

June 20, 1944.

C. J. DENTZER ET AL

2,351,669

SPOOLING APPARATUS

Filed Oct. 1, 1942

4 Sheets-Sheet 1

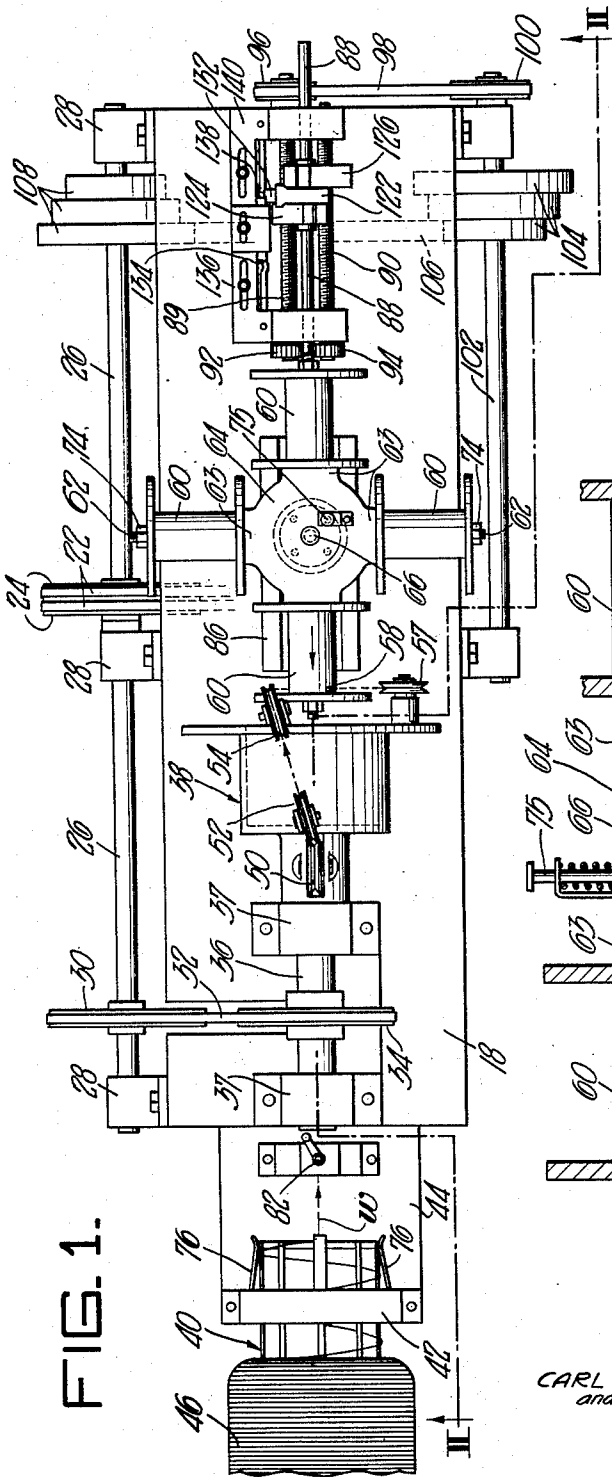
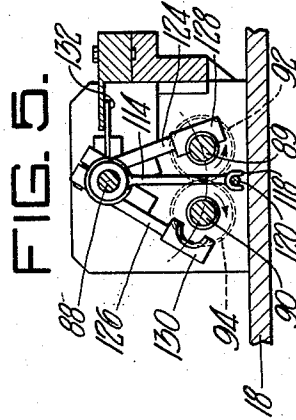
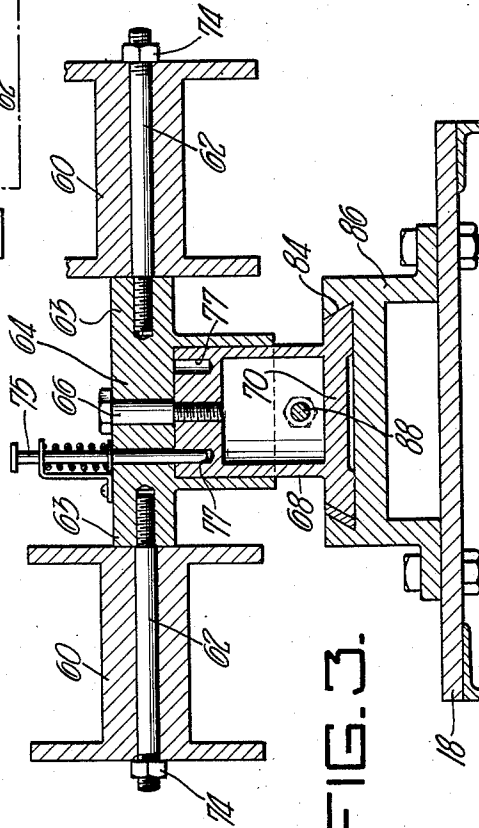


FIG. 1.

