

[54] **METHOD OF BRAKING AND
RELEASING A BOBBIN MANDREL
AND WINDING APPARATUS FOR
IMPLEMENTING THE AFORESAID
METHOD**

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[58] Field of Search242/39, 36, 37, 38, 18 DD,
242/46.2, 46.4, 46.6

[56] **References Cited**

UNITED STATES PATENTS

3,064,910	11/1962	Schippers et al.242/18 DD
3,462,092	8/1969	Mullins242/46.4
3,494,565	2/1970	Mullins242/46.4
3,495,781	2/1970	Graf et al.242/46.4
3,498,551	3/1970	Briner et al.242/46.4 X

3,517,891 6/1970 Zeis et al.242/46.4

FOREIGN PATENTS OR APPLICATIONS

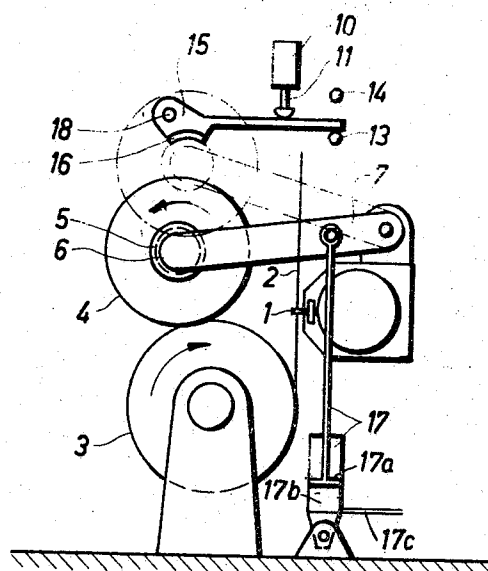
463,346 11/1968 Switzerland242/46.4

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[57] **ABSTRACT**

A method and apparatus for braking a bobbin mandrel supported on a pivotable arm and for releasing a full bobbin formed on a bobbin tube fixed on said bobbin mandrel of a yarn winding apparatus, which contemplates pivoting the bobbin mandrel against a brake lever mounted to be pivotable about a fixed axis to assume either a first position for braking the bobbin mandrel or a second position for actuating a switching function to release the bobbin tube from the bobbin mandrel. A braking force component is generated which acts against the braking lever to prevent such braking lever from pivoting into the second position for activating a switching function for releasing the bobbin tube from the bobbin mandrel until the bobbin mandrel has come to a complete standstill. After the bobbin mandrel has been braked and comes to a complete standstill, a force is applied to the braking lever which causes it to pivot into the second position for activating the switching function to release the bobbin tube from the bobbin mandrel.

