to one of the flange plates 84. The holder 88 is mounted on a support rail 76 in a predetermined direction (angle) by a bolt or the like via a bracket 90. The shaft 74 extends outwards from the holder 88 and the drive motor 77 is arranged a that extended part.

Similar to the brushless DC motor shown in the first embodiment, the drive motor 77 comprises a rotor 91 attached to the shaft extended part and a stator 92 arranged in the outer radial direction area of the rotor 91, and not only support the stator 92 but are also stored in the cylindrical case 94 that supports the shaft extended part via a pair of bearings 93. One side of the case 94 is connected to the end of the holder 88.

Furthermore, the drive part (not shown in the drawing) detailed in the previous embodiment is provided on the outer part of the drive motor 77 and is connected to a control unit (not shown in the drawing) that manages the operation of the spinning machine.

With the aforementioned arrangement, a complicated drive transmission means (belt and pulleys) such as conventional nip rollers are unnecessary and not only is a reduction in the space used achieved by making the entire device more compact but a decrease in energy consumption is also achieved.

Furthermore, the changing of the contact angle between the roller members 28,29 may be easily performed by simply exchanging the bracket 90 or adjusting the mounting direction. There is no generation of uneven rotation and as any rotation abnormality caused by damage to the bearings 87,93 can be quickly detected, problems may be prevented before they occur.

It should be noted that the present invention is not limited to a nip twister or nip roller as described in the aforementioned embodiments and may be used on any similar yarn false twisting device.

Next, an improved embodiment used on the nip twister of a draw texturizing machine will be described using Figures 9 and 10.

210 is a basal member comprising a inner cylinder 210a, a first outer cylinder 210b mounted on the periphery of the inner cylinder 210a and arranged with a bearing 211, and a second outer cylinder 210c above the first outer cylinder 210b and similarly mounted on the periphery of the inner cylinder 210a. The basal member 210 is arranged on a frame F being a support member for supporting the false twister, via bearing 211 arranged on the first outer cylinder 210b. 212 is an approximately cylindrical middle member of which the lower end may is removably mounted on a flange 210b' of the first outer cylinder 210b by a suitable fixing tool such as a screw or nut/bolt or the like.

A plurality of fins 212a are arranged on the periphery of the middle member 212 along the axial direction of the middle member 212. 213 is an approximately cylindrical tip member removably mounted on the upper inside of the middle member 212 by a suitable fixing tool such as a screw or nut/bolt or the like. Thus a rotating shaft (drive shaft) 216 which freely rotates is supported by a bearing 214 arranged inside the tip member 213 and a bearing 215 mounted on the upper inside of the inner cylinder 210a of the basal member 210. 217 is a first pulley mounted on the upper end of the rotating shaft 216. The holder is comprised of the upper basal member 210, middle member 212 and tip member 213.

m1 are a plurality of drive coils arranged at suitable intervals on the inside of the approximately cylindrical middle members 212. m2 is a rotor magnet mounted on the rotating shaft 216 and is positioned on the inside of the drive coil m1. The brushless motor (drive motor) M comprises as the motor part, the drive coils m1 mounted on the middle member 212 and the rotor magnet m2 mounted on the rotating shaft 216. In this way, the brushless motor M is arranged inside the holder.

218 is an arm member mounted as a single unit with the middle member 212 or on the middle member 212. A support frame 218a is formed on the free end of the am member 218. 219 is a second pulley support arm mounted on the support frame 218a of the arm member 218 and a freely rotating shaft 222 parallel with the rotating shaft 216 is arranged on a bearing 221

incorporated in a bearing frame 220 mounted on the second pulley support frame 219.

Furthermore, a second pulley 223 is mounted on the freely rotating shaft 222 and a continuous belt 224, as false twist application means, is stretched between the first pulley 217 mounted on the upper end of the rotating shaft 216 and the second pulley 223 mounted on the freely rotating shaft 222. The rotating member is comprised of the first pulley 217, second pulley 223 and false twist bolt 224.

As current flows in sequential order from the drive circuit to the plurality of drive coils m1 arranged on the inside of the approximately cylindrical middle member 212, the rotating shaft 216 is rotated by the driving of the rotor magnet m2 because of a rotational magnetic field being generated in the periphery of the rotor magnet m2. Accordingly, the false twist belt 224 stretched between the first pulley 217 mounted on the rotating shaft 216 and the second pulley 223 mounted on the freely rotating shaft 222, runs in a suitable direction due to the rotation of the first pulley 217 mounted on the rotating shaft 216.

On the false twist member T arranged as described above, the middle member 212 where a plurality of fins 212a are formed along the axial direction, is made of aluminium or the like which excels at heat radiation. Thus due to the formation of the middle member 212 as fins 212a and the middle member 212 being made of aluminium or the like which excels at heat radiation, the heat which the brushless motor M incorporated in the middle member 212 generates may be efficiently removed and accordingly, the durability of the false twist member T including the bearings 214,215 arranged in the vicinity of the brushless motor M may be improved.

Furthermore, by making the arm member 218 mounted as a single unit with the middle member 212 or on the middle member 212 out of aluminium or the like which excels at heat radiation, the radiation abilities may be improved.

