June 10, 1941. M. J. McHALE 2,245,490

AUTOMATIC THREAD TENSION COMPENSATING DEVICE FOR WINDING MACHINES

Filed June 7, 1938

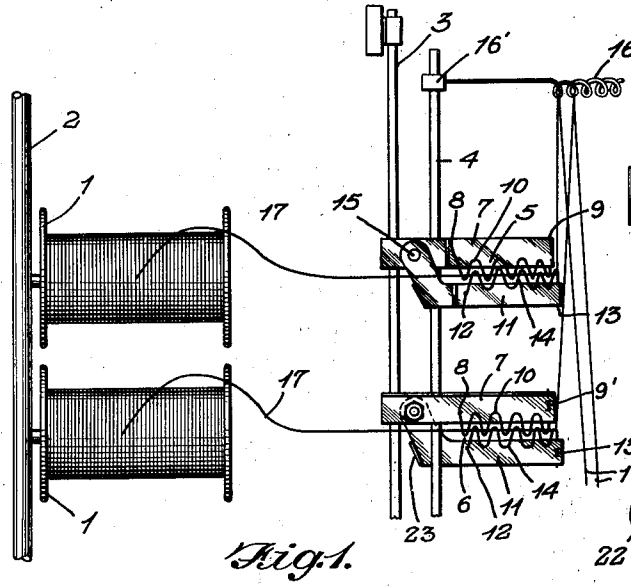


Fig. 1.

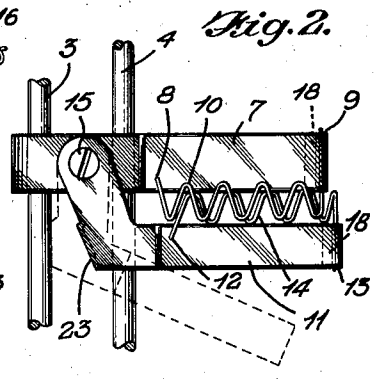


Fig. 2.

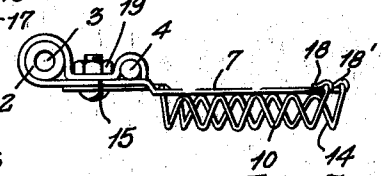


Fig. 3

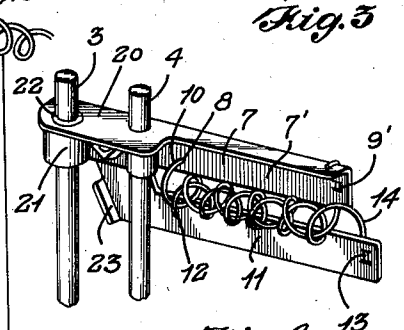


Fig. 4.

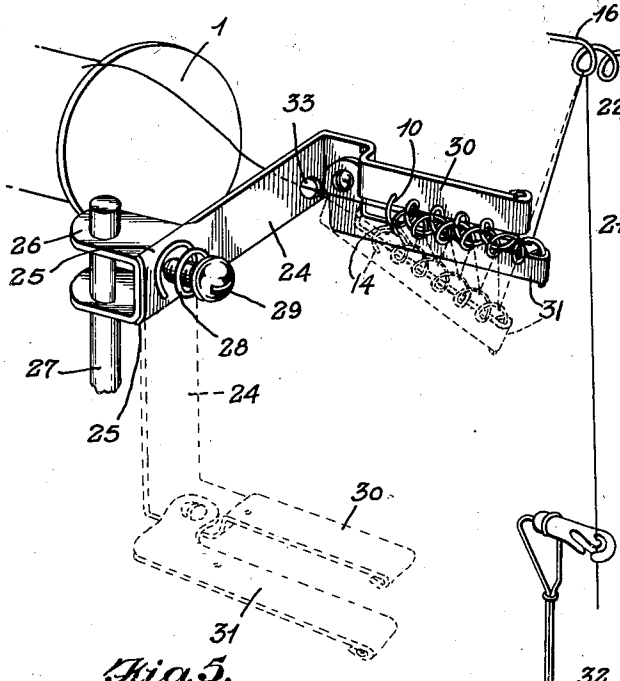


Fig. 5.

Inventor
MICHAEL J. McHALE,

By

Attorney

Patented June 10, 1941 2,245,490

UNITED STATES PATENT OFFICE

2,245,490

AUTOMATIC THREAD TENSION COMPENSATING DEVICE FOR WINDING MACHINES

Michael J. McHale, Scranton, Pa.

Application June 7, 1938, Serial No. 212,350

4 Claims. (Cl. 242—153)

My invention relates to thread tensioning devices and more particularly to an automatic tension compensating arrangement adapted for use with winding machines and the like.

Heretofore, it has been proposed to use thread tensioning devices with winding machines, wherein tension is applied to the thread by passing it through a pair of contacting discs, contact between the discs being effected through the medium of a spring or other device adapted to maintain the discs under pressure during the winding operation. It has been proposed to use thread tensioning devices of the character wherein the thread is passed between two opposed fabric surfaces, for example plush or pile fabrics, for the purpose of creating a tension on the thread as it is pulled through a holder or other support provided with fabric surfaces. Similarly it has also been suggested to use a system of adjustable weights or levers, acting directly on the thread and supported thereby or arranged to deflect the thread from its normal path as it unwinds from the take-off bobbin.

