May 7, 1957 S. FÜRST 2,791,384

WINDING TERMINATING APPARATUS FOR WINDING MACHINES

Filed Feb. 19, 1954

FIG. 1.

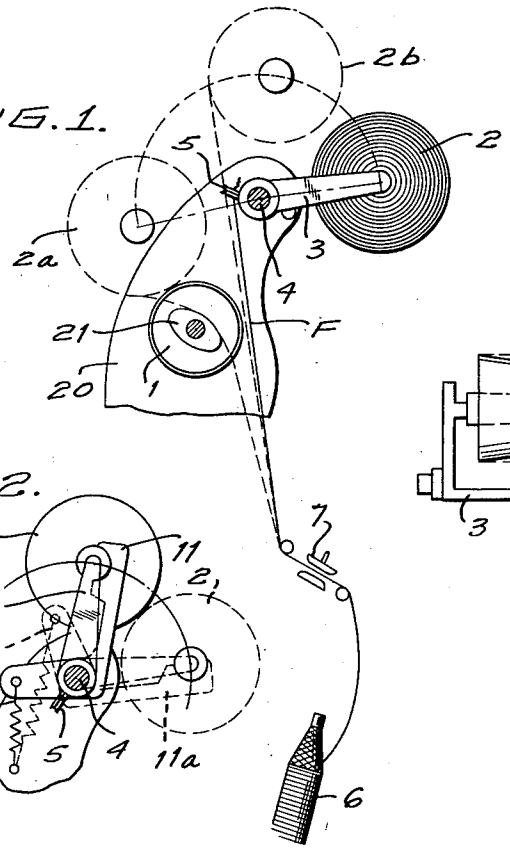


FIG. 2.

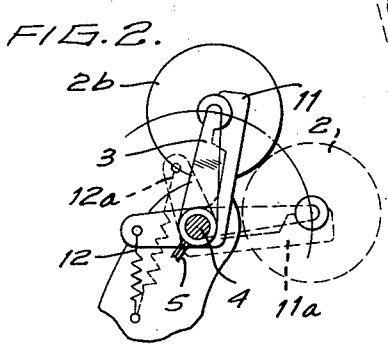


FIG. 3.

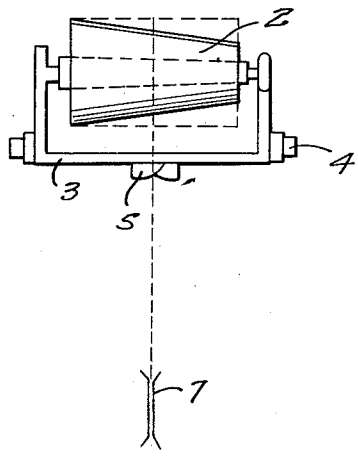
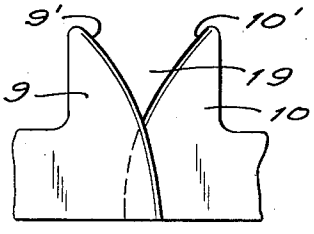


FIG. 4.



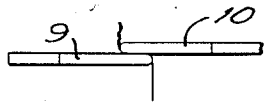
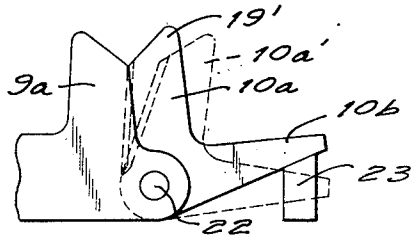


FIG. 4a.

FIG. 5.



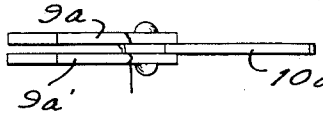


FIG. 5a.

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WINDING TERMINATING APPARATUS FOR WINDING MACHINES

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13 Claims. (Cl. 242—39)

The present invention relates to apparatus for terminating winding of a thread on a take-up spool rotating due to inertia although no longer driven.