Yet further, the tip member 213 on which is arranged the bearing 214 that supports the rotating shaft 216 and also the basal member 210 on which is arranged the bearing 215 that supports the the rotating shaft 216 are made of high strength iron or steel or the like in order to increase the strength.

Due to the arrangement of the drive part support member T' of the false twist member T that supports the rotating shaft 216 driven by the brushless motor M, comprising the three splittable cylindrical members which may be removed from each other being the basal member 210, middle member 212 and tip member 213, when the rotating shaft 216 and bearings 214,215 are to be exchanged due to abrasion or wear, the rotating shaft 216 and bearings 214,215 may be exchanged by removing the tip member 213 and middle member 212 or the like. Accordingly, on comparison of the drive part support member T' of the false twist member T with a device being a single unit, the maintenance of the false twist member including the exchange of rotating shaft 216 and bearings 214,215 is simple.

As shown in Figure 10, due to the positioning of the false twist member T having the aforementioned arrangement such that the false twisting belts 224 stretched between the first pulley 217 and second pulley 223 of the pair of false twist members T cross over each other, a false twist device that imparts a false twist in the yarn y and advances the yarn y is comprised.

In the aforementioned embodiment, a false twist device has been disclosed which is provided with a pair of false twist belts 224 as false twist application members that are stretched between the first pulley 217 and second pulley 223 and which imparts a false twist in the yarn y and advances the yarn y by sandwiching the yarn y due to that pair of false twist belts 224 however, the false twist device may be arranged by the arrangement of the false twist member T by arranging a false twist disc or false twisting drum as a false twist application member on the rotating shaft 16 and positioning the pair of false twist members T having a false twisting drum or disc such that the yarn y is sandwiched by the false twisting drums or discs.

Due to a first aspect of the present invention, as the drive motor is incorporated in the holder, the number of parts and space used may be reduced. Furthermore, as the drive motor is directly linked to the drive shaft of the rotating member, a compact arrangement is possible as the transmission member such as a pulley or belt is unnecessary and a further reduction in the number of parts and space can be achieved.

Yet further, a reduction in energy consumption is achieved.

Yet further still, as a drive motor is arranged on each of the pair of rotating members, changing the cross-over angle which sandwiches the yarn may be performed easily and an increase in the utility of the device is achieved as changing of the twist direction can be easily performed.

As the holder may be divided into the basal member, middle member and tip member, the maintenance of the false twist device is simple.

Furthermore, as the drive shaft that rotates in unison with the rotating member is supported by the dividable basal member and tip member, the exchange of the drive shaft and maintenance inspection become simpler.

As fins are arranged on the periphery of the middle member and the middle member is formed of a material having excellent heat radiation properties, the heat generated by the motor may be efficiently removed and accordingly, the durability of the false twist member including the bearings arranged in the vicinity of the motor is increased.

Claims

1. A yarn false twisting device,

provided with a pair of rotating members for applying a twist by sandwiching a yarn, and a holder that holds each of the rotating members so as to be freely rotating, and
where a drive motor is incorporated in the holder of at least one of the rotating members.

2. A yarn false twisting device as in claim 1, wherein the drive motor is directly linked to a drive shaft of the rotating members.

3. A yarn false twisting device as in claims 1 or 2, wherein the drive motor is arranged on each of the pair of rotating members.

4. A yarn false twisting device as in either of claims 1 through 3, wherein the holder may be split into at least three members being a middle member having the drive motor, a basal member mounted on one end of the middle member and a tip member mounted on the other end of the middle member.

5. A yarn false twisting device as in claim 4, wherein the drive shaft which rotates in unison with the rotating members is supported by the basal member and tip member.

6. A yarn false twisting device as in claims 4 or 5, wherein fins are formed on the periphery of the middle member and the middle member is formed of a material excelling at heat radiation.

7. A yarn false twisting device as in either of claims 1 through 6, wherein the rotating member comprises a drive pulley, free pulley and continuous belt, a pair of bearings are arranged in the holder, the drive shaft of the drive pulley is held so as to be freely rotatable on these bearings, the drive motor is arranged between the pair of bearings and the rotor and stator of the drive motor are mounted on the drive shaft of the drive pulley and the holder respectively.

8. A yarn false twisting device,
provided with a pair of rotating members formed as hollow rubber rollers, where a drive shaft and a holder that holds the drive shaft via a bearing so that the drive shaft is freely rotatable are arranged on each of the rotating members, and
where a drive motor is directly liked to each of the drive shafts of the rotating members.

