Dec. 21, 1965 J. D. CONTI 3,224,698

WINDING APPARATUS

Filed May 28, 1964

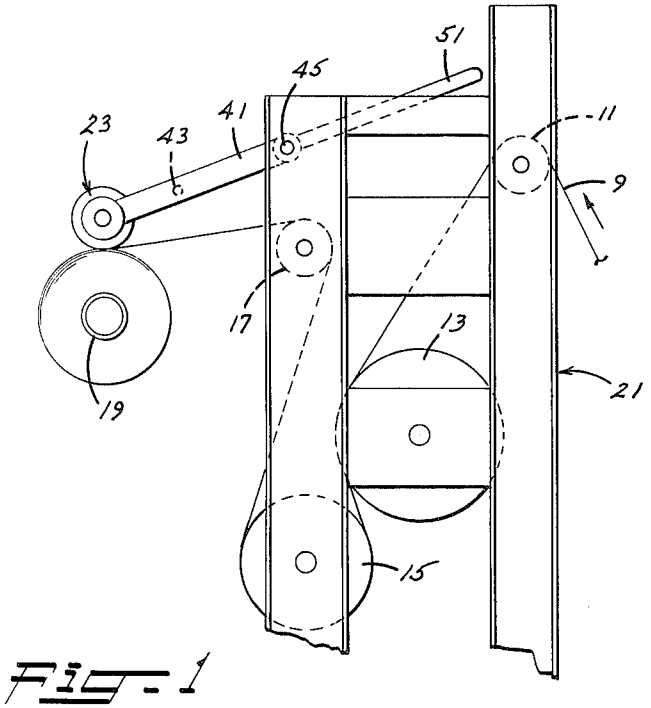

Fig. 1

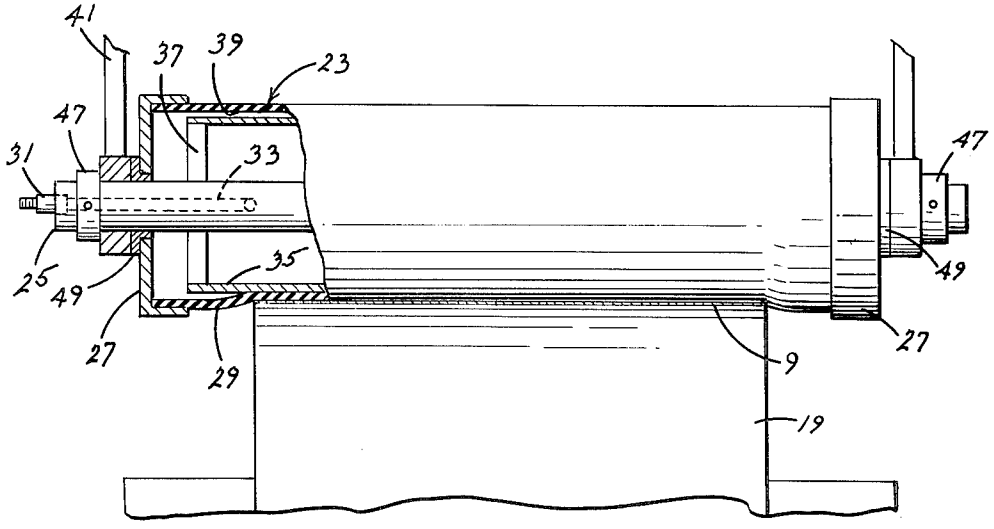

Fig. 2

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WINDING APPARATUS

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This invention relates to winding of webs and more particularly to an improved apparatus for guiding the longitudinal edges of a thin web during the winding thereof and for minimizing lateral movement between layers of the web which have been wound.

Various proposals have been made for controlling the tendency for thin webs to telescope as they are being wound into roll form. Such proposals may involve the use of web edge detectors which effect lateral movement of roll supporting carriages, variations in web tension patterns, limitations on the size or diameter of the wound roll, etc. None of these or other similar measures have been entirely satisfactory from the standpoint of operating efficiency, economy and/or the resulting product. Accordingly, a primary object of this invention is to provide a generally new or improved and more satisfactory web winding apparatus.

Another object is the provision of an apparatus designed to minimize telescoping of thin webs as they are being wound in roll form.

Still another object is the provision of apparatus for guiding the edges and minimizing lateral movement of a thin web as it is being wound upon itself.

Still further objects will appear from the following description.

These objects are accomplished in accordance with the present invention by an apparatus in which a resilient, inflated follower roll is employed for guiding the longitudinal edges of a thin web as it is being wound in roll form. More particularly, the follower roll includes a shaft and a thin-walled sleeve or tubing which extends between a pair of fixed end plates. The thin-walled tubing is formed of a highly resilient rubber or like material and is adapted to be inflated to a desired pressure by air or other gas which is delivered through an opening in the roll shaft. A rigid tube having an outside diameter which is slightly less than the inside diameter of the thin-walled resilient sleeve, is fixed to the roll shaft and serves to prevent the follower roll sleeve from bowing excessively when it is pressed snugly against the wound roll.

