United States Patent

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[54] WINDING SHAFT FOR ROLL-CUTTING MACHINES

4 Claims, 3 Drawing Figs.

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[50] Field of Search 242/56.2, 56.9, 46.2, 46.4, 68.2, 180

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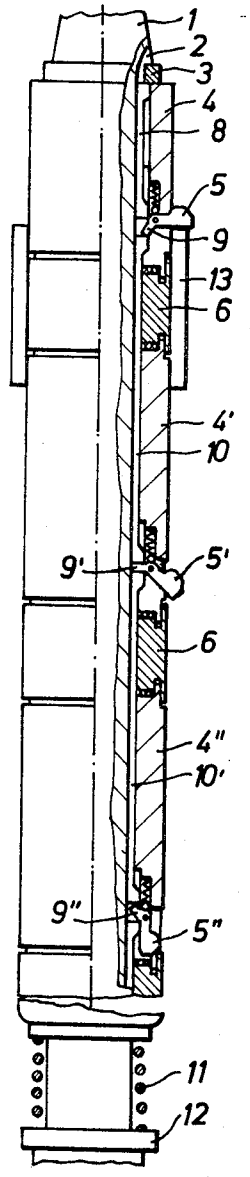
ABSTRACT: In the winding shaft for roll-cutting machines are provided stops which are pivotal about pivots in a longitudinal groove. The stops have a rest position in which they are disposed inside the longitudinal groove. Additionally they are adapted to pivot into an operating position in which they are perpendicular to the winding shaft axis. An object of this invention is to provide a winding shaft on which winding tubes can be so positioned that they are in exact alignment with separate webs or strips produced in the roll-cutting machine.



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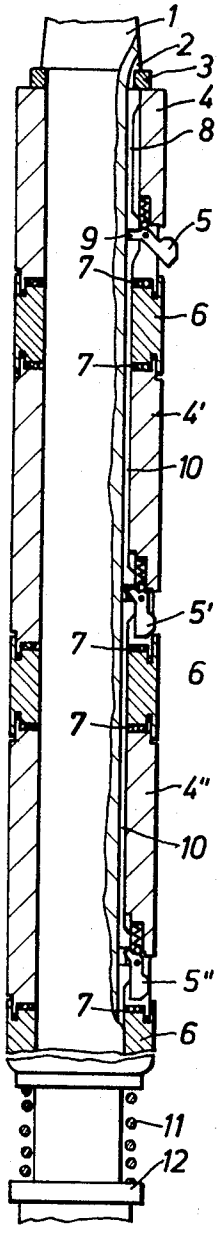

FIG. 1

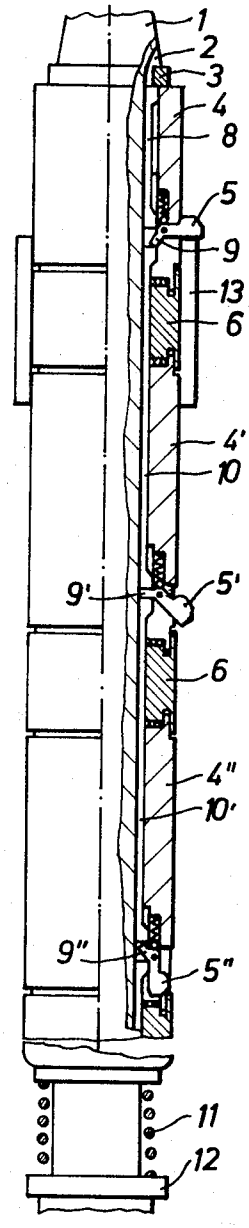

FIG. 2

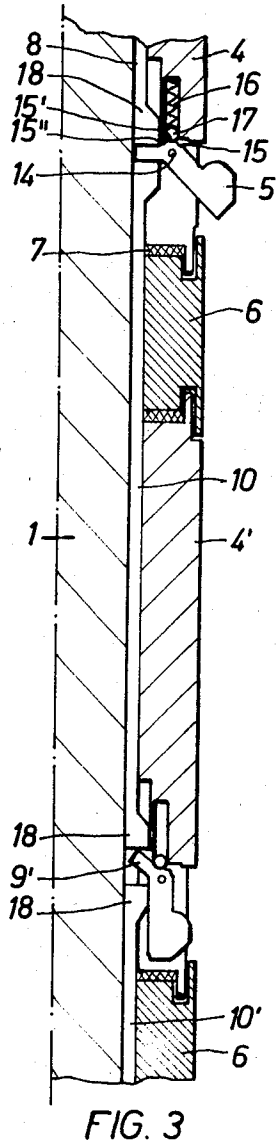

FIG. 3

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WINDING SHAFT FOR ROLL-CUTTING MACHINES

The present invention relates to a winding shaft for roll-cutting machines.

