

Aug. 14, 1956

S. FÜRST

2,758,799

METHOD FOR SUCKING UP THREAD ENDS OF CROSS-WOUND BOBBINS

Filed June 28, 1952

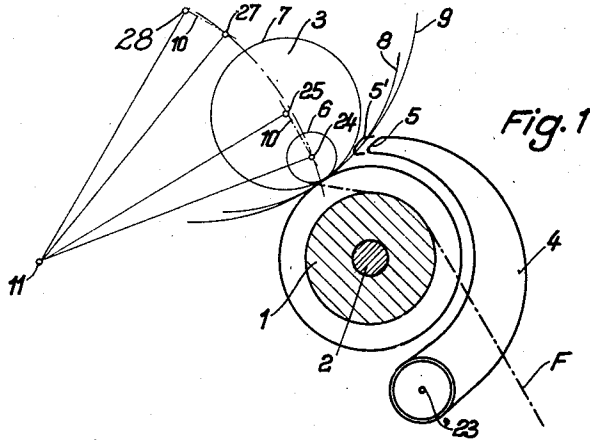


Fig. 1

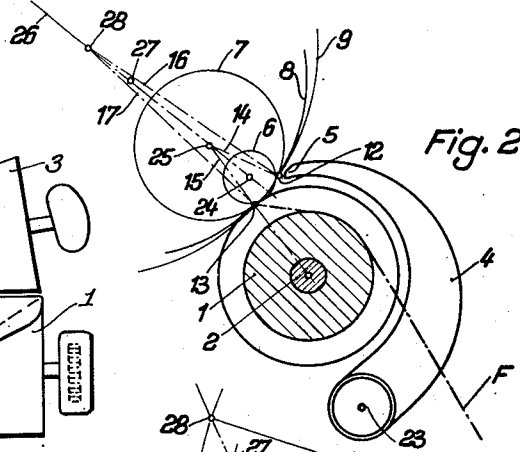


Fig. 2

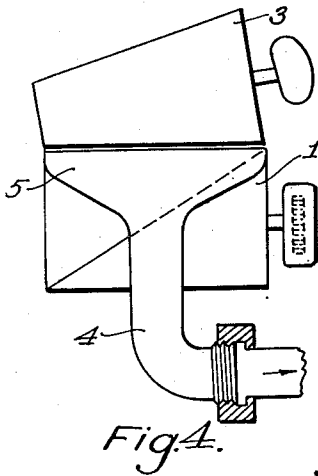


Fig. 4.

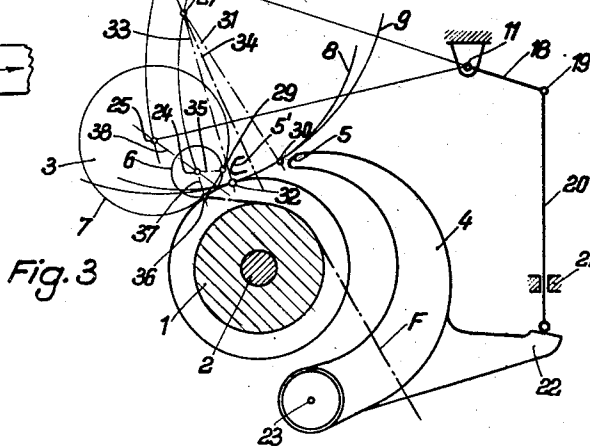


Fig. 3

Inventor:
Stefan Fürst

1

2,758,799

METHOD FOR SUCKING UP THREAD ENDS OF CROSS-WOUND BOBBINS

Stefan Fürst, M. Gladbach, Germany, assignor to Walter Reiners, Waldniel, Lower Rhine, Germany

Application June 28, 1952, Serial No. 296,134

Claims priority, application Germany July 4, 1951

12 Claims. (Cl. 242—35.6)

This invention relates to a method for sucking up thread ends from cross-wound bobbins and more particularly to a sucking-up method for thread ends from the peripheral surface of conical or tapered bobbins during winding on quick-traverse and cross-winding frames.

