July 16, 1963 M. A. NYE ETAL 3,097,812

WIRE PACKAGING MACHINE

Filed Dec. 15, 1960 5 Sheets-Sheet 1

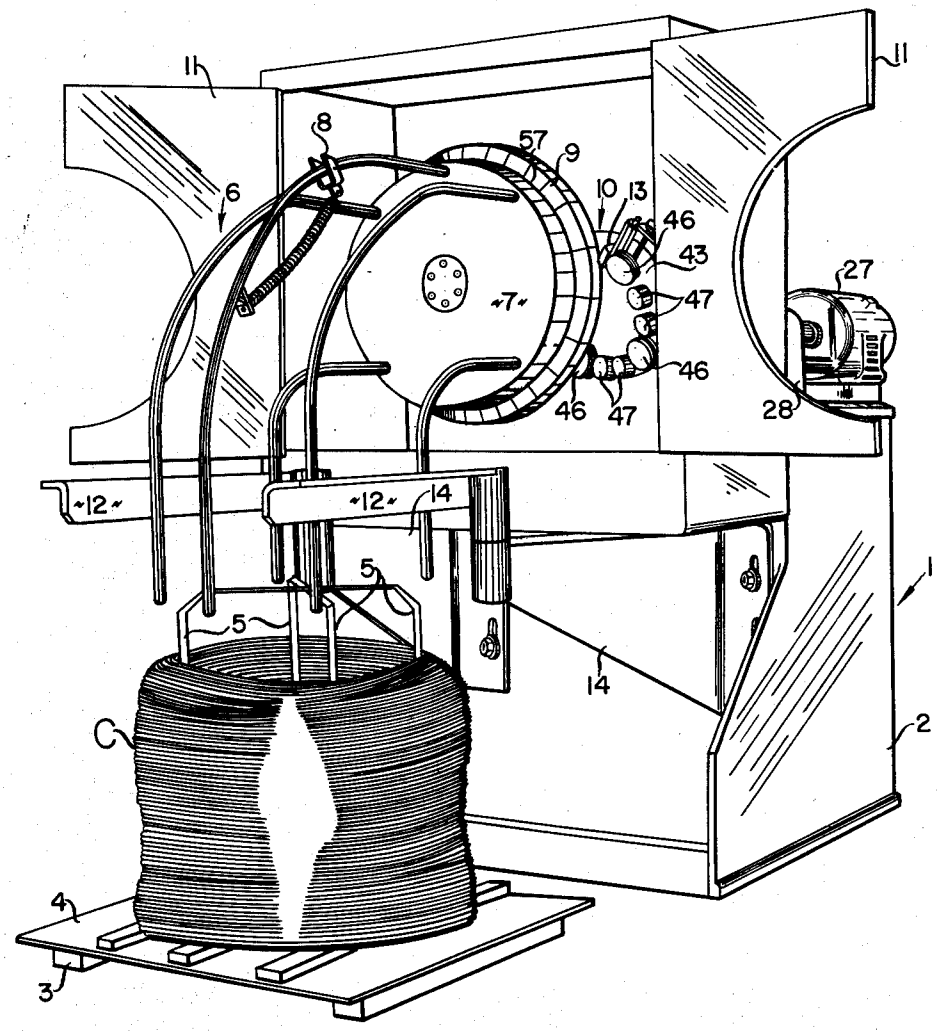


FIG 1

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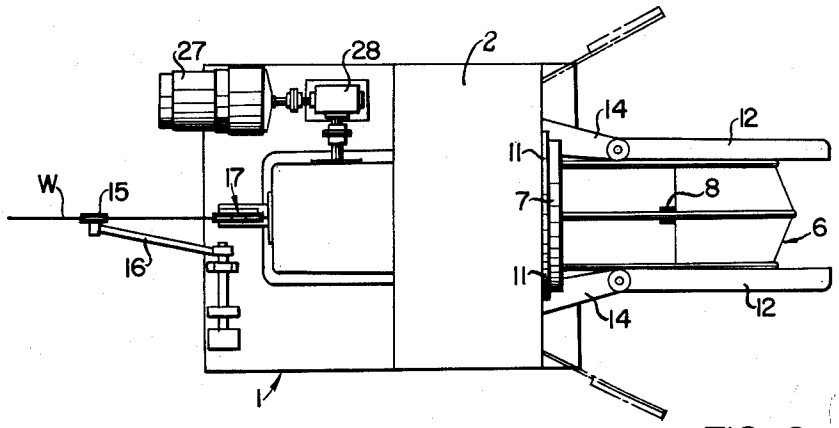


