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Description

The present invention relates to a method and an apparatus for winding a wire rod which is fed from a rolling mill along a predetermined path.

In the art of winding a wire rod which is run along a predetermined path from a rolling mill, a wire rod winder of a poling-reel type, for example, is used. In the case where billets are efficiently rolled into wire rods at relatively short intervals, the successively produced wire rods are led to alternately or sequentially selected one of plural stationary winders, along respective paths which lead to the stationary winders. More specifically, each of the wire rods from a rolling mill is first introduced into a branching or switching device which selects one of the plural wire paths that leads to the winder which is currently assigned to wind the wire rod. In this arrangement, the wire rod which is currently fed from the rolling mill is wound in the form of a coil by one of the plural winders, while the coil already wound by another winder is taken out so that this unloaded winder is able to wind a wire rod which will be fed thereto in the next winding cycle.

In the above-described arrangement for winding successively produced wire rods, however, plural wire paths should be provided between the branching device and the respective stationary wire winders. For example, when two wire winders are used, the corresponding two wire paths should be formed so as to feed the wire rods from the branching device to the respective two winders. If it is desired to wind a wire rod in a desired one of opposite directions (either clockwise or counterclockwise) on each of the two winders, two wire paths must be provided for each of the two winders, one path for producing a clockwise coil, and the other path for a counterclockwise coil. Consequently, a total of four wire paths are required in order to enable each of the two wire winders to operate in either one of the two winding directions.

In this connection, it is noted that each wire path extending from a branching device is formed in a line which is defined by cooling devices, pinch roll units, guide tubes, guide rolls, support post, wire inlet tube, and other members. Accordingly, the cost of the wire winding equipment and the required area of installation are increased as the number of wire paths is increased. In addition to the above inconveniences, the conventional arrangement suffers a problem that wire rods are likely to be damaged due to frictional contact with the branching device while the direction of feed of the wire rod is changed at and by the branching device, whereby the quality of the produced coil is lowered.

US-A 1 984 744 discloses an alternative arrangement wherein wire rods travel in sequence along a single wire path to a machine comprising four winders, each extending radially outwardly from an upright shaft. Rotation of the shaft brings the winders into a winding position in sequence. Each winder includes a horizontal arm which remains stationary during winding. A wire rod is wound on to the arm by means of a curved guide which is

rotated about a horizontal axis and a mechanism for drawing a leading end of the rod along the arm at an appropriate speed. With this arrangement, each wire rod travels along a non-linear path, there is no provision for winding one coil in a clockwise direction and another in an anti-clockwise direction, and each arm must travel through a comparatively large distance between the winding and non-winding positions.

DE-C 3 109 110 discloses an apparatus for forming coils of wire or rod without ends which need trimming. In this apparatus there are two mandrels, one for receiving useful coils and the other for receiving scrap at the beginning or end of each useful coil. The two mandrels are mounted on a carriage which runs on rails and is driven by a hydraulic cylinder between positions wherein first one and then the other mandrel is suitably disposed for receiving a coil of wire or rod.

It is therefore an object of the present invention to provide a method and an apparatus for winding a wire rod supplied from a rolling mill, which are capable of producing coils of wire with improved quality, at high efficiency and with minimum cost.

According to the invention, there is provided a method of winding wire rods into coils, said method comprising the steps of:

(a) feeding a plurality of wire rods in succession from a rolling mill along a single linear wire path;

(b) providing a first wire winder and a second wire winder in mutually spaced apart relation and mounted on a carriage which is movable to and fro on a carriage path that is transverse to said single linear wire path, said first and second wire winders each being rotatable about a vertical axis, said first wire winder having a first side that faces said second wire winder and a second side that is remote from said second wire winder and said second wire winder having a first side that faces said first wire winder and a second side that is remote from said first wire winder;

(c) positioning said carriage so that the first side of said first wire winder is in alignment with said single wire path; then

(d) rotating said first wire winder in a first angular direction so as to wind a first wire rod into a first coil; then

(e) positioning said carriage so that the first side of said second wire winder is in alignment with said single wire path; and then

(f) rotating said second wire winder in a second angular direction, opposite from said first angular direction, so as to wind a second wire rod into a second coil.

