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Ueda

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[45] **Aug. 20, 1974**

[54] **WIRE STRANDING MACHINE**

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[73] Assignee: **Hamana Iron Works Co., Ltd.,** Osaka, Japan

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Oct. 19, 1971 Japan 46-82119

[52] **U.S. Cl.** **57/58.34,** 57/81
[51] **Int. Cl.** **D07b 3/02,** D07b 3/04
[58] **Field of Search** .. 57/58.34–58.38, 81, 102, 106

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Primary Examiner—Donald E. Watkins
Attorney, Agent, or Firm—Sughrue, Rothwell, Mion, Zinn & Macpeak

[57] **ABSTRACT**

A wire stranding machine provides a number of bobbin units mounted on a single base for rotating a number of spools of wires. Wire guides draw the wire under even tension through a sinusoidal path to a wire stranding member. A conductive ring surrounds the wire members and generates an electrical signal if any of the wire members snap or become non-uniform in tension. The particular wire path and uniform tensioning permits a maximum velocity of rotation to be developed with the wires.

9 Claims, 12 Drawing Figures

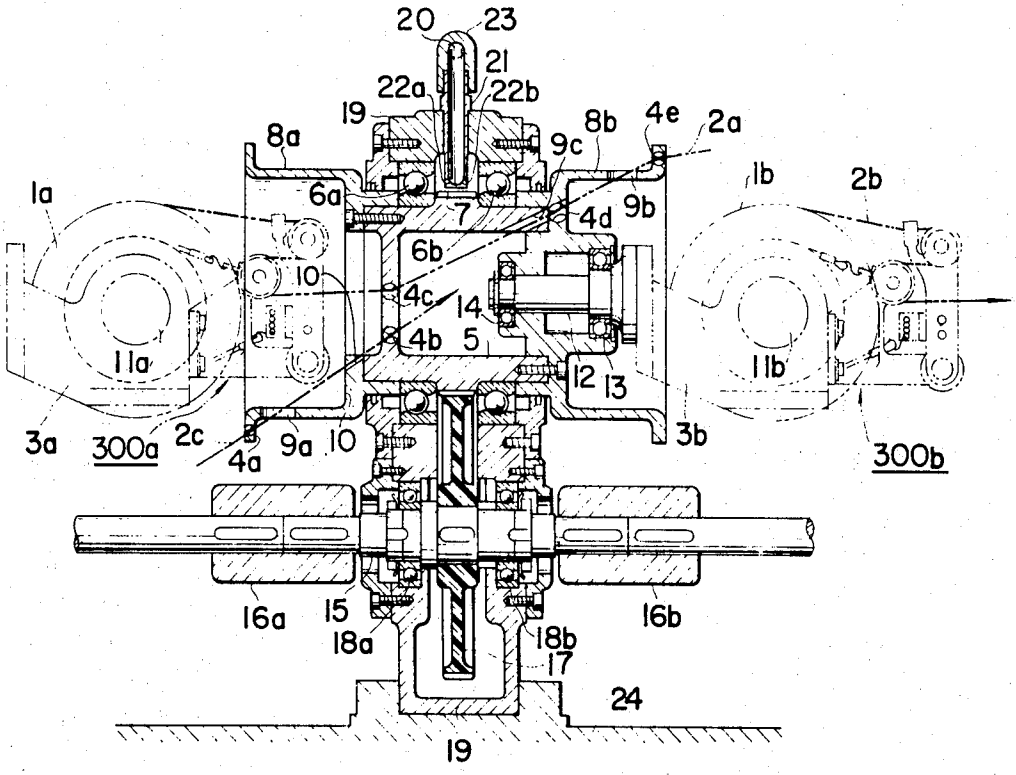
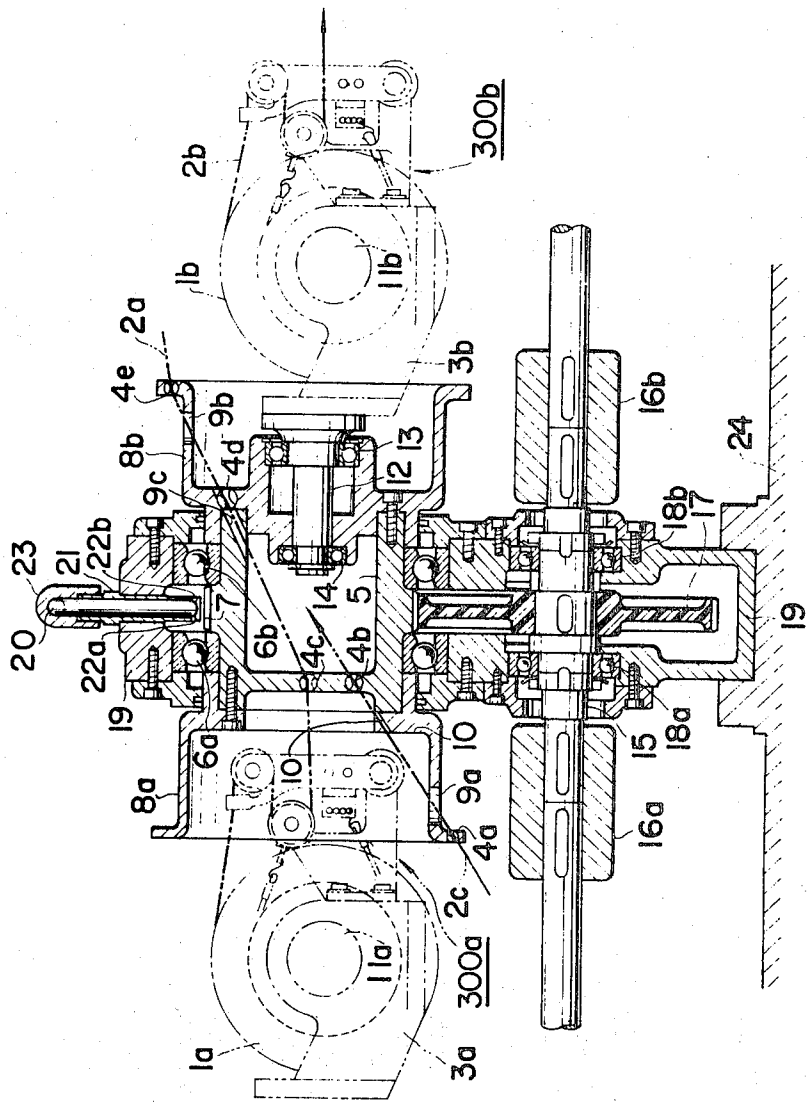