A pair of pivot arms support the follower roll against the web roll which is being wound and permit the follower roll to move away from the axis of the wound roll as it iincreases in diameter. The follower roll extends across the entire width and beyond the longitudinal edges of the thin web as such web is being wound upon itself in roll form. The supporting arms are weighted or otherwise actuated so as to urge the follower roll against the web with sufficient force as to have the resilient sleeve deform and, in effect, extend over and embrace side portions of the wound roll. In this manner, the distorted portions of the resilient sleeve guide the longitudinal edges of the advancing web and prevent the same from moving laterally as it is wound upon itself in roll form.

In the drawing, FIGURE 1 is a side view of a portion of a web winding apparatus which incorporates the improved follower roll of the invention; and

FIGURE 2 is a front view on an enlarged scale of a portion of the apparatus shown in FIGURE 1.

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Referring to the drawing a thin web 9 which is to be wound upon itself is advanced from any suitable apparatus such as a coater, printing apparatus, etc., passed over a series of tension rolls 11, 13, 15 and 17 and then collected on a core 19 which is rotated by a conventional means, not shown. The tension rolls 11, 13, 15 and 17 are rotatably supported by the fixed frame members 21 which form a part of any known winding apparatus.

The follower roll of the present invention is indicated generally by the character 23 and includes a shaft 25, a pair of rigid annular end plates 27 and a thin-walled sleeve or tubing 29 which extends between and is fixed to the end plates 27. The sleeve 29 is formed of a soft, highly resilient rubber or like material and is adapted to be inflated with air or other gas delivered through a valve 31 and a passage 33 formed in the shaft 25. A rigid tube 35 is fixed to the inner shaft 25 by plates 37 which are of open construction so as to permit the contained gas to move freely within the follower roll. The outside diameter of the rigid tube 35 is slightly smaller than the inside diameter of the sleeve 29 so that a narrower space 39 normally exists between these members.

The follower roll 23 is supported between the ends of a pair of arms 41 which are interconnected by a tie rod 43 and are pivoted at 45 to the fixed frame members 21. As shown in FIGURE 2, the arms 41 are each attached to the follower roll shaft 25 by bearings 47, with a washer or spacer 49 being interposed between each of the arms 41 and the adjacent end plate 27 of the follower roll. The portions 51 of the support arms 41 which project beyond the pivots 45 permit the follower roll 23 to be easily lifted away from the roll of web material which is being wound, as for example during initial lacing operations.

In use, the follower roll 23 is inflated with air or other gas and permitted to rest upon the web roll as shown in FIGURE 1. Under the weight of the follower roll and the portions of the arms 41 to which such roll is connected, the portion of the resilient sleeve 29 which is in direct engagement with the web roll is deformed or flattened, as shown in FIGURE 2, until it engages with the rigid tube 35. It will be noted that in this condition the portions of the sleeve 29 which extend beyond the edges of the web fold over and, in effect, embrace portions of the roll sides. If desired, the follower roll may be urged more snugly against the wound web under a positive pressure, as by conventional hydraulic means.

As a result of the action of the follower roll, the longitudinal edges of the thin web which is being wound are properly guided and maintained aligned with the edges of that portion of the web which is already wound on the roll core. More important, the projection of the follower roll sleeve over and onto the sides of the wound roll stabilize the same by preventing the wound layer of the web from shifting laterally and thereby causing the roll to telescope. Furthermore, the force of the follower roll assists in providing a tight web roll.

It will be noted that the rigid tube 35 of the follower roll minimizes the degree of deformation of the roll sleeve 29 and prevents bowing of the follower roll. Further, it will be apparent that in view of the gas contained within the follower roll the sleeve will engage with the web roll substantially along its entire length even if such web roll is not of uniform diameter and contains undulations and/or other surface deformities.

It is to be understood that changes and variations may

be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A winding apparatus including a core on which a web is wound into a roll, means for guiding the web toward and onto said core, an inflatable follower roll, having a shaft, a pair of end plates, a sleeve formed of soft and highly resilient material extending between and secured to said end plates, and means for inflating said sleeve, said sleeve being longer than the width of the web which is being wound, and means for urging said follower roll against the surface of the web roll so that portions of the inflated follower roll sleeve project over and onto the sides of the web roll.

2. Apparatus as defined in claim 2 further including a rigid tube positioned within said sleeve for preventing

bowing of said follower roll sleeve when pressure is applied to its surface, said tube having an outside diameter slightly less than the inside diameter of said sleeve.

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