May 6, 1958 J. W. DE POY 2,833,329

WIRE PACKAGING TAKEUP AND COILING APPARATUS WITH ROTATABLE FLYER

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FIG. 1

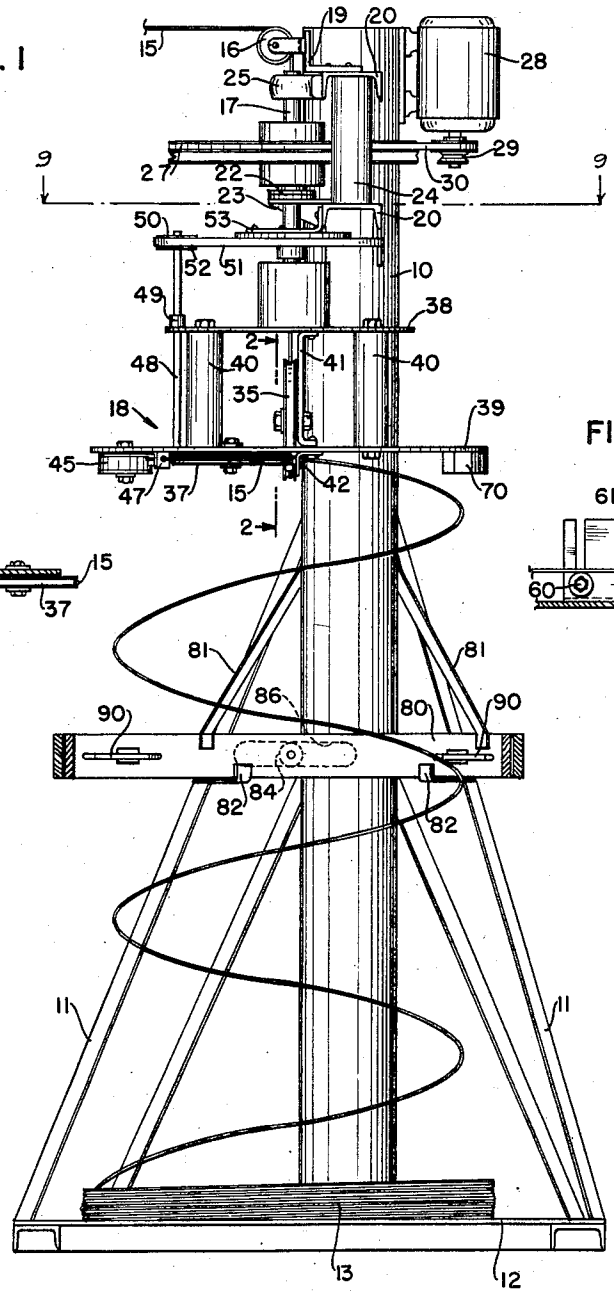


FIG. 2

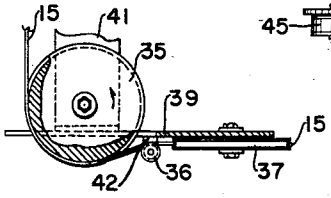
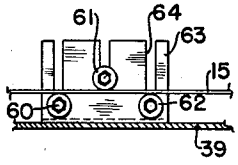