FIG. 1


300b
2b
1b
11b
2a
4e
3b
16b
24
8b
9b
4d
12
13
9c
18b
17
23
21
22b
7
14
5
19
20
22a
6b
4c
4b
19
6a
10
15
18a
8a
10
9a
16a
4a
2c
11a
300a
1a
3a

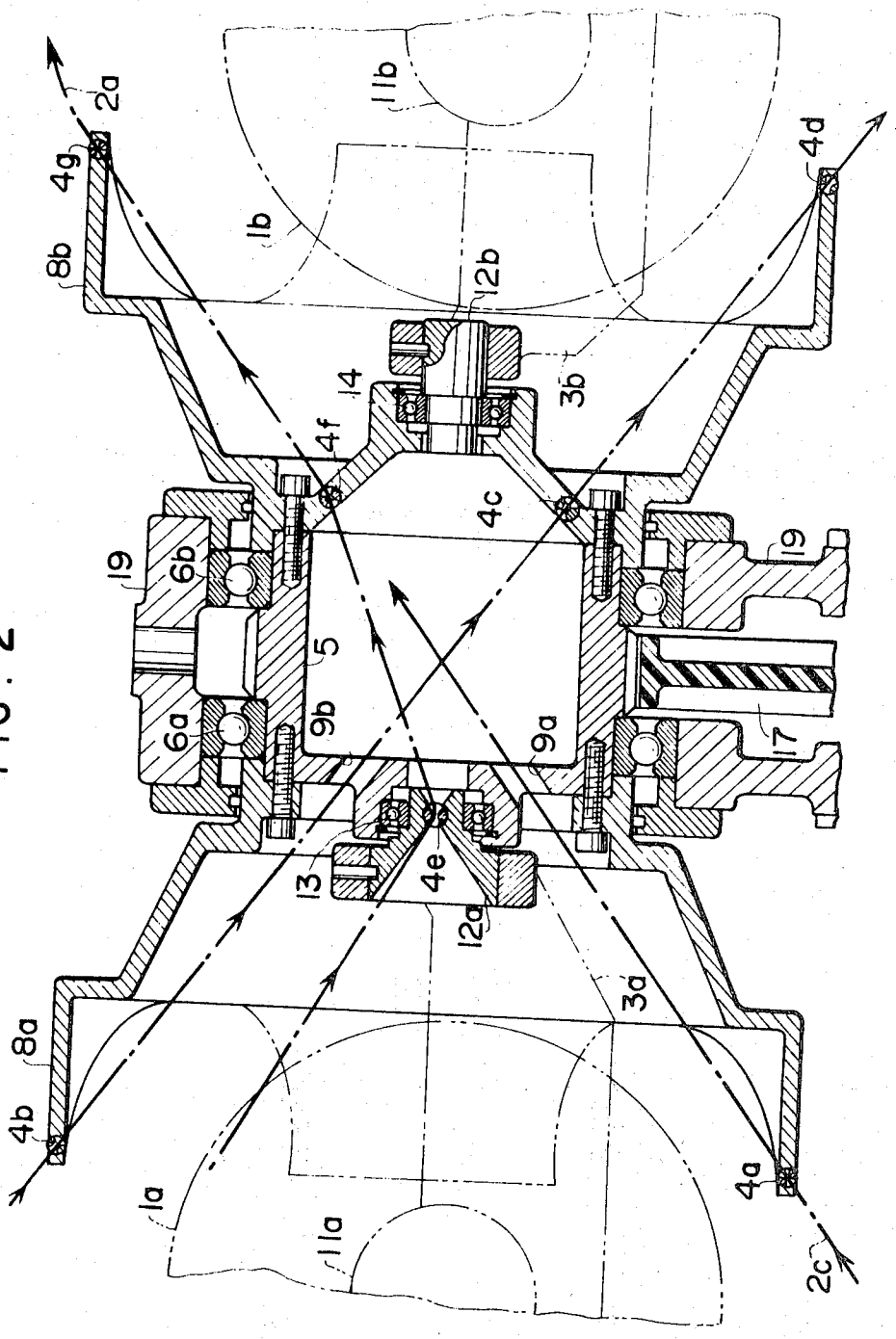

2a
4g
8b
11b
1b
12b
4d
3b
14
4f
4c
19
6b
5
9b
9a
6a
17
13
4e
12a
3a
8a
4b
1a
11a
4a
2c