According to another aspect of the invention, there is provided apparatus for winding wire rods into coils, said apparatus comprising:

(a) first means for feeding a plurality of wire rods in succession from a rolling mill along a single linear wire path;

(b) a carriage movable to and fro on a carriage path that is transverse to said single wire path;

(c) a first wire winder and a second wire winder mounted on said carriage in mutually spaced apart relation on a line transverse to said single wire path, said first and second wire winders each being rotatable about a vertical axis, said first wire winder having a first side that faces said second wire winder and a second side that is remote from said second wire winder and said second wire winder having a first side that faces said first wire winder and a second side that is remote from said first wire winder;

(d) second means for moving said carriage back and forth between a first position in which the first side of said first wire winder is in alignment with said single wire path and a second position in which the first side of said second wire winder is in alignment with said single wire path;

(e) third means for rotating said first wire winder in a first angular direction so as to wind a first wire rod into a first coil; and

(f) fourth means for rotating said second wire winder in a second angular direction, opposite from said first angular direction, so as to wind a second wire rod into a second coil.

In the method or apparatus of the present invention described above, the wire winders are selectively brought into a winding position. Consequently, the wire rods which are successively fed from the rolling mill at relatively short time intervals may be led to selected one of the plural wire winders, without branching the wire path originating from the rolling mill, into plural branch paths corresponding to the plural wire winders. In other words, the wire rods may be supplied to the appropriate wire winders along a single wire path. Thus, the instant winding method or apparatus makes it possible to achieve a considerable reduction in the number of components of the wire path arrangement such as branching device, cooling device, pinch rolls, guide tubes, guide rolls, posts and wire inlet tubes, whereby the overall cost of the equipment and the installation space may be minimized. Moreover, the elimination of a branching device frees the wire rods from otherwise possible bending stresses and consequent frictional damages when the direction of feed of the wire rod is changed at the branching device.

According to an advantageous embodiment of the apparatus of the invention, the carriage may be a truck having wheels which roll on rails extending in the direction perpendicular to the wire path. In this case, the drive means for moving the truck may comprise a hydraulic cylinder.

According to another advantageous embodiment of the invention, each of the wire winders comprises a substantially cylindrical drum which is rotatable about its vertical axis and open at its upper end. The wire rod is introduced through the upper open end and wound in the cylindrical drum.

In accordance with a further advantageous embodiment, the wire rods are fed from the rolling mill along a single wire path to the carriage, and the plural wire winders consist of two wire winders which are spaced from each other in the direction perpendicular to the wire path.

The foregoing and other objects, features and advantages of the present invention will be better understood from reading the following detailed description of a preferred embodiment of the invention, when considered in connection with the accompanying drawing, in which:

Fig. 1 is a schematic plan view of billet rolling and wire winding equipment which includes one embodiment of a wire winding apparatus of the invention;

Fig. 2 is an elevational view of a wire winding apparatus taken along line II-II of Fig. 1;

Fig. 3 is an elevational view of the wire winders taken along line III-III of Fig. 1; and

Fig. 4 is a schematic plan view corresponding to Fig. 1, showing a known arrangement of billet rolling and wire winding equipment.

To further clarify the concept of the present invention, a preferred embodiment of the invention will be described by reference to the accompanying drawing.

Referring first to Fig. 1, there is shown a general arrangement of billet rolling and wire winding equipment constructed according to the invention, which is suitable for practicing the method of the invention. The equipment comprises a finish rolling-mill stand 10 which is disposed as the last stage of a hot-rolling process. A wire rod 14 fed from the rolling-mill stand 10 is guided along a linear wire path 12 which leads to a carriage in the form of a truck 20. The truck 20 carries thereon two wire winders 16, 18 which are spaced from each other along a line transverse, suitably perpendicular to the wire path 12. The truck 20 is movable in the direction in which the two wire winders 16, 18 are disposed, i.e., transversely, suitably perpendicularly to the wire path 12. The wire path 12 is formed in a line which is defined by plural cooling devices 22 for cooling the wire rod 14, pinch rolls 24 for guiding the wire rod 14, and other members necessary to guide the wire rod 14 to the truck 20.

As illustrated in detail in Figs. 2 and 3, there is formed a pit 26 in the ground floor. On shoulders 29 which partially define the pit 26, a pair of rails 28 are laid in parallel with each other, so that the rails 28 run perpendicularly to the wire path 12. The truck 20 is adapted to move with its wheels 30 rolling on the rails 28. More specifically stated, the truck 20 is connected at its one end to a piston rod 36 of a hydraulic cylinder 34 which is fixedly disposed in the pit 26, so as to serve as a major component of drive means for moving the truck 20. This drive means further includes limit switches (not shown) which are disposed at four positions along the rails 28, so that the piston rod 36 and consequently the truck 20 may be moved to a desired one of four positions corresponding to the positions of the limit switches. The four positions of the truck 20 correspond to two winding positions of a first poling reel 38 (which will be described), and two winding positions of a second poling reel 40 (which will be described). One of the two winding positions for each poling reel 38, 40 is assigned for winding the wire rod 14 into a clockwise coil, and the other winding

position is for winding the wire rod 24 into a counterclockwise coil. Thus, the truck 20 is positioned selectively at one of the four winding positions.

