ABSTRACT OF THE DISCLOSURE

Wire bundling machine of the flyer type characterized in that (a) tubular horizontal takeup block is secured to machine housing and has a single peripheral V-groove adjacent its end into which wire is wound by a flyer disposed adjacent the end of the block, and (b) one end of a wire guide horn is nested in the flyer to receive consecutive wire loops from the V-groove of the block and to turn them from generally vertical position to horizontal position for dropping by gravity from the other end of the horn to form an upstanding bundle or package.

BACKGROUND OF THE INVENTION

In the processing of wire or rod it is known to provide bundling machines at various stages of the drawing, heat treating, etc. of wire or rod. In known equipment, the wire to be coiled is fed through a tubular flyer drive shaft from drawing or other processing apparatus, and over flyer sheaves which are operative to helically wrap the wire about a takeup block in the form of consecutive loops, it being necessary to maintain several loops in contact around the periphery of the drum in order that the formation of the loops can occur under tension sufficient to pull the wire through a drawing die or other preceding processing apparatus. Thereafter, the consecutive loops as they are formed are wound about the takeup block for collection in the form of a generally vertical package or bundle.

In this type of known equipment, if the flyer is disposed between the takeup block and the machine housing, as shown for example in the patent to Bittman 3,013,741, the takeup block must be mounted on a shaft extending through the surrounding flyer drive shaft, whereby severe bending stresses may be imposed on said takeup block shaft when the wire is wrapped on the takeup block under substantial tension. Furthermore, in a horizontal takeup machine having a casing sheave on the end of said takeup block shaft, the end of the wire guiding horn is spaced a substantial distance from the end of the takeup block, as shown for example in FIG. 5 of the patent to Bittman 3,013,742.

It is also known to mount a takeup block on the bundling machine housing by means of planetary holding gears, whereby the wire to be coiled may emerge from the flyer drive shaft between the machine housing and the takeup block. In this case when the takeup block is horizontal, the wire guiding horn may be mounted directly on the end of the takeup block as shown, for example, in the patents to Nye 3,049,215, Nye et al. 3,097,812, and Bittman 3,241,786. However, such planetary holding gear arrangement is expensive to manufacture and install and must be sturdy built in view of the relatively great overhang between the takeup block and the machine housing.

SUMMARY OF THE INVENTION

The present invention has for its principal aim the provision of a bundling machine for wire or rod in which the horizontal takeup block is disposed immediately in front of the machine housing and is either fixedly secured to the housing or journalled in the housing, the flyer disposed between the end of the takeup block and the wire or rod guiding horn with the latter being nested within the flyer to obviate catching of the wire or rod as consecutive loops move from the takeup block to the horn.

It is another object of this invention to provide a bundling machine having a wire or rod takeup block which is provided with a single peripheral V-groove adjacent the end thereof into which the wire or rod is wrapped in such manner that the oncoming wire presses the offcoming wire toward the bottom of the V-groove thus to achieve wrapping under tension without necessity of having a plurality of wraps as in a conventional takeup block and without necessity of providing means for holding such plurality of wraps tightly around the block.

It is another object of this invention to provide a takeup block of the character indicated which may be driven in the manner of a rotary capstan with the flyer rotating in the opposite direction to provide a let-off point which moves in a circular path and which enables the formation of wire loops of diameter larger than the capstan according to the flyer and capstan speeds.

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

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features herein after fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of a few of the various ways in which the principle of the invention may be employed.

BRIEF DESCRIPTION OF THE DRAWING

In said annexed drawing:
FIG. 1 is a side elevation view partly in cross-section, illustrating one form of apparatus embodying the present invention;
FIG. 2 is a cross-sectional view taken substantially along the line 2—2, FIG. 1;
FIG. 3 is a cross-section view on an enlarged scale taken substantially along the line 3—3, FIG. 2; and
FIG. 4 is a fragmentary cross-section view of another form of apparatus embodying the present invention.

DISCUSSION OF THE INVENTION

In FIGS. 1 to 3 the wire or rod takeup block herein illustrated is journalled in a bearing assembly secured to the housing 3, and, in turn a tubular flyer drive shaft 4 is journalled for rotation within said block. The block 1 may be driven as by the drive shaft 5 and intermeshing gears 6 and 7. Suitable drive means (not shown) may be coupled to the respective shafts 4 and 5.