FIG. 2

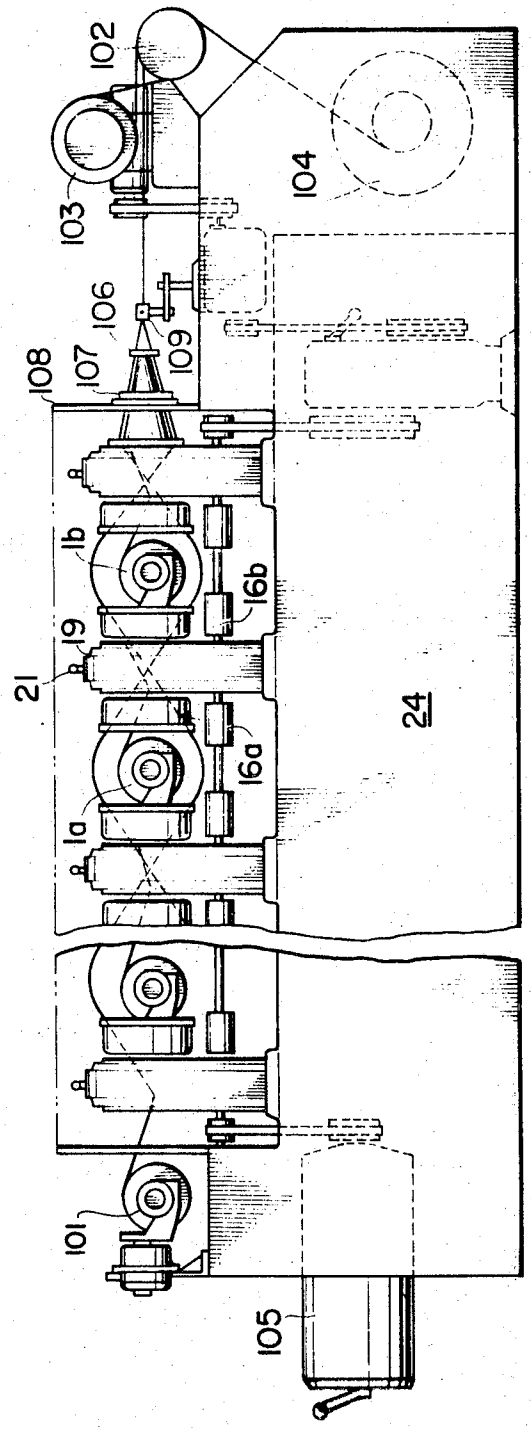


FIG. 3

FIG. 4A

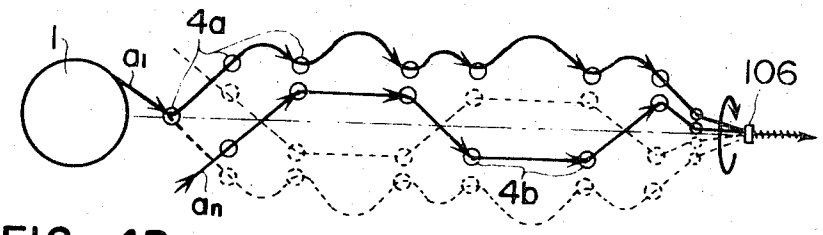


FIG. 4B

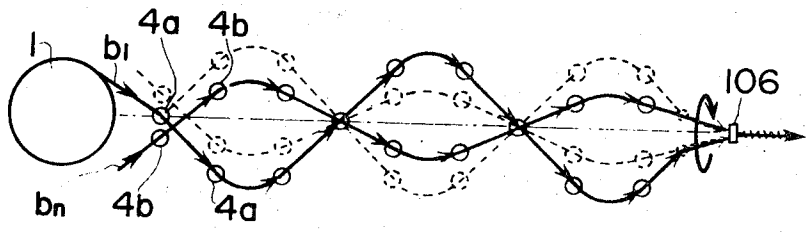


FIG. 5

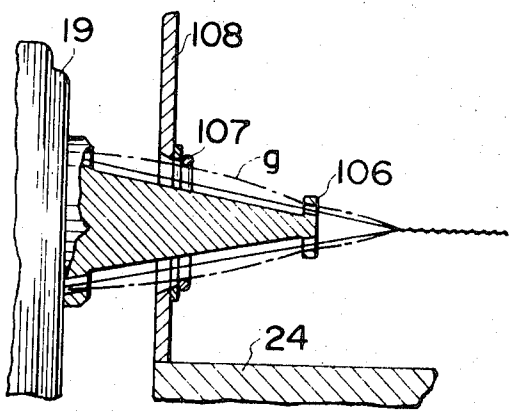


FIG. 6

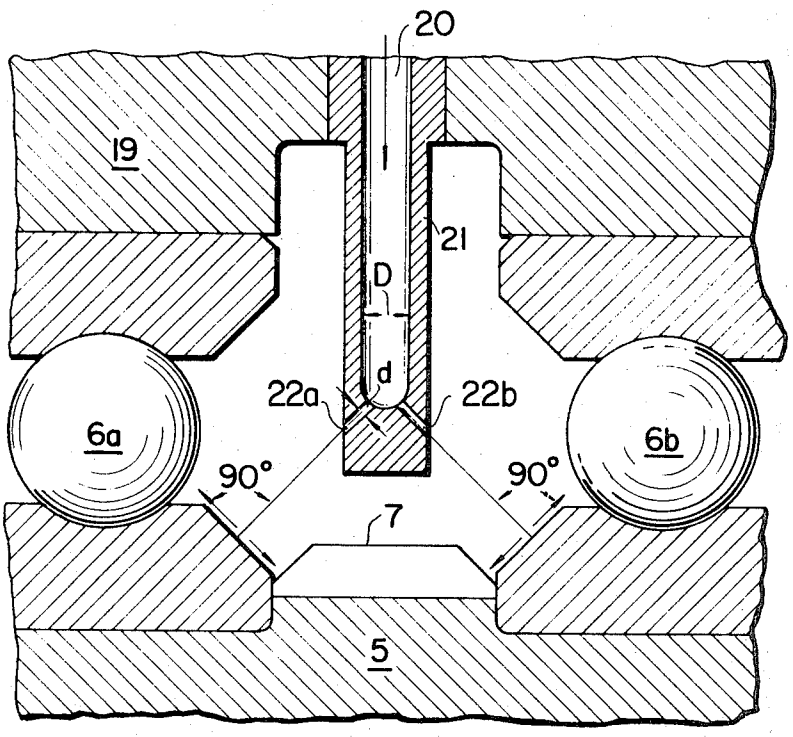


FIG. 7

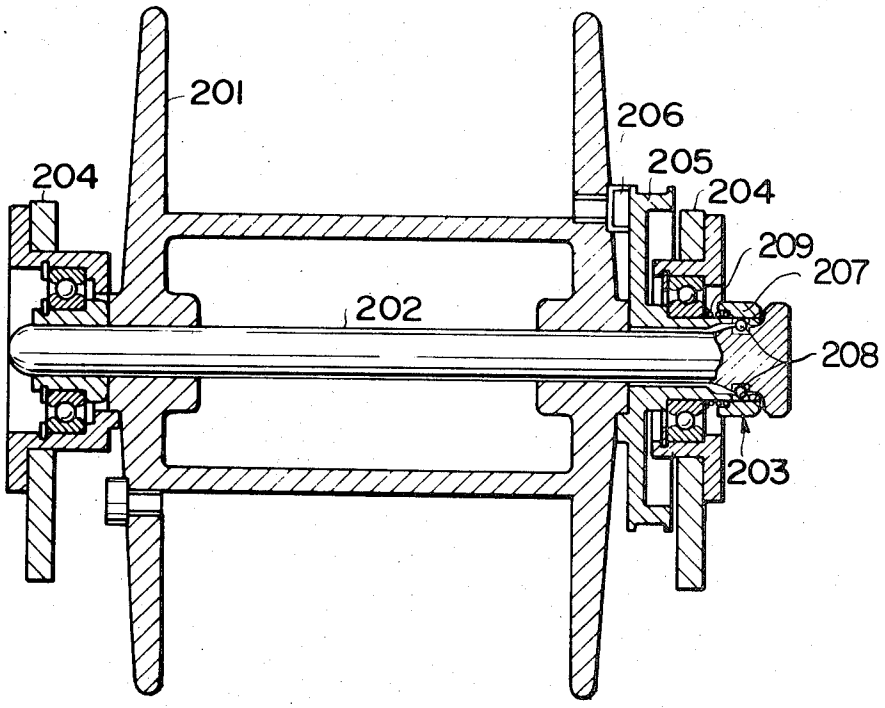


FIG. 8A

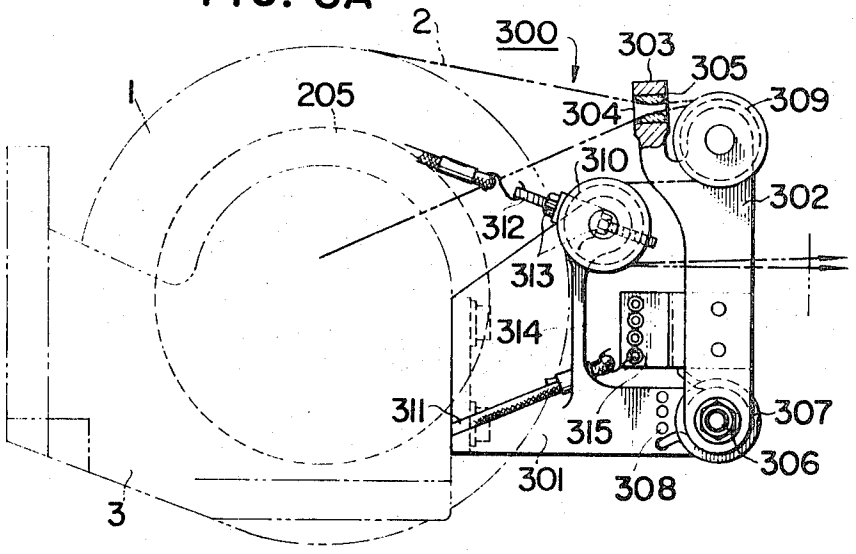

2
300
303
305
1
205
304
309
310
302
312
313
314
311
315
307
306
301
308
3

FIG. 8B

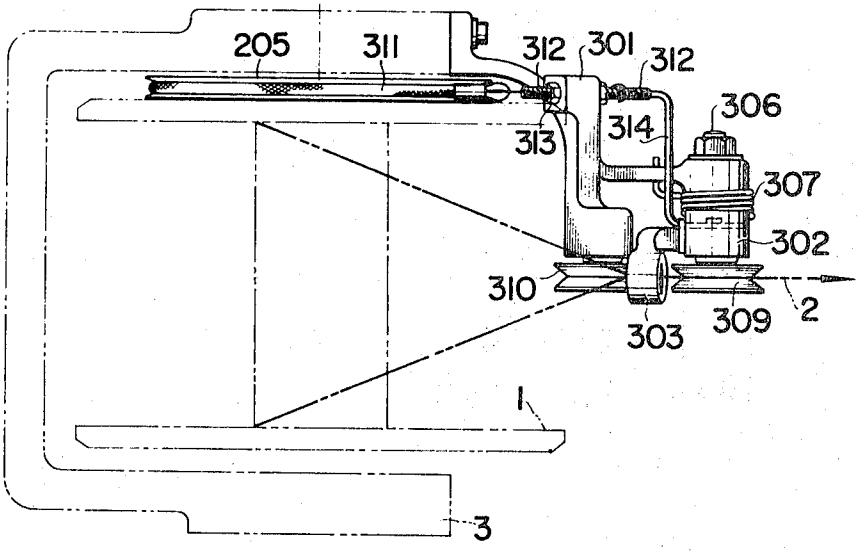

205
311
312
301
312
306
313
314
307
302
310
309
2
303
1
3

FIG. 8C

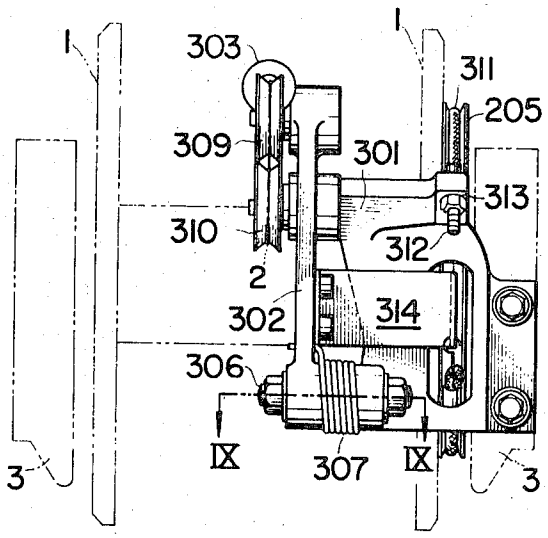
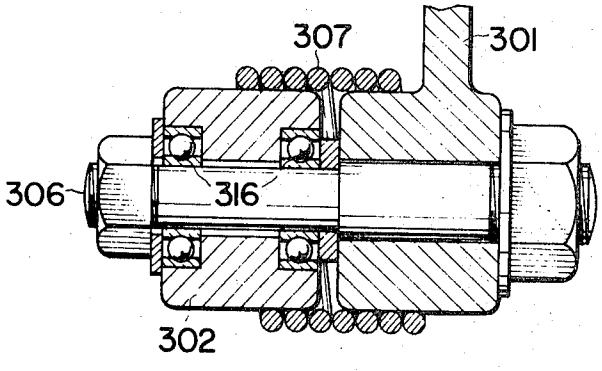

1
303
311
205
309
301
313
310
312
2
314
302
306
IX
307
IX
3
3

FIG. 9


307
301
306
316
302

WIRE STRANDING MACHINE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to wire stranding machines of the type wherein a number of wire elements are stranded together to form a single strand.

More specifically, the invention is concerned with an improved wire stranding machine wherein frames which carry and guide the wire elements to a stranding core can be rotated at a higher speed with a minimum amount of resistance and wherein the wire elements can be drawn from the respective bobbins and passed through the machine under uniform tension.