FIG. 3



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FIG. 4

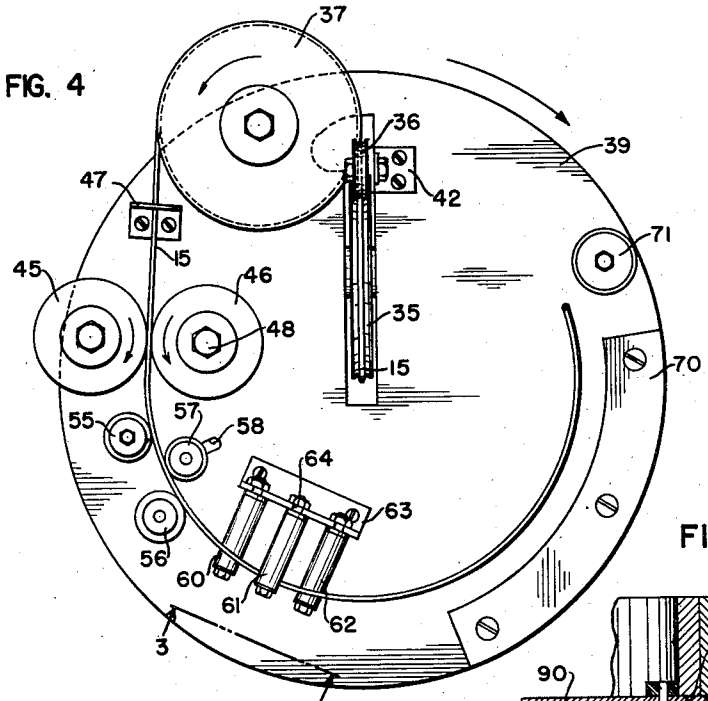


FIG. 7

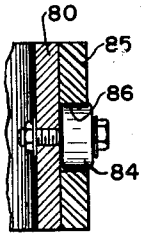
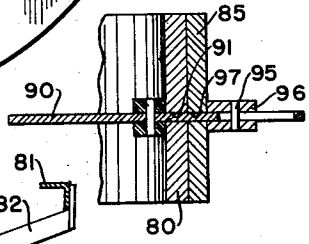