In winding machines in which a thread or filament is wound on a spood or bobbin in a predetermined pattern, and in which the spools are automatically changed, it is necessary to terminate the driving of the take-up spool as soon as it is filled with wound-up thread. This is done by moving the take-up spool away from a driving drum. However, the full take-up spool continues to rotate due to inertia so that a considerable length of thread is wound on the take-up spool although the same is no longer driven.

In arrangements of this type, thread laying means are provided for winding the thread on the take-up spool in a predetermined pattern, for instance in a criss-cross pattern. Such thread laying means are no longer effective when the full take-up spool is moved away from the driving drum so that during inertia rotation of the take-up spool the thread is not wound in the desired pattern but in parallel superimposed loops which form a bulge on the finished spool. Such bulge is highly undesirable since it covers the spool surface in one place and prevents the effective dyeing and liquid treatment of the thread wound on the spool. Moreover, the annular bulge presses together the layers of thread so that inner tensions are produced, and the uniformity of the thread winding is unfavorably influenced which may cause damage to the thread. Also, the compressed thread does not run properly off the spool.

It is the object of the present invention to provide an arrangement preventing the formation of a bulge consisting of parallel loops in a take-off spool.

It is another object of the present invention to break the thread as soon as the winding of the spool is completed.

It is a further object of the present invention to provide on the movable supporting means which support the take-up spool, a thread breaking means which engages and breaks the thread when the take-up spool moves away from its driven winding position.

It is a still further object of the present invention to clamp the broken thread which is connected to the thread supply means so that it may be gripped by suitable means when the next take-up spool is to be wound.

It is also an object of the present invention to provide means for braking the take-up spool when the same is moved away from the thread laying means so that winding of a bulge of parallel loops due to spool inertia is prevented.

With these objects in view the present invention mainly consists in an arrangement for terminating winding of a take-up spool in an automatic winding machine, and comprises in combination thread supply means, take-up spool means located spaced from the thread supply means for receiving a thread from the same, the take-up spool means and the thread supply means adapted to hold a tensioned thread portion, movable support means supporting the take-up spool means for movement between a driven winding position and another position in which the take-up spool is not driven, thread laying means adapted to lay the tensioned thread portion in a predetermined winding pattern on the take-up spool means in the driven position and adapted to release the tensioned thread portion in the other position of the take-up spool means, and means for terminating winding of the thread on the take-up spool means due to inertia of the take-up spool means in the other position of the same.

According to one embodiment of the present invention the means for terminating winding of the thread is a brake engaging the take-up spool in the other position.

According to a preferred embodiment of the present invention the winding is terminated by clamping and cutting means which engage and cut the tensioned thread portion so that rotation of the take-up spool due to inertia cannot produce an annular bulge of superimposed parallel threads.

Preferably the thread breaking means are arranged in the middle of the take-up spool since the thread extends between the middle of the spool and the thread supply means when the thread laying means release the thread during movement of the take-up spool to its inoperative position.

Preferably the thread breaking means are cutting means attached to the movable supporting means supporting the take-up spool so that a fixed actuating means may engage the cutting means during movement of the take-up spool and shift the cutting means to a cutting position.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a side elevation of the head of a winding machine illustrating a preferred embodiment of the present invention;

Fig. 2 is a side elevation of a modified embodiment of the present invention;

Fig. 3 is a fragmentary plan view of the apparatus shown in Fig. 1;

Fig. 4 is a plan view of a thread breaking means according to the present invention;

Fig. 4*a* is a fragmentary front view of the thread breaking means shown in Fig. 4;

Fig. 5 is a fragmentary plan view of a modified thread breaking means; and

Fig. 5*a* is a fragmentary front view of the thread breaking means shown in Fig. 5.