FIG 2

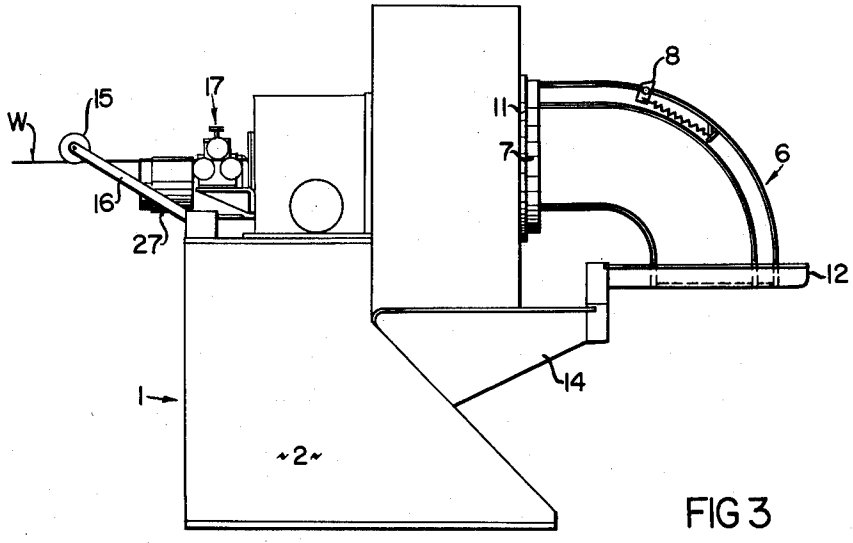


FIG 3

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WIRE PACKAGING MACHINE

Filed Dec. 15, 1960 5 Sheets-Sheet 3

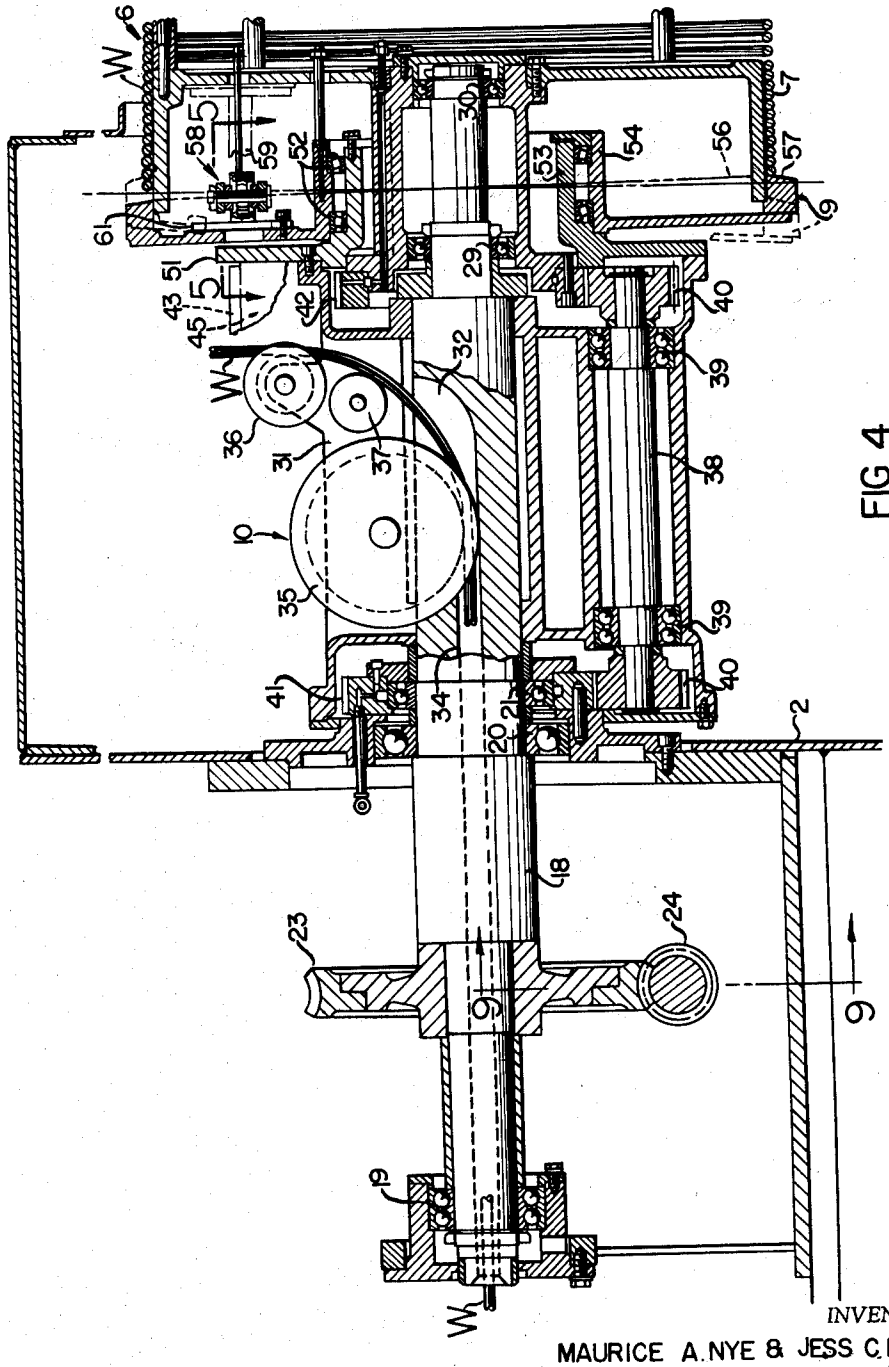


FIG 4

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WIRE PACKAGING MACHINE

Filed Dec. 15, 1960 5 Sheets-Sheet 4

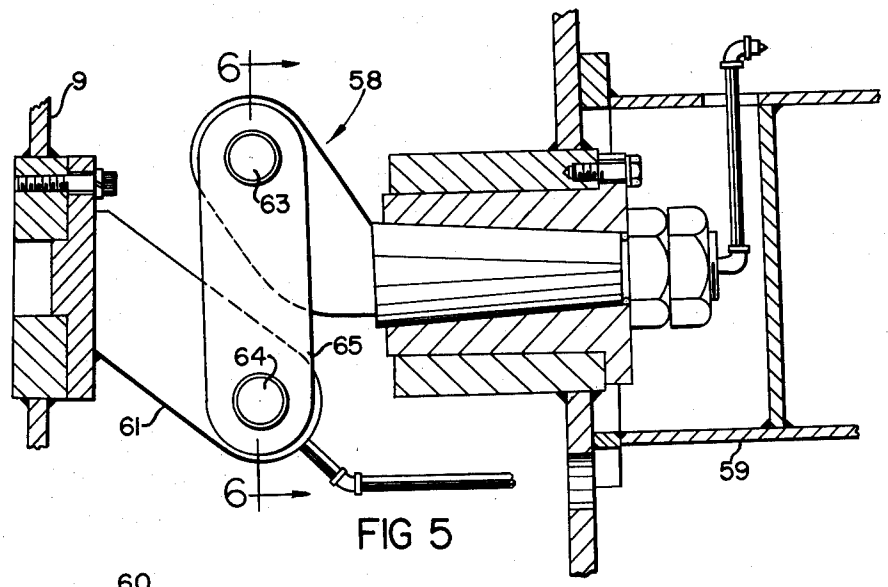


FIG 5

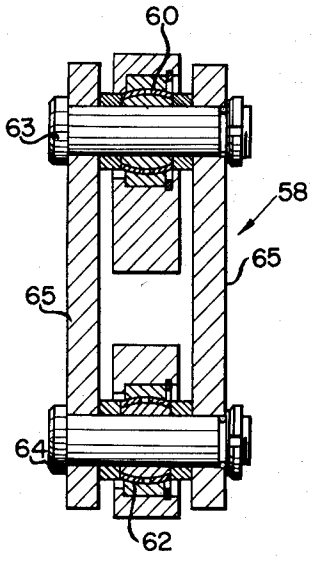


FIG 6

