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[54] **SEPARATOR FOR UNPROCESSED WIRE IN
REELING AND WINDING APPARATUS**
10 Claims, 2 Drawing Figs.

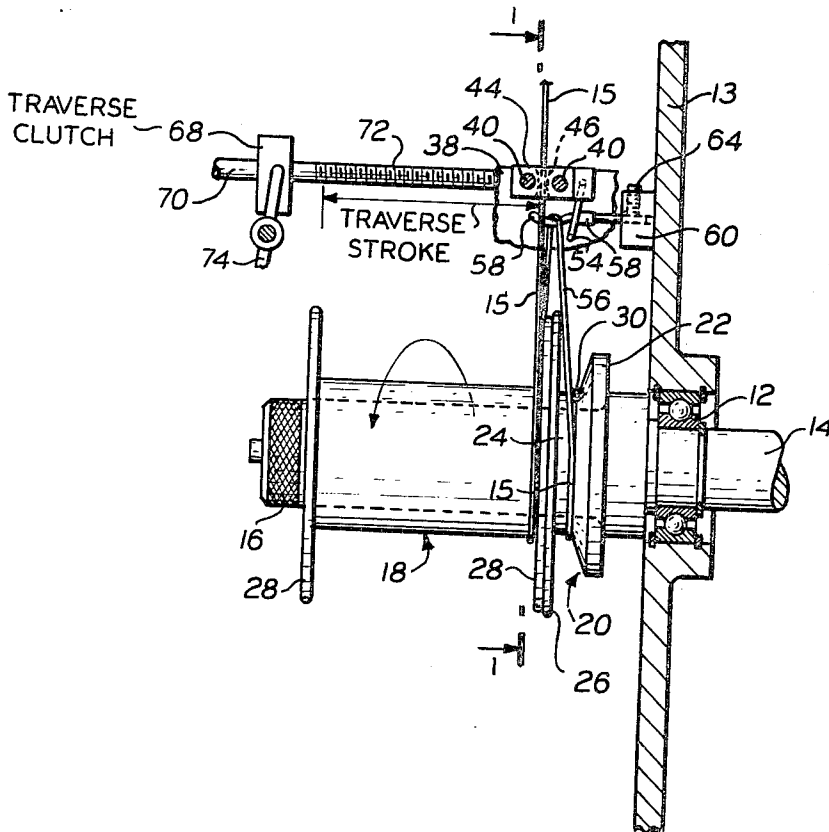
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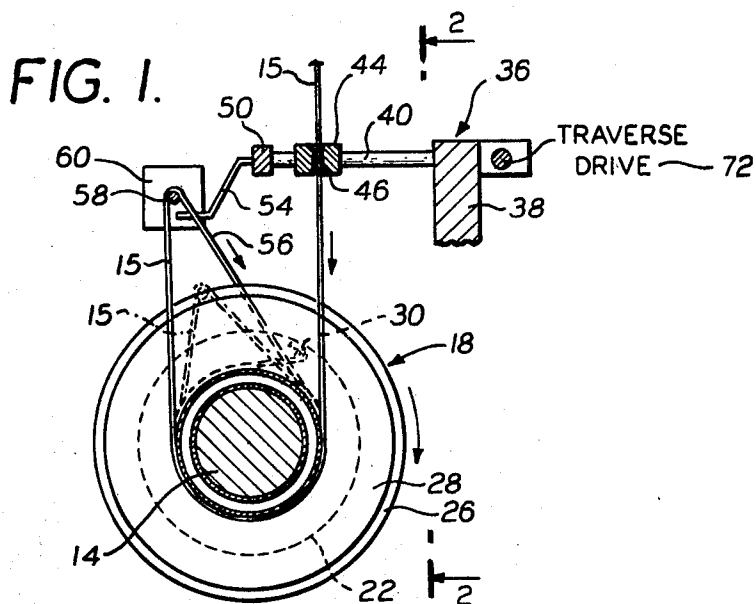
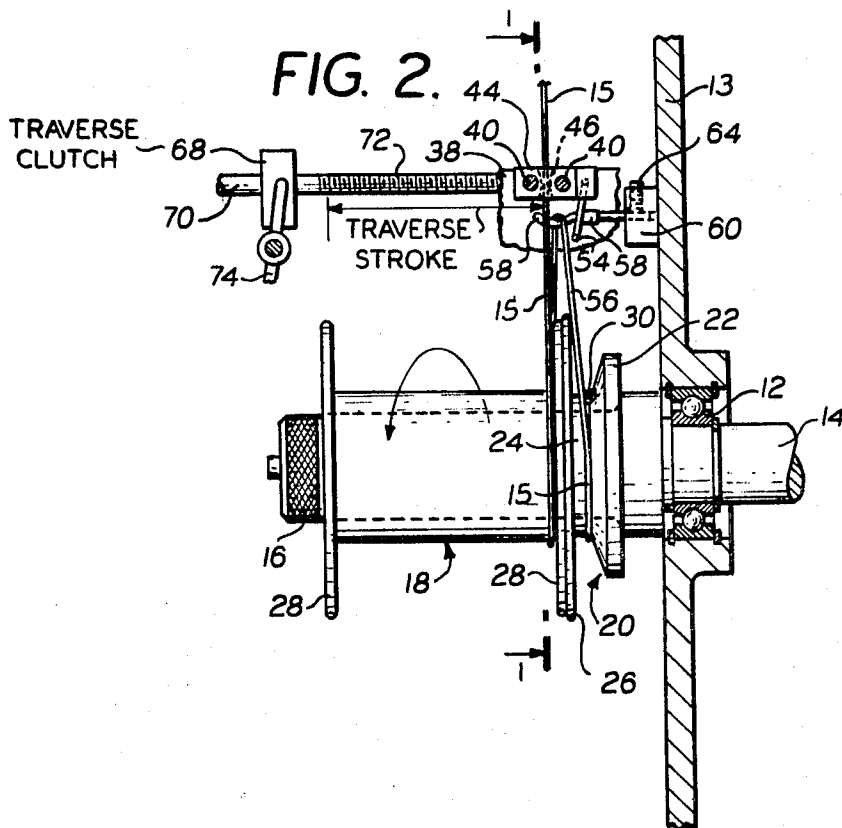
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ABSTRACT: When starting the winding of wire on a reel, the unprocessed, damaged, or unuseable end portion of a long wire is wrapped around an auxiliary reel or dummy reel adjacent to the main reel and as the reel and dummy rotate, the wrapping wire is wrapped first on the dummy and then shifted to continue its winding on the main reel. A pushoff device operated from a wire guide of the traverse of the winding machine releases a loop of wire as the transfer is made from the dummy to the reel. The pushoff, being at the traverse speed, is slow and the loop makes the apparatus suitable for use with any existing reeling machines and does not require a slack accumulator.