Referring now to the drawing, and more particularly to Fig. 1, on a fixed support **20**, a driving drum **1** is turnably mounted for driving the take-up spool **2** in the position **2***a* which is illustrated in broken lines. A thread laying means **21** is provided in the region of the driving drum **1** for laying the thread on the take-up spool in a predetermined pattern such as a criss-cross pattern. This arrangement is known, and not an object of the present invention. The take-up spool means **2** are supported on a movable supporting means illustrated to be a frame **3** which is pivotally mounted on the support **20** on a shaft **4**. The frame **3** carries in the middle thereof the thread breaking means **5** as best seen in Fig. 3. Thread supply means supply a thread to the thread laying means **21** for being wound on the take-up spool in the position **2***a*. The thread supply means include a spool or reel **6** carrying the thread supply and the thread ten-

sioning device 7 so that the thread which is wound on the take-up spool 2 is tensioned.

During operation of the apparatus the movable supporting means 3 are moved away from the thread laying means 21 when the winding is completed on the take-up spool, so that the take-up spool means move from a driven winding position 2*a* through an intermediate other position 2*b* to a position of rest which is designated by the reference numeral 2.

The tensioned thread portion F between the take-up spool means 2 and the thread supply means 6, 7 is located in the intermediate position 2*b* of the take-up spool means as shown in Fig. 3, and extends straight between the middle of the take-up spool and the thread tensioning device 7.

The tensioned thread portion F is engaged by the thread breaking means 5 when the take-up spool means is in the intermediate position 2*b*. The thread breaking means are illustrated in Figs. 4 and 5 in greater detail. In the embodiment shown in Fig. 4, two clamping members 9 and 10 have edges 9′, 10′ which define a flaring recess 19 into which the tensioned thread portion F slides in the position 2*b* shown in Fig. 1 so that the thread is clamped between the members 9 and 10, as best seen in Fig. 4*a*. Such clamping is sufficient to break the thread since the take-up spool means 2 continues to rotate due to inertia, and snaps the clamped thread. Preferably, the edges 9′ and 10′ are cutting edges so that the thread is cut when passing between the members 9 and 10.

The thread, however, is clamped between the members 9 and 10 so that the thread portion supplied by the thread supply means 6, 7 is held by the clamping members 9 and 10 and is ready to be picked up by suitable means, which are not an object of the present invention, to be supplied to the next take-up spool which is to be provided with a winding. In this respect it is particularly advantageous that the thread breaking means are arranged in the middle of the supporting frame 3 and in the region of the middle of the spool 2.

The clamping and cutting members 9, 10 may be operated by suitable means to move relative to each other in a scissor-like motion. As shown in Figs. 1 and 3, the thread breaking means 5 are secured to the movable supporting means for movement with the same so that the scissor-like movement of the thread-breaking means may be effected by a fixed actuating member which engages the thread breaking means during movement of the movable supporting means 3.

According to the arrangement illustrated in Figs. 5 and 5*a*, the clamping and cutting members 9*a* and 10*a* are pivotally connected to each other by a pin 22, so that the member 10*a* is pivoted from its open position 10*a*′ into a cutting position when the arm 10*b* engages the fixed actuating member 23 during movement of the thread breaking means 9*a*, 10*a*, 10*b* with the supporting means 3. When the tensioned thread portion F has passed into the flaring recess 19′, which is formed when member 10*a* is in the position 10*a*′, the member 23 actuates the member 10*a* to cut off the thread and to clamp the thread between itself and the part 9*a*′ of the member 9*a*.

In the embodiment of Figs. 1 and 3 the thread breaking means 5 terminate winding of the thread on the take-up spool means when the tensioned thread portion F is released by the thread laying means 21.