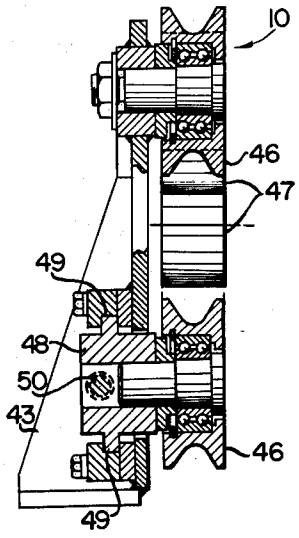


FIG 8

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WIRE PACKAGING MACHINE

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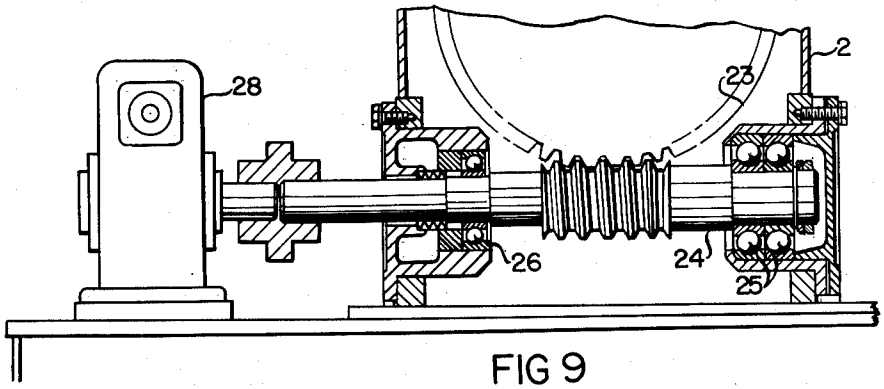


FIG 9

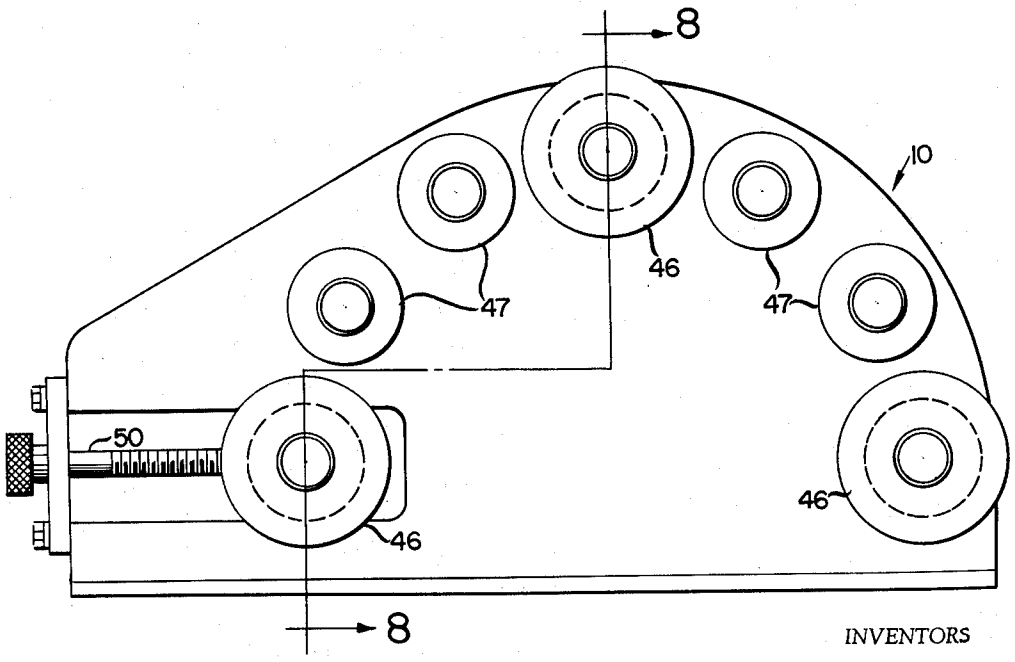


FIG 7

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United States Patent Office 3,097,812 Patented July 16, 1963

3,097,812

WIRE PACKAGING MACHINE

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Filed Dec. 15, 1960, Ser. No. 75,965
5 Claims. (Cl. 242—82)

The present invention relates generally as indicated to a wire packaging machine and more particularly to a so-called "dead coil-dead block" machine in which both the package and takeup block are stationary and in which the latter embodies a pushoff ring effective to advance the convolutions of wire or the like, as they are formed around the block.

