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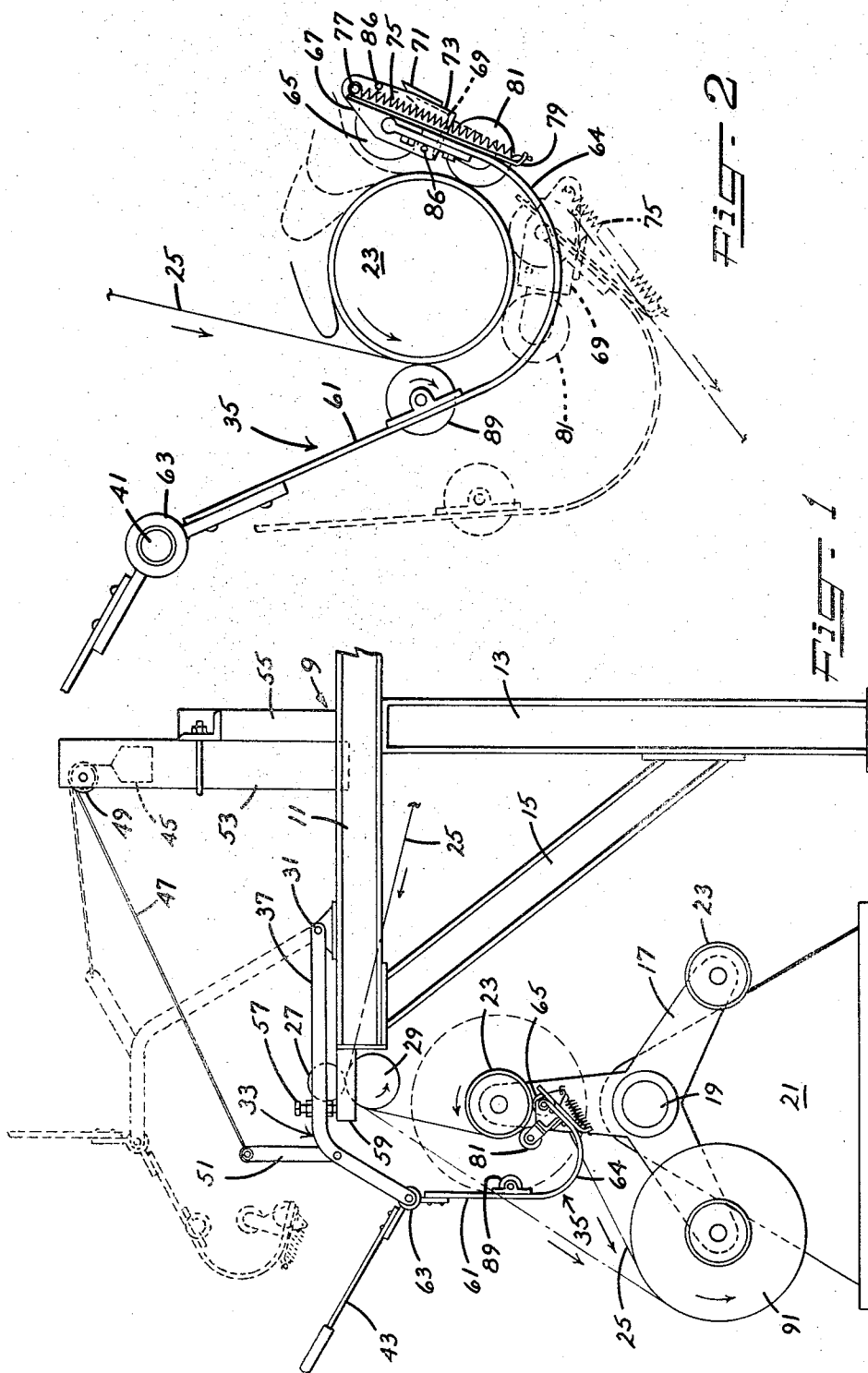
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MECHANICAL ROLL CHANGER