6 Claims, 3 Drawing Figures



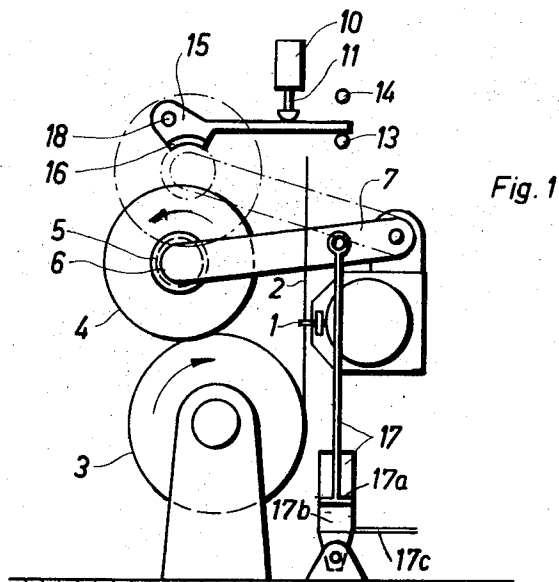


Fig. 1

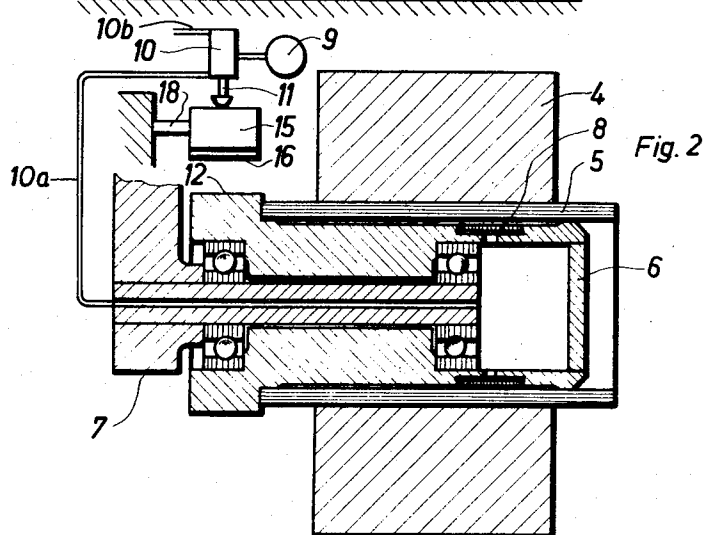


Fig. 2

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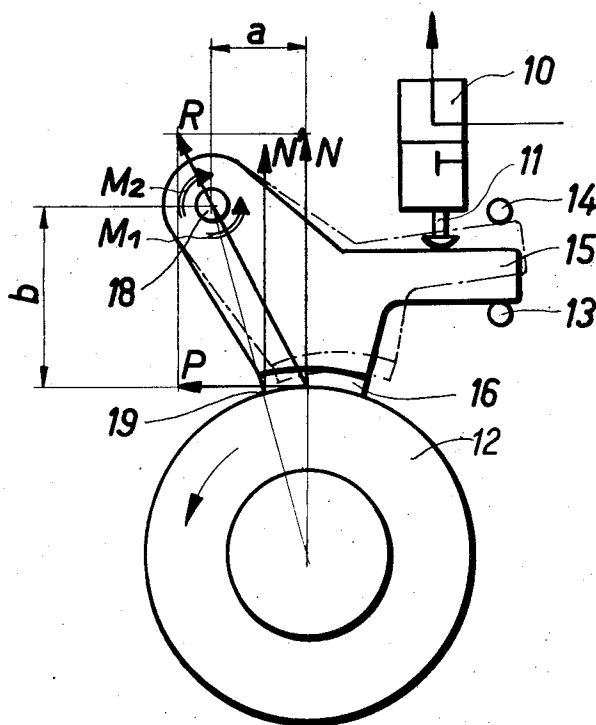


Fig. 3

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METHOD OF BRAKING AND RELEASING A BOBBIN MANDREL AND WINDING APPARATUS FOR IMPLEMENTING THE AFORESAID METHOD

BACKGROUND OF THE INVENTION

The present invention relates to a new and improved method of braking and releasing a bobbin mandrel supported on a pivotable arm, and further pertains to a new and improved winding apparatus for the implementation of the aforesaid method.

There are already known to the art winding devices in which a mechanism arranged within the bobbin mandrel prevents release of the bobbin tube supported thereon before it comes to standstill. When working with bobbin tubes of extremely small internal diameter, such as used on winding devices operating at very high speeds, for instance on spin-draw-winding machines, these mechanisms no longer can be arranged within the bobbin mandrel as the room required is not available.

SUMMARY OF THE INVENTION

Hence, there is a real need in the art for a method of solving, in the most simple manner, the problem of bringing to a standstill the full bobbin as quickly as possible and automatically releasing the bobbin tube fixation without delay after standstill of the bobbin by means of a mechanism arranged outside of the bobbin mandrel. Accordingly, a primary objective of the present invention is to fulfill this need.

Another more specific object of the present invention relates to an improved method of, and apparatus for, braking a bobbin mandrel and releasing the bobbin tube carrying the bobbin package, after the bobbin mandrel has been brought to standstill, and wherein the mechanism for releasing the bobbin tube from the bobbin mandrel can be effectively arranged externally of the bobbin mandrel.

Still a further significant object of the present invention relates to an improved method of, and apparatus for, braking a bobbin mandrel and releasing the bobbin tube carrying the bobbin package from the mandrel after it has been stopped, and wherein the entire cooperation and structure of the various components is such that the release of the bobbin tube from the bobbin mandrel is only possible after the mandrel has been completely brought to standstill.

A further significant object of the present invention relates to an improved apparatus for the braking of a bobbin mandrel and the release of the bobbin tube supported by the bobbin mandrel in an extremely reliable, efficient and positive way.

Yet a further significant object of the present invention relates to an improved method of braking a bobbin mandrel and releasing the bobbin tube with the bobbin package supported thereon from the bobbin mandrel after it has been brought to standstill, while making use of the braking force component to prevent release of the bobbin tube from the bobbin mandrel during such time as the bobbin mandrel is still not stationery, and after it is stationery exerting a force in such a way that the fixation between the bobbin tube and the bobbin mandrel is then quickly and positively released.

Now, in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the inventive method of braking a bobbin mandrel supported on a

pivotable arm and releasing a full bobbin formed on a bobbin tube fixed on the bobbin mandrel of a winding apparatus, is manifested by the features that the bobbin mandrel is pivoted against a brake lever pivotably arranged on a fixed axis such that the generated braking force component prevents pivoting of such brake lever into a position for activating a switching function to permit release of the bobbin tube until such time as the bobbin mandrel has come to a complete standstill. Thereafter the brake lever is pivoted into a position which activates release of the bobbin tube fixation.