FIG. 1

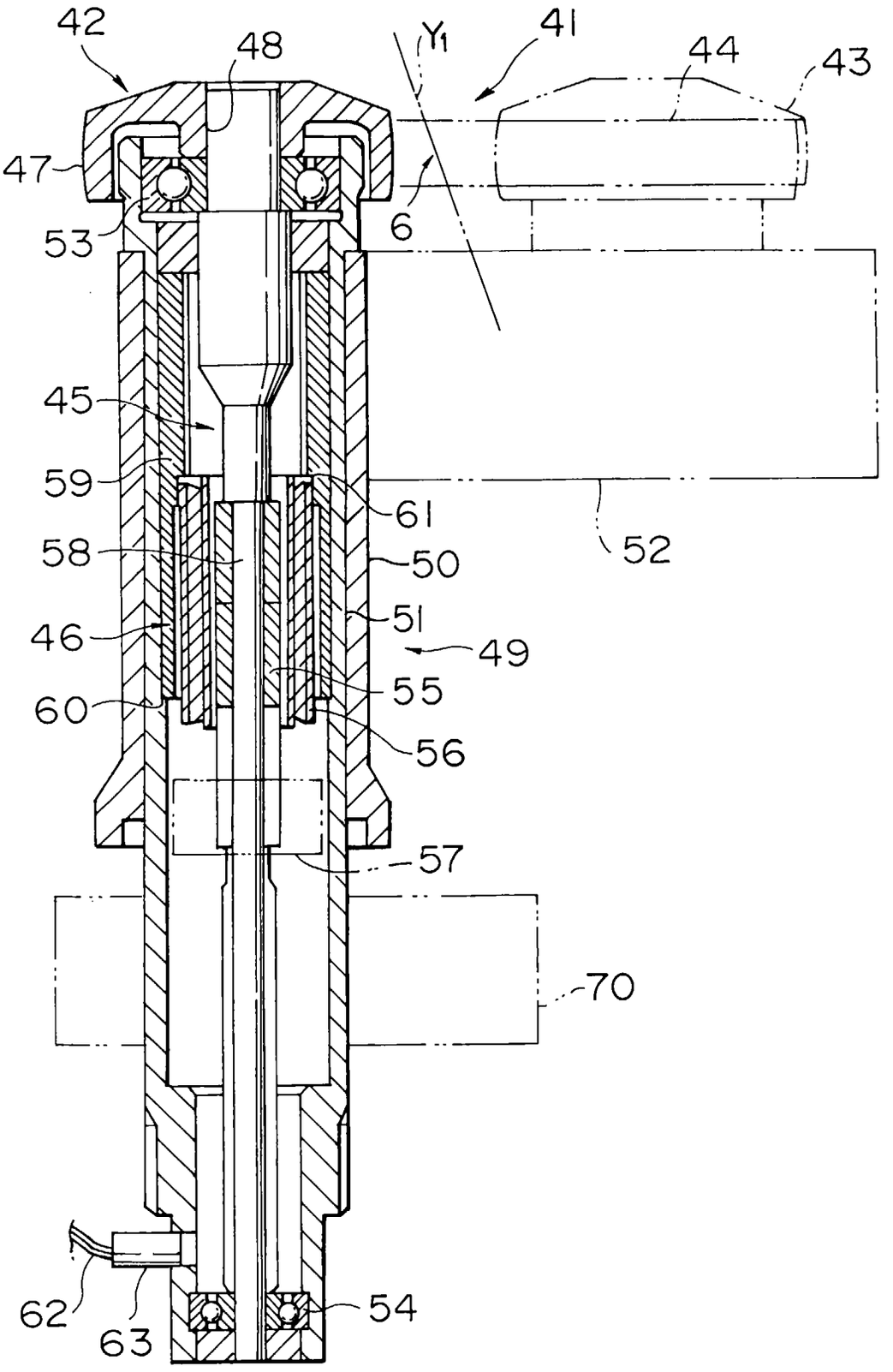
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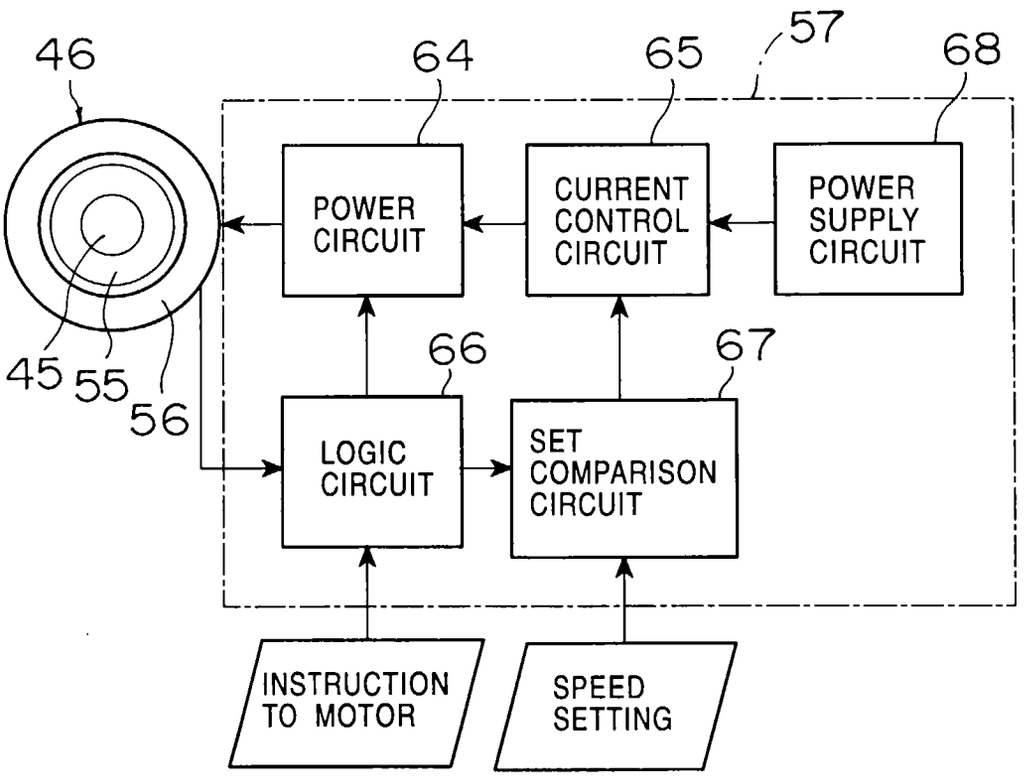
FIG. 2A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LOGIC CIRCUIT
SET COMPARISON CIRCUIT
INSTRUCTION TO MOTOR
SPEED SETTING