FIG. 6



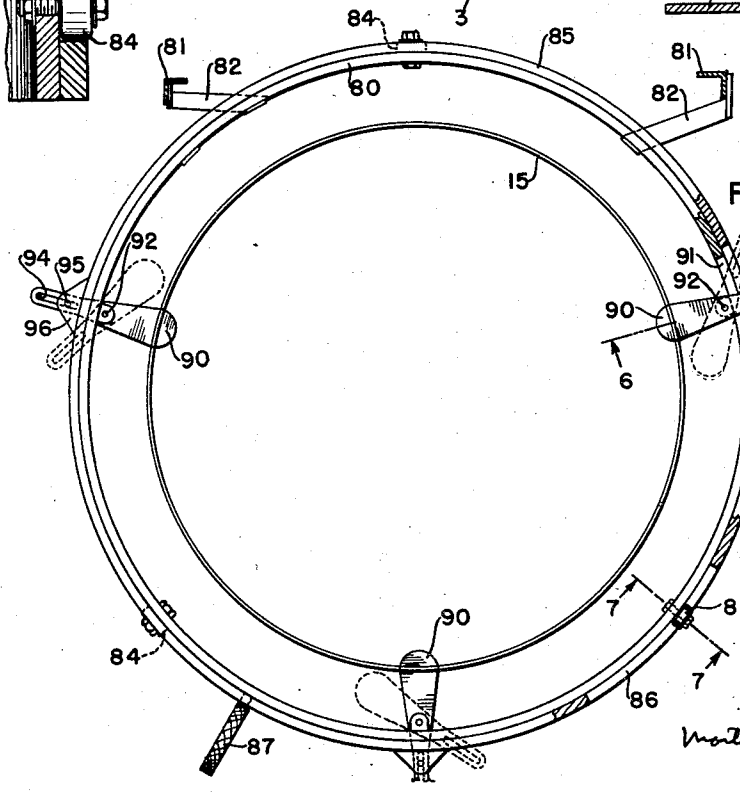


FIG. 5

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FIG. 8

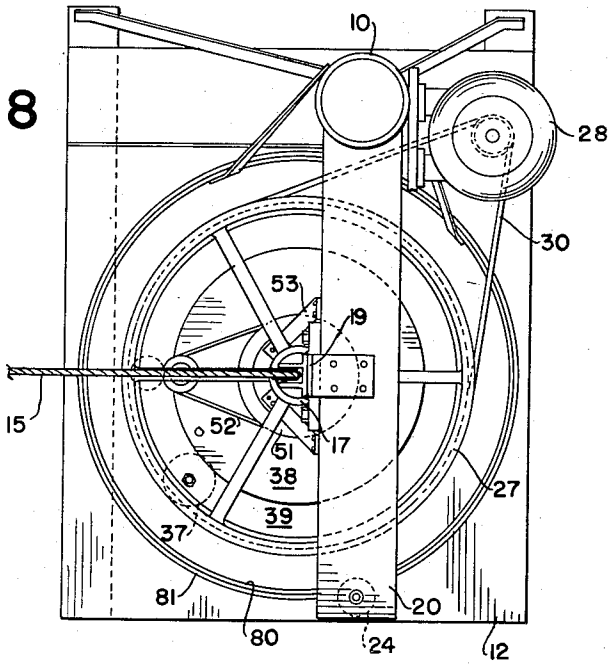
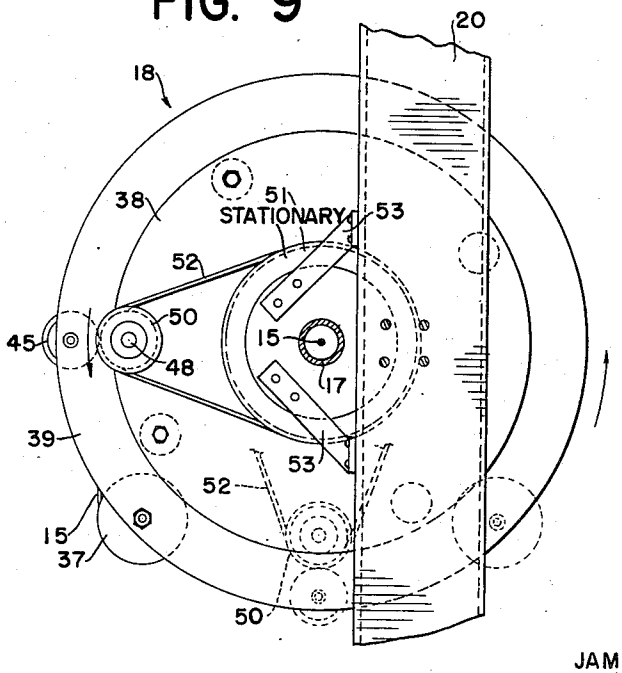


FIG. 9



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WIRE PACKAGING TAKEUP AND COILING APPARATUS WITH ROTATABLE FLYER

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Application December 9, 1955, Serial No. 552,030

8 Claims. (Cl. 153—65)

This invention relates to wire packaging takeup apparatus, and more particularly to such an apparatus by which wire may be taken up directly from a wire drawing machine, a galvanizing frame or other production machine, and formed into a bundle thereof, in dead cast condition, if desired. More especially, the invention is concerned with a wire packaging takeup apparatus which consumes a minimum of floor space in operation, can continuously handle wire at speeds of 2,000 feet per minute or more without interruption due to removal of individual packages and coils therefrom as formed, and which provides a substantial increase in safety for the workers.

For a great many years, and with greater intensity currently, the wire making and packaging industry has sought a takeup apparatus which will provide a stationary package or bundle. Of the takeup apparatuses presently on the market, most have been too expensive, or have required too much space for operation. Furthermore, most have been limited in speed of operation and have not been capable of forming a sufficiently dead cast bundle of wire, if desired. In addition, none to my knowledge, which will otherwise satisfactorily coil or bundle wire, has been provided with any means for continuing the takeup or coiling operation continuously during the time in which a completed parkage or bundle is being removed preparatory to the formation of a new one.

By dead cast is meant that if a circle of wire is cut from a coil thereof and suspended freely intermediate its ends, the circle of wire, including those ends, will lie in a plane with the ends aligned.