FIG. 3.

INVENTORS:
CARL J. DENTZER, GUY W. SHURMER
and OTTO J. VANEK,
BY: *John E. Jackson*
THEIR ATTORNEY.

June 20, 1944.

C. J. DENTZER ET AL

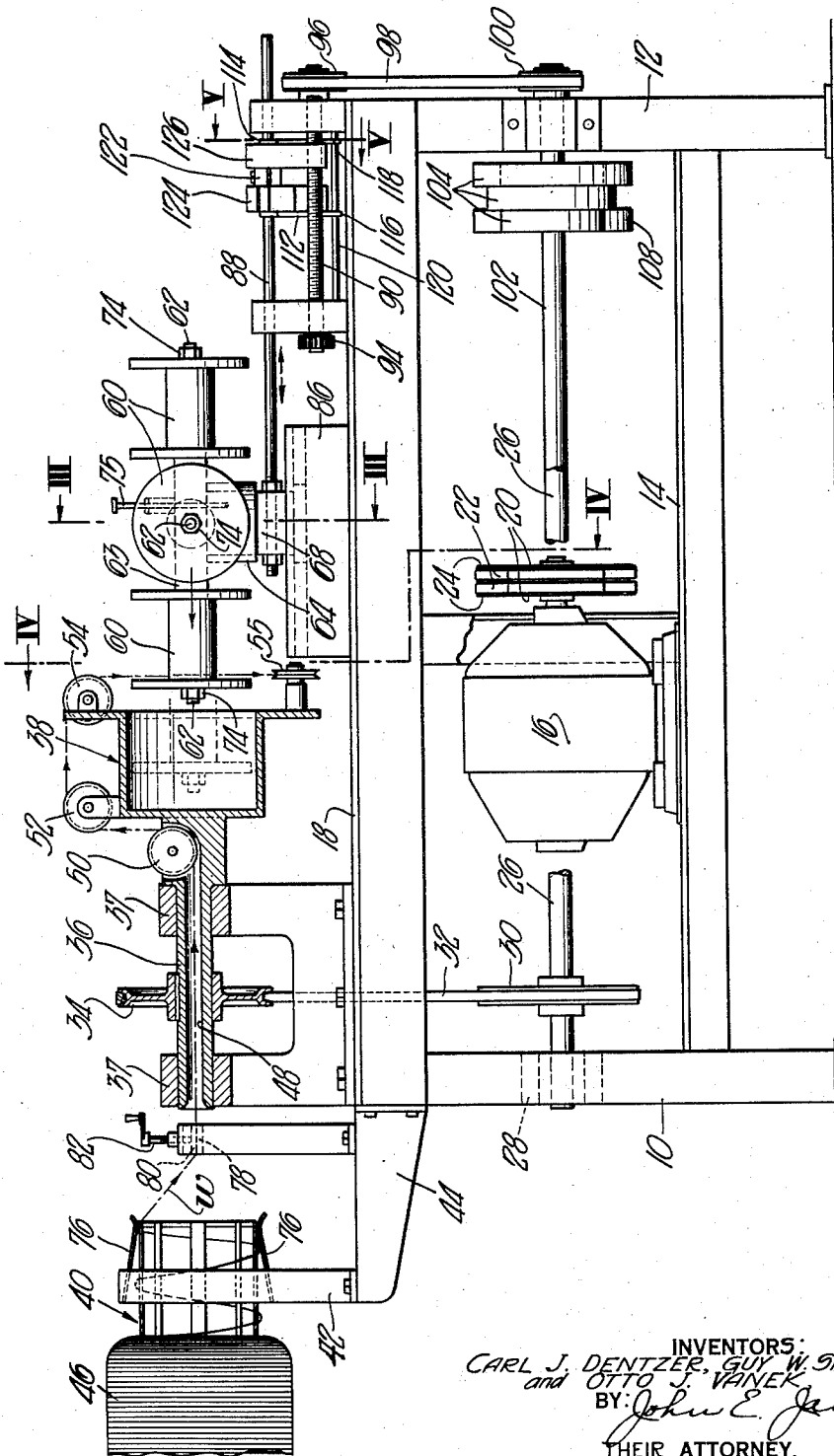
2,351,669

SPOOLING APPARATUS

Filed Oct. 1, 1942

4 Sheets-Sheet 2

FIG. 2.