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SEPARATOR FOR UNPROCESSED WIRE IN REELING AND WINDING APPARATUS

BACKGROUND AND SUMMARY OF THE INVENTION

When wire coiling or reeling machines are used to wrap wire on a reel, it may be necessary to eliminate the initial end of a long wire which is unprocessed, damaged, hardened, or otherwise unsatisfactory. The first turns in wrapping the wire are, therefore, segregated from the remainder of the wire.

This invention provides an extremely simple mechanism whereby an untreated or unuseable end of wire may be segregated and readily discarded subsequent to the coiling or reeling of the remainder of the wire.

The invention is easily added to existing apparatus for coiling or reeling wire. The apparatus that changes the wire wrapping from an auxiliary or dummy reel, which accumulates the waste end, to the main reel that winds the good wire, engages the wire at the traversing speed of the apparatus instead of at about twice the winding speed, as has been usual in winding machines of the prior art. The traversing speed may be approximately 40 feet per minute whereas the winding speed may be between 5,000 and 10,000 feet per minute.

This is critical when winding very fine wire such as No. 36 B&S. This obviously contributes to a more satisfactory operation and a smaller chance of breaking the wire in the transfer operation.

At the moment of transfer, this invention makes some excess of wire available briefly. A wire accumulator upstream of the winding machine is, therefore, not necessary to avoid tensile shock to the wire at the moment of transfer from the dummy to the reel.

Other objects, features and advantages of the invention will appear or be pointed out as the description proceeds.

BRIEF DESCRIPTION OF DRAWING

In the drawing, forming a part hereof, in which like reference characters indicate corresponding parts in all the views:

FIG. 1 is a diagrammatic sectional view of wire-winding apparatus made in accordance with this invention; the section being on the line 1—1 of FIG. 2; and

FIG. 2 is a diagrammatic sectional view taken on the line 2—2 of FIG. 1.

DESCRIPTION OF PREFERRED EMBODIMENT

The drawing shows a frame 13 which houses two bearings. One of these bearings, designated by the reference character 12, is shown in FIG. 2 and the bearings support a power-driven spindle 14. At its front end the spindle 14 has an expanding arrangement actuated by a nut 16. An empty reel 18 is placed on the spindle 14 and locked in place by the nut 16.

An auxiliary reel or dummy 20 includes a back flange 22 and a barrel section 24. The barrel section 24 may be either cylindrical or tapered slightly to a smaller diameter where it meets the flange 26. The auxiliary reel or dummy 20 has a flange 26 which is slightly larger than flanges 28 at the opposite ends of the reel 18. These flanges 28 are fastened to the cylindrical portion of the reel 18 in the conventional manner. The diameter of the barrel portion of the dummy reel 20 is somewhat smaller than the diameter of the barrel portion of the reel 18.

The flange 26 is located on the spindle 14 in front of the dummy 20 and is preferably secured against rotation with respect to the spindle 14 by a pin or key, or in any other suitable manner, but is easily removable after the reel 18 has been removed from the spindle 14. A mushroom-type end catch 30, located on the back flange of the dummy 20, is used for gripping the end of a wire 15. The winding machine has a conventional traverse mechanism indicated generally in FIG. 1 by the reference character 36 and this traverse mechanism includes a traverse block 38 which moves back and forth in a direction normal to the plane of the paper in FIG. 1. Two

horizontal bars 40 extend outward from the traverse block 38 and move back and forth as a unit with the traverse block. A wire guide 44 has openings through which the bars 40 extend; and the wire guide 44 slides freely on the bars 40 to accommodate the wire guide 44 to increases in diameter of the wire wrapping on the reel 18.

The wire, designated by the reference character 15, passes through a guide opening 46 in the wire guide 44; and it is common practice to have a diamond or other hard material used in the opening 46 to resist wear of the guide by continued passage of the wire 15.

At the end of the bars 40 remote from the traverse block 38 there is another block 50 secured to the bars 40 and a pushoff pin 54 projects from the block 50 to a location behind a run 56 of the wire 15 where the wire travels downward from a deflector 58 carried by a stationary block 60 attached to the frame 13, as shown in FIG. 2.

The deflector 58 is preferably made of hard material, such as ceramic, and is shaped like a shallow hook with a rounded tip, as best shown in FIG. 2. The deflector 58 is adjustable axially and angularly and is held in any desired adjusted position by a set screw 64 threaded into the block 60 in position to engage the end portion of the deflector which extends into the block 60.

Before starting a winding operation, the traverse 36 is positioned at the back end of its stroke, i.e., toward the right in FIG. 2. This operation is performed manually or by means of an automatic reset, depending upon the design of the particular winding machine.