Broadly, my invention comprises a wire packaging takeup apparatus for forming coils of the wire at whatever rate it flows from the producing unit, be it a wire forming machine, a galvanizing frame, etc. The apparatus includes means for imparting a permanent curvature to the wire and for removing, if desirable, all of the helical cast therefrom (which would normally be present in a conventionally coiled wire) or even for reversing the helical cast. Furthermore, the apparatus includes means for interrupting the flow of wire from the wire bending portion thereof to the bundle without interrupting the takeup from the production machine. This latter means permits the removal of bundles or coils as formed without any time loss and without any scrap loss, as would be incurred in connection with intermittent operation of a galvanizing frame, due to interrupted operation of a takeup apparatus.

More specifically my wire packaging takeup and coiling apparatus comprises a rotatable flyer having means associated therewith for changing the direction of movement of a wire from a production machine substantially to the plane of rotation of the flyer. It also includes means on the flyer for then imparting to the wire, substantially in the plane of rotation, a desired circular cast. Additionally, means is included on the flyer for controlling the cast of the wire other than in the plane of rotation of the flyer and for advantageously removing from the

wire all helical cast. Advantageously, the apparatus also includes means for removing any cast imparted to the wire by the direction-changing means prior to imparting thereto the desired circular cast. With this apparatus I am able to deliver the taken up wire as a stationary coil on, in or over any suitable container or even free onto the floor or a pallet.

Advantageously, the apparatus also includes a suitable retractible means for interrupting the flow of the wire from the coiling portion of the apparatus to the container, floor or pallet without, however, interrupting the flow of wire from the producing machine. Hence a completed bundle or coil of wire may be removed from the apparatus without interrupting the operation thereof, and more important without interrupting the flow from the producing machine.

For a more detailed understanding of the invention, reference may be made to the following description of one embodiment thereof as illustrated in the accompanying drawings in which:

Fig. 1 is an elevation showing the complete apparatus;

Fig. 2 is a fragmentary elevation illustrating in greater detail the means for changing the direction of movement of the wire, handled by the apparatus, to the plane of rotation of the flyer;

Fig. 3 is a fragmentary elevation showing in greater detail the means for controlling the cast of the wire following the curvature thereof;

Fig. 4 is a bottom view of the flyer and the elements of the apparatus supported thereby;

Fig. 5 is a plan view of a means for interrupting the flow of wire from the coiling apparatus to enable removal of a bundle or coil without interrupting operation of the apparatus;

Fig. 6 is a vertical sectional detailed view taken along line **6—6** of Fig. 5;

Fig. 7 is a vertical sectional detailed view taken along line **7—7** of Fig. 5;

Fig. 8 is a plan view of the apparatus of Fig. 1; and

Fig. 9 is an enlarged partial plan view, partially in section, taken along line **9—9** of Fig. 1 and is intended principally to illustrate the rotatability of the flyer.

The wire packaging takeup and coiling apparatus illustrated comprises a main back support post **10** held in a substantially vertical position by a bracing member **11** extending from a base platform **12** which is also adapted to support a pallet or package element for receipt of coiled wire or for supporting a coil **13** of wire directly as formed.

A wire **15** to be coiled is taken up by the apparatus by being drawn thereinto in a manner described below over a pulley **16** and thence through a hollow shaft **17** downwardly to a rotating flyer identified generally by the reference numeral **18**. Pulley **16** is supported by a bracket **19** mounted on one of a pair of channel irons **20** extending from post **10**. Hollow shaft **17** is supported by a thrust bearing **22** mounted on a bracket **23** which in turn is mounted on the other of the channel irons **20**. The outer ends of channel irons **20** are connected by a brace member **24**. The upper end of hollow shaft **17** is positioned by a bearing **25** which may be mounted on the same channel iron **20** as is the bracket **19** for pulley **16**. The hollow shaft **17** which supports flyer **18** also has mounted thereon a driven pulley **27** by which it may be rotated from a variable speed motor **28** through an adjustable pulley **29** (mounted on the output shaft of the motor) through a V-belt **30**. Hence the rotatable flyer may be driven at any of a variety of predetermined speeds.