INVENTORS:
CARL J. DENTZER, GUY W. SHURMER
and OTTO J. VANEK
BY: *John E. Jackson*
THEIR ATTORNEY.

June 20, 1944.

C. J. DENTZER ET AL

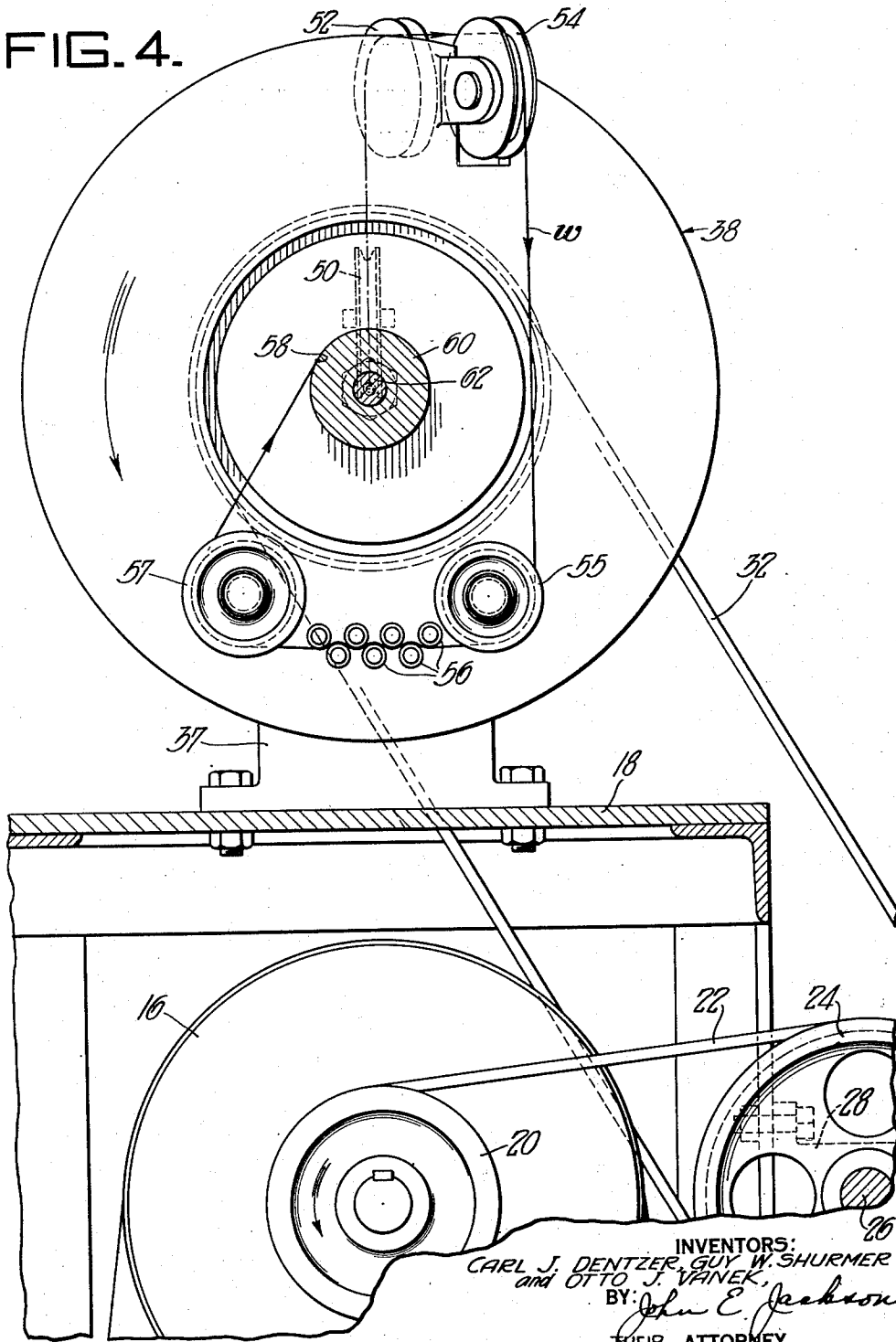
2,351,669

SPOOLING APPARATUS

Filed Oct. 1, 1942

4 Sheets-Sheet 3

FIG. 4.