Filed Feb. 26, 1957

2 Sheets-Sheet 1



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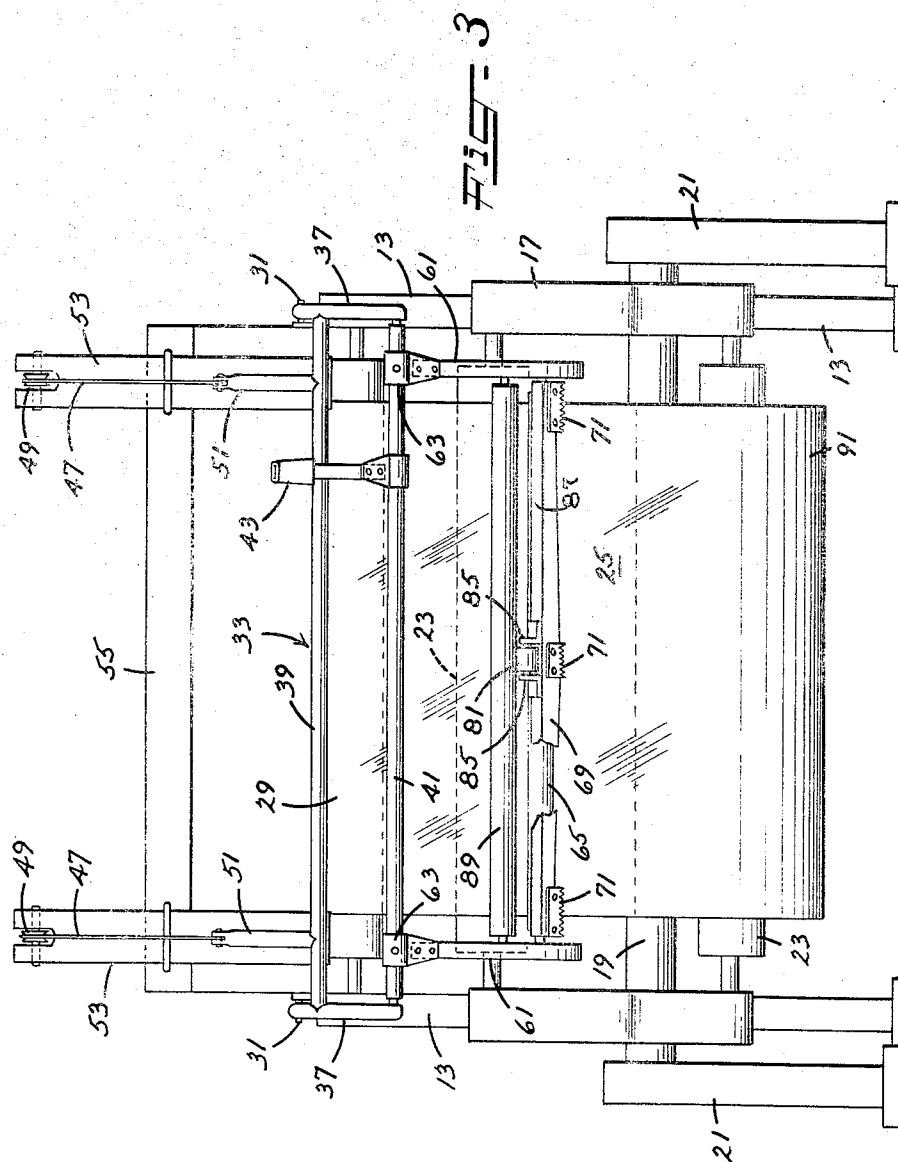
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MECHANICAL ROLL CHANGER

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9 Claims. (Cl. 242—56)

The invention relates to web winding, and particularly to an apparatus for severing a continuous traveling web from a fully wound roll and transferring the leading end thereof to an empty roll core without interruption of the winding operation.

In the winding of web materials, continued efforts have been made to obtain a product of uniform character with a minimum of waste. Heretofore, starting of a traveling web onto a cylindrical roll core has been effected by bunching the web itself onto and around the roll core. This procedure not only involves a considerable waste of web material, but the formation of an eccentric roll which, when rotated, induces a varying or pulsating tension on the web itself. In the manufacture of regenerated cellulose, for example, the conventional web winding practices result in each wound roll having many feet of wrinkled and distorted film which, because of its appearance, is unsalable. While many proposals have been made to remedy the objections in the existing web winding methods, none have apparently proved satisfactory as evidenced by the continued and prevailing use of the time-honored manual procedures. Accordingly, it is a primary object of the invention to provide a generally new or improved and more satisfactory mechanism for severing and transferring a traveling web from a full roll to an empty roll core.

Another object is the provision of improved means for severing a continuous web from a fully wound roll and directing the leading end thereof about an empty roll core, without interrupting the web delivery or substantially altering its speed or tension.

Still another object is to provide an improved device capable of urging a continuous traveling web about an empty roll core simultaneously as the web is wound onto a partially filled roll, sever the web rapidly without distorting the same, and direct its leading end into the correct position for being gripped by the empty roll core as it is rotated.

A further object is the provision of a safe and more satisfactory apparatus for effecting the start of a continuous traveling web material onto a roll core with a minimum of web bunching at the roll core.