2. Description of the Prior Art

Tubular type rotating frames have been predominantly used as a rotary guide means for the rotating wire elements in the high speed wire stranding machine. With such tubular type frames, however, the peripheral velocity at a certain point on the rotating frame can reach the critical velocity with respect to its physical strength and problems of vibrations exist as the bobbins used become larger and larger.

Furthermore, limitations on the arrangment for drawing the wire elements by the mechanical characteristics of the tubular type rotating frame constitute a serious obstacle to further reduction of the frictional resistance to the wire elements, and the percentage of unacceptable strands is significantly high because of nonuniformity in tension on the wire elements passing through the rotating frame.

Various efforts have been made to strengthen the rotating frame by arranging and providing a bearing assembly on each of a number of bobbin and cradle combination units contained within the rotating frame. With such arrangement, however, the peripheral speed of the rotating frame often exceeds the maximum permissible velocity of the bearings and from the standpoint of economy, the manufacturing cost of such large bearings is considerably high.

In addition to the above, conventional wire stranding machines have inherent problems of noise and present substantial torque on the rotating frame.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a novel and improved wire stranding machine which comprises a plurality of units, each of the units including a motor, an elongated bed, and a drive shaft connected with the motor. A plurality of units are disposed on the bed in series, each of the units including a stationary body, a drive gear rigidly connected to the drive shaft within the stationary body, a rotating cylinder having an intagliated gear formed at an intermediate portion on the outer periphery of the cylinder with the cylinder being rotatably supported by the stationary body through bearings mounted on the outer periphery of the cylinder at both sides of the intagliated gear. The intagliated gear is meshed with the drive gear for imparting rotation from the motor to the cylinder. A pair of shorter cylindrical frames are integrally connected to the opposite ends of the cylinder, and a cradle integrally connected to a cradle shaft extends along the center axis of the cylinder. The cradle shaft is rotatably held by a boss provided in the central portion of the cylindrical frames through bearings mounted on the cradle shaft. A wire-supplying bobbin is rotatably supported or sustained by the cradle through a bearing assembly mounted on a bobbin shaft. A wire tension control means is provided for automatically and constantly controlling non-uniformity in tension on each of the wire elements. The control means is integrally connected to the cradle stretched out in front of each wire-supplying bobbin and a wire sagging or snapping detector means for automatically detecting non-uniformity in tension or snapping on each of the wire elements is disposed near a wire stranding portion through an electrical insulator. The detecting means is electrically connected with a motor by the interposition of a motor controlling means, whereby the motor is under control. A roll-up means including a guide plate, a stranding core, take-up control capstans, a roll-up bobbin, a take-up control means, and a lubricating means for feeding lubricating oil to two gears and bearings mounted on the periphery of cylinder is provided. The cylinder and cylindrical frames have a plurality of wire guide holes and a plurality of wire guide bushings with rotatable spherical seats adapted to follow varying orientation of the wire elements, the wire guide holes and bushings being arranged and disposed in such relationship that all of the wire elements are guided to travel in sinusoidally-curved paths from each of the wire-supplying bobbins to the stranding core. The drive gear is formed of a special phenol resin and the cylindrical frames are integrally connected to the cylinder and formed of an aluminum light alloy, thereby reducing the weight of the combination of the cylinder and cylindrical frames. The machine can rotate the cylinder and cylindrical frames in each unit at a peripheral speed of 120 m/sec or higher with little noise and vibration. Moreover, the wire stranding operation can be carried out in a stable and efficient manner under uniform tension with a minimum of resistance to the wire elements and with a minimum amount of torque exerted on the wire elements upon the starting or stopping of the operation of the machine.

It is another object of the invention to provide a compact wire stranding machine having a unique configuration of a stationary body in each of the independent units constructed to facilitate assembly and disassembly of the stationary body, and wherein the drive shaft is detachably joined in every unit by means of a split coupling means for facilitating replacement of units. The other components of the machine and all the assemblies from the wire-supplying means to strand take-up means inclusive of all the units disposed therebetween is mounted on an elongated bed integrally formed.

Another object of the invention is to overcome all of the above-mentioned problems in conventional wire stranding machines by completely achieving the above-described objects of the invention.

DESCRIPTION OF THE DRAWINGS

Now the aforementioned advantages of this invention will be described with reference to the following accompanying drawings:

FIG. 1 is an elevational cross-sectional view showing the essential parts of a unit such as would be used in a preferred embodiment of the stranding machine of the invention;

FIG. 2 is an elevational cross-sectional view showing a modified form of the essential parts of a unit em-

ployed in another embodiment of the stranding machine according to the invention;

FIG. 3 is a schematic elevational view showing the external configuration of a complete stranding machine according to the present invention;

FIG. 4A is a schematic view explaining the manner in which the wire elements are drawn and passed through the units in a conventional wire stranding machine;

FIG. 4B is a schematic view explaining the method of guiding and passing the wire elements through the wire stranding machine according to the present invention;

FIG. 5 is a view illustrating a wire sagging or snapping detector means of the present invention for automatically detecting non-uniformity in tension or snapping on each of the wire elements;

FIG. 6 is an enlarged elevational cross-sectional view of a lubricating means according to the present invention;

FIG. 7 is an enlarged cross-sectional view showing a bobbin support means such as would be employed in the stranding machine according to the present invention;

FIG. 8A is a vertical side view of the wire tension control means according to the present invention;

FIG. 8B is a plan view of the wire tension control means;

FIG. 8C is a vertical front view of the wire tension control means, and

FIG. 9 is a sectional plan view of a portion connecting a control lever with a body of the control means cut with a line IX—IX in FIG. 8C.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, and particularly to FIG. 1, a pair of relatively short cylindrical frames 8*a*, 8*b* are integrally connected to the opposite ends of a cylinder 5.

The cylinder 5 is rotatably supported within a stationary body 19 by means of bearings 6*a*, 6*b* mounted on and disposed around the outside of the cylinder.

A cradle 3*b*, which supports a bobbin 1*b* by means of a bobbin shaft 11*b*, is fixed to a stub shaft 12 rotatably mounted to the cylindrical frame 8*b* by the interposition of bearing assemblies 13 and 14 at the output end of the device. Similarly, a cradle 3*a*, which supports a bobbin 1a by means of a bobbin shaft 11*a*, is located at the input end of the device.