INVENTORS

INVENTORS:
CARL J. DENTZER, GUY W. SHURMER
and OTTO J. VANEK,

BY: *[Signature]*

THEIR ATTORNEY.

June 20, 1944.

C. J. DENTZER ET AL

2,351,669

SPOOLING APPARATUS

Filed Oct. 1, 1942

4 Sheets-Sheet 4

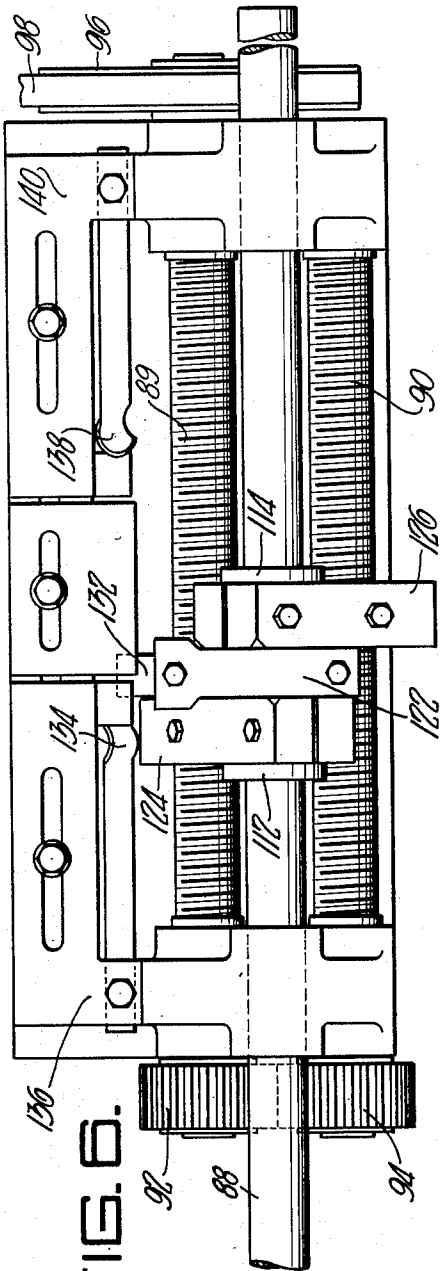


FIG. 6.

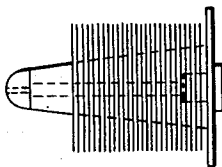


FIG. 8.