In the embodiment illustrated in Fig. 2 other means for terminating winding of the thread on the take-up spool are provided. It will be understood that in the embodiment of Fig. 2 a driving drum 1 and a thread laying means 21 are provided which are not shown. In the embodiment of Fig. 2 the winding is terminated by braking the take-up spool means 2, and for this purpose a bell-crank-shaped brake means 11 is provided which is urged by spring 12 to engage a shaft portion of the take-up spool means 2 in the position 2*b* in which the thread has already been released by the thread laying means 21 and in which the take-up spool means has already been released by the driving drum 1. In this position the take-up spool means 2 tends to rotate due to inertia, but is braked by the brake means 11 which move with the take-up spool means until the brake means 11 are in the position 11*a* illustrated in broken lines, in which position the spring 12 is tensioned in the position designated by reference numeral 12*a*.

It will be apparent that the brake means 11 prevent rotation of the take-up spool means 2 due to inertia and thereby terminate winding of thread on the take-up spool means 2. It will be noted that in the final position designated in Fig. 2 by reference numeral 2, the weight of the spool adds to the braking effect. The extent of braking may also be adjusted by adjusting the tension of the spring 12.

Advantageously thread breaking means 5 are also provided in the modified embodiment illustrated in Fig. 2 so that the thread is automatically cut and clamped by the thread breaking means 5 when the take-up spool means 2 arrive in the position 2*b*.

It will be understood that each of the elements described above, or two or more together, may also find a useful applicatiton in other types of winding machines differing from the types described above.

While the invention has been illustrated and described as embodied in a device for terminating winding on a take-up spool due to inertia, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a winding machine, in combination, thread supply means; take-up spool means located spaced from said thread supply means for receiving a thread from the same, so that said take-up spool means and said thread supply means hold a thread portion; movable support means supporting said take-up spool means for movement between a driven winding position and another position in which said take-up spool is not driven; thread laying means for laying said thread portion in a predetermined winding pattern on said take-up spool means in said driven position and being located between said thread supply means and said take-up spool in said driven position so that said thread portion moves away from said thread laying means in said other position of said take-up spool means; and means for terminating winding of said thread on said take-up spool means due to inertia of said take-up spool means in said other position of the same and being located in the region of said take-up spool means in said other position of said take-up spool means.

2. In a winding machine, in combination, thread supply means; take-up spool means located spaced from said thread supply means for receiving a thread from the same, so that said take-up spool means and said thread supply means hold a tensioned thread portion; movable support means supporting said take-up spool means for movement between a driven winding position and another position in which said take-up spool is not driven; and means for terminating winding of said thread on said take-up spool, mounted on said movable support means and being located in the region of said take-up spool means in said other position of the latter and adapted to break said tensioned thread portion in said

other position of said take-up spool means whereby winding is terminated.

3. In a winding machine, in combination, thread supply means; take-up spool means located spaced from said thread supply means for receiving a thread from the same, so that said take-up spool means and said thread supply means hold a thread portion; movable support means supporting said take-up spool means for movement between a driven winding position and another position in which said take-up spool is not driven; thread laying means for laying said thread portion in a predetermined winding pattern on said take-up spool means in said driven position and being located between said thread supply means and said take-up spool in said driven position so that said thread portion moves away from said thread laying means in said other position of said take-up spool means; and thread breaking means located intermediate said thread laying means and said take-up spool means in said other position of the latter so as to engage and break said thread portion in said other position of said take-up spool means whereby winding is terminated.

4. In a winding machine, in combination, thread supply means; take-up spool means located spaced from said thread supply means for receiving a thread from the same, so that said take-up spool means and said thread supply means hold a tensioned thread portion; movable support means supporting said take-up spool means for movement between a driven winding position and another position in which said take-up spool is not driven; thread laying means for laying said tensioned thread portion in a predetermined winding pattern on said take-up spool means in said driven position and being located between said thread supply means and said take-up spool in said driven position so that said tensioned thread portion moves away from said thread laying means in said other position of said take-up spool means; and brake means mounted on said movable support means and engaging said take-up spool means in said other position of the same and preventing rotation of said take-up spool means due to inertia whereby winding of said thread is terminated.