An object of the present invention is to provide a winding shaft on which winding tubes can be so positioned that they are in exact alignment with the separate webs or strips produced in the roll-cutting machine. It is only in this way that rolls can be obtained whose packages are not out of alignment with the winding tube.

It is known to effect the positioning of the winding tubes on a winding shaft by means of spacer elements. In this arrangement, a winding tube and a spacer element are pushed alternately on to the winding shaft. The winding shaft in this case is provided with a stop in alignment with the outermost web. A disadvantage with this procedure is that, before each winding operation, the spacer elements have to be pushed on to the winding shaft in addition to the winding tubes and that, on completion of the winding operation, the spacer elements have to be removed, together with the completed rolls.

It is an additional disadvantage that an accurate positioning is only achieved when the winding tubes have exactly the width of the webs to be wound and the spacer elements have exactly the width of the gaps between the webs. It is not difficult to produce spacer elements with the necessary accuracy. However, the winding tubes always show differences in dimensions, which are cumulative according to the number of winding tubes on the winding shaft. This results in the winding tubes not being in alignment with the webs which are to be wound, an effect that is particularly pronounced at the end of the winding shaft. The rolls wound on to these tubes carry a package which is therefore out of alignment with the winding tube and consequently has to be readjusted. This disadvantage does not occur when the tubes can be accurately positioned.

A positioning of the winding tubes on the winding shaft so as to be independent of the tolerances of the winding tubes is achieved according to the invention by having pivotal stops provided in a longitudinal groove of the winding shaft, the said stops having a rest position in which they are disposed inside the longitudinal groove and being adapted to be swung into an operating position in which they are perpendicular to the axis of the winding shaft.

The result thereby obtained is that each winding tube, because it has its own stop associated with it, can be positioned in accurate alignment, any misalignment of the package being thereby avoided. The position of the stops in the rest position inside the longitudinal groove is necessary so that the winding tubes can be slid on the winding shaft up to the stops associated with them and over the stops situated before them.

In one advantageous embodiment of the winding shaft according to the invention, the stops are provided with setting levers, which include an angle of 135° with the stop surfaces. A pushrod is provided in each case between the setting levers of neighboring stops.

By having the stops constructed in the form of toggle levers, the abutment surface of the first stop is initially disposed at 45° to the longitudinal axis of the winding shaft. When the winding tube is pushed on, the stop is pivoted under the sliding pressure, until it bears against an abutment element which is provided. In this position, the abutment or bearing surface is perpendicular to the axis of the winding shaft. With the pivotal movement, the setting lever of the stop slides the push rod in the direction opposite to that in which the winding tube is pushed on, whereby the next stop is pivoted into an intermediate position. On pushing on the next winding tubes, this operation is then once again repeated.

In order to prevent the stops pivoting out of the winding shaft under their own weight, which can happen when the winding shaft is so positioned that the stops are on the underside thereof, it is proposed according to one particular embodiment of the invention to provide a detent for each stop on the winding shaft, each stop having separate catches for the rest position, the operating position and the intermediate position. The detent may consist, for example, of a spring-loaded ball, which can engage in corresponding socketlike catches on the stop, but can easily be forced back on actuating the stop.

After completing the winding operation, the fully wound rolls are removed in the direction opposite to that used when pushing on the winding tubes. The rolls may be removed individually, or in groups, or all together by gripping the roll wound on to the first tube to be pushed on and using it to push all remaining rolls in front of the first roll off the winding shaft. The stop levers are then forced back into the axially parallel position inside the winding shaft.

The essential features of the invention are now to be more fully explained by reference to a drawing. The figures show one constructional form of winding shaft by way of example, the shaft tube holders which are individually held on the shaft by friction.

In the accompanying drawings:

FIG. 1 is a view, partly in longitudinal section, of a winding shaft without winding tubes;

FIG. 2 is a view, partly in longitudinal section, of a winding shaft after pushing on a first winding tube;

FIG. 3 is a view of part of a winding shaft in longitudinal section with two stops and associated push rods.