The wire winders 16, 18 mounted on the truck 20 are of so-called "poling reel" type, each including the previously indicated poling reel 38, 40 in the form of a cylindrical winding drum which is rotatable about its axis. Since these two winders 16 and 18 are identical to each other in construction, the following description refers only to the winder 18.

The poling reel 40 is rotated by a drive motor 42 via a reduction gear 43, and closed at its bottom end by a support disc 44 as indicated in Fig. 2, while the wire rod 14 is wound in the reel 40. The support disc 44 is movable in the poling reel 40 in the vertical direction, by an elevator rod 46 which is disposed co-axially with the poling reel 40 and movable up and down along the axis of rotation of the reel 40. Described in greater detail, the elevator rod 46 whose upper end is secured to the support disc 44, is operatively connected at its lower end to a hydraulic cylinder 50 through a lever 52 and a link 54. The hydraulic cylinder 50 is fixed to a bracket 48 which extends downward from the bottom of the truck 20. The lever 52 is pivotally supported on the bracket 48 and connected at its opposite ends to the cylinder 50 and the link 54, respectively. Linear movements of the hydraulic cylinder 50 will cause the lever 52 to pivot in opposite directions, thereby moving the elevator rod 46 up and down via the link 54. In this arrangement, the support disc 44 at the upper end of the elevator rod 46 is held at its lower position indicated in broken line in Fig. 2 while the wire rod 14 is being wound as a coil in the poling reel 40, but after the completion of the winding cycle, the disc 44 on which the coil is wound is moved upward to its upper position upon activation of the hydraulic cylinder 50, so that the coil may be pushed out of the poling reel 40.

Adjacent to the edge of the pit 26, a post 56 is erected for supporting in a known manner a wire inlet tube 58 which forms the terminal portion of the wire path 12. This wire inlet tube 58 through which the wire rod 14 is passed, is oriented so that the wire rod 14 is led into an upper part of the poling reel 40 (38). Depending upon the specific thickness (diameter or cross sectional area) of the wire rod 14, the vertical position and angle of inclination of the wire inlet tube 58 with respect to the post 56 are changed as illustrated in solid and broken lines in Fig. 2. Namely, the angle of the terminal portion of the wire path 12 is suitably adjusted to the thickness of the wire rod 14. Alternatively, it is possible to use a switching device to branch the terminal portion of the wire path 12.

The operation of the present embodiment will be described.

In the case where the wire rod 14 is wound as a counterclockwise coil by the wire winder 18, the truck 20 is moved to the position indicated in solid line in Fig. 1, i.e., to a winding position of Fig. 3, for positioning the poling reel 40 so that the wire inlet tube 58 points into the upper open end portion of the poling reel 40. More precisely, the truck 20 is positioned so that the left-hand side end (as viewed in

Fig. 3) of the upper open end of the poling reel 40 is aligned with the wire inlet tube 58, as shown in Fig. 3. In this position, the poling reel 40 is rotated at a peripheral speed substantially equal to a feed speed of the wire rod 14 which is fed from the finish rolling-mill stand 10 which produces the wire rod 14 by rolling a billet. With the wire rod 14 fed into the rotating poling reel 40, the wire rod 14 is wound as a counterclockwise coil in the reel 40. While the winding operation is being performed on the poling reel 40, the coil already wound in the other poling reel 38 is removed out of the reel 38.

Upon completion of the winding cycle in the poling reel 40, the truck 20 is moved by the hydraulic cylinder 34 to another winding position, indicated in broken line in Fig. 1, at which the wire inlet tube 58 is brought into alignment with the upper open end of the other poling reel 38, before the leading end of the next wire rod 14 reaches the poling reel 38. Thus, the truck 20 is positioned so that the winders 16 and 18 are located at their winding and non-winding positions.

Subsequently, the new wire rod 14 is wound in the poling reel 38 as a clockwise coil. In the meantime, the support disc 44 in the poling reel 40 is raised to take out the counterclockwise coil which has been produced in the poling reel 40.