The front end of the flyer drive shaft 4 is journalled in the bearing hub 8 of a wire loop guiding horn 9 along which wire or rod loops coming off the block 1 are turned from generally vertical position to horizontal position for collection in coil or package form as on the platform 10. If desired, the platform 10 onto which the wire or rod loops fall may be progressively lowered as the package increases in vertical height so as to maintain a constant distance of drop of the loops from the lower end of the horn 9.

Adjacent the bearing hub 8, the flyer drive shaft 4 has secured for rotation therewith a flyer plate 11 carrying idler sheaves 12 and 14. Within the block 1 the flyer drive shaft 4 has a wire guide sheave 15 so that wire or rod entering the shaft 4 from the left end passes around the sheave 15 and thence radially thorough the axial gap 16 between the end of the takeup block 1 and the adjacent end of the flyer plate 11.
The takeup block 1 is ring-like or tubular and has a beveled outer edge which is flame-hardened or otherwise hardened and which, with the similarly hardened ring 17 secured to the end of the block 1, defines a V-groove 18.

In stringing up the apparatus, the wire or rod emerging from between the flyer plate 11 and the end of the takeup block 1 is passed around the sheave 12, a part turn around the V-groove 18 of the takeup block 1, around the other sheave 14, and a part turn around the V-groove 18 of the block 1 beneath the length of wire or rod which passes from the sheave 12 to sheave 14.

Accordingly, when the flyer shaft 4 is rotated in a clockwise direction as viewed in FIG. 2, the outer stretch of wire or rod will press the inner stretch toward the bottom of the V-groove 18 and the wire or rod may be removed from said groove 18 in loop form at the region where it is not engaged by the outer stretch. As consecutive wire loops are thus released from the takeup block 1 they are guided by the horn 9 to drop vertically from the lower end of the horn as best shown in FIG. 1. It is noted that the ends of the rods 19 constituting said horn 9 extend into an annular groove 20 in the adjacent face of the flyer plate 11 to prevent catching of the loops as they are released from the takeup block groove 18. The FIG. 4 machine is substantially the same as that of FIGS. 1 to 3 except that the takeup block 21 is fixedly secured directly to the housing 22.

When the takeup block 1 or 21 is stationary, the loops of wire or rod will come off the takeup block at a diameter substantially the same as that of the takeup block groove 18. However, if it be desired to form loops of larger diameter, the speed of rotation of the flyer shaft 4 may be decreased and the takeup block 1 may be driven by the gearing 6–7 in a direction opposite to that of the flyer shaft 4. In that case, the loops coming off the takeup block 1 will be of larger diameter while yet the linear speed of the wire or rod may be kept constant as desired for drawing or like operations.

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. A wire bundling machine comprising a housing; a tubular takeup block extending outwardly from said housing and directly supported thereby in a horizontally extending position, said block having a peripheral groove adjacent the outer end thereof; a flyer having a drive shaft journaled in said block and extending axially through said block, a plate on said shaft outwardly of said block forming an axial gap with the outer end of said block for radial movement of wire from within said shaft, and first and second angularly spaced sheaves on said plate disposed radially outward of said groove for linear movement of wire through said gap successively around said first sheave, said groove, said second sheave, and back into said groove beneath the wire already therein from said first sheave to said second sheave whereby upon rotation of said shaft the wire is formed into consecutive loops removable from the region of said block wherein the inner wire is unencumbered by the outer wire in said groove; and loop guide means immediately adjacent said plate for receiving such consecutive loops of wire from said block for gravity descent therefrom.

2. The machine of claim 1 wherein the inner end of said block is journaled in said housing and drive means are provided for rotating said block in a direction opposite to that of said flyer thus to vary the diameter of the wire loops removed from said block.

3. The machine of claim 1 wherein said loop guide means comprises a downwardly turned horn having a bearing hub in which the outer end of said shaft is journaled.

4. The machine of claim 3 wherein said plate has an annular groove in which the upper end of said horn is nested to prevent catching of the wire between said plate and horn.

References Cited

UNITED STATES PATENTS

2,927,744 3/1960 Nye et al. 242—82
3,023,977 3/1962 Whitacre 242—82
3,106,354 10/1963 Kitselman 242—47.08
3,177,690 4/1965 McIveried 72—66
3,270,979 9/1966 Whitacre 242—82
5,368,772 2/1968 Tyng 242—82

NATHAN L. MINTZ, Primary Examiner