The invention contemplates that the release of the bobbin tube fixation can be undertaken while the bobbin mandrel is at standstill by pivoting the brake lever so as to activate a valve which then interrupts the supply of a suitable control medium from a pressure source, thereby releasing the fixation of the bobbin tube with the bobbin mandrel.

As far as the winding apparatus structure used in the implementation of the inventive method, generally speaking such comprises a bobbin mandrel mounted to be pivotable away from a friction drive drum, there also being provided a releaseable bobbin tube fixation mechanism. According to important aspects of the invention, a brake lever is mounted to be pivotable between a braking position and a releasing position, with the position of its pivoting axis being selected such that the contact force exerted on the brake lever by the bobbin mandrel, in the absence of the braking force, pivots the brake lever into its releasing position where there is undertaken release of the bobbin tube fixation.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIG. 1 is a schematic side view of a preferred embodiment of inventive winding apparatus, and used in the performance of the inventive method;

FIG. 2 is an enlarged cross-sectional view of the bobbin mandrel arrangement used in the winding apparatus of FIG. 1; and

FIG. 3 is a side view of the braking mechanism for the bobbin mandrel used in the winding apparatus of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Describing now the drawings, and referring particularly to the exemplary embodiment of yarn winding apparatus depicted in the drawings, it will be understood that a yarn or thread traversing device 1 serves to traverse back and forth a yarn or thread 2 supplied from above, according to the desired traverse. During this yarn traversing operation the yarn 2 contactingly follows a suitably driven friction drive drum 3 until it has been wound in the form of a suitable bobbin package 4 which contacts the drive drum 3. The bobbin package 4, more specifically, is formed upon a detachable bobbin tube 5 placed on a bobbin mandrel 6 extending within the bobbin tube 5, as shown. Bobbin mandrel 6 is supported on a pivotable arm member 7 which, in turn, is attached to the machine frame.

During operation the bobbin tube 5 is fixed with the bobbin mandrel 6 by means of an elastic sleeve member 8 capable of being subjected to the pressure of a suitable pressurized fluid medium, typically compressed air. This compressed air is delivered to the sleeve member 8 from a compressed air source 9 through the agency of a suitable three-way valve member 10 during such time as its valve control piston 11 is in its lowered position. On the other hand, when the valve control piston 11 is raised, then, the supply of compressed air to the elastic sleeve member 8 is shut off, the air within the sleeve member is discharged, for instance via the conduit 10a and the valve outlet 10b, and the bobbin tube 5 can be readily removed axially away and off of the bobbin mandrel 6. Further, a ring member 12 is arranged at the end of the bobbin mandrel 6 facing the pivotable arm member 7. A brake lever 15 pivotably mounted at location 18 is pivotably arranged to move between two stop members 13 and 14, brake lever 15 further incorporating a suitably constructed brake lining 16. The brake lever 15 together with its brake lining 16 contacts the ring member 12 during such time as the bobbin mandrel 6 is raised away from the drive drum 3 into the position shown in phantom lines in FIG. 1. Lifting of the full bobbin or bobbin package 4 is effectuated through the agency of an appropriate pneumatic or hydraulic lifting mechanism 17, employing the piston 17a and cylinder arrangement 17b, shown schematically in FIG. 1.

The operation of the winding apparatus structure described heretofore is as follows: When the lifting mechanism or device 17 is actuated, specifically by supplying a suitable pressurized medium at location 17c to the cylinder 17b so as to raise the piston arrangement 17a, then, the bobbin mandrel 6 including the bobbin tube 5 and the full bobbin package 4, are all raised so as to contact the brake lining 16, as indicated by the phantom line position of the bobbin mandrel 6, bobbin tube 5 and bobbin package 4 in FIG. 1. Hence, as best indicated by referring to FIG. 3 a normal pressure force N is generated which exerts a moment M_1 upon the braking lever 15: wherein $M_1 = a \times N$, wherein N represents the normal pressure force produced by the lifting mechanism 17, and a represents the distance of such normal pressure force N from the pivot point 18 of the brake lever 15. Since the bobbin mandrel 6 still rotates at high speed there is simultaneously produced a friction force P , which can be defined by the equation $P = N \times \mu$, wherein μ is the co-efficient of friction. Since the friction force P acts in the direction indicated in FIG. 3, a moment M_2 is produced which is opposite to the moment M_1 . The moment M_2 can be defined by the equation $M_2 = P \times b$, wherein b represents the spacing or distance of the force P from the pivot point 18.