By reference particularly to Figs. 1, 2 and 4, it may be seen that wire **15** enters the rotatable flyer **18** over a direction-changing pulley **35** from which it is then drawn

over a second pulley 36 located adjacent the lower portion of pulley 35 and adapted to discharge the wire into the plane of rotation of the lower portion of the flyer 18 onto a third pulley 37. All three of pulleys 35, 36 and 37 are mounted on the flyer which, in the form illustrated, comprises upper and lower plate members 38 and 39 secured rigidly together by a plurality of connecting posts 40. Pulley 35, as shown in Fig. 1, is mounted on a bracket 41 extending between plates 38 and 39 of the flyer and so as to rotate in a vertical plane. Pulley 36 is mounted on a bracket 42 secured to the bottom face of plate 39. This pulley 36, incidentally, which may be termed a casting pulley, is provided primarily to remove any cast imparted to the wire in its passage over pulley 35 and also rotates in a vertical plane. Pulley 37 is mounted on a shaft secured to bottom plate 39 of flyer 18, and as illustrated is mounted to rotate in a horizontal plane.

The wire 15 is drawn through aforementioned hollow shaft 17 and pulleys 35, 36 and 37 by a pair of driving rolls 45 and 46 (Fig. 4), the latter of which is driven. In leaving pulley 37, the wire passes through a guide bracket 47. Of the drive rolls 45 and 46, roll 45, which is an idler, is adjustably mounted on plate 39 for rotation in a horizontal plane, as indicated, and for movement toward and away from driven roll 46 whereby the pair may be adjusted to frictionally grip, for drawing, wires of different sizes. The driven roll 46 is supported beneath plate 39, and in the same plane as is roll 45 and pulley 37, by a drive shaft 48 (Figs. 1 and 9) extending through both plates 38 and 39 and supported thereon by a thrust bearing 49. A driven pulley 50 is fixedly secured to the upper end of drive shaft 48 and is adapted to be drivingly interconnected with a drive pulley 51 by a V-belt 52. Drive pulley 51 is fixedly secured by a bracket 53 to the lower of channel irons 20 and is concentric with hollow shaft 17, the latter of course being freely rotatable through an opening in the center of the bracket 53 and pulley 51. Thus, as the rotatable flyer 18 is rotated by hollow shaft 17, driven pulley 50 moves about fixed pulley 51 and is itself rotated by reason of its connection to the latter by belt 52. Hence roll 46 is rotated, and in cooperation with roll 45 draws the wire 15 into the flyer as previously mentioned.

The wire 15 is urged, upon leaving rolls 45 and 46, through three casting rolls 55, 56 and 57 supported by the lower plate 39 of the flyer to rotate in the plane of rotation of rolls 45 and 46. Casting roll 57 is mounted in a slot 58 of plate 39 for adjustment with respect to fixedly positioned rolls 55 and 56. These casting rolls 55, 56 and 57 are adapted to impart a circular cast to the wire 15 as it is urged therebetween. The degree of cast is of course variable by adjustment of the position of cast roll 57 with respect to cast rolls 55 and 56.

After leaving these rolls 55, 56 and 57, the wire is forced through a second group of cast rolls 60, 61 and 62. As will be noted in Fig. 3, these rolls are mounted for rotation in a vertical plane on a bracket 63 provided with a slot 64 for adjustably receiving the supporting shaft for each roll. The cast rolls 60, 61 and 62 are adapted to remove helical cast from wire 15 as it is forced therebetween or even to impart thereto a reverse helical cast. Thus this set of vertically rotating casting rolls permits the formation of what has heretofore been termed a dead cast wire.