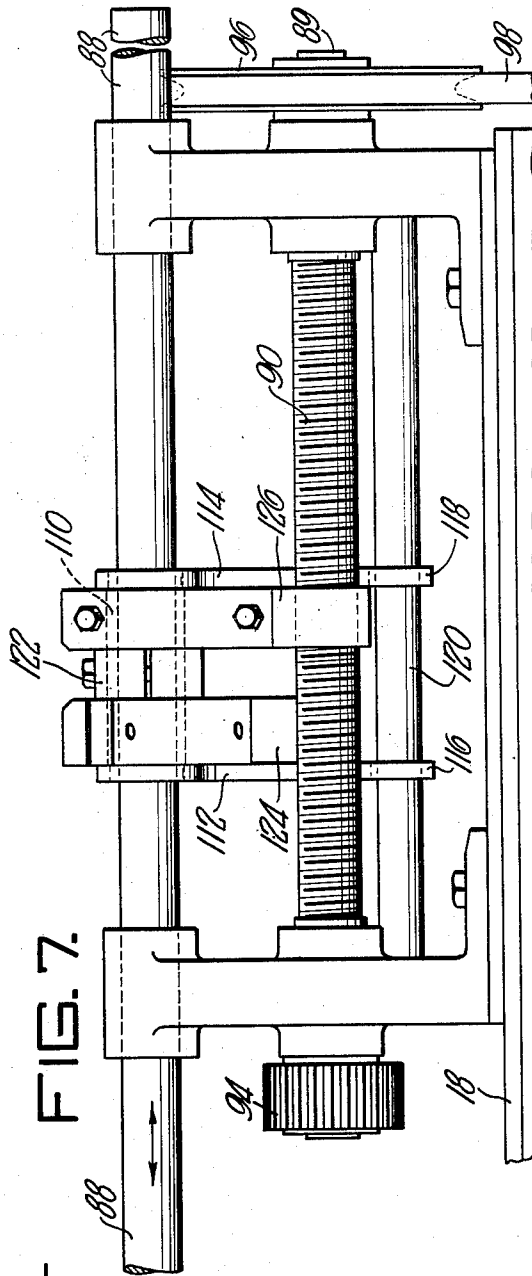


FIG. 7.

INVENTORS:
CARL J. DENTZER, GUY W. SHURMER
and OTTO J. VANEK.
BY: *John E. Jackson*
THEIR ATTORNEY.

UNITED STATES PATENT OFFICE

2,351,669

SPOOLING APPARATUS

Carl J. Dentzer, Parma, Guy W. Shurmer, Warrensville, and Otto J. Vanek, Cleveland, Ohio, assignors to The American Steel and Wire Company of New Jersey, a corporation of New Jersey

Application October 1, 1942, Serial No. 460,434

13 Claims. (Cl. 242—25)

The present invention relates to improvements in apparatus for spooling wire in separate batches periodically as the wire accumulates on a rotary or stationary block of any conventional form of wire drawing machine. The novel features relate to the improved structural arrangement and coordination of parts or equivalents thereof such as shown in the accompanying drawings and defined with particularity in the appended claims.

For a more complete understanding of the invention, reference should be made to the accompanying drawings, the following detailed disclosure and the appended claims.

In the drawings:

Figure 1 is a plan view illustrative of a preferred construction of the machine embodying the present invention;

Figure 2 is a view partly in side elevation and partly in section as indicated by the staggered line II—II of Figure 1;

Figure 3 is a fragmentary transverse section on line III—III of Figure 2;

Figure 4 is a transverse section on line IV—IV of Figure 2;

Figure 5 is a detailed view illustrating a traversing mechanism taken on line V—V of Figure 2;

Figures 6 and 7 are, respectively, a plan view and side elevation of parts shown in Figure 5 with portions broken away and shown in section in the interest of clearness; and

Figure 8 is an elevation illustrating a modification of a reel rotatable on a vertical axis.

Referring in detail to the drawings 10 and 12 represent respective end frames to which there is secured a platform 14 supporting the main drive motor 16, and a top plate 18 which serves as a supporting base for many component parts of the mechanism to be described. The armature shaft of the motor 16 carries a double grooved pulley 20 around which is trained a parallel pair of the belts 22 transmitting the motor drive to a double grooved pulley 24 secured to a countershaft 26 mounted in suitable bearings 28 carried by the frame structure of the machine.

The shaft 26 near one end carries a pulley 30 which is connected by a belt 32 to a pulley 34 keyed or otherwise secured to a hollow trunnion 36 journaled in bearings 37 which serve to rotatably support a flier 38.

As shown at the left in Figures 1 and 2, 40 represents the fixed block of a continuous fine wire drawing machine. One extremity of the block is suitably supported by an upright 42 carried by a bracket 44 secured to the end frame 10 of the machine. The block 40 as illustrated is of skeleton

form and it may be of considerable length so as to provide for the accumulation of an extremely long coiled bundle 46 of fine wire, say three or four feet in length by about one foot in diameter. The wire of the bundle 46 may be regarded as having accumulated over a long period of time as the result of a conventional wire drawing operation, for example, the same may accumulate continuously for several hours on the block 40 as the wire drawing operation proceeds. The machine of the present invention is arranged to withdraw the wire from the bundle in intermittent stages and to accumulate it in separate batches on separate spools in a rapid yet reliable manner. The spools are carried by a rotatable turret which the operator manually turns and locks in desired positions as hereinafter described.

The trunnion 36 of the flier 38 has a central longitudinally extending passageway 48 formed thereon. An inner grooved guide sheave 50 is rotatably mounted on the flier and is adapted to guide the longitudinally advancing wire *w* in its outward travel where it passes over guide sheaves 52 and 54. From the guide sheave 54 the wire passes to and around another guide sheave 55 thence between straightener rolls 56 and around guide sheave 57 to the point 58 where it is fastened to the spool 60. The stretch of wire between the sheave 54 and the sheave 57 is in a plane or zone extending beyond the end of the flier. Each spool 60 is carried by a respective one of a plurality of rods 62 secured to bosses 63 radiating from a turret 64 rotatably supported on a trunnion stud 66 secured to an upstanding hub 68 formed on a horizontally reciprocating carriage 70.