These and other objects and advantages of the invention will be apparent from the following description and accompanying drawing in which:

Figure 1 is a side view of a portion of a winding machine illustrating the apparatus of the present invention at an intermediate stage of its operation;

Figure 2 is an enlarged side view of a portion of the structure shown in Figure 1, illustrating the device of the present invention at the end of its web severing and transfer movement; and

Figure 3 is a front view of the structure shown in Figure 1.

The web severing and transfer mechanism of the present invention is designed for use with a conventional web winding apparatus having a pair of rotatable spiders

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between which a plurality of individual roll cores are adapted to be supported for independent rotation. In general, the apparatus of the present invention includes a web transfer carrier formed of a pair of laterally spaced spring arms pivotally mounted at one end for movement into embracing relationship about a roll core. As the carrier is moved toward a web traveling continuously onto a partially wound roll, a guide roll carried thereby engages with the web and urges the same into partially embracing relationship about an empty rotating web core, without interrupting the web delivery. Concomitantly, a series of cutting blades is moved into the web to sever the same, with the leading end thereof being directed further about the roll core. As the carrier approaches the end of its movement, the guide roll leaves the core surface while the leading end of the web itself is carried around the roll core by the rotary movement of the core itself.

The device of the present invention is designed for use with any suitable forming or treating apparatus from which a continuous web is discharged for winding into roll form. Thus, as illustrated in Figure 1, the character 9 denotes generally the terminal portion of such web forming or treating apparatus, including a pair of horizontal beams 11 cantilevered from the columns 13 and suitably braced as shown at 15. As with the conventional web winding machines, a roll support is provided having a pair of spaced spiders 17 fixed to a central shaft 19 carried by the bearing plates 21 and selectively rotated by any convenient means, not shown. A roll core 23 is mounted between the free ends of each pair of aligned spider arms, with conventional means, not shown, being utilized to independently rotate the cores at the speed of the traveling web 25 as they are sequentially moved into the uppermost position shown in Figure 1, and at a reduced speed as they approach a fully wound condition and are rotated into the position shown at the left of Figure 1. To maintain the web 25 within its desired path, the web is passed between a pair of co-operating pinch or guide rolls 27 and 29 intermediate its travel from the apparatus 9 to the roll core 23.

The web severing and transfer mechanism of the present invention is pivoted at 31 to the apparatus 9 for movement as a unit between its broken and solid line positions shown in Figure 1, and includes a pivot frame 33 and a carrier 35. The pivot frame 33 is formed of a pair of side bars 37 which are interconnected by a crossbar 39 and pivotally mounted to the beams 11. The side bars 37 are angled in a downward direction, as viewed in Figure 1, to correctly position the carrier 35 with respect to the uppermost core 23 as hereinafter described, and rotatably support an elongated operating shaft 41 to which the carrier itself and an operating handle 43 are rigidly fixed. In its inoperative position, the frame and carrier unit is maintained in an elevated position by the counterbalancing weights 45 fixed to the ends of the cables 47, which in turn are trained over the pulleys 49 and secured to the ends of the pivot frame extensions 51. The pulleys 49 are carried at the upper ends of the tubes 53 which are clamped to the support frame 55 and serve as protective housings for the counterbalancing weights 45. As seen in Figure 1, the side bars 37 are provided with adjusting screws 57 which are adapted for engagement with the beam extensions 59 and limit the downward movement of the frame 33.

The carrier 35, as best seen in Figures 1 and 2, includes a pair of laterally spaced and aligned spring arms 61, each being fixed at 63 to the operating shaft 41. The opposite ends of the spring arms 61 are each provided with a return bend to form an arcuate portion

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64 which assumes a position concentric with the roll core 23 when the carrier is urged into its location as shown in Figure 2. An elongated guide roll 65 extends between and is rotatably mounted on the free ends of the spring arms 61. Mounted for independent pivotal movement on the shaft or trunnions of the roller 65 are a pair of brackets 67 between which is supported an angle-shaped cutter bar 69. A series of serrated cutting blades 71 are adjustably fixed to the leading edge of the cutter bar flange 73, preferably with the outermost or edge cutting blades set to initiate web severance as hereafter described. In its inoperative position, the cutter bar 69 is resiliently urged into position as shown in Figure 1, by the tension springs 75, each connected to an adjacent bracket and spring arm by the pins 77 and holders 79. It will be noted that in this position, the cutting blades 71 are well removed from the web path and thus prevent unintentional cutting of the same. During use, the cutter bar 71 is progressively urged in a counterclockwise direction as viewed in Figures 1 and 2, against the resilient action of the springs 75, as a result of a kicker roll 81 engaging with the periphery of the roll core. As best seen in Figure 3, the kicker roll 81 is rotatably carried between a pair of spaced bearing plates 85 fixed to the central portion of the cutter bar flange 87. To restrict turning movement of the cutter bar 69 between its extreme positions, the cutter bar brackets 67 are provided with limit pins 86. A second elongated roll 89 is also rotatably carried between the spring arms 61 for maintaining the traveling web snugly against the roll core during the severing and transfer procedure described below.