Hitherto, in wire packaging machines employing stationary takeup blocks, pushoff rings have not been employed owing to the difficulty of mounting such rings for wobbling action while holding them and the blocks against rotation. Moreover, in such stationary takeup block packaging machines it is conventional practice to conduct the elongated material through the hollow drive shaft of a rotary flyer which has a sheave orbiting around the takeup block to continuously wrap the elongated material around the latter. However, to prevent the wire from being too sharply curved, such sheave has been made of relatively large diameter. Consequently the head of the machine must be sufficiently large to permit such orbiting of the large sheave around the takeup block.

Accordingly, it is a principal object of this invention to provide a wire packaging machine of the stationary block-stationary coil type in which there is provided a wobbling non-rotating pushoff ring in association with the takeup block.

It is another object of this invention to provide a novel wire guide means on the flyer that contributes to the compactness of the machine herein while yet preventing the wire from being too sharply curved.

Other objects and advantages of the present invention will become apparent as the following description proceeds.

To the acomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail a certain illustrative embodiment of the invention, this being indicative, however, of but one of the various ways in which the principle of the invention may be employed.

In said annexed drawings:

FIG. 1 is a perspective view of a preferred embodiment of this invention;

FIG. 2 is a top plan view of the wire packaging machine shown in FIG. 1;

FIG. 3 is a side elevation view as viewed upwardly from the bottom of FIG. 2;

FIG. 4 is a central vertical cross-section view showing the stationary takeup block mounted on the flyer drive shaft and showing the non-rotating pushoff ring mounted in tilted position with respect to the axis of the takeup block and flyer drive shaft;

FIG. 5 is a fragmentary horizontal cross-section view on enlarged scale taken substantially along the line 5—5, FIG. 4;

FIG. 6 is a cross-section view taken substantially along the line 6—6, FIG. 5;

FIG. 7 is a side elevation view of the wire guide of the flyer assembly;

FIG. 8 is a cross-section view taken susbtantially along the line 8—8, of FIG. 7; and

FIG. 9 is a cross-section view taken substantially along

the line 9—9, FIG. 4 showing the drive mechanism for the flyer drive shaft.

Referring now in detail to the drawings and first, more especially to FIGS. 1 to 3, the wire packaging machine 1 herein comprises a housing 2 in front of which the coil receiver platform or pallet 3 is adapted to be positioned, said platform being herein shown by way of example as comprising a base 4 with upstanding guide bars 5 over which the convolutions of wire W from horn 6 of the takeup block 7 descend by gravity to form a wire package or coil C.

The upper portion of the housing 2 has mounted thereon the stationary horizontal takeup block 7 with the horn 6, composed as of curved tubes, secured thereto. The horn 6 receives the wire convolutions from the takeup block 7 and turns them to generally horizontal position for dropping by gravity over the guide bars 5 of the pallet 3. The horn 6 is preferably provided with a spring-loaded catch 8 to hold back the convolutions as formed around the takeup block so that several convolutions will accumulate at the catch 8 before being released for travel around the horn 6 for descent to form the coil C.

As later explained in detail, the takeup block 7 is provided with a wobbling, non-rotating pushoff apron or ring 9 which is operative as the flyer assembly 10 is rotated about an axis which coincides with the horizontal centerline of the takeup block 7 to progressively advance the convolutions from the block 7 as the flyer assembly 70 wraps the wire W around the block. If desired, the flyer assembly 10 may have a wire drawing die 13 mounted thereon as shown in FIG. 1 so as to draw the wire W as it is wrapped around the block 7.

The housing 2 is provided with suitable hinged doors 11 which form an opening through which the wire convolutions are advanced. Above the platform 3 there are provided arms 12 pivoted on vertical axes of the brackets 14 for swinging movement either to permit free descent of the wire convolutions from the horn 6 to the platforms 3, or to arrest such descent. In FIGS. 1, 2, and 3 these arms 12 are shown in the last-mentioned position whereby the wire W may be severed for removal of the completed coil C and for placement of an empty platform 3 beneath the horn 6. During the time that the complete coil C is being removed, the wire convolutions will be accumulated on said arms 12 so that it is not necessary to stop the takeup operation.