As the flier rotates it will turn counterclockwise as indicated by the arrow in Figure 4. Each spool is normally held stationary on its supporting rod 62 radiating from one of the bosses 63 of the turret by a clamp nut 74. As the flier rotates the wire will be pulled around the several guide sheaves and wrapped in coils around the spool which has been aligned with the axis of the rotating flier. A spring pressed locking pin 75 co-acts with recesses 77 to releasably hold the turret in position to align any one of the several spools with the flier.

As each convolution is pulled from the bundle 46 it passes through the restricted space between spring fingers 76 and the outer periphery of the fixed block. This provides for a smooth or uniform pay-off of the wire from the bundle. From the block the wire passes between tension plates 78 and 80 the latter being adapted to be adjusted by manipulation of a tension screw 82. As the

spool is moved longitudinally in relation to the hollow trunnion 36 the wire will be distributed uniformly thereon. To this end means are provided for traversing the turret supporting carriage 70. The traversing mechanism is best shown in Figures 5 through 7. The base 70 of the carriage is of dove-tail form as shown in Figure 3 so as to slide in the gib groove 84 of the carriage guide 86 which is bolted to the top plate 18 as shown.

A push rod 88 secured to the carriage is adapted to be shifted longitudinally in opposite directions by means of respective feed screws 89 and 90. These screws carry meshing gears 92 and 94. The screw 89 at one extremity carries a pulley 96 which is driven by a belt 98 from a pulley 100 carried by a countershaft 102. This shaft carries a cone pulley 104 which is connected by belt 106 with a similar cone pulley 108 mounted on the aforesaid countershaft 26.

The push rod 88 carries a sleeve 110 provided with downwardly extending arms 112 and 114 whose lower extremities are forked at 116 and 118 so as to fit over a fixed guide rod 120. Surrounding the sleeve 110 there is a sleeve 122 which is rotatable thereon. This sleeve 122 carries respective arms 124 and 126 which carry respective half nuts 128 and 130 adapted to be periodically engaged with the feed screws 89 and 90. As shown in Figure 5 the half nut 128 is in cooperative feeding relation with the feed screw 89. At this time the rotation of the screw will feed the carriage and turret supported thereby to the left as shown in Figure 2, and therefore toward the flier. During this movement of the spool toward the left, the same enters a central recess formed in the end of the flier as suggested by the dotted portion of the spool shown in Figure 2. After the spool has been moved a sufficient distance to the left to cause the wire being accumulated to contact the right flange of the spool, a follower 132 will strike a cam member 134 secured to an adjustable plate 136. This will rock the arm 124, thereby disconnecting the nut 128 from the feed screw 89. At the same time, the arm 126 will be rocked so as to engage the nut 130 with the feed screw 90. Thus the direction of movement of the carriage will be reversed. When the carriage has moved a predetermined distance, depending upon the longitudinal distance between the flanges on the spool, another cam 138 carried by an adjustable support 140 will come into play and shift positions of the half nut. In this manner, the traversing mechanism will distribute the winding uniformly lengthwise of the spool as the same is shifted longitudinally first in one direction and then in the opposite direction.

From the foregoing, it is apparent that our invention provides apparatus for winding wire on a spool comprising either a rotary or stationary block for supporting a coiled bundle of wire and rotary means such as the flier for withdrawing the wire from the bundle and winding it around a spool, and that the spool support is in the nature of a rotatable turret carrying a plurality of arms fixedly positioning respective spools thereon in such manner that the spool supporting turret carriage can be traversed in opposite directions periodically in such manner as to uniformly distribute the wire withdrawn from the bundle uniformly lengthwise of the particular spool carried by the turret, which has been aligned with the axis of the flier trunnion. The parts disclosed include means such as exemplified by the flipper fingers coacting with the

block to control the pay-off of successive convolutions of the coil and means for exerting a tension on the wire after it is released by the flipper fingers from which tension means the wire moves longitudinally through the hollow trunnion of the flier and around the guide sheaves carried thereby to a zone outwardly of and beyond the extremity of the flier head which is remote from the trunnion. From this point beyond the flier head the wire is distributed uniformly lengthwise of the spool by reason of the fact that the traversing mechanism automatically moves the spool back and forth at a rate properly coordinated with the winding motion and the pitch or advance of the feed screws.