As heretofore mentioned, the web severing and transfer mechanism is retained in an elevated position, as indicated by the broken lines in Figure 1, by the counterbalancing weights 45. When the roll of web material being wound approaches its desired size, the operator effects rotation of the shaft 19, thereby moving the spiders counterclockwise, as viewed in Figure 1, to lower the roll 91 nearing completion and to position an empty core 23 at the uppermost point of its circular travel about the shaft 19. During this relocation of roll cores, it will be understood that the web delivery continues uninterrupted and that the speed and tension of the web remain unchanged. Further, it will be noted that the roll 91 is rotated at a reduced speed during its relocation to compensate for the increase in travel of the web, and that the uppermost empty core 23 is independently rotated until it attains the same speed as the traveling web before any web material is wound thereon.

At this stage, the operator pulls downwardly on the handle 43 to lower the frame 33 into engagement with the beam extensions 59 and to urge the carrier 35 in a counterclockwise direction, as seen in Figure 1, toward the continuously traveling web. With this movement of the carrier 35, the guide roll 65 engages with the web 25 and progressively urges the same partially about the periphery of the uppermost roll core 23. It will be here noted that the core 23 rotates in the same direction and at the speed of the traveling web 25, and that roll 65 is turned freely on its axis by the movement of the web itself. Thus, the web travel to roll 91 continues uninterrupted, notwithstanding the action of the carrier 35 in embracing the web 25 about approximately one-half of the periphery of the core 23. As shown in Figure 2, the roll 65 travels along the periphery of the core 23 to insure proper web contact therewith, and therefore the carrier arms 61 are formed of spring steel, suitably tempered to enable the same to be repeatedly flexed as the carrier is moved between its broken and solid line positions.

Concomitantly with the embracing of the traveling web 25 about the core 23 by the roll 65, the kicker roll 81 engages with the core periphery and effects a counterclockwise turning of the cutter bar 69 progres-

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sively with the movement of the carrier 35 toward its solid line position shown in Figure 2. As the carrier approaches its broken line position shown in Figure 2, the cutter bar 69 has been turned sufficiently to cause the blades 71 to contact and sever the web 25. The leading end of the now severed web is carried upwardly about the core 23 with the continued movement of the carrier 35 to its terminal position shown in Figure 2. Just prior to assuming this terminal position, however, it will be noted that the roll 89 contacts the web and maintains the same engaged with the core surface, while the roll 65 leaves the core periphery and stops turning to prevent the web leading end from winding thereon. It will thus be evident that the web leading end will be carried about the core 23 by the rotary movement of the core itself with little or no bunching of the web occurring. Preferably, the handle 43 is also formed of tempered spring steel to absorb any excessive forces which may be applied to mechanism by the operator.

After a sufficient number of turns of the web 25 have been accumulated on the newly started roll, the handle 43 is merely elevated to withdraw the carrier 35 from its terminal position and allow both the frame 33 and carrier 35 to assume its inoperative position as shown by broken lines in Figure 1. During this withdrawal movement, it will be apparent that the rolls 65 and 81 merely rotate on the surface of the web wound onto the core 23 without disturbing its delivery, speed or tension.

It is seen from the above description that the objects of the invention are well fulfilled by the apparatus described. The description is intended to be illustrative only and it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. In apparatus for severing and transferring a traveling continuous web from a roll being wound to an empty rapidly rotating core upon which a new roll is to be started including means for shifting the roll being wound from a winding position to a position for unloading and for simultaneously shifting the rotating empty core to a winding position, the improvement comprising a carrier, means for moving the carrier toward the traveling web and into a terminal position wherein the carrier partially encircles the empty core, guide means supported on the leading end of said carrier for urging the traveling web partially about the empty core as the carrier is moved into its terminal position, and cutting means supported on said carrier for severing the traveling web intermediate said guide means and the roll being wound as the carrier approaches its terminal position, said cutting means including a cutter bar pivotally mounted on said carrier and means supported by said cutter bar and engaging with the empty roll core for pivoting said cutter bar into the traveling web as the carrier approaches its terminal position whereby said guide means positions the leading end of said severed traveling web adjacent the rotating empty core for winding thereon.