The wire 15, which is supplied from a previous operation such as a drawing machine, goes over guide means and is then fed in a generally vertical direction down through the wire guide 44, as shown in FIGS. 1 and 2. The wire 15 proceeds downwardly at a location between the flanges 28 of the reel 18 and adjacent to the back flange 28 or the empty reel, as shown in FIG. 2. The wire 15 is then wrapped about a part of the circumference of the cylindrical portion of the reel 18, and in the construction illustrated the wire passes around approximately one half of the circumference of the reel 18, and it is then led up beyond the circumference of the flange 28 and around the deflector 58. The wire 15 is then directed down and to the right in FIG. 1 behind the flange 26 and is wrapped around the barrel or cylindrical portion of the dummy reel 20 and attached to the catch 30.

The wire 15 is made taut and the reeling machine is ready for running. When the machine is started, the wire 15 will wrap on the dummy 20 only and will travel around the rotating cylindrical portion of the reel 18 and slide over the smooth deflector 58.

The diameter of the cylindrical portion of the dummy reel 20 is slightly smaller than that of the main reel 18; and therefore the peripheral speed of the main reel exceeds slightly the wire speed. The speeds approach one another as the wire builds up on the dummy 20. The slip of the wire on the main reel reduces the drag of the wire sliding over the deflector 58 and facilitates the pushing off of the wire from the deflector 58.

The transfer of the wire from wrapping on the dummy to wrapping on the reel 18 is effected by the traverse 36. When the winding machine is first started in operation, the start of the motion of the traverse 36 is delayed until the wiremaking process is up to speed and processed wire is reaching the reel. When the traverse operation starts, the block 38 moves the bars 40 in a direction parallel to the axis of rotation of the spindle 14 so that the block 50 and the pushoff pin 54 moves toward the left in FIG. 2. The pushoff pin 54 engages the run 56 of the wire 15 which is coming off the deflector 58 and pushes the wire off the end of the deflector 58.

Means for delaying the start of the operation of the traverse 36 is illustrated diagrammatically in the drawing as a clutch 68 between a shaft 70, motor driven in timed relation with the spindle 14, and a traverse drive screw 72. The clutch 68 has a control 74 which is used as means for delaying the start of the traverse when beginning a winding operation.

The loose loop of wire created by the displacement of the wire from the deflector 58 is taken up promptly by an accumulator along the path of the wire upstream from the winding machine if an accumulator is used, or by momentary reduction in the speed of the wire which is compatible with the drawing machine.

This loop is promptly drawn taut against the flange 26, as shown in phantom in FIG. 1. At this time the wire 15 has approximately one half of a wrap around the cylindrical portion of the reel 18, and thus the slight drag created by the loop over the flange will be amplified according to the flat belt theory, similar to the operation of a capstan. This is expressed by the equation:

$$S_2/S_1 = e^{f\alpha} > 1$$

where

$$e = 2.7182 +$$

$$S_1, S_2 = \text{tensions}$$

$$f = \text{coefficient of friction}$$

$$\alpha = \text{angle of wrap}$$

According to this principle, even though there is no positive catch for the wire as on some existing arrangements, the wire loop does not slide back over the flange, but starts wrapping inside the reel.

The wrapping of wire on the reel 18 takes place in even layers since the traverse reciprocates evenly through its full stroke equal to the inside width of the reel 18 in accordance with conventional practice. When the reel is fully wrapped, the machine can be stopped manually or automatically, depending upon the design, at which time the full reel is removed from the spindle 14 by operating the nut to unlock the mechanism which holds the reel 18 on the spindle. After the reel 18 is removed, the flange 26 is removed and this exposes the side of the wire accumulation on the dummy 20. This unuseable wire is removed by either cutting it or sliding it off. After thus removing the wire from the dummy 20, the flange 26 is replaced and the machine is ready to receive another empty reel for the next winding operation.

The preferred embodiment of the invention has been illustrated and described and the invention is defined in the appended claims.