With the above winding cycle repeated, the wire rods 14 which are successively fed along the single wire path 12 from the finish rolling-mill stand 10 at relatively short time intervals, may be wound alternately by one of the two wire winders 40, 38, with minimum non-productive time, i.e., with high winding efficiency. When it is desired to wind the wire rods 14 in the counterclockwise direction in the poling reel 38, and in the clockwise direction in the poling reel 40, this winding operation in the reverse direction may be readily accomplished by moving the truck 20 to change the winding position, so that the wire inlet tube 58 is aligned respectively with the left-hand side edge and the right-hand side edge (in Fig. 3) of the poling reel 38, and 40, in the same way as previously indicated. In this instance, the direction of rotation of the reels 38, 40 should be reversed. Since the poling reels 38, 40 on the truck 20 are movable, there is no need to branch the single wire path 12 for feeding the wire rod 14 to different positions for clockwise and counterclockwise winding operations for each poling reel.

As described hitherto, the instant winding system or apparatus and method are adapted to efficiently handle the wire rods 14 which are fed in succession from the finish rolling-mill stand 10 at comparatively short intervals, and along the single wire path 12. In other words, the successively fed wire rods 14 are wound alternately in one of the two wire winders 38, 40 while the winders 38, 40 are held at the appropriate winding positions. Hence, the instant apparatus and method make it possible to considerably simplify the wire path, that is, contribute to reduction in the number of components constituting the wire path 12, such as branching device, cooling device, pinch rolls, guide tubes, guide rolls, support post and wire inlet tube. Consequently, the cost of the wire winding equipment as a whole, and the installation area

required, are reduced to an appreciable extent. Further, since the instant apparatus does not require a branching device for feeding the wire rod along one of plural wire paths as used in the conventional system, the wire rod 14 is not marred or otherwise damaged due to a bending force applied during a pass through the branching device. Thus, the conventionally encountered deterioration of quality of the produced coils is eliminated, or at least minimized.

For comparison, an example of a conventional system is shown in Fig. 4, wherein a single wire path originating from a finish rolling-mill stand 70 is branched by a branching device 76 into two wire paths which lead to two stationary wire winders 72 and 74 provided for the single finish rolling-mill stand. In the case where the wire rods 75 are wound selectively in the clockwise or counterclockwise direction in each of the two winders 72, 74, each of the branch wire paths should be further branched into two branch paths for the clockwise and counterclockwise coils. This will increase the number of wire paths, and the total length of the wire paths, thereby requiring a larger number of components such as cooling devices and pinch rolls for the entire equipment. Accordingly, the conventional system suffers relatively high equipment cost and large space requirement for installation. Furthermore, the produced coils are degraded in quality due to damages of the wire rods which are subjected to a bending force while they are passed through one or more branching devices.

For example, the truck 20 which carries the wire winders 16, 18 and is movable with its wheels 30 rolling on the rails 28 by the hydraulic cylinder 34, may be moved by an electric motor. Further, the truck 20 may be replaced by a carriage or other forms of movable means, which is movable by means of a slide slidable on a suitable bearing surfaces, or by means of a suitable link mechanism. Further, the carriage may be replaced by a rotary turning table which is rotatable about the vertical axis.

While the truck 20 carries the two winders in the illustrated embodiment, three or more winders may be mounted on the truck or similar movable means indicated above.

The poling reels 38, 40 used in the illustrated embodiment are provided in the form of cylindrical drums with a support disc. However, it is possible that the reels be formed by a plurality of pins which are secured to a suitable base and which are disposed in mutually spaced-apart relation along a profile of a coil to be produced.

It will be obvious to those skilled in the art that other changes and modifications may be made, in view of the foregoing teaching, without departing from the scope of the invention defined in the appended claims.

Claims

1. A method of winding wire rods into coils, said method comprising the steps of:

(a) feeding a plurality of wire rods (14) in succession from a rolling mill (10) along a single linear wire path (12);

(b) providing a first wire winder and a second wire winder (18) in mutually spaced apart relation and mounted on a carriage (20) which is movable to and fro on a carriage path that is transverse to said single linear wire path (12), said first and second wire winders (16, 18) each being rotatable about a vertical axis, said first wire winder (16) having a first side that faces said second wire winder (18) and a second side that is remote from said second wire winder (18) and said second wire winder (18) having a first side that faces said first wire winder (16) and a second side that is remote from said first wire winder (16);

(c) positioning said carriage (20) so that the first side of said first wire winder (16) is in alignment with said single wire path (12); then

(d) rotating said first wire winder (16) in a first angular direction so as to wind a first wire rod (14) into a first coil; then

(e) positioning said carriage (20) so that the first side of said second wire winder (18) is in alignment with said single wire path (12); and then

(f) rotating said second wire winder (18) in a second angular direction, opposite from said first angular direction, so as to wind a second wire rod (14) into a second coil.