A winding shaft body 1 has a longitudinal groove 2 and is provided with a stop ring 3. Sleeves 4, 4′ and 4″, having stops 5 pivotally mounted thereon, are pushed on to the winding shaft body 1. Winding tube holders 6 are situated between the tubes 4 and 4′, and 4′ and 4″. The holders have intermediate felt rings 7 on both sides for producing a frictional connection between the sleeves and the winding tube holders 6. A rod 8 is situated in the longitudinal groove 2 between the stop ring 3 and the adjacent stop lever 5. This rod limits pivotal movement of a setting lever 9. Push rods 10 are disposed between each of the other stops 5 in the longitudinal groove 2. The sleeves 4, 4′ and 4″ and the winding tube holders 6 are forced together by means of a spring 11, the pretension of which can be altered by an adjusting nut 12. The stop ring 3 serves as an abutment.

The stops 5 are in the form of toggle levers, whose arms, i.e., the stop surfaces, form an angle of 135° with the setting levers 9. The setting levers 9 are operatively connected to the pushrods 8 and 10. The cooperation between the setting levers 9 and the push rods 10 can be clearly seen in FIGS. 1 and 2.

In FIG. 1, the winding shaft is prepared to receive a first winding tube 13, shown in FIG. 2. The winding tube is pushed on to the winding shaft from the bottom, as seen in the drawing, and over the stop levers 5′ and 5″ up to the stop lever 5, which forms an angle of 45° with the axis of the winding shaft. The winding tube 13 is now forced against the stop lever 5, whereby the latter pivots in an anticlockwise direction so as to be perpendicular to the axis of the winding shaft (see FIG. 2). Because of the anticlockwise movement, the setting lever 9 displaces the push rod 10 by a corresponding amount towards the bottom as seen in the drawing. As a result, the stop 5′ is turned counterclockwise through 45° and emerges from the tube 4′ (see FIG. 2). It thus becomes operative as a stop for the next winding tube. By pushing on this next winding tube, the stop 5′ rotates until it is perpendicular to the axis of the winding shaft. This in turn causes the stop 5″ to rotate out of the sleeve by 45°. This process may be continued with further stops. The stops are so arranged on the winding shaft that they are each in alignment with one edge of the webs to be wound on. The removal of fully wound rolls is effected in the direction opposite to that used when pushing on the winding tubes. In this case, the stops 5 are once again forced back into their initial position inside the sleeves 4, 4′ and 4″.

FIG. 3 is a partial view of the winding shaft in section and to a larger scale. The stop lever 5, is mounted to pivot about a pivot 14, and comprises three socket-shaped catches 15, 15′ and 15″, corresponding to the three positions which the lever can assume. A ball 17 engages in these catches, under the pressure of a spring 16, and secures the stop 5 in the required position. This procedure is necessary when the winding shaft is

so positioned that the stop levers are on the underside thereof. They would then hinge under their own weight through 45° from the winding shaft and prevent the winding tube being pushed beyond the stop disposed in the 45° intermediate position. The push rods 8, 10, 10' comprise projections 18 on their ends, which engage in the sleeves 4, 4' and 4''. By this means, a positive connection is produced between the winding shaft body 1 and the sleeves 4, 4' and 4''. The sleeves are thus rotated at the speed of rotation of the winding shaft, while the winding tube holders 6 are frictionally driven through the felt rings 7 at a speed of rotation corresponding to the speed of the webs which are to be wound on the shaft.

We claim:

1. A winding shaft for receiving and positioning winding tubes for roll-cutting machines comprising a longitudinal groove in the periphery of said winding shaft, a plurality of stops disposed in said groove, pivots in said groove mounting said stops for pivotal movement within and out of said groove, said stops having a stop surface for longitudinally engaging said winding tubes in a stop position when said stop surface is disposed substantially perpendicular to the axis of said shaft, said pivots providing pivotal movement of said stops from a retracted position within said groove to said stop position through an intermediate position in which said stop surface is disposed at an acute angle to said axis of said winding shaft, and linking means movably connecting said stops whereby movement of one of said stops from said intermediate to said stop position moves the following stop from said retracted to said intermediate position.

2. A winding shaft as set forth in claim 1 wherein each of said stops includes a setting lever disposed at an angle of approximately 135° with said stop surface, and said movable linking means including pushrods disposed in said groove between said setting levers of adjacent stops.

3. A winding shaft as set forth in claim 2 wherein said pushrods transmit retracting movement of said stops to adjacent stops to move said adjacent stops to the intermediate position.

4. A winding shaft as set forth in claim 1 wherein resilient detent means are provided between said winding shaft and said stops, and said detent means having operating positions for detachably retaining said stops in said retracted, intermediate and stop positions.

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