FIG. 2B

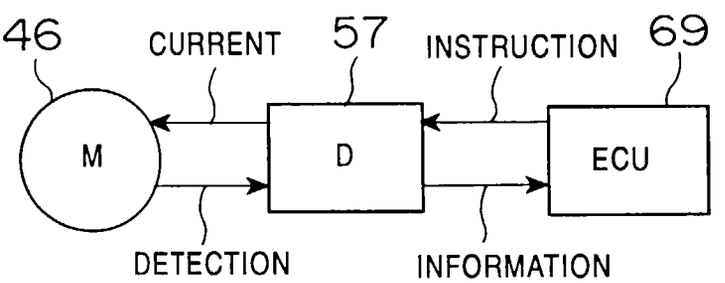
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FIG. 3

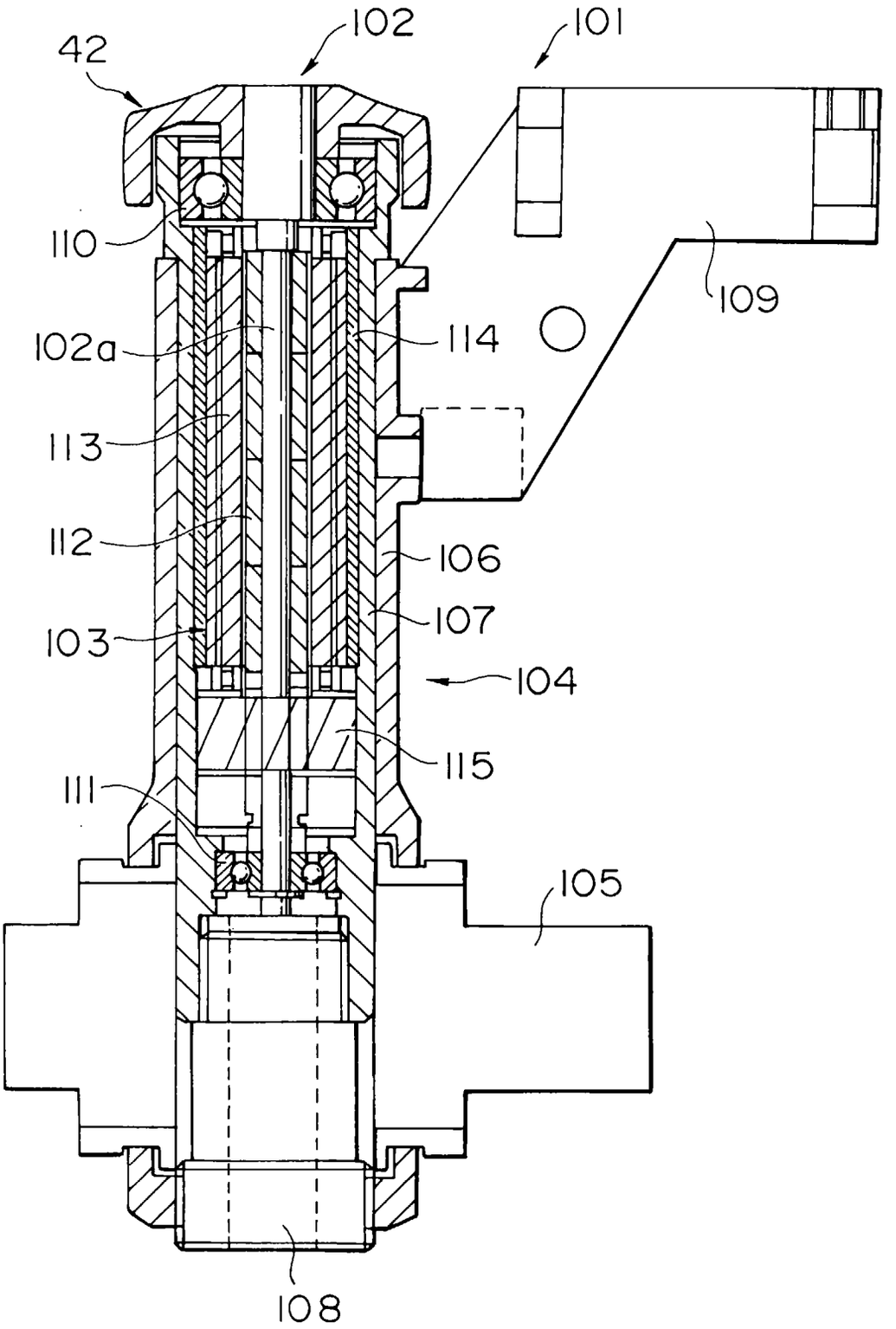
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FIG. 4