In automatic cross-winding frames, broken thread ends are usually sucked up from the cross-wound bobbin by means of a suction tube with a suction nozzle, and are then fed to a knotting device. To be successful, such procedure requires that the suction nozzle is constantly adjusted in very close relation to the peripheral surface of the cross-wound bobbin. This exacting requirement is the reason that to date only cylindrical or slightly tapered cross-wound bobbins can be produced on automatic winding frames, because it is very difficult to keep accurate adjustment of the mouthpiece of the suction tube in relation to the constantly growing bobbin surface throughout the whole winding length, when winding bobbins with large taper, or such whose taper changes during the winding operation. Difficulties arise usually when applying suction nozzles extending along the whole width or length of the bobbin, because during increase of bobbin diameter it is only in certain regions of the periphery possible to achieve close adjustment of the suction nozzle with presently used supporting constructions for the bobbin holder. The difficulties of this kind are particularly due to the conical building-up feature of the bobbin, which causes continuously varying distance changes between bobbin and suction mouthpiece, and effects that not all points of the peripheral surface maintain the most suitable small distance from the suction nozzle. There are also suction nozzles in use, which lie elastically against the spool periphery, have a relatively small suction opening, and, for the purpose of catching a broken thread at any spot, are mounted for back and forth movement along the surface of the bobbin. The certainty with which a thread can be caught with such appliance, however, is rather small, since the suction stream of such small suction nozzle can cover only a small area of the peripheral surface. Other known constructions of automatic winding apparatus for producing cylindrical cross-wound bobbins employ a mechanism in which the point at the periphery of the bobbin, where the driving power is applied, is coordinated with the position of the suction opening in such a manner that the driving point and the suction nozzle maintain a certain predetermined relation to each other on the surface of the bobbin. Such an arrangement, however, is possible only if certain constructive prerequisites are met. Normally, the driving point and the point opposite to the suction opening are angularly displaced on the peripheral surface of the bobbin.

The present invention obviates the well-known shortcomings inherent in drive arrangements for cross-wound bobbins applying the principle of driving the bobbin from its periphery; in which the straight line on the periphery of the bobbin coinciding with the driving point and the corresponding line coinciding with the point opposite to

2

the suction opening are angularly displaced, and in which the suction opening does not touch the periphery of the bobbin; by providing that the distance of the suction nozzle from the bobbin surface is substantially maintained uniform throughout the whole diameter range, and that the axis of the bobbin is guided to move laterally with increasing diameter of the bobbin along a line halving the angle formed between a line extending from the bobbin axis through a point opposite to the suction opening and a line extending from the bobbin axis through the driving point of the bobbin. According to this invention, the axis of the bobbin, in its lateral movement, is guided along a curve, and the displacements created thereby between a straight peripheral line opposite to the suction tube and the position of the suction opening are compensated in that the position of the suction nozzle is adjusted in dependence of the position of the bobbin carrier by means of a connecting link which rocks the suction tube under the influence of the bobbin carrier.

The novel features of this invention will become apparent from the following detailed description of an embodiment which is shown in the accompanying drawing, wherein

Fig. 1 is a diagrammatic plan view of the appertaining parts as arranged in customary devices of this kind;

Fig. 2 shows diagrammatically the varying locations of the bobbin carrier with the common intersecting point of all peripheral circles of the bobbin opposite to the suction nozzle;

Fig. 3 shows an arrangement with a suction nozzle controlled by the bobbin carrier; and

Fig. 4 shows a side view of the nozzle and other members of the device.

Referring to Fig. 1 of the drawing, the thread guide roller 1 is mounted on a drive shaft 2. A thread F, guided by roller 1, is being wound on a bobbin 3. A suction tube 4 is arranged in front of guide roller 1 and is provided with a suction nozzle 5, 5'. The conical or tapered bobbin 3 has at the beginning of winding a small diameter 6 with appertaining center point 24, and a large diameter 7 with appertaining center point 25. The small diameter of the bobbin when full, is indicated by a circular arc 8 with appertaining center point 27; and the large diameter, by circular arc 9 with appertaining center point 28. The location of the axis 10 of the bobbin can laterally be moved along an arc by means of a bobbin carrier pivoted at point 11.

The Fig. 2 shows a modification, in which the bobbin is arranged so that its axis, indicated at the points 24, 25, 27, 28, advances with increasing bobbin diameter along a straight line 26, instead of along an arc as in Fig. 1. The enveloping curves of the bobbin 6, 7, 8, 9, identical with small and large diameters of empty and full bobbin respectively, intersect in a common point 12, which faces suction nozzle 5. The bobbin has contact with thread guide roller 1 in point 13, which is also the point where the driving power for the bobbin is applied. The connecting line between point 25 and point 12 is designated by numeral 14; and the connecting line between point 25 and point 13, by numeral 15. Furthermore, the connecting lines between center point 28 and the points 12 and 13 are indicated at 16 and 17 respectively.