As best shown in FIGS. 2 and 3, the incoming wire W passes under the sheave 15 of a pivoted tension arm 16 and thence passes through an adjustable pinch roll assembly 17 to impose tension on the wire W as it is wrapped around the takeup block 7 by the flyer assembly 10. The wire W from the pinch roll assembly 17 passes into the rear end of the flyer drive shaft 18 (see FIG. 4).

Having thus described the general construction of the wire packaging machine 1 herein, special reference will now be made to FIGS. 4 to 9 which show the details of construction of the stationary takeup block 7 with its pushoff ring 9 and the flyer assembly 10 which orbits around the takeup block 7 to wrap the wire W thereon to form it into convolutions or loops that are continuously pushed off the block 7 by the wobbling pushoff ring 9.

Thus, in FIG. 4 the flyer drive shaft 18 is supported in the housing 2 for rotation about its horizontal axis by the antifriction bearings 19, 20, and 21, and keyed on said shaft 18 between the bearings 19 and 20 is a worm wheel 23. As best shown in FIG. 9, the worm wheel 23 is driven by the worm shaft 24 which is journalled in the housing 2 by the antifriction bearings 25 and 26, the worm shaft being powered by the electric drive motor 27 through the angle drive and speed reducer unit 28.

The flyer drive shaft 18 extends forwardly through the

bearings 20 and 21 and has its front end portion rotatably supported by the bearings 29 and 30 in the center of the takeup block 7.

Keyed on the portion of the flyer drive shaft 18 between the bearings 21 and 29 is the flyer assembly 10 which is formed with a radial slot 31 aligned with a radial slot 32 formed in the flyer drive shaft 18, the latter slot 32 communicating with the central passage 34 in the shaft. The portion of the flyer assembly 10 shown in FIG. 4 comprises two sheaves 35 and 36 and a roller 37 journalled in the slot 31 and over which the wire W is curved as shown.

The flyer assembly 10 also carries a rotatable pinion shaft 38 mounted in the antifriction bearings 39 and having pinions 40 keyed at both ends which mesh with gears 41 and 42 fixed to the housing 2 and to the takeup block 7 respectively. In view of such epicyclic gearing arrangement, it can be seen that when the flyer drive shaft 18 together with the flyer assembly 10 are rotated about the axis of the flyer drive shaft 18, the takeup block 7 will be held against rotation due to the meshing of the pinion 40 with the gear 41 fixed to the housing 2.

The guide frame 43 of the flyer assembly 10 (see FIG. 1) is mounted in tilted or skewed position with respect to the trans-axial plane of the takeup block 7.

In the present case, instead of providing the usual sheave over which the wire W is guided for wrapping around the takeup block 7, there is provided the obliquely disposed wire guide frame 43 which is mounted on boss 45 and which carries an arcuate series of guide sheaves 46 and rollers 47, as most clearly shown in FIGS. 7 and 8. The last sheave 46 (at the left in FIG. 7) from which the wire W leaves the guide frame 43 is carried by a block 48 which is slide-guided in longitudinal guideways 49 formed in the frame 43. In threaded engagement with said block 48 is a rotatable, but axially fixed, adjusting screw 50, and thus the last sheave 46 may be longitudinally shifted to adjust the curvature of the wire W as it leaves the last sheave 46.

Secured to the flyer assembly 10 just behind the takeup block 7 is the bearing mounting plate 51 for the pushoff ring 9, there being opposed tapered roller bearings 52 or the like interposed between the hubs 53 and 54 of mounting plate 51 and pushoff ring 9. The mounting plate 51 and its hub 53 are tilted from vertical as represented by dot-dash line 56 to cause wobbling of the non-rotating pushoff ring 9 between the solid line and dotted line positions of FIG. 4 as the flyer assembly is rotated.

The pushoff ring 9 is fitted over the rear end of the takeup block 7 and has a beveled face 57 along which the wire W is guided as it is wrapped around the takeup block 7. The pushoff ring 9 is held against rotation while permitted to wobble as aforesaid with respect to the takeup block 7 as by means of the universal joint assembly 58 which is illustrated in detail in FIGS. 5 and 6. Referring to FIGS. 5 and 6 there is fixedly mounted to the takeup block 7 a bracket assembly 59 provided with a spherical bearing 60. Similarly fixedly secured to the pushoff ring 9 is a bracket member 61 providing a spherical bearing 62. Extending tangentially across said bearings 60 and 62 and pivotally mounted on the bearing pins 63 and 64 are a pair of links 65. As evident, by reason of the provision of the spherical bearings 60 and 62 and the pivotal connections of links 65 to the bearing pins 63 and 64, the pushoff ring 9 is capable of universal tilting movement with respect to the takeup block 7 while rotation of the pushoff ring 9 is prevented.