2. In apparatus for severing and transferring a traveling continuous web from a roll being wound to an empty rapidly rotating core upon which a new roll is to be started including means for shifting the roll being wound from a winding position to a position for unloading and for simultaneously shifting the rotating empty core to a winding position, the improvement comprising a carrier mounted for pivotal movement about an axis parallel to the empty core, said carrier having a resilient arcuate portion adapted to be flexed into partial concentric encirclement about said empty core as said carrier is pivoted about its axis toward the traveling web and into a terminal position, a guide roll rotatably supported on the leading end of said carrier for urging the traveling web and flexing the resilient arcuate por-

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tion of the carrier into partial encirclement about the empty core as the carrier is moved into its terminal position, a cutter bar pivotally mounted on said carrier, a kicker roll rotatably carried by said cutter bar, said kicker roll engaging with the empty core as the carrier is moved toward its terminal position for progressively pivoting said cutter bar toward and into the traveling web to sever the same intermediate said guide roll and the roll being wound whereby said guide roll positions the leading end of the severed traveling web adjacent to the rotating empty core for winding thereon as the carrier is moved into a concentric position about the empty core.

3. The improvement as defined in claim 2 further including yieldable means maintaining said kicker roll engaged with the empty core.

4. In apparatus for severing and transferring a traveling continuous web from a roll being wound to an empty rapidly rotating core upon which a new roll is to be started including means for shifting the roll being wound from a winding position to a position for unloading and for simultaneously shifting the rotating empty core to a winding position, the improvement comprising a carrier including a pair of laterally spaced arms mounted for pivotal movement as a unit along an axis substantially parallel to the empty core, said arms each having a resilient arcuate end portion for partially and concentrically encircling more than a 90° arc of the empty core periphery as the carrier is moved toward the traveling web and into a terminal position, a guide roll extending between and rotatably mounted on the free ends of the arcuate end portions of said arms, said guide roll urging the traveling web partially about the empty core and assisting in flexing the resilient arcuate end portions as the carrier is moved toward its terminal position, a cutter bar, means mounting said cutter bar on said carrier for pivotal movement about the axis of said guide roll, a kicker roll rotatably carried by said cutter bar, and yieldable means maintaining said kicker roll engaged with the periphery of the empty core, said kicker roll progressively pivoting said cutter bar toward and into the traveling web as the carrier is pivoted to thereby effect web severance intermediate said guide roll and the roll being wound before the carrier reaches its terminal position, with said guide roll urging the severed end of the web into further engagement with the periphery of the empty core as the carrier is moved toward and into its terminal position.

5. The improvement as defined in claim 4 wherein the free ends of said carrier arms extend along planes substantially parallel to planes extending tangent to the empty core periphery whereby the guide roll is disengaged from the periphery of the empty core when the carrier is in its terminal position.

6. In apparatus for severing and transferring a travel-

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ing continuous web from a roll being wound to an empty rapidly rotating core upon which a new roll is to be started including means for shifting the roll being wound from a winding position to a position for unloading and for simultaneously shifting the rotating empty core to a winding position, the improvement comprising a frame having one end pivotally connected to a fixed structure, a shaft rotatably connected to the opposite end of said frame and extending substantially parallel to the empty core, a carrier fixed to said shaft and having a resilient arcuate portion adapted to be flexed into partial concentric encirclement about said empty core periphery as said shaft is turned to move said carrier toward the traveling web and into a terminal position, a guide roll rotatably supported on the leading end of said resilient arcuate portion urging the traveling web and flexing the resilient arcuate portion of the carrier into partial encirclement about the empty core as the carrier is moved into its terminal position, a cutter bar pivotally mounted on said carrier, a kicker roll rotatably carried by said cutter bar, resilient means maintaining the kicker roll engaged with the periphery of the empty core, said kicker roll progressively pivoting said cutter bar toward and into the traveling web as the carrier is moved toward its terminal position to effect severance of the web intermediate said guide roll and roll being wound, and a counterbalancing weight reacting on said frame for maintaining the frame and carrier in an elevated inoperative position during roll winding.

7. The improvement as defined in claim 6 wherein said carrier includes a pair of laterally spaced spring arms each being fixed at one end to said shaft and having a reverse bent portion at its opposite end, said reverse bent portions terminating with free ends extending along a plane substantially tangent to the reverse bent portions to permit said guide roll to be disengaged from the periphery of the empty core when said carrier is in its terminal position.

8. The improvement as defined in claim 7 further including a second guide roll extending between and rotatably mounted to said arms intermediate said reverse bent portions and said shaft.

9. The improvement as defined in claim 6 wherein said shaft is turned by a handle formed of resilient and flexible material.

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