Referring now to Fig. 3, there is shown a lever 18 arranged to swing about a point 11 which is also the pivot point of the bobbin carrier. This lever 18 is rigidly secured to said bobbin carrier (not indicated in the figure) and is in communication with a lever 22 through a linkage 19 and through a connecting rod 20 which is guided in a sleeve 21. Lever 22 is rigidly se-

3

cured to the suction tubing and is able to rock together with the latter about pivot point 23. The point of intersection of the enveloping circles of the smallest conical bobbin 6, 7 is at 29. The enveloping circles of the largest diameters 8, 9 intersect in point 30. The connecting line between center point 27 and contact point 32 is indicated at 33. A line halving the angle between lines 31 and 33 is shown at 34. The connecting line between center point 24 and intersecting point 29 is shown at 35; and a connection between intersection 24 and a contact point 36, at 37. An angle-halving line between the lines 35 and 37 is designated by numeral 38. The angle-halving lines 34 and 38 are simultaneously axes of rotation of bobbin 3.

As can be seen in Fig. 1, the suction nozzle 5 is adjusted with close spacing to bobbin enveloping circles 8, 9 of a large bobbin. It will be noted that the bobbin enveloping circles 6 and 7 of the smallest conical bobbin are adjacent to suction nozzle 5' only in the range of the large diameter 7, and that a considerable distance exists between the diameter 6 and the suction nozzle 5'. Such large distance between bobbin and nozzle gives little assurance of sucking up a broken thread.

This indicates that in an arrangement as represented in Fig. 1, it is, without special schemes, not possible to arrive at a correlation between suction nozzle and bobbin diameter in such a way that the distance between suction nozzle and peripheral surface of bobbin remains always rather small, and it is thus not assured that the thread end is sucked up always under the same condition irrespective of bobbin diameter.

The positioning of the bobbin in an arrangement as shown in Fig. 2 is modified in that, during the building-up period of the bobbin, the center points 24, 25, 27, 28 of the bobbin travel, according to a predetermined rule, along the line 26. The line 26 is halving the angle formed by the lines 14, 15 and 16, 17. The line 14 connects the center point 25 with the common intersecting point 12 of the bobbin enveloping circles 6, 7, 8, 9. The line 15 connects the same center point 25 with the driving point 13, which is also the contact point of bobbin 3 with the thread guide roller 1. The line 16 connects the bobbin center 28 with the common intersecting point of all bobbin enveloping circles 12 by large bobbin diameters. The line 17 connects the same center 28 with the driving or contact point 13 between the largest bobbin and the thread guide roller 1. Thus it will be understood that in the arrangement just described and illustrated in Fig. 2, a uniform distance between outside diameter of bobbin and suction nozzle 5 is assured, and this regardless of bobbin diameter and regardless of whether a bobbin has conical or cylindrical shape. The only prerequisite is that all enveloping circle centers lie on the angle-halving line of an angle formed by the connecting lines between enveloping-circle center points 24, 25, 27, 28 and the common intersecting points 12 of all bobbin enveloping circles on one hand and between the same center points and the driving or contact point 13 on the other hand.

The Fig. 3 shows an arrangement in which the findings illustrated in Fig. 2 have been put to practical use. The bobbin enveloping circle centers 24 of the smallest diameter and 25 of the largest diameter of a small bobbin lie on the angle-halving line of the angle between connecting lines 35 and 37. When the bobbin is wound to its largest diameter, both bobbin enveloping points 27, 28 lie on the angle-halving line 34 of the angle between connecting lines 31 and 33. Because the bobbin carrier swings about a rigid point 11, the intersecting point of the bobbin enveloping lines in front of the suction tube travels from point 29 pertaining to the smallest bobbin diameter to the right to intersecting point 30 pertaining to the largest bobbin diameter. To prevent such travel it is necessary to shift the suction tube 4 with suction nozzle 5 by means of the elements 18,

4

20, 22. The position of the suction nozzle can thus be controlled in dependence of the bobbin carrier in such a manner that the distance between suction nozzle 5 and the periphery of the bobbin is maintained substantially uniform, irrespective of bobbin diameter. The width of the suction nozzle 5 is, as clearly shown in in Fig. 4, equal to the length of the bobbin 3.