5. In a winding machine, in combination, thread supply means; take-up spool means located spaced from said thread supply means for receiving a thread from the same, so that said take-up spool means and said thread supply means hold a thread portion; movable support means supporting said take-up spool means for movement between a driven winding position and another position in which said take-up spool is not driven; thread laying means for laying said thread portion in a predetermined winding pattern on said take-up spool means in said driven position and being located between said thread supply means and said take-up spool in said driven position so that said thread portion moves away from said thread laying means in said other position of said take-up spool means; and thread breaking means mounted on said movable supporting means and located intermediate said thread laying means and said take-up spool means in said other position of the latter and so as to engage said tensioned thread portion in said other position of said take-up spool means for terminating winding of the thread.

6. In a winding machine, in combination, thread supply means; take-up spool means located spaced from said thread supply means for receiving a thread from the same, so that said take-up spool means and said thread supply means hold a tensioned thread portion; movable support means supporting said take-up spool means for movement between a driven winding position and another position in which said take-up spool is not driven; thread laying means for laying said tensioned thread portion in a predetermined winding pattern on said take-up spool means in said driven position and being located between said thread supply means and said take-up spool in said driven position so that said tensioned thread portion moves away from said thread laying means in said other position of said take-up spool means; and thread breaking means including cutting means located spaced equal distances from the ends of said take-up spool and located intermediate said thread laying means and said take-up spool means in said other position of the latter so as to engage and cut said tensioned thread portion in said other position of said take-up spool means whereby winding is terminated.

7. In a winding machine, in combination, thread supply means; take-up spool means located spaced from said thread supply means for receiving a thread from the same, so that said take-up spool means and said thread supply means hold a tensioned thread portion; movable support means supporting said take-up spool means for movement between a driven winding position and another position in which said take-up spool is not driven; thread laying means for laying said tensioned thread portion in a predetermined winding pattern on said take-up spool means in said driven position and being located between said thread supply means and said take-up spool in said driven position so that said tensioned thread portion moves away from said thread laying means in said other position of said take-up spool means; and thread breaking means located intermediate said thread laying means and said take-up spool means in said other position of the latter and including two thread breaking members having edges defining a flaring recess spaced equal distances from the ends of said take-up spool so as to engage said tensioned thread portion in said recess in said other position of said take-up spool means whereby said thread portion is guided between said thread breaking members so that said thread portion is broken.

8. In a winding machine, in combination, thread supply means; take-up spool means located spaced from said thread supply means for receiving a thread from the same, so that said take-up spool means and said thread supply means hold a tensioned thread portion; movable support means supporting said take-up spool means for movement between a driven winding position and another position in which said take-up spool is not driven; thread laying means for laying said tensioned thread portion in a predetermined winding pattern on said take-up spool means in said driven position and being located between said thread supply means and said take-up spool in said driven position so that said tensioned thread portion moves away from said thread laying means in said other position of said take-up spool means; and thread breaking means located intermediate said thread laying means and said take-up spool means in said other position of the latter and including two cutting members having cutting edges defining a flaring recess so as to guide said thread portion between said cutting members where it is cut by said cutting edges.

9. In a winding machine, in combination, thread supply means; take-up spool means located spaced from said thread supply means for receiving a thread from the same, so that said take-up spool means and said thread supply means hold a tensioned thread portion; movable support means supporting said take-up spool means for movement between a driven winding position and another position in which said take-up spool is not driven; thread laying means for laying said tensioned thread portion in a predetermined winding pattern on said take-up spool means in said driven position and being located between said thread supply means and said take-up spool in said driven position so that said tensioned thread portion moves away from said thread laying means in said other position of said take-up spool means; two thread breaking members movable relative to each other and having cutting edges, said thread breaking members being mounted on said movable supporting means and located intermediate said thread laying means and said take-up spool means in said other position of said movable supporting means, said cutting edges defining a flaring recess for engaging said tensioned thread portion in said

other position; and fixed actuating means engaging at least one of said thread breaking members in said other position of said movable supporting means and moving said one of said thread-breaking members into a cutting position in which said cutting edges overlap for cutting said thread portion.