By reason of such mounting of the pushoff ring 9, the rotation of the flyer drive shaft 18 and flyer assembly 10 will cause the pushoff ring to wobble to provide a space from the last wire convolution to the beveled face 57 for the convolution being formed and to shove the wire W axially toward the horn 6.

Referring again to FIG. 1, the wire W which is to be packaged is trained over the seven sheaves and rollers 46 and 47 of the flyer guide frame 43 and when the flyer assembly rotates in a clockwise direction the wire W will be wrapped around the takeup block 7 adjacent the beveled face 57 of the pushoff ring 9. As the wire W is thus being wrapped around the takeup block 7, the wobbling motion of the pushoff ring 9 will progressively shove the wire W axially toward the horn 6. The convolutions or loops of wire W thus formed will accumulate to some extent at the spring-loaded catch 8 and periodically the convolutions will overcome the tension in the spring, whereby they will gravitate around the curved portion of the horn 6 and drop down around the guide bars 5 of the receiver 3, the accumulator arms 12 at that time being out of the way to permit such free descent of the convolutions. When the wire bundle or coil C is of desired size, the arms 12 will be swung inward to the position shown in FIG. 1, to arrest further descent of the convolutions, whereupon the wire W may be cut and the receiver 3 with its package C thereon may be removed and replaced by an empty one. In the meantime, the convolutions will collect on the arms 12 and when the empty receiver 3 is in place, the arms 12 are swung apart to cause the convolutions collected thereon to drop down over the guide bars 5 of the receiver.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

We therefore particularly point out and distinctly claim as our invention:

1. In a wire packaging machine, the combination of a stationary takeup block; a rotary flyer assembly rotatable about an axis coinciding with the centerline of said block to wrap wire around said block in the form of successive convolutions; a wobbling pushoff ring adjacent one end of said block effective to push the convolutions therearound axially toward the other end; said ring and assembly having a rotary, axially fixed connection between them about an axis which is tilted with respect to the centerline of said block; and universal joint means between said ring and block radially outward of said rotary connection arranged to hold said ring against rotation with respect to said block but to permit wobbling of said ring through such rotary connection.

2. The wire packaging machine of claim 1 wherein the centerline of said block is horizontal; and wherein a horn is secured to such other end of said block to turn the convolutions pushed off said block to generally horizontal position for descent by gravity to form an upwardly growing package on a receiver adapted to be positioned beneath said horn.

3. In a wire packaging machine, the combination of a stationary takeup block; a rotary flyer assembly including a hollow drive shaft therefor rotatable about an axis coinciding with the centerline of said block, and a wire guide to wrap wire fed through said drive shaft and over said guide around said block in the form of successive convolutions; a wobbling pushoff ring adjacent one end of said block effective to push the convolutions therearound axially toward the other end; said ring and assembly having a rotary, axially fixed connection between them about an axis which is tilted with respect to the centerline of said block; and universal joint means between said ring and block radially outward of said rotary connection arranged to hold said ring against rotation with respect to said block but to permit wobbling of said ring through such rotary connection; said wire guide comprising an arcuate series of at least three circular elements rotatable about their respective axes and over which the wire successively passes tangentially from said drive shaft to said block.

4. In a wire packaging machine, the combination of a stationary takeup block; a rotary flyer assembly rotatable about an axis coinciding with the centerline of said

block to wrap wire around said block in the form of successive convolutions; a wobbling pushoff ring adjacent one end of said block effective to push the convolutions therearound axially toward the other end; said ring and assembly having a rotary, axially fixed connection between them about an axis which is tilted with respect to the centerline of said block; and ball joint pivotal link means between said ring and block radially outward of said rotary connection arranged to hold said ring against rotation with respect to said block but to permit wobbling of said ring through such rotary connection.

5. The wire packaging machine of claim 4 wherein said means includes members fixed respectively to said ring and block in circumferentially spaced relation, and a link pivotally connected to said members about generally radially extending axes to prevent relative rotation of said ring and block and to permit wobbling of said ring with respect to said block.

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