The cylinder 5 is provided with an intagliated gear 7 which is integrally formed at an intermediate portion on the periphery of the cylinder and engages a drive gear 17 rigidly mounted on a drive shaft 15 for imparting rotation to the combined cylinder 5 and cylindrical frames 8*a*, 8*b*. The drive shaft is rotatably mounted on the stationary body 19 by means of bearings 18*a*, 18*b*, and the stationary body 19 is in turn mounted on an integral, elongated bed 24, which will be explained further hereinafter. The cylinder 5 and the cylindrical frames 8*a*, 8*b* not only include a plurality of wire guide bushings 4*a*, 4*b*, 4*c*, 4*d*, 4*e*, but are formed with a plurality of wire guide holes 9*a*, 9*b*, 9*c*, and a wire guide cut-out 10, these wire guide bushings and wire guide holes as well as the cut-out being disposed so as to support the wire elements 2*a*, 2*b*, 2*c* drawn from the bobbins in the previous units and conduct such wire elements to the next unit.

Both ends of the drive shaft 15 rotatably supported on the stationary body 19 by the bearings 18*a*, 18*b* in each unit are joined to intermediary drive shafts by means of split coupling means 16*a*, 16*b*.

A single lubricant ducting passage 20 communicating with an injection nozzle 21 is disposed to extend through the central top portion of the stationary body 19 and open via the nozzle openings 22*a*, 22*b* immediately above the top of the gear 7 integral with the rotating cylinder for supplying a lubricant to the primary bearings 6*a*, 6*b*. These elements are shown in more detail in FIG. 6. The wire tension control means 300*a*, 300*b* are integrally connected with the cradles 3*a*, 3*b*, respectively. These elements are shown in more detail in FIGS. 8A-8C and 9.

While the unit construction described above with reference to FIG. 1 is particularly suitable for use with relatively small bobbins, it is understood that the machine according to the present invention can be modified to contain large bobbins, as described herein with reference to FIG. 2.

FIG. 2 shows a unit such as would be used in such modification, wherein the same general configuration as that of FIG. 1 is shown, but with a different cradle design for supporting relatively large bobbins and a modified cylinder and cylindrical frames construction associated therewith. In this figure, the same identifying numerals are used for parts corresponding to those shown in FIG. 1.

As shown in FIG. 2, the cylindrical frames 8*a*, 8*b* rotatably support the cradle shafts 12*a*, 12*b* by means of bearings 13, 14 mounted on the central portion of cylindrical frames, the cradle shafts 12*a*, 12*b* sustaining respectively the shafts 11*a*, 11*b* of the bobbins 1*a*, 1*b*, disposed on the opposite sides of the unit.

In other words, each bobbin disposed between adjacent units is supported by a cradle located and sustained between the adjacent units.

FIG. 3 shows the external appearance of a complete wire stranding machine consisting of the requisite number of independent units having the construction shown in the previous figures and disposed and mounted in series on an integral elongated bed 24. The wire stranding machine of FIG. 3 includes a wiresupplying bobbin 101 for supplying the initial wire element, take-up control capstans 102 and 103, a roll-up bobbin 104, a drive motor 105 for rotating the drive shaft 15, a guide plate 106 for leading wire elements to a stranding core 109 and a breaking ring 107 disposed near the guide plate to automatically detect snapping of wires or nonconformity in tension on the wires, the ring being mounted on a hood 108 by the interposition of a suitable electrical insulating means.

In operation, the wire elements drawn from the respective bobbins travel and pass centrifugally in sinusoidally-curved paths to form balloons between each adjacent unit, as shown in FIG. 3.

High speed rotation of all the wire elements drawn from the bobbins and passing in sinusoidally-curved paths of travel through the units to the stranding core is effective to achieve one of the primary advantageous features of this invention, which will be more readily understood by reading the following description made in reference to FIGS. 4A and 4B.

In the prior art, the wire elements have passed through the wire stranding machine as in the manner shown in FIG. 4A, wherein a wire element al drawn from one bobbin is guided to pass in a waved path through guide bushings spaced from the axis of rotation of the frame and to progress without intersecting with the axis of rotation of the frame, whereas another wire element is passed across the axis of rotation of the frame in some phase of travel and is guided in a similar way to that of the wire element al in other phase travel. In this manner, the wire elements passing through the units to the stranding core are in different relationships with respect to the axis of rotation of the frame, resulting in non-uniformity in tension on the wire elements as well as nonuniform distribution of tension along the length of the elements. This non-uniformity lead to problems of guide bushing friction and wear.

Accordingly, the wire elements break frequently in the conventional wire stranding machines, and the percentage of unacceptable product is considerably high.

In accordance with the present invention and with reference to FIG. 4B, all the wire elements are guided to pass from their respective bobbins to the stranding core in sinusoidally-curved paths which are in similar relationship with respect to the rotation of the units and intersecting therewith. This is conductive to uniformity in tension on all the wire elements and uniform distribution of tension along the length of each wire element. Since each of the wire elements may thus be drawn in a smooth manner without considerable interference, any problems of friction resistance and wire breaking are substantially eliminated. Accordingly, the manufacturing operation can be carried out at a peripheral speed of 120 m/sec or higher and such higher speed production can be continued for a prolonged time period in a stable manner with a minimum of wire breaking.

FIG. 5 illustrates a wire sagging or snapping detector means for automatically detecting non-uniformity in tension on the wire elements, or snapping of the wire elements, which comprises a breaking ring **107** constructed of copper wire and adapted to contact with enlarged or expanded portion of the balloon of wire elements due to centrifugal forces overcoming the reduced tension on the wires upon the occurrence of non-uniformity in tension or snapping on each of the wire elements, as indicated by dotted curves g in FIG. **5**, thereby making electrical connection between the ring **107** electrically connected to a positive voltage source of 240 V and the grounded wire elements. This results in actuation of a motor controlling means whereby the drive motor is de-energized in an automatic manner. In this way, snapping or nonuniformity in tension of the wire elements is automatically detected and checked.

FIG. 6 shows an enlarged view of a lubricating means used in the present invention. Oil supplied under pressure from an oil pump and mixed with air is passed through the lubricant ducting passage **20** to the injection nozzle **21**, wherein the oil is injected as spray from nozzle openings **22***a*, **22***b*.