A retaining block 70 and roll 71 may be supported on the lower face of plate 39 of the rotatable flyer 18 to control, if necessary, the course of the wire after it leaves casting rolls 60, 61 and 62.

The wire, upon leaving the rotatable flyer, is permitted to drop downwardly to form the package of coiled wire 13. As the circles of wire, as they are deposited from the flyer, are substantially stationary except in the vertical direction, the coil or package may be formed on, in or over any suitable container, or as illustrated, free on the base 12 of the apparatus or upon a pallet placed thereon.

As previously explained, it is desirable and essential, if scrap losses are to be avoided, for example in taking up wire from a galvanizing machine, that the takeup operation be continuous. Hence, the packaging and coiling must be continuous and provision must be made for removal of packages or coils, as completed, without interruption of the takeup. Because of the nature and characteristics of the coiled wire delivered from the flyer of this invention, the flow thereof from the flyer to the ultimate position of formation of the package may be interrupted without there being incurred any necessity for interrupting the operation of the takeup and coiling operation.

Hence there is desirably provided an apparatus of the type shown in detail in Figs. 5 through 7 and in Fig. 1. This interrupting apparatus, which permits the removal of a package of coiled wire 13 upon completion of its formation without interruption of the takeup and coiling operations, may comprise an inner annular ring 80 supported by a plurality of support members 81 from back post 10 and further by a plurality of bracing brackets 82 from bracing members 11. The diameter of annular ring member 80 is substantially greater than that of any coil to be formed. A number of rolls 84 are spaced equidistant about annular ring member 80, being secured thereto for rotation in a vertical plane. These rollers 84 are adapted to carry a second annular ring member 85 which surrounds ring member 80 and is provided with a plurality of slots 86, one to receive each roller 84 whereby ring member 85 is supported thereon for limited movement about and concentrically with ring member 80. A handle 87 is secured to ring member 85 to facilitate this relative movement of it with respect to ring member 80.

Ring member 80 also pivotally supports at least three wire-supporting arms 90 which extend through slots 91 formed therein and are secured therein by pivot pins 92. Each wire supporting arm 90 is provided at its outer end with a longitudinal slot 94 which is adapted to receive a pin 95 secured to the outer face of annular member 85 by a pair of lugs 96. Slots 97 accommodate the passage of the outer end of arms 90 through ring member 85.

Arms 90, as shown in Fig. 5, are extendable so as to intercept a coil of wire leaving the rotatable flyer 18. Hence this coil and successive coils are prevented from passage through this intermediate supporting apparatus to coil 13, which permits removal of coil 13 without discontinuing the takeup and coiling operation. Upon movement, however, of outer annular ring member 85 in a counterclockwise direction as shown in Fig. 5, the arms 90 are pivoted to their dotted line positions as there shown, which permits the wire supported thereby to fall through and further permit successive coils to pass freely therethrough to form another package of wire upon the completion of which interruption of the flow of the wire through this intermediate supporting apparatus may be accomplished by moving outer ring member 85 in a clockwise position so as to extend arms 90 again to their intercepting positions.

With the above-described apparatus, wire may be continuously taken up for packaging and coiled from various producing units such as wire-forming machines and galvanizing frames, etc. at speeds up to 2,000 feet per minute or more and without interruption due to the removal of individual packages and coils as formed. Furthermore, it requires a minimum of floor space for operation and is completely free from any rotating parts beneath the rotatable flyer whereby the safety of the worker, particularly in removing formed packages, is immeasurably improved. It is furthermore adjustable, as described, and hence can be adjusted to operate at varied constant speeds or at controllable variable speeds, can be adjusted to impart different degrees of curvature to the wire and can further be adjusted to deliver the wire,

if desirable, in dead cast condition or in a variety of helically cast conditions.