I claim as my invention:

1. An apparatus for sucking up thread ends from a bobbin comprising, in combination, a drive roller adapted to supply a thread; a rotary bobbin member engaging with the periphery thereof said drive roller and being rotated by the same for winding up thread supplied by said drive roller so as to build a thread body of wound-up thread, said bobbin member being urged away from said drive roller by said thread body; a nozzle member opposite said bobbin member for sucking up thread ends; and movable supporting means supporting at least one of said members for movement along a predetermined path for keeping constant the distance between said nozzle member and a peripheral portion of the thread body wound up on said bobbin member.

2. An apparatus for sucking up thread ends from a bobbin comprising, in combination, a drive roller adapted to supply a thread; a rotary bobbin member engaging with the periphery thereof said drive roller and being rotated by the same for winding up thread supplied by said drive roller so as to build a thread body of wound-up thread, said bobbin member being urged away from said drive roller by said thread body; a nozzle member opposite said bobbin member for sucking up thread ends; and movable supporting means supporting said bobbin member for movement along a predetermined path in such manner that the peripheral surface portion of a wound up thread body remains at a constant distance from said nozzle member.

3. An apparatus for sucking up thread ends from a bobbin comprising, in combination, a drive roller adapted to supply a thread; a rotary bobbin member engaging with the periphery thereof said drive roller and being rotated by the same for winding up thread supplied by said drive roller so as to build a thread body of wound-up thread, said bobbin member being urged away from said drive roller by said thread body; a nozzle member opposite said bobbin member for sucking up thread ends; a movable supporting member supporting said bobbin member for movement along a predetermined path; and movable supporting means connected to said movable supporting member for movement therewith, said movable supporting means supporting said nozzle member for movement along another predetermined path in such manner that the distance between a peripheral portion of said wound up thread body and said nozzle member remains constant during movement of said bobbin member.

4. A method for sucking up thread ends, comprising, in combination, the steps of winding a body of thread so that the diameter of the body of thread increases during winding; holding a peripheral surface portion of said body of thread in a stationary position so that the distance between said peripheral surface portion and the axis of said body of thread increases during winding; producing by a suction means suction at a point spaced a predetermined distance from said body of thread; and guiding at least said body of thread along a predetermined path so that said predetermined distance remains constant and the same suction force acts on said body of thread regardless of the increase of diameter of the same during winding.

5. A method for sucking up threads comprising, in combination, the steps of winding thread to form a conical thread body means having an axis so that the diameter of said conical thread body means increases during winding; holding a peripheral surface portion of said

5

conical thread body means in a stationary position; producing, at the start of the winding, suction by suction means arranged a predetermined distance from said stationarily held peripheral surface portion of said conical thread body means, at least one of said means being arranged movably during winding; and moving at least one of said means during winding along such a path that at each moment of winding the projection of the axis of said conical thread body means on a plane normal to said stationarily held surface portion halves the angle formed between the projections of two lines on said plane, one of which connects a point of said projection of said axis with said stationarily held peripheral surface portion and the other of which connects said point of said axis with that point on the surface of the wound up conical thread body means which is nearest to said suction means.

6. A method for sucking up thread ends comprising, in combination, the steps of stationarily supporting and driving a thread body means along a first substantially straight surface portion so as to rotate said thread body means about an axis of rotation; simultaneously supplying thread to said thread body means so that thread is wound thereon whereby the diameter of said thread body means increases and said axis tends to move away from said first straight surface portion; applying by movable suction means suction to a second substantially straight surface portion of said thread body means extending substantially parallel to said first substantially straight surface portion; and guiding said thread body means and moving said suction means in such manner that said axis of said thread body means is located at any moment during winding in a plane substantially parallel to said substantially straight surface portions and spaced equal distances from the same.

7. A method for sucking up thread ends comprising in combination, the steps of stationarily supporting and driving a thread body means along a first substantially straight surface portion so as to rotate said thread body means about an axis of rotation; simultaneously supplying thread to said thread body means so that thread is wound thereon whereby the diameter of said thread body means increases and said axis tends to move away from said first substantially straight surface portion; applying suction to a second substantially straight surface portion of said thread body means; and guiding said thread body means in such manner that said axis of the same is located at any moment during winding in a plane located intermediate said straight surface portions and spaced equal distances from the same.