2. A method of winding wire rods into coils as claimed in claim 1 and further comprising the steps of:

(a) after step (f) in claim 1, positioning said carriage (20) so that the first side of said first wire winder (16) is in alignment with said single wire path (12); then

(b) rotating said first wire winder (16) in said first angular direction so as to wind a third wire rod (14) into a third coil; and then

(c) continuing alternate use of said first and second wire winders (16, 18), always aligning the first side of each wire winder (16, 18) with said single wire path (12) before rotating each wire winder.

3. A method as claimed in claim 1 or 2, wherein said carriage path is perpendicular to said single wire path (12).

4. Apparatus for winding wire rods into coils, said apparatus comprising:

(a) first means (24) for feeding a plurality of wire rods (14) in succession from a rolling mill along a single linear wire path (12);

(b) a carriage (20) movable to and fro on a carriage path that is transverse to said single wire path (12);

(c) a first wire winder (16) and a second wire winder (18) mounted on said carriage (20) in mutually spaced apart relation on a line transverse to said single wire path (12), said first and second wire winders (16, 18) each being rotatable about a vertical axis, said first wire winder (16) having a first side that faces said second wire winder (18) and a second side that is remote from said second wire winder (18) and said second wire winder (18) having a first side that faces said first wire winder (16) and a second side that is remote from said first wire winder (16);

(d) second means (34, 36) for moving said carriage (20) back and forth between a first position

in which the first side of said first wire winder (16) is in alignment with said single wire path (12) and a second position in which the first side of said second wire winder (18) is in alignment with said single wire path (12);

(e) third means (42, 43) for rotating said first wire winder (16) in a first angular direction so as to wind a first wire rod (14) into a first coil; and

(f) fourth means (42, 43) for rotating said second wire winder (18) in a second angular direction, opposite from said first angular direction, so as to wind a second wire rod (14) into a second coil.

5. Apparatus as claimed in claim 4, wherein said carriage path is perpendicular to said single wire path (12) and said first and second wire winders (16, 18) are mutually spaced apart on a line perpendicular to said single wire path (12).

Patentansprüche

1. Verfahren zum Aufwickeln von Metalldrähten zu Drahtrollen, gekennzeichnet durch folgende Schritte:

(a) Fördern mehrerer Metalldrähte (14) der Reihe nach von einer Walzstrecke (10) entlang einer einzigen linearen Drahtförderbahn (12);

(b) Anordnen einer ersten Drahtwickel­einrichtung (16) und einer zweiten Drahtwickel­einrichtung (18) derart, daß sie voneinander beab­standet und auf einem Schlitten (20) befestigt sind, der auf einer Schlittenbahn hin- und herbewegbar ist, die quer zu der einzigen linearen Drahtförderbahn (12) verläuft, wobei die erste und die zweite Drahtwickel­einrichtung (16, 18) um eine vertikale Achse drehbar sind und die erste Drahtwickel­einrichtung (16) eine erste Seite hat, die der zweiten Drahtwickel­einrichtung (18) zugewandt ist, sowie eine zweite Seite, die von der zweiten Drahtwickel­einrichtung (18) abgewandt ist, und wobei ferner die zweite Drahtwickel­einrichtung (18) eine erste Seite hat, die der ersten Drahtwickel­einrichtung (16) zugewandt ist, sowie eine zweite Seite, die von der ersten Drahtwickel­einrichtung (16) abgewandt ist;

(c) Positionieren des Schlittens (20) derart, daß die erste Seite der ersten Drahtwickel­einrichtung (16) mit der einzigen Drahtförderbahn (12) fluchtet; anschließend

(d) Drehen der ersten Drahtwickel­einrichtung (16) in einer ersten Winkelrichtung, um einen ersten Metalldraht (14) zu einer ersten Drahtrolle aufzuwickeln; anschließend

(e) Positionieren des Schlittens (20) derart, daß die erste Seite der zweiten Drahtwickel­einrichtung (18) mit der einzigen Drahtförderbahn (12) fluchtet; und anschließend

(f) Drehen der zweiten Drahtwickel­einrichtung (18) in einer zweiten Winkelrichtung, entgegengesetzt der ersten Winkelrichtung, um einen zweiten Metalldraht (14) zu einer zweiten Drahtrolle aufzuwickeln.