During such spray injection, the oil spray becomes wet oil droplets due to rapid reduction in pressure and are then directed to the inner chambers of the spaced bearings **6***a*, **6***b*. An amount corresponding to 10 percent of such oil droplets splashes over the intagliated gear **7**, and the remaining 90 percent creeps and passes to the bearings **6***a*, **6***b*. In other words, the bearings **6***a*, **6***b* and the gear **7** are lubricated simultaneously from a single lubrication nozzle in an efficient and reliable manner which is believed to represent another of the advantageous features of the invention.

As shown in FIG. **7**, the bobbin support means is constructed of a cradle **204**, a brake wheel **205** having a projection **206** for engaging a bobbin **201** with the brake wheel **205**, a bobbin shaft **202**, a coupler type locking means **203** including a retainer ring **207**, a plurality of steel balls **208**, and a spring **209** which bears against the retainer ring **207**.

In FIG. **7**, the bobbin shaft **202** is locked into the brake wheel **205** fixed in the cradle **204** in the state of perfect attachment by the interposition of the coupler type locking means during the operation. On the other hand, in order to attach or detach the bobbin shaft **202** to the rest of the bobbin support means, the retainer ring **207** is withdrawn.

If the bobbin shaft **202** is in the state of imperfect attachment to the rest of the bobbin support means, a remarkable amount of tension on the wire element and of resistance on the bobbin brake may occur, so that the wire element will snap at the stranding core.

By using the bobbin support means of the present invention, any imperfect attachment of the bobbin can be prevented.

An extremely small change in the tension on the wire elements **2***a*, etc., always takes place in a stranding machine of the present invention due to the winding diameter of the wire element in the bobbin becoming small upon the lapse of operation time of the machine, the wire element being always rocked from side to side in the amount of the winding width of the wire element in the bobbin, the wound state of the wire element on the bobbin not being uniform, etc.

Additionally, since the torque required to rotate the bobbin becomes small gradually as the winding diameter of wire element on the bobbin becomes small, the tension on the wire element varies.

In addition, it is considered that the tension is also changed due to the external causes.

However, in order to obtain a strand of high quality adapted for the desired standard, it is necessary and indispensable to eliminate the change of the tension on all the wire elements from the above sources so as to draw all the wire elements with a constant and uniform tension from the respective bobbin and to guide them into the stranding core.

The wire tension control means **300** of this invention will now be described with reference to FIGS. **8A**, **8B**, **8C** and **9**. In these figures, numeral **1** illustrates a bobbin for winding and supplying the wire element **2**, **3** is a cradle for bearing the bobbin **1**, **301** is a mounting rod fixed to the cradle **3** at the base end to be projected forwardly of the bobbin **1** and bent, so that the end is disposed generally at the center of the width of the bobbin. **302** is a control lever which is rockably journaled to the mounting rod **301** toward the feeding direction of the wire element **2** by the interposition of a supporting pin **306** mounting the bearings **316** thereon as shown in FIG. **9**, while a coil spring **307** is mounted onto the outer peripheries of both bosses provided at the respective end of the control lever **302** and the mounting rod **301** in such a manner that the one end of the coil spring is engaged with the control lever **302**,

while the other end is placed in a spring tension adjusting hole **308** provided at the mounting rod **301**, so that the control lever **302** is resiliently rocked to the mounting rod **301** as installed. The upper end of the control lever **302** is branched into a fork shape, and a guide arm **303** having a guide hole **304** mounted with a wire element guide bushing **305** is formed at the bobbin side thereof, while a wire element guide roll **309** is rotatably mounted through a bearing (not shown) at the other side thereof.

The mounting rod **301** is also rotatably mounted on a secondary wire element guide roll **310** through a bearing (not shown), but which is lower than the guide roll **309**, and is disposed near the bobbin **1**.

A brake string **311** made of braided rope is suspended to the bobbin brake wheel **205** mounted onto the same shaft as that of the bobbin **1**, and one end of the brake string **311** is fixed with a screw bar **312** slidably clamped to the mounting rod **301** through nuts **313**, screwed with the screw bar **312**, while the other end thereof is engaged with an engaging plate **314** tightly fixed to the control lever **302**.

A plurality of brake string adjusting holes are provided at the engaging plate **314** so as to adjust the brake force with respect to the bobbin by changing the engaging position of the brake string. The fine adjustment of the braking string is conducted by the relationship between the screw bar **312** and the nuts **313**.

The wire tension control means **300** of this invention is thus constructed so as to feed the wire element **2** drawn from the bobbin **1** through the guide bushing **305**, guide roll **309**, and the secondary guide roll **310**, in turn, in suspension toward the stranding core. The operation thereof will now be described as follows.

To the wire element **2** is applied a tension equal to the sum of the torque required to rotate the bobbin **1** on which the wire element is carried and the bobbin brake force supplied by the brake string **311**. Initially, the repelling force of the coil spring **307** is predetermined so as to balance with the tension on the wire element **2** at a position where the control lever **302** is just standed vertically.

If the tension on the wire element **2** is increased, the control lever **302** is inclined at the side of the bobbin **1** against the repelling force of the spring coil **307** around the supporting pin **306**, which is a fulcrum of the inclination of control lever **302**, by the interposition of the guide roll **309** and the secondary guide roll **310**. As a result of this, the increased tension is balanced by the inclining action of the control lever **302** because, at the same time the tension in the wire element is increased, the brake string **311** is loosened by the inclining of the control lever **302** so as to lighten the brake force to the bobbin **1**. The net result is that the cause of the tension on the wire element **2** is also restrained because the sum of the torque required to rotate the bobbin and the bobbin brake force has remained the same as before.

If the tension on the wire element **2** becomes smaller, the control lever **302** is inclined at the feeding side of the wire element **2** to a position where the tension becomes equal to the original tension by the repelling force of the coil spring **307** because, at the same time the tension on the wire is decreased, the brake string **311** is tightened by the inclination of the control lever **302** so as to increase the brake force to the bobbin **1**. As a result of this, the cause which makes the tension decrease is restrained again because the sum of the torque required to rotate the bobbin and the bobbin brake force has remained the same as before.

Thus, the wire element **2** passing through the secondary guide roll **310** is always drawn with constant tension without reflecting the affect of the change of the tension caused by the rocking of the wire element **2** and changes in the winding diameter and width of the wire element **2** on the bobbin **1**.