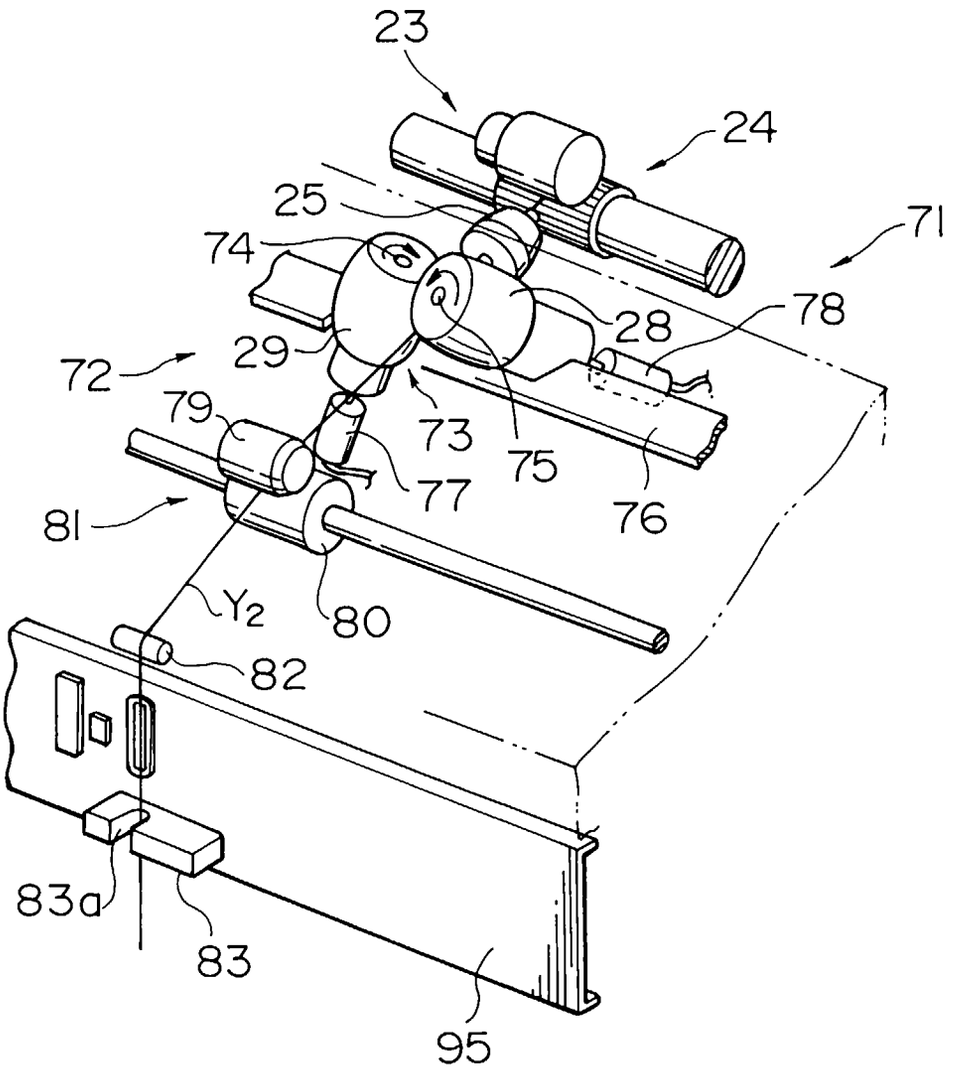
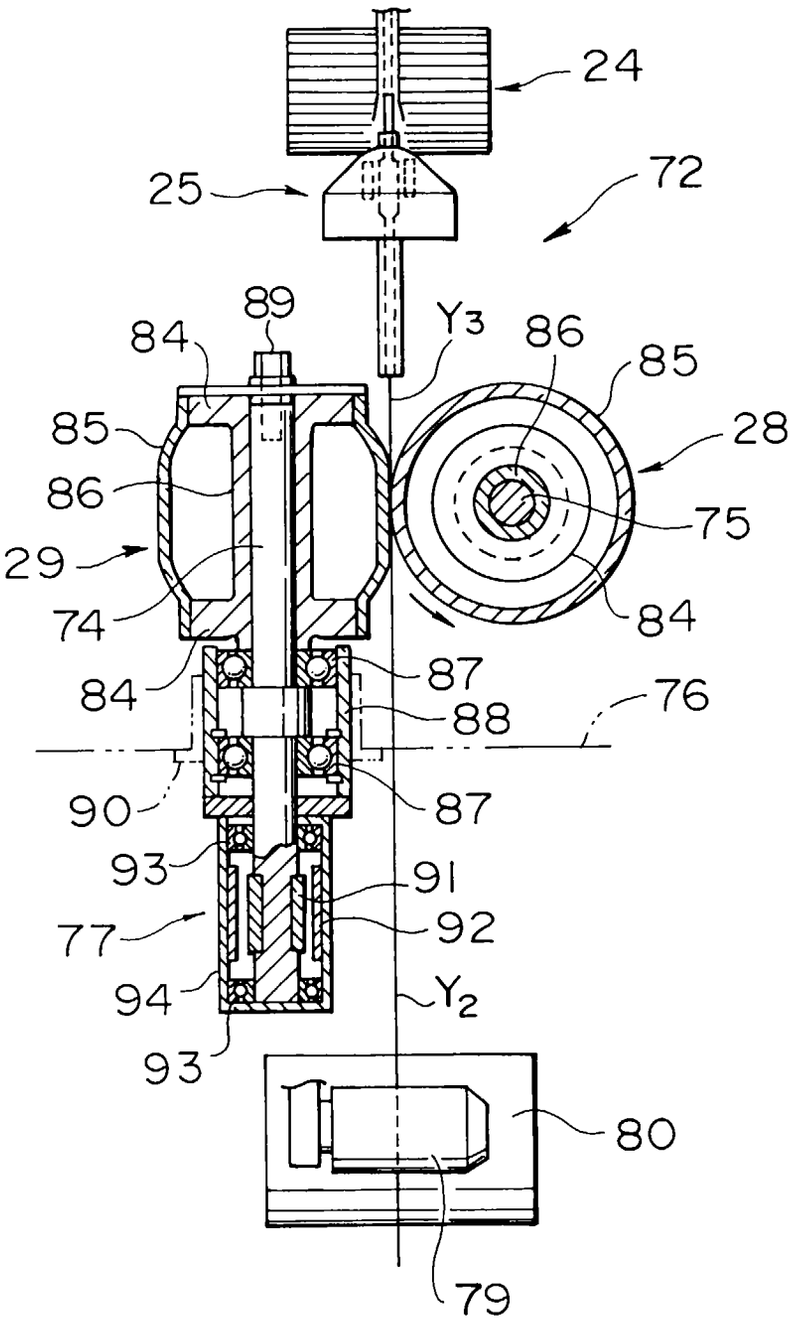