The apparatus illustrated and specifically described herein is of course but one form which the broad apparatus of my invention may take. Hence, various changes and modifications may be made in it without departing from the scope of the invention which should rather be limited only to the extent set forth in the appended claims. Thus, for example, it is contemplated that under certain conditions it might be desirable or necessary to rotate the flyer **18** other than in a horizontal plane. Hence provision for mounting the flyer and its associated driving parts other than vertically, as specifically illustrated, is contemplated. Furthermore, it is contemplated, for example, that the flyer may be mounted for rotation other than directly upon the illustrated rotatable hollow shaft **17**.

I claim:

1. Wire packaging takeup apparatus comprising a rotatable flyer, means on the flyer for changing the direction of movement of a wire to be handled thereby substantially to the plane of rotation of the flyer, means on said flyer alone for then wholly imparting a desired circular cast to the wire substantially in said plane of rotation, and means on said flyer for changing the helical cast characteristic of the circular cast wire, said circular cast imparting means and said helical cast changing means alone determining the final cast of the wire in a coil thereof formed by said apparatus.

2. Wire packaging takeup apparatus according to claim 1 which includes means on the flyer for first removing any cast imparted to the wire by the direction changing means.

3. Wire packaging takeup apparatus according to claim 1 which includes means mounted on the flyer for drawing the wire into the flyer substantially along the axis of rotation thereof, and a plurality of casting rolls mounted on the flyer and adapted to receive the wire from said drawing means and to impart thereto a circular cast substantially in the plane of rotation of said flyer.

4. Wire packaging takeup apparatus according to claim 3 in which the casting rolls are mounted to rotate substantially in the plane of rotation of the flyer.

5. Wire packaging takeup apparatus according to claim 3 which includes means supported on said flyer for removing from said wire any cast imparted thereto by the direction-changing means.

6. Wire packaging takeup apparatus comprising a rotatable flyer, means on the flyer for changing the direction of movement of a wire to be handled thereby substantially to the plane of rotation of the flyer, means mounted on said flyer for drawing the wire into the flyer substantially along the axis of rotation thereof, a plurality of casting rolls mounted on the flyer and adapted to receive the wire from said drawing means and to impart thereto a circular cast substantially in the plane of rotation of said flyer, and a plurality of cast rollers supported on said flyer for rotation in a plane substantially perpendicular to the plane of rotation of the flyer for changing the helical cast characteristic of the wire after it leaves the circular casting rolls.

7. Wire packaging takeup apparatus comprising a rotatable flyer, means on the flyer for changing the direction of movement of a wire to be handled thereby substantially to the plane of rotation of the flyer, means mounted on said flyer for drawing the wire into the flyer substantially along the axis of rotation thereof, a plurality of casting rolls mounted on the flyer and adapted to receive the wire from said drawing means and to impart thereto a circular cast substantially in the plane of rotation of said flyer, a plurality of cast rollers supported on said flyer for rotation in a plane substantially perpendicular to the plane of rotation of the flyer for changing the helical cast characteristic of the wire after it leaves the circular casting rolls, and means supported on said flyer for removing from said wire any cast imparted thereto by the direction-changing means.

8. Wire packaging takeup apparatus comprising a rotatable flyer, means on the flyer for changing the direction of movement of a wire to be handled thereby substantially to the plane of rotation of the flyer, means mounted on said flyer for drawing the wire into the flyer substantially along the axis of rotation thereof, a plurality of casting rolls mounted on the flyer and adapted to receive the wire from said drawing means and to impart thereto a circular cast substantially in the plane of rotation of said flyer, a plurality of cast rollers supported on said flyer for rotation in a plane substantially perpendicular to the plane of rotation of the flyer for changing the helical cast characteristic of the wire after it leaves the circular casting rolls, and means supported on said flyer for removing from said wire any cast imparted thereto by the direction-changing means, said means for drawing the wire into the flyer being adapted to push said wire through said casting rolls for imparting the circular cast to the wire and said cast rollers for changing the helical casting characteristic of said wire.

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