Therefore, in the stranding machine of this invention, which is provided with the above wire tension control means to all bobbins, all wire elements are supplied to the stranding core with constant and uniform tension, and, at the same time, the excessive rotation of the bobbin and the breakage of the wire elements due to the overload may be prevented.

It should be noted that as the surface area of each of the wire guide holes **9***a*, **9***b* located in the cylindrical frames **8***a*, **8***b* is less than 1/10 of the overall peripheral surface area of each cylindrical frame, and the edges of the guide holes are all rounded to reduce resistance to wind pressure. The machine can be thus operated with less noise and vibration.

Furthermore, since the cylindrical frames of the invention are formed of light aluminum alloy, the amount of torque required for starting or stopping the machine operation can be significantly reduced.

It should also be noted that the combination of the rotating cylinder and the cylindrical frames in each unit is supported on the individual stationary body independently of adjacent units and the drive shaft for rotating the combined cylinder and cylindrical frames in each unit is detachably joined to those in adjacent units by means of couplings, whereby each unit can be easily removed from the machine for changing parts or repairing defective components in the unit upon the occurrence of any trouble.

Alternatively, the complete unit may be replaced with a new one, if desired.

It has been found in our experiments that the units constructed in accordance with the invention can be quickly replaced in 10 minutes, although the tubular type wire stranding machine of the prior art has required 4 hours for achieving the same procedure.

In addition, assembly and installation of the units on the elongated common bed is accomplished easily and quickly without requiring any clamping means, such as bolts. Upon arrival at the installation point, the time required for construction of a complete stranding machine of the present invention is approximately 30 minutes, after which the machine if ready for operation.

What is claimed is:

1. A wire stranding machine comprising:

a base member;

a drive motor;

wire stranding means for stranding the wires;

a plurality of wire bobbin means mounted on the base member and adapted for rotation by the drive motor, each wire bobbin means including a source of wire and a cylindrical member having a plurality of wire guides for cooperating with the wires from the bobbins to provide sinusoidal paths for the wires when the cylindrical member is rotating;

a wire tension detector means for detecting any non-uniformity in tension of the wire before it enters the wire stranding means; and

means for controlling the tension of wire from at least one of said sources of wire so that, during operation of the machine, the tension in said wire is always a constant equal to the sum of the force required to draw wire from said source of wire and a variable brake force.

2. A wire stranding machine as in claim **1,** where the wire tension detector means includes a circular conductive means surrounding the wires and capable of generating a signal upon contact with the wires and control means for responding to the signal and stopping the drive motor.

3. A wire stranding machine comprising:

a motor;

an elongated bed;

a drive shaft connected with said motor;

a plurality of units disposed on said bed in series, each of said units including a stationary body, a drive gear rigidly connected to said drive shaft within said stationary body, a rotating cylinder having an intagliated gear formed at an intermediate portion on the outer periphery of said cylinder, said cylinder being rotatably supported by said stationary body through bearings mounted on the outer periphery of said cylinder at both sides of said intagliated gear and said intagliated gear being meshed with said drive gear for imparting rotation from said motor to said cylinder, a pair of shorter cylindrical frames integrally connected to the opposite ends of said cylinder, a cradle shaft, cradle shaft bearings, a cradle integrally connected to the cradle shaft extending along the center axis of said cylinder, said cradle shaft being rotatably held by a boss provided in the central portion of said cylindrical frames through the bearings mounted on said cradle shaft, a bobbin shaft bearing assembly, a wire supplying bobbin rotatably supported or sustained by said cradle through the bearing assembly mounted on a bobbin shaft, a wire tension control means for automatically and constantly controlling non-uniformity in tension on each of wire elements, said control means being integrally connected to said cradle stretched out in front of each wire supplying bobbin, a wire tension detector means for automatically detecting any nonuniformity in tension or snapping on each of the wire elements disposed near a wire stranding portion, said detecting means being electrically connected with the motor whereby said motor can be made to stop,

a roll-up means including a guide plate, a stranding core, take-up control capstans, a roll-up bobbin and a take-up control means, and

lubricating means for feeding lubricating oil to said two gears and bearings mounted on the periphery of said cylinder.

4. A wire stranding machine as claimed in claim **3,** wherein said cylinder and cylindrical frames have a plurality of wire guide holes and a plurality of wire guide bushings having rotatable spherical seats adapted to follow varying orientation of said wire elements, said wire guide holes and bushings being arranged and disposed in such relationship that all of said wire elements are guided to travel and pass in sinusoidally-curved paths from each of said wire supplying bobbins to the stranding core.

5. A wire stranding machine as claimed in claim **3,** wherein said drive shaft is detachably joined to each of said unit by split coupling means so as to facilitate change of said parts as well as replacement of said unit.

6. A wire stranding machine as claimed in claim **3,** wherein said drive gear is formed of a phenol resin.

7. A wire stranding machine as claimed in claim **3,** wherein said cylindrical frames are formed of an aluminum light alloy.

8. A wire stranding machine as claimed in claim **1** wherein said source of wire is a bobbin mounted on a rotatable shaft and said means for controlling the tension of wire from at least one of said sources of wire comprises a bobbin brake wheel mounted on said rotatable shaft, a brake string passing around the bobbin brake wheel, and means for adjusting the friction between said brake string and said bobbin brake wheel so that, during operation of the machine, the tension in said wire is always the sum of the force required to draw wire from said bobbin and the force required to overcome the friction force between said brake string and said bobbin brake wheel.

9. A wire stranding machine as claimed in claim **8** wherein said means for adjusting the friction between said brake string and said bobbin brake wheel comprises:

a control lever pivotably mounted on the wire bobbin means comprising said bobbin;

a wire element guide roll mounted on said pivotable control lever and located so that, as said pivotable control lever is pivoted in a first direction, the tension required to draw wire from said bobbin is increased and, as said pivotable control level is pivoted in a second direction, opposite to said first direction, the tension required to draw wire from said bobbin is decreased; and

means for connecting one end of said brake string to said control lever so that, as said pivotable control lever is pivoted in said first direction, the force required to overcome the friction force between said brake string and said bobbin brake wheel is decreased and, as said pivotable control lever is pivoted in said second direction, the force required to overcome the friction force between said brake string and said bobbin brake wheel is increased.

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