2. Verfahren zum Aufwickeln von Metalldrähten zu Drahtrollen nach Anspruch 1, ferner gekennzeichnet durch folgende Schritte:

(a) nach Schritt (f) gemäß Anspruch 1 Positionieren des Schlittens (20) derart, daß die erste Seite der ersten Drahtwickel­einrichtung (16) mit der einzigen Drahtförderbahn (12) fluchtet; anschließend

(b) Drehen der ersten Drahtwickel­einrichtung (16) in der ersten Winkelrichtung, um einen dritten Metalldraht (14) zu einer dritten Drahtrolle aufzuwickeln; und anschließend

(c) fortlaufende abwechselnde Verwendung der ersten und zweiten Drahtwickel­einrichtung (16, 18), wobei jeweils die erste Seite jeder Drahtwickel­einrichtung (16, 18) mit der einzigen Drahtförderbahn (12) fluchtet, bevor die Drahtwickel­einrichtung gedreht wird.

3. Verfahren nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Schlittenbahn senkrecht zu der einzigen Drahtförderbahn (12) verläuft.

4. Vorrichtung zum Aufwickeln von Metalldrähten zu Drahtrollen, gekennzeichnet durch

(a) eine erste Einrichtung (24) zum Fördern mehrerer Metalldrähte (14) der Reihe nach von einer Walzstrecke entlang einer einzigen linearen Drahtförderbahn (12);

(b) einen Schlitten (20), der auf einer Schlittenbahn hin- und herbewegbar ist, die quer zu der einzigen Drahtförderbahn (12) verläuft;

(c) eine erste Drahtwickel­einrichtung (16) und eine zweite Drahtwickel­einrichtung (18), die auf dem Schlitten (20) auf einer Linie voneinander beab­standet befestigt sind, die quer zu der einzigen Drahtförderbahn (12) verläuft, wobei die erste und die zweite Drahtwickel­einrichtung (16, 18) um eine vertikale Achse drehbar sind und die erste Drahtwickel­einrichtung (16) eine erste Seite, die der zweiten Drahtwickel­einrichtung (18) zugewandt ist, und eine zweite Seite aufweist, die von der zweiten Drahtwickel­einrichtung (18) abgewandt ist, wobei die zweite Drahtwickel­einrichtung (18) eine erste Seite, die der ersten Drahtwickel­einrichtung (16) zugewandt ist, und eine zweite Seite hat, die von der ersten Drahtwickel­einrichtung (16) abgewandt ist,

(d) eine zweite Einrichtung (34, 36) zum Bewegen des Schlittens (20) vorwärts und rückwärts zwischen einer ersten Position, in der die erste Seite der ersten Drahtwickel­einrichtung (16) mit der einzigen Drahtförderbahn (12) fluchtet, und einer zweiten Position, in der die erste Seite der zweiten Drahtwickel­einrichtung (18) mit der einzigen Drahtförderbahn (12) fluchtet;

(e) eine dritte Einrichtung (42, 43) zum Drehen der ersten Drahtwickel­einrichtung (16) in einer ersten Winkelrichtung, um einen ersten Metalldraht (14) zu einer ersten Drahtrolle aufzuwickeln; und

(f) eine vierte Einrichtung (42, 43) zum Drehen der zweiten Drahtwickel­einrichtung (18) in einer zweiten Winkelrichtung, entgegengesetzt der ersten Winkelrichtung, um einen zweiten Metalldraht (14) zu einer zweiten Drahtrolle aufzuwickeln.

5. Vorrichtung nach Anspruch 4, dadurch gekennzeichnet, daß die Schlittenbahn senkrecht zu der einzigen Drahtförderbahn (12) verläuft und daß die erste und die zweite Drahtwickel­einrichtung (16,

18) auf einer Linie voneinander beabstandet sind, die senkrecht zu der einzigen Drahtförderbahn (12) verläuft.

Revendications

1. Procédé pour enrouler des fils ronds laminés sous la forme de bobines, ledit procédé incluant les étapes consistant à :

- (a) faire avancer successivement une pluralité de fils ronds laminés (14) à partir d'un laminoin (10) le long d'un trajet linéaire unique (12) des fils;
- (b) prévoir un premier bobinoir et un second bobinoir (18) espacés l'un de l'autre et montés sur un chariot (20), qui peut être déplacé en va-et-vient sur un trajet qui s'étend transversalement par rapport audit trajet linéaire unique (12) des fils, lesdits premier et second bobinoirs (16, 18) pouvant tourner chacun autour d'un axe vertical, ledit premier bobinoir (16) possédant un premier côté tourné vers ledit second bobinoir (18) et un second côté éloigné dudit second bobinoir (18) et ledit second bobinoir (18) possédant un premier côté tourné vers ledit premier bobinoir (16) et un second côté éloigné dudit premier bobinoir (16);
- (c) positionner ledit chariot (20) de manière que le premier côté dudit premier bobinoir (16) soit aligné avec ledit trajet unique (12) des fils, puis
- (d) faire tourner ledit premier bobinoir (16) dans un premier sens de manière à enrouler un premier fil rond laminé (14) pour former une première bobine; puis
- (e) positionner ledit chariot (20) de manière que le premier côté dudit second bobinoir (18) soit aligné avec ledit trajet unique (12) des fils; puis
- (f) faire tourner ledit second bobinoir (18) dans un second sens, opposé audit premier sens, de manière à enrouler un second fil rond laminé (14) pour former une seconde bobine.