FIG. 5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93
91
77
92
94
Y2
93
80
79

FIG. 6

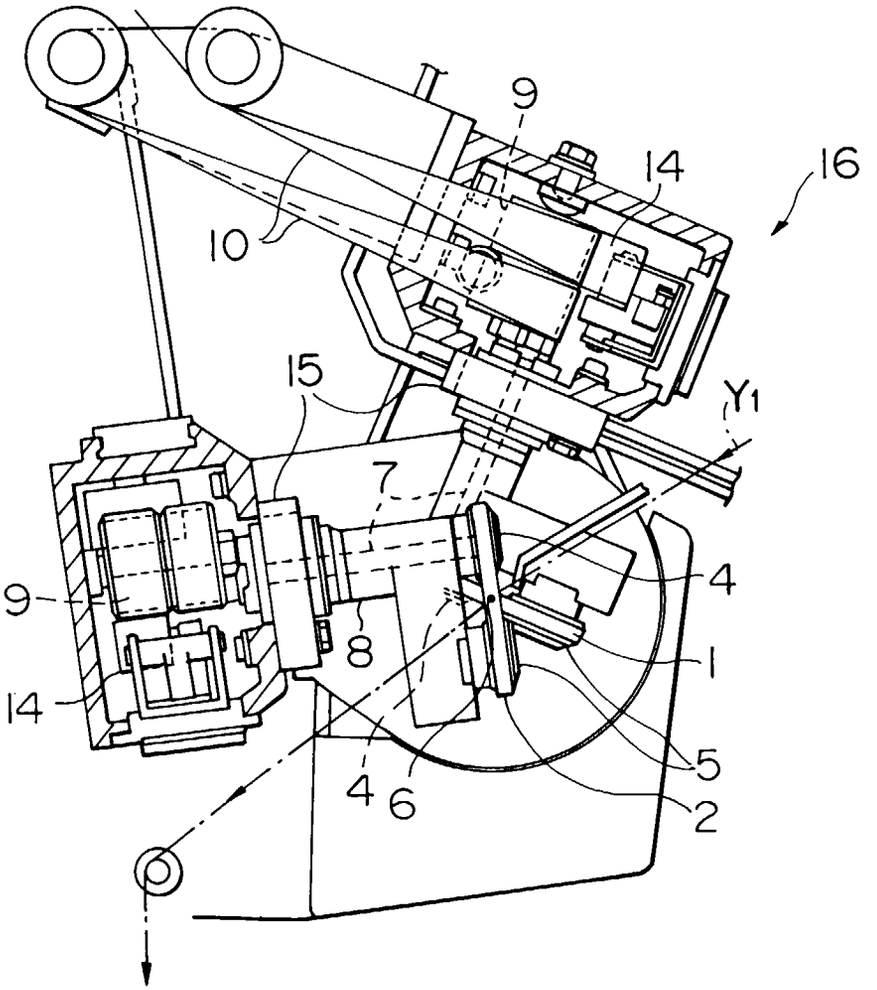


FIG. 7

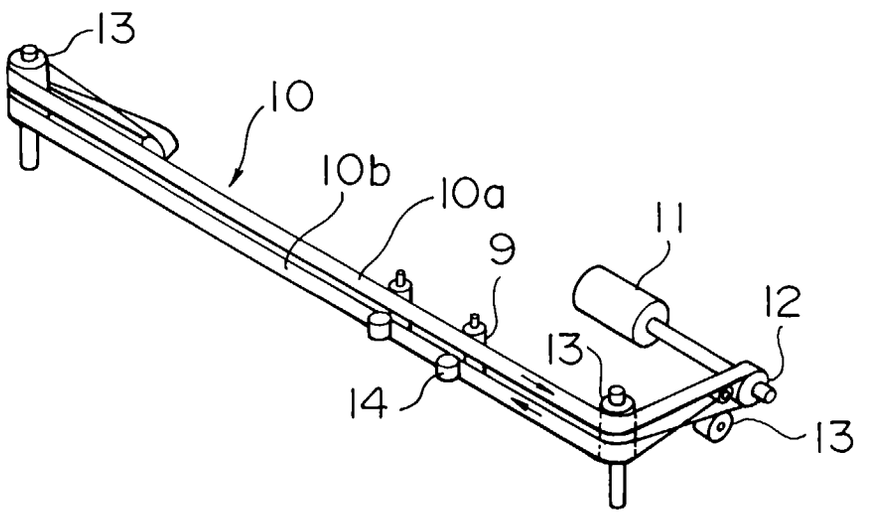


FIG. 8

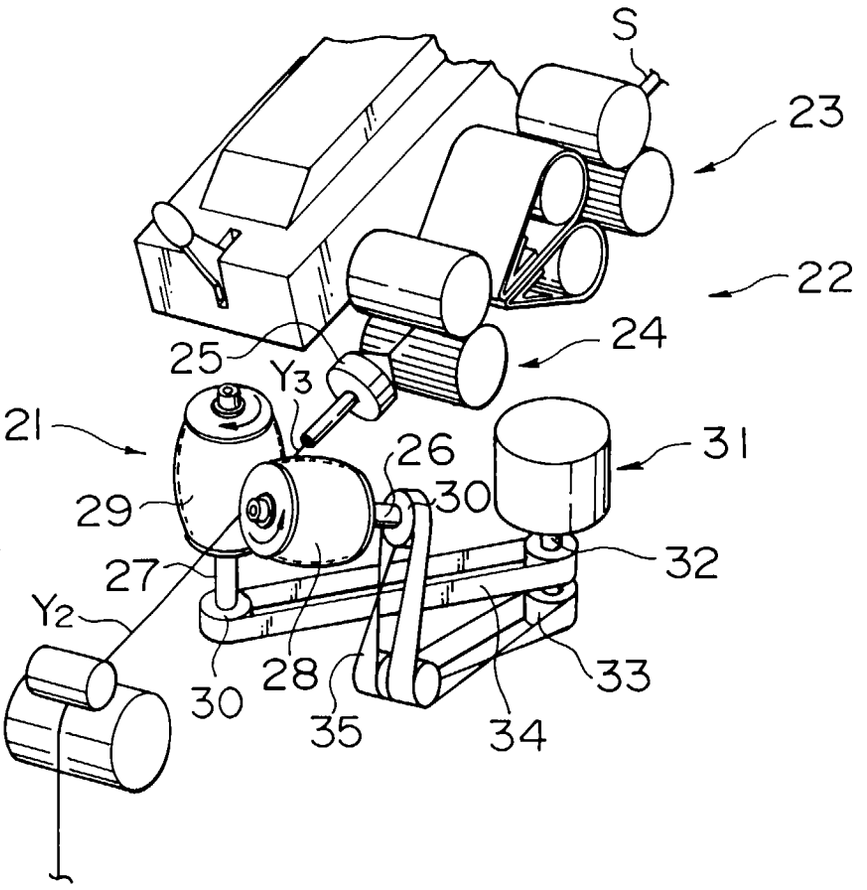


FIG. 9

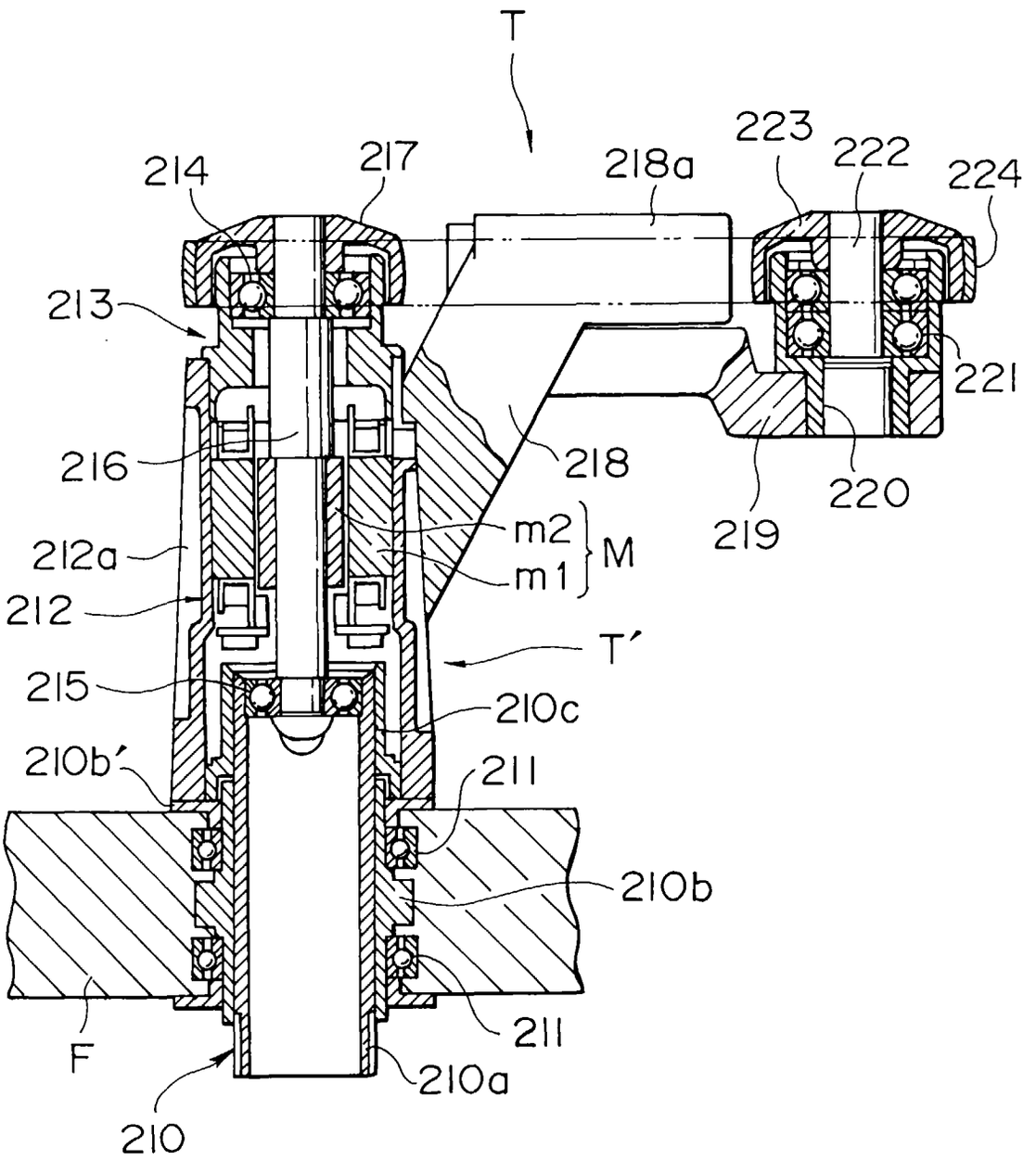
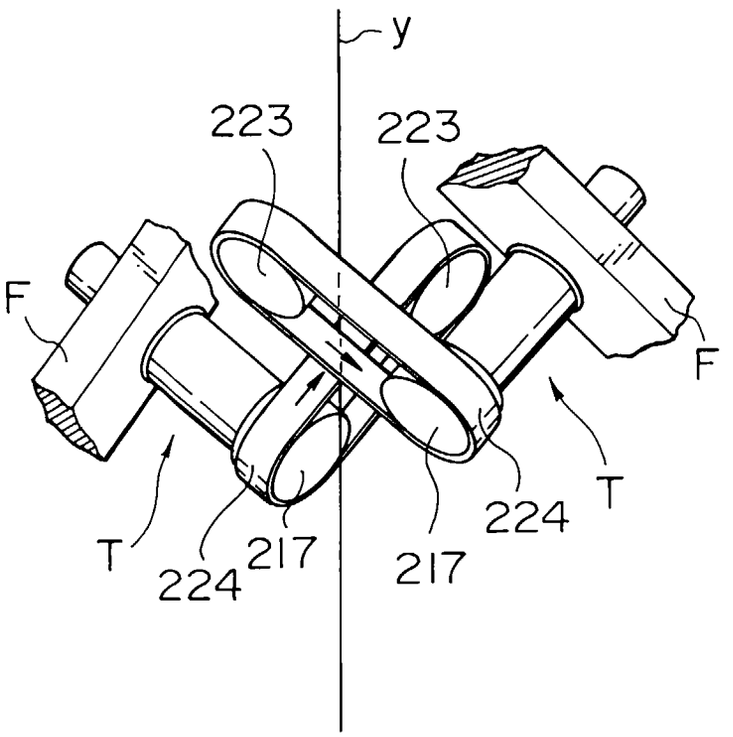

T
214
217
218a
223
222
224
213
221
216
218
220
219
m2
M
m1
212a
212
T'
215
210c
210b'
211
210b
211
F
210a
210

FIG. 10



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 11 6186

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)
A	US 4 047 373 A (TAKAI ISAO) * figures 1,5,7,9 * * column 5, line 7 - line 12 *	1-9	D02G1/08 D01H1/11
A	US 5 502 961 A (TONE SHOICHI ET AL) * figure 6 *	1-6	
A	US 4 372 106 A (OBERSTRASS DETLEV) * the whole document *	1-8	
A	US 4 899 533 A (SCHMITT GUNTHER ET AL) * figures *	1-8	
A	US 4 051 655 A (LORENZ HELLMUT ET AL) * figure 9A *	1-8	
A	DE 31 20 199 A (KUGELFISCHER G SCHAEFER & CO) * figures 1,2 *	1-8	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

D02G
D01H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	2 February 1998	Barathe, R

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