Now by suitably selecting the position of the pivot point 18 of the brake lever 15 it is possible to insure that the resultant force R of the forces N and P will pass to the left of the pivot point 18 and, in the extreme case, can pass through the pivot point 18. Consequently, there is produced a resultant moment $M_R = M_2 - M_1 = 0$ acting in a clockwise direction. As a result, the brake lever 15 which contacts the lower stop 13 while it is in its braking position, does not pivot, rather remains pressed against the stop member 13 as long as

rotation of the bobbin mandrel 6 generates a braking force P . When the bobbin mandrel 6 comes to a complete standstill, the braking force P is no longer present. As a result, the brake lever 15 is pivoted into the position indicated with phantom lines in FIG. 3, by virtue of the force N' exerted by the lifting mechanism 17 which now acts at the location 19. Hence, the valve control piston 11 of the valve unit 10 is raised in order to interrupt the supply of compressed air formerly delivered from the compressed air source 9 and the conduit 10a into the bobbin mandrel 6: and the compressed air previously delivered is drained from the sleeve member 8, preferably constructed in the form of a suitable diaphragm. The bobbin tube 5 is therefore released, that is, no longer is clamped with the bobbin mandrel 6, and hence, can be easily removed axially off of the bobbin mandrel 6, a new empty tube then can be placed onto such bobbin mandrel. Furthermore, the brake lever 15 is maintained during this time in its position by the stop member 14. After the bobbin-change operation has been completed, the arm member 7 pivots the bobbin mandrel 6 back into its winding position and the brake lever 15 drops under its own weight back against the stop member 13, whereupon compressed air is once again delivered to the sleeve member 8 which fixedly clamps the bobbin tube 5 to the bobbin mandrel 6. As previously explained, instead of employing compressed air any other suitable pressurized medium may be used as the control medium.

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

Accordingly, what is claimed is:

1. A winding apparatus comprising a bobbin mandrel, a bobbin tube for a bobbin package carried by said bobbin mandrel, means for releasably fixing said bobbin tube with said bobbin mandrel, a friction drive drum for drivingly contacting said bobbin mandrel, pivotable arm means cooperating with said bobbin mandrel for pivoting said bobbin mandrel out of contact with said friction drive drum, and mechanism for braking the bobbin mandrel and for actuating said fixing means for releasing the releasable fixation of said bobbin tube with said bobbin mandrel which incorporates a brake lever, means for pivotably mounting said brake lever to pivot between a braking position for braking the bobbin mandrel and a release position for actuating said fixing means for releasing the fixation of the bobbin tube with said bobbin mandrel, said pivotable mounting means providing a pivot axis for said brake lever located such that in the absence of a braking force the contact force exerted by the bobbin mandrel upon the brake lever pivots such brake lever into its release position to cause said fixing means to release fixation of the bobbin tube with the bobbin mandrel.

2. The apparatus as defined in claim 1, wherein said mechanism for braking and for actuating said fixing means further includes means cooperating with said fixing means and said brake lever for releasing said fixation of said bobbin tube with said bobbin mandrel, said means being activated by said brake lever when the latter moves into said release position.

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3. The apparatus as defined in claim 2, wherein said fixing means comprises an expansible sleeve member carried by said bobbin mandrel and cooperating with said bobbin tube and supported by said bobbin mandrel, and means for delivering a pressurized fluid medium to said expansible sleeve member to provide fixation of said bobbin tube with said bobbin mandrel.

4. A method of braking a rotating bobbin mandrel of a yarn winding apparatus and releasing a bobbin tube including a full bobbin from said bobbin mandrel, comprising the steps of:

- a. fixing the bobbin tube with the bobbin mandrel during rotation of said bobbin mandrel;
- b. pivoting said bobbin mandrel against a brake lever by pivoting an arm supporting said bobbin mandrel;
- c. generating a braking force component acting against said brake lever which prevents said brake lever from pivoting about a fixed axis into a switching position and from activating a switching function in said switching position until the bobbin mandrel has come to a complete standstill;
- d. braking the bobbin mandrel and bobbin tube thereon to complete standstill;
- e. then applying a force to said brake lever which pivots said brake lever into said switching position so as to activate said switching function in said switching position by said brake lever; and

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f. releasing said bobbin tube fixation with said bobbin mandrel by said switching function.

5. The method as defined in claim 4, further including the step of actuating a valve mechanism when the brake lever is in its switching position which interrupts a supply of a control medium, and utilizing the absence of said supply of control medium to release the fixation of the bobbin tube with the bobbin mandrel.

6. A method of braking a rotating bobbin mandrel of a yarn winding apparatus and releasing a bobbin tube including a wound bobbin from said bobbin mandrel, comprising the steps of:

- a. fixing the bobbin tube with the bobbin mandrel during rotation of said bobbin mandrel;
- b. pivoting said bobbin mandrel against a brake lever;
- c. generating a braking force component which acts against said brake lever to prevent said brake lever from assuming a position for releasing the fixation between the bobbin tube and bobbin mandrel until the bobbin mandrel has come to standstill;
- d. braking the bobbin mandrel and bobbin tube thereon to standstill;
- e. shifting said brake lever into said releasing position; and
- f. releasing said bobbin tube fixation with said bobbin mandrel.

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