2. Procédé pour enrouler des fils ronds laminés sous la forme de bobines selon la revendication 1 et incluant en outre les étapes consistant à :

- (a) à la suite de l'étape (f) de la revendication 1, positionner ledit chariot (20) de manière que le premier côté dudit premier bobinoir (16) soit aligné avec ledit trajet unique (12) des fils; puis
- (b) faire tourner ledit premier bobinoir (16) dans ledit premier sens de manière à enrouler un troisième fil rond laminé (14) pour former une troisième bobine; puis
- (c) continuer à utiliser en alternance lesdits premier et second bobinoirs (16, 18), toujours en alignant le premier côté de chaque bobinoir (16, 18) avec ledit trajet unique (12) des fils, avant de faire tourner chaque bobinoir.

3. Procédé selon la revendication 1 ou 2, selon lequel ledit trajet de déplacement du chariot est perpendiculaire audit trajet unique (12) des fils.

4. Dispositif pour enrouler des fils ronds laminés sous la forme de bobines et des dispositifs comprenant:

- (a) des premiers moyens (24) servant à faire avancer une pluralité de fils ronds laminés (14) successivement à partir d'un laminoin le long d'un trajet unique linéaire (12) pour des fils;

(b) un chariot (20) déplaçable en va-et-vient sur un trajet transversal audit trajet unique (12) des fils;

(c) un premier bobinoir (16) et un second bobinoir (18) montés sur ledit chariot (20) en étant espacés l'un de l'autre, sur une ligne transversale par rapport audit trajet unique (12) des fils, lesdits premier et second bobinoirs (16, 18) pouvant tourner chacun autour d'un axe vertical, ledit premier bobinoir (16) possédant un premier côté tourné vers ledit second bobinoir (18) et un second côté éloigné dudit second bobinoir (18), et ledit second bobinoir (18) comportant un premier côté tourné vers ledit premier bobinoir (16) et un second côté éloigné dudit premier bobinoir (16);

(d) des seconds moyens (34, 36) servant à déplacer ledit chariot (20) en va-et-vient entre une première position, dans laquelle le premier côté dudit premier bobinoir (16) est aligné avec ledit trajet unique (12) des fils, et une seconde position, dans laquelle le premier côté dudit second bobinoir (18) est aligné avec ledit trajet unique (12) des fils;

(e) des troisièmes moyens (42, 43) servant à faire tourner ledit premier bobinoir (16) dans un premier sens de manière à enrouler un premier fil rond laminé (14) sous la forme d'une première bobine; et

(f) des quatrièmes moyens (42, 43) pour faire tourner ledit second bobinoir (18) dans un second sens, opposé audit premier sens, de manière à enrouler un second fil rond laminé (14) sous la forme d'une seconde bobine.

5. Dispositif selon la revendication 4, dans lequel ledit trajet de déplacement du chariot est perpendiculaire audit trajet unique (12) des fils et lesdits premier et second bobinoirs (16, 18) sont espacés l'un de l'autre sur une ligne perpendiculaire audit trajet unique (12) des fils.