10. In a winding machine, in combination, thread supply means; take-up spool means located spaced from said thread supply means for receiving a thread from the same, so that said take-up spool means and said thread supply means hold a tensioned thread portion; movable support means supporting said take-up spool means for movement between a driven winding position and another position in which said take-up spool is not driven; thread laying means for laying said tensioned thread portion a predetermined winding pattern on said take-up spool means in said driven position and being located between said thread supply means and said take-up spool in said driven position so that said tensioned thread portion moves away from said thread laying means in said other position of said take-up spool means; and thread breaking means located intermediate said thread laying means and said take-up spool means in said other position of the latter and including two clamping members having edges defining a flaring recess so as to engage said tensioned thread portion in said recess in said other position of said take-up spool means whereby said thread portion is clamped between said clamping members so that said thread portion is broken by said take-up spool means rotating due to inertia and the portion of said thread portion which is connected to said thread supply means is clamped and held by said clamping members.

11. In a winding machine, in combination, thread supply means; take-up spool means located spaced from said thread supply means for receiving a thread from the same, so that said take-up spool means and said thread supply means hold a tensioned thread portion; movable support means supporting said take-up spool means for movement between a driven winding position and another position in which said take-up spool is not driven; thread laying means for laying said tensioned thread portion in a predetermined winding pattern on said take-up spool means in said driven position and being located between said thread supply means and said take-up spool in said driven position so that said tensioned thread portion moves away from said thread laying means in said other position of said take-up spool means; two clamping members movable relative to each other and having cutting edges, said clamping members being mounted on said movable supporting means and located intermediate said thread supply means and said take-up spool means in said other position of said movable supporting means, said cutting edges defining a flaring recess for engaging said tensioned thread portion in said other position; and fixed actuating means engaging at least one of said clamping members in said other position of said movable supporting means and moving said one of said clamping members into a cutting position in which said cutting edges overlap for cutting said thread portion and in which said clamping members clamp the portion of said thread portion which is connected to said thread supply means.

12. In a winding machine, in combination, thread supply means; take-up spool means located spaced from said thread supply means for receiving a thread from the same, so that said take-up spool means and said thread supply means hold a tensioned thread portion; movable support means supporting said take-up spool means for movement between a driving winding position and another position in which said take-up spool is not driven; thread laying means for laying said tensioned thread portion in a predetermined winding pattern on said take-up spool means in said driven position and being located between said thread supply means and said take-up spool in said driven position so that said tensioned thread portion moves away from said thread laying means in said other position of said take-up spool means; thread breaking means located intermediate said thread laying means and said take-up spool means in said other position of the latter and so as to engage and break said tensioned thread portion in said other position of said take-up spool means; and brake means engaging said take-up spool means during movement of said movable supporting means after said take-up spool means have left said driven position for preventing rotation of said take-up spool means due to inertia.

13. In a winding machine, in combination, thread supply means; take-up spool means located spaced from said thread supply means for receiving a thread from the same, so that said take-up spool means and said thread supply means hold a tensioned thread portion; movable support means supporting said take-up spool means for movement between a driven winding position and another position in which said take-up spool is not driven; thread laying means so that said tensioned thread portion in a predetermined winding pattern on said take-up spool means in said driven position and being located between said thread supply means and said take-up spool in said driven position so that said tensioned thread portion moves away from said thread laying means in said other position of said take-up spool means; thread breaking means located intermediate said thread laying means and said take-up spool means in said other position of the latter and including two cutting members having cutting edges defining a flaring recess so as to guide said thread portion between said cutting members and cut by said cutting edges; and break means engaging said take-up spool means during movement of said movable supporting means after said take-up spool means have left said driven position for preventing rotation of said take-up spool means due to inertia.

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