An important advantageous feature inherent in the described mechanism is that the spool is held stationary and the wire is wound thereon at a higher rate of speed than that obtainable by conventional apparatus heretofore generally used. The improved machine shown herein has been successfully operated at spooling speeds ranging from 900 to 2600 feet per minute, which is approximately four times faster than prior art practice, and still higher speeds are believed to be readily obtainable. One governing factor in the high speed spooling of wire is the tendency of the wire leaving the bundle to snarl or tangle. This tendency is largely overcome in the machine of our invention by the above described spring flipper fingers and tension plates which are effective in the combination to control the uniform pay-off of wire from the bundle.

The invention makes possible an important saving since wooden spools can be successfully used in place of the more expensive metal spools heretofore required for high speed spooling. Since the wooden spools in the machine of our invention are held stationary, there is no danger of their flying to pieces under the influence of centrifugal force as they would very likely do if rotated at a speed comparable to the rate of wire travel obtainable by use of our improved machine.

In the embodiment of the invention illustrated, the block from which the wire is paid off is normally stationary. It is to be understood, however, that the invention also contemplates paying the wire off from a rotary reel or block.

While we have described quite precisely the construction and arrangement of coacting instrumentalities which an actual reduction to practice has shown to be highly desirable, it is not to be construed that we are limited thereto, since various modifications may be made by those skilled in the art without departure from the invention as defined in the appended claims.

We claim:

1. Apparatus for winding wire on a spool comprising, a normally stationary means supporting an elongated loosely coiled bundle of wire, a rotary member for withdrawing convolutions of said wire endwise from said bundle and winding it around a spool, a spool support carrying means for fixedly positioning a spool thereon, and means for traversing said spool support in opposite directions periodically so as to distribute the winding of wire withdrawn from the bundle uniformly lengthwise of a spool carried by said support.

2. Apparatus for winding wire on a spool comprising, a normally stationary block supporting an elongated loosely coiled bundle of wire, a rotary flier for withdrawing convolutions of said wire endwise from said bundle and winding it

around a non-rotating spool, means successively engaging each convolution to control the endwise pay-off thereof, a spool support carrying means for detachably securing a spool thereto, and means for traversing said spool support in opposite directions periodically so as to distribute the winding of wire withdrawn from the bundle uniformly lengthwise of a spool carried by said support.

3. Apparatus for winding wire on a spool comprising, a normally stationary means supporting a coiled bundle of wire, a rotary member for withdrawing wire from said bundle and winding it around a spool, a turret carrying a plurality of spool positioning members, a carriage on which the turret is rotatably supported, means for traversing said carriage in opposite directions periodically so as to distribute the winding of wire withdrawn from the bundle uniformly lengthwise of a spool carried by said support.

4. Apparatus for winding wire on a spool comprising, a normally stationary means supporting a coiled bundle of wire, a rotary member for withdrawing wire from said bundle and winding it around a spool, a turret carrying a plurality of spool positioning members, a carriage on which the turret is rotatably supported, means for traversing said carriage in opposite directions periodically so as to distribute the winding of wire withdrawn from the bundle uniformly lengthwise of a spool carried by said support and means for releasably locking the turret so as to hold selected spool positioning members thereof in proper position to receive wire from said rotary member.

5. Apparatus for winding wire on a spool comprising, a normally stationary block extending through the central void of and supporting a coiled bundle of wire, a rotary flier having a hollow axial trunnion through which the wire from said stationary block passes and a head carrying means for guiding the wire from the hollow trunnion to a zone beyond the extremity of said head remote from said trunnion, a spool support carrying means for fixedly positioning a spool thereon, means for traversing said spool support in opposite directions periodically with respect to said flier so as to distribute the winding of wire withdrawn from the bundle uniformly lengthwise of a spool carried by said support.