8. An apparatus for sucking up thread ends from a bobbin comprising, in combination, a drive roller adapted to supply a thread; a rotary conical bobbin member engaging with the periphery thereof said drive roller and being rotated by the same for winding up thread supplied by said drive roller so as to build a conical thread body of wound-up thread, said conical bobbin member being urged away from said drive roller by said thread body; a nozzle member opposite said conical bobbin member for sucking up thread ends; and movable supporting means supporting at least one of said members for movement along a predetermined path for keeping constant the distance between said nozzle member and a peripheral portion of the conical thread body wound up on said conical bobbin member.

9. An apparatus for sucking up thread ends from a bobbin comprising, in combination, a drive roller adapted to supply a thread; a rotary conical bobbin member engaging with the periphery thereof said drive roller and being rotated by the same for winding up thread supplied by said drive roller so as to build a conical thread body of wound-up thread, said bobbin member being

6

urged away from said drive roller by said conical thread body; a nozzle member opposite said bobbin member for sucking up thread ends; a movable supporting member supporting said conical bobbin member for movement along a predetermined circular path; and movable supporting means connected to said movable supporting member for movement therewith, said movable supporting means supporting said nozzle member for movement along another predetermined circular path in such manner that the distance between a peripheral portion of said wound up conical thread body and said nozzle member remains constant during movement of said bobbin member.

10. An apparatus for sucking up thread ends from a bobbin comprising, in combination, a drive roller adapted to supply a thread; a rotary conical bobbin member engaging with the periphery thereof said drive roller and being rotated by the same for winding up thread supplied by said drive roller so as to build a conical thread body of wound-up thread, said bobbin member being urged away from said drive roller by said conical thread body; a nozzle member opposite said bobbin member for sucking up thread ends; a first pivoted lever means supporting said conical bobbin member for movement along a predetermined circular path; a second pivoted lever means supporting said nozzle member for movement along a predetermined circular path; and link means connecting said first and second lever means in such manner that the distance between a peripheral portion of said wound up conical thread body and said nozzle member remains constant while said first pivoted lever means is pivoted by said conical thread body as said thread body is built up.

11. An apparatus for sucking up thread ends comprising, in combination, a rotary bobbin member; a drive roller engaging with an axially extending substantially straight peripheral surface portion said rotary bobbin member for rotating the same, and being adapted to supply a thread to said bobbin member so as to build a thread body of said wound-up thread on said bobbin member whereby said bobbin member is urged away from said drive roller by said built-up thread body; a nozzle member for sucking up thread ends having an elongated straight nozzle opening extending along said thread body; a movable supporting means supporting said nozzle member for movement along a predetermined path for holding constant the distance between said nozzle opening and said thread body as the thread body is built up; a movable supporting member connected to said bobbin member for guiding the same with the axis of the same moving along a predetermined path in which said axis is spaced substantially equal distances from said straight surface portion of said drive roller and from said straight nozzle opening; and a linkage means connecting said supporting member with said supporting means so that said nozzle member moves in accordance with the position of said bobbin member.

12. An apparatus for sucking up thread ends comprising, in combination, a rotary conical bobbin member; a drive roller engaging with an axially extending substantially straight peripheral surface portion said rotary conical bobbin member for rotating the same, and being adapted to supply a thread to said bobbin member so as to build a conical thread body of wound-up thread on said bobbin member whereby said bobbin member is urged away from said drive roller by said built-up thread body; a nozzle member for sucking up thread ends having an elongated straight nozzle opening extending along said thread body; movable supporting means supporting said nozzle member for movement along a predetermined first circular path for holding constant the distance between said nozzle opening and said conical thread body as the thread body is built up; a movable supporting member connected to said bobbin member for guiding the same with the axis of the same moving along a predetermined

7

second circular path in which said axis is spaced substantially equal distances from said straight surface portion of said drive roller and from said straight nozzle opening; and a linkage means connecting said supporting member with said supporting means so that said nozzle member moves in accordance with the position of said bobbin member.

5

8

References Cited in the file of this patent

UNITED STATES PATENTS

2,053,296	Marcellus	Sept. 8, 1936
2,238,923	Abbott	Apr. 22, 1941
2,365,701	Higgins	Dec. 26, 1944
2,395,465	Cotchell et al.	Feb. 26, 1946
2,432,722	Campbell	Dec. 16, 1947