FIG. 1

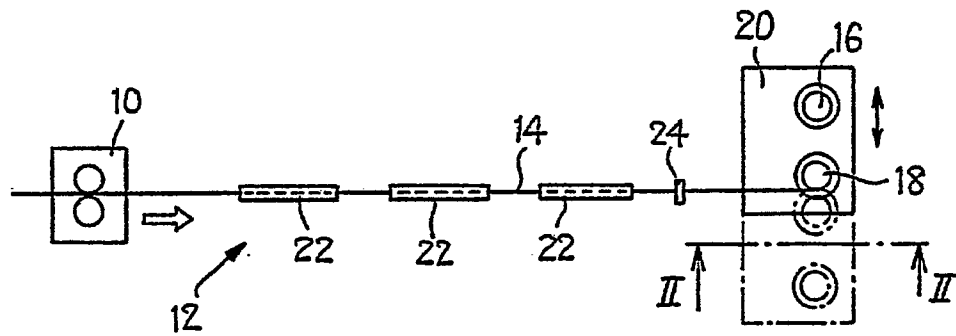


FIG. 4

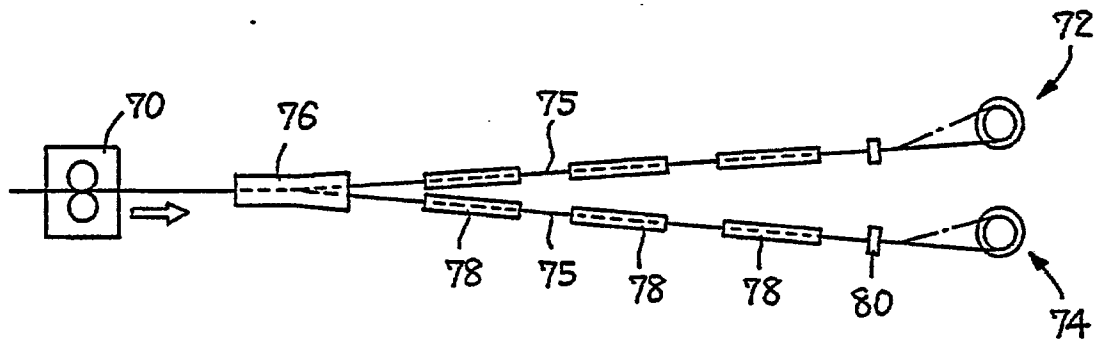


FIG. 2

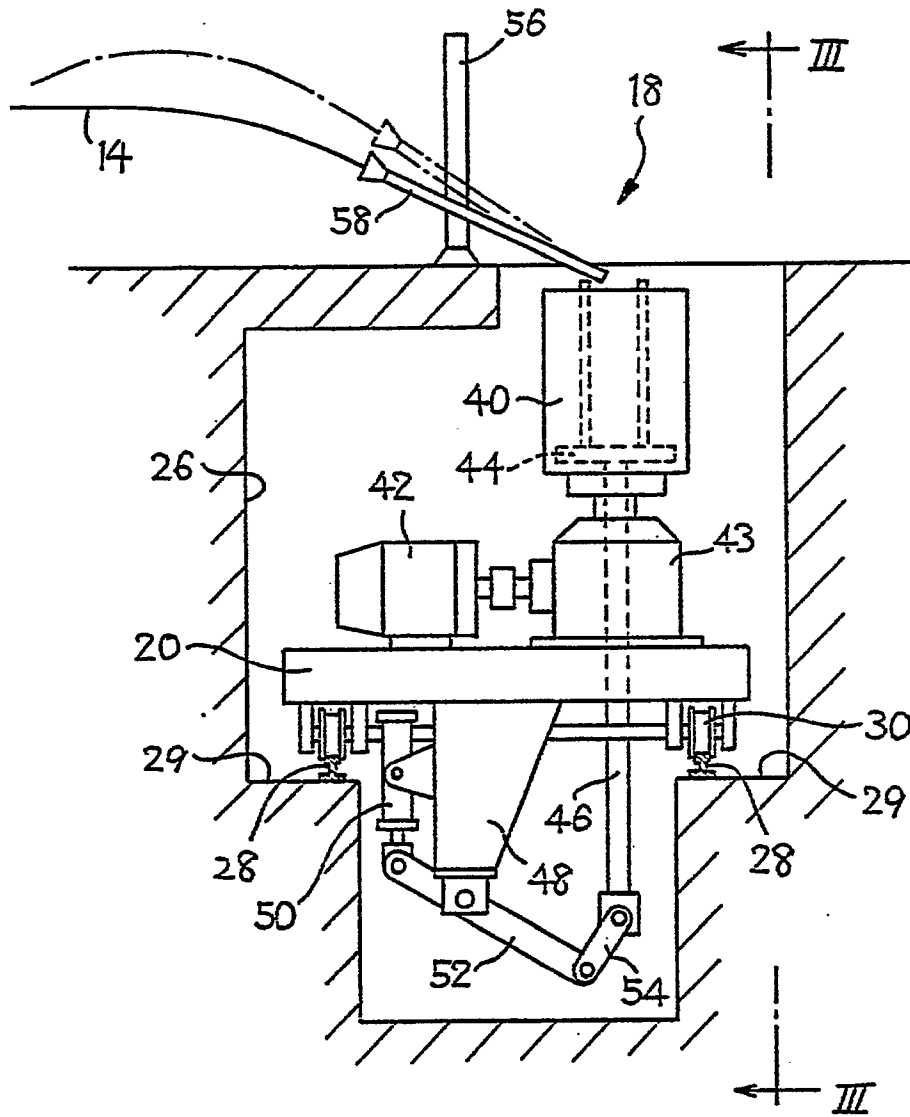


FIG. 3