What is claimed is:

1. Apparatus for segregating a leading end portion of a wire when wrapping the wire by means of a reeling machine including, in combination, a main reel having a cylindrical portion that fits around a spindle of the reeling machine, an auxiliary reel for location rearward of the main reel on the spindle, a wire deflector at a relatively fixed location with respect to the rotating reels and radially spaced from the reels and a location radially outward from the rearward end of the main reel in position to act as a substantially stationary guide for the wire that passes across a part of the core of the main reel and that then passes out and around the deflector and then back to the auxiliary reel beyond and rearward end of the main reel, means for securing the end of the wire to the auxiliary reel to cause the wire to wrap thereon, a traverse for guiding wire as it wraps on the main reel, and a pusher carried by the traverse and in position for displacing the wire from the deflector whereby further wrapping of the wire is on the main reel.

2. The apparatus described in claim 1 characterized by the main reel having flanges at both ends of the cylindrical portion, and the deflector being spaced outward beyond the periphery of the rearward flange of the main reel, the deflector being in position to deflect a length of run of the wire that extends from a location adjacent the cylindrical portion of the main reel and outward beyond and over the rearward flange of the main reel and then inward to the auxiliary reel on which the end portion of the wire wraps.

3. The apparatus described in claim 2 characterized by the deflector extending axially in a direction parallel to the axis of rotation of the reels, and the pusher for displacing wire from the deflector being in position to displace the wire beyond the end of the deflector and toward the front of the main reel.

4. The apparatus described in claim 1 characterized by the traverse being supported for movement back and forth along the length of the main reel, said traverse including a guide through which the wire travels on its way to the main reel, the wire deflector extending parallel to the direction of movement of the traverse, and the pusher carried by the traverse being in position to push the wire off a forward end of the deflector as the traverse moves the guide into position to supply wire to the cylindrical portion of the main reel.

5. The apparatus described in claim 4 characterized by the guide and the deflector being on the same side of the main reel, said main reel having flanges at both ends, the wire passing from the guide around substantially one half of the circumference of the cylindrical portion of the main reel between the flanges of the main reel and then to the deflector outward from the periphery of the rearward flange of the main reel and across that flange to the auxiliary reel on which the end portion of the wire is wrapped.

6. The apparatus described in claim 5 characterized by a spindle for rotating the reels, a fixed frame with bearings by which the spindle is supported, the deflector being a rod having a circular portion around which the wire passes to change the direction of travel of the wire, means connecting the deflector with the fixed frame of the apparatus, said deflector extending forward across the auxiliary reel and terminating in an end over the rearward portion of the main reel, and means for effecting adjustment of the pusher and the forward end of the deflector with respect to one another to change the position of the traverse at which the pusher displaces the wire from the deflector.

7. The apparatus described in claim 6 characterized by said means for effecting adjustment being a support on the frame and into which the deflector extends, the deflector being movable axially and angularly in the support, and releaseable means for locking the deflector in any selected adjusted position.

8. Wire reeling apparatus including a main reel and an auxiliary reel adjacent to one another and rotatable about a common axis, means for supplying wire to the reels including a wire guide and a traverse that moves the guide back and forth axially for applying the wire on a cylindrical portion of the main reel in overlapping layers, a deflector for deflecting a run of wire from the main reel over the rearward flange thereof to the auxiliary reel when the traverse is at the rearward end of its stroke, and means operated by the traverse for displacing the wire from the deflector.

9. The wire reeling apparatus described in claim 8 characterized by means for delaying the start of the operation of the traverse when beginning a wire winding operation.

10. The wire reeling apparatus described in claim 8 characterized by the main reel having a cylinder surface on which the wire is to be wound, and the wire passing from the wire guide around at least a part of the circumference of said cylinder surface, and said cylinder surface being of larger diameter than a cylinder surface of the auxiliary reel on which the end portion of the wire wraps so that the peripheral speed of the cylinder surface of the main reel is greater than the wire speed when starting the operation of the apparatus, the difference of diameter of the main reel and the auxiliary reel being approximately equal to several layers of wire whereby said peripheral speed and said wire speed approach one another as wire winds on the auxiliary reel.

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