6. Apparatus for winding wire on a spool comprising, a normally stationary block extending through the central void of and supporting a coiled bundle of wire, a spring finger coacting with the block to control the endwise pay-off of successive convolutions of the coiled bundle, means for exerting a tension on the wire after it passes said spring finger, a rotary flier having a hollow axial trunnion through which the wire from said stationary block passes and a head carrying a plurality of grooved sheaves guiding the wire from the axial zone of the hollow trunnion to a zone beyond the extremity of the head remote from said trunnion, a spool support carrying means for fixedly positioning a spool thereon, means for traversing said spool support in opposite directions periodically so as to distribute the winding of wire withdrawn from the bundle uniformly lengthwise of a spool carried by said support.

7. Apparatus for winding wire on a spool comprising, a normally stationary block extending through the central void of and supporting a coiled bundle of wire, a spring finger coacting with the block to control the endwise pay-off of successive convolutions of the bundle, means for

exerting a tension on the wire after it passes said spring finger, a rotary flier having a hollow trunnion through the axis of which the wire from said stationary block passes and a head carrying means for guiding the wire from the trunnion to a zone beyond the extremity of the head remote from said trunnion, a spool support movable in a line substantially axially of said trunnion to positions on both sides of said region so as to distribute the wire withdrawn from said bundle uniformly lengthwise of a spool secured fixedly to said support.

8. Apparatus for winding wire on a spool comprising, a normally stationary block extending through the central void of and supporting a coiled bundle of wire, a spring finger coacting with the block to control the pay-off of successive convolutions of the bundle, means for exerting a tension on the wire after it passes said spring finger, a rotary flier having a hollow trunnion through which the wire passes and a head carrying a plurality of grooved sheaves guiding the wire from said trunnion to a zone beyond the extremity of said head remote from said trunnion, a turret rotatable on an axis perpendicular to that of said trunnion, a plurality of supports to secure spools fixedly to said turret and adapted to be selectively aligned with said trunnion so as to accumulate separate batches of wire on respective spools carried by said supports, and means for traversing said turret in opposite directions periodically so as to distribute the winding of wire withdrawn from the bundle uniformly lengthwise of a respective selected spool carried by one of said supports.

9. Apparatus for winding wire on a spool comprising, a normally stationary block extending through the central void of and supporting a loosely coiled bundle of wire, means engaging the wire and controlling the pay-off thereof endwise from said loosely coiled bundle, a rotary flier having a hollow trunnion through the axis of which the wire from said stationary block travels and a chambered head adapted to have a spool moved into and out of nested relation therewith, means for guiding the wire from the hollow trunnion to a zone beyond the extremity of said head remote from the trunnion, a spool mounted on a support movable lengthwise into and out of the chamber in the flier head whereby the wire payed off from said bundle is uniformly distributed while being wound on said spool by the rotary motion of said flier.

10. Apparatus for winding wire on a spool, comprising means supporting a loose bundle or coil of wire, a rotary member for withdrawing wire from said supply and winding it around a spool, means engaging and controlling the pay-off of each convolution of wire endwise from said supporting means, a spool support carrying means for fixedly positioning the spool thereon, and means for traversing said spool support in opposite directions periodically so as to distribute the winding of wire withdrawn from said supply uniformly lengthwise of a spool carried by said support.

11. Apparatus for winding wire on a spool, comprising rotatably supported means for a loose bundle or coil of wire, a rotary member for withdrawing the wire from said coil and winding it around a spool, means engaging and controlling the pay-off of each convolution of wire endwise from said supporting means, a spool support carrying means for fixedly positioning a spool thereon, and means for traversing said spool support

in opposite directions so as to distribute the winding of wire withdrawn from the coil uniformly lengthwise of a spool carried by said support.

12. Apparatus for winding wire on a spool, comprising means supporting a loose bundle or coil of wire, means controlling the pay-off of wire endwise from said supporting means, a rotary member for withdrawing wire from said supply and winding it around a spool, a spool support carrying means for fixedly positioning the spool thereon, and means for traversing said spool support in opposite directions periodically so as to distribute the winding of wire withdrawn from said supply uniformly lengthwise of a spool 15 carried by said support.

13. Apparatus for winding wire on a spool, comprising means rotatably supporting a loose bundle or coil of wire, means controlling the pay-off of wire endwise from said supporting means, a rotary member for withdrawing the wire from said coil and winding it around a spool, a spool support carrying means for fixedly positioning a spool thereon, and means for traversing said spool support in opposite directions so as to distribute the winding of wire withdrawn from the coil uniformly lengthwise of a spool carried by said support.

CARL J. DENTZER.
GUY W. SHURMER.
OTTO J. VANEK.