While the prior art devices, will no doubt operate to provide a tension on the thread as it is being wound, they are open to several inherent objections. Tensioning devices of the type in which spring pressed opposed discs are used, are not satisfactory for the reason that the friction between the disc surfaces and the thread, and therefore the thread tension, is dependent upon the pressure exerted by the spring and the condition of the thread. If the spring loses its resiliency or if the thread is oily, the discs do not create any tension, with the result that the thread is wound on the take-up bobbin in a loose condition, including knots or loops which have been formed as the thread unwinds from the take-off bobbin. If a pair of opposed fabric surfaces is used for the purpose of putting the thread under tension as it passes therebetween, the thread tension decreases as the fabric surfaces wear and if the thread is oily, there is little or no friction between the thread and the surfaces, and hence no tension thereon between the points of take-off and take-on, of the respective bobbins.

It is the purpose of the present invention, to overcome the difficulties encountered in the prior art devices and to provide a thread tensioning arrangement for winding machines and the like wherein the thread is maintained under the required tension during the winding operation, the tension on the thread being automatically compensated to the required degree, in event of excess slack or variation in pull on either the take-off or take-up sides of the tensioning device.

An object of my invention is to provide an improved automatic compensating thread tensioning device for winding machines and the like.

Another object of my invention is to provide an improved thread tensioning device adapted to provide a substantially uniform tension on the thread under conventional winding conditions.

Yet another object of my invention is to provide an improved thread tensioning device adapted for use with standard winding machines.

Still another object of my invention is to provide a combined thread tensioning device and automatic stop arrangement adapted to maintain the required tension on a thread during the winding operation and to function as an automatic stop device to cut off power to the winding machine in event of breakage of a thread.

A further object of my invention is to provide an automatic compensating thread tensioning device which is strong and sturdy in construction, consisting of but few parts, not liable to get out of order even after long and continued use.

With these and other objects in view, which may be incident to my improvements, the invention consists in the parts and combinations to be hereinafter set forth and claimed, with the understanding that the several necessary elements, comprising my invention, may be varied in construction, proportions and arrangement, without departing from the spirit and scope of the appended claims.

In order to make my invention more clearly understood, I have shown in the accompanying drawing means for carrying the same into practical effect, without limiting the improvements in their useful applications to the particular constructions, which for the purpose of explanation, have been made the subject of illustration.

In the drawing:

Figure 1 is an elevational view showing the improved thread tension device in the operative position on a winding machine.

Fig. 2 is a detailed elevational view of one of the tensioning devices.

Fig. 3 is a plan view of the device shown in Fig. 2.

Fig. 4 is a detailed elevational view of a modified form of the tensioning device; and

Fig. 5 is an elevational view showing a modified form of support for the tensioning device.

Referring to the drawing and more particularly to Figure 1, the thread tensioning devices are shown in the operative position on a wind-

ing machine. Bobbins 1 are mounted upon a suitable support 2 forming a part of the winding frame and attached to vertical supports 3 and 4 are two thread tensioning devices designated generally by numerals 5 and 6. Each of the thread tensioning devices comprises a fixed arm 7 comprising a body portion formed with a support engaging section adapted to receive the vertical rods 3 and 4. The body portion 7 is also provided with an opening 8 and recess or slot 9 adapted to receive the ends of a thread guide member 10. Attached to the body portion, in the vicinity of the support engaging section is a pivotal arm 11 formed with an opening 12 and recess or slot 13 adapted to receive the ends of a complementary thread guiding member 14. The arm may be pivoted to the body portion by means of a suitable screw 15.

The tensioning device 6 is constructed somewhat similar to tensioning device 5, however, differs therefrom in the specific arrangement of the openings to receive the thread guide members and also its position with respect to the vertical support members 3 and 4. In connection with tension device 6, it will be noted that the thread guide members 10 and 14 are supported in the body portion of the fixed arm 7 and pivotal arm 11 respectively by means of openings 8 and 12 together with slots 9' and 13'. For the purpose of guiding and maintaining the threads in a separated position after they pass through the tensioning devices, a separating wire 16 is provided, which may be attached to support rod 4, by means of holder 16' or other suitable clamp.

In the operation of the tensioning device, thread 17 is passed through the wire guide members 10 and 14 through one of the loops formed on the wire separator 16 and then to a winding drum, cop, bobbin or other device for further manipulation or treatment of the thread. It will be noted that as the thread is unwound from a bobbin, tension thereon is maintained through the medium of the pivotal arm 11 of the thread tensioning device. Since the thread is inserted through the opening in the respective spirals which form the thread guide means, in event of any slackening of the thread, arm 11 under the force of gravity will drop downwardly carrying with it loops of thread formed between peripheral points of the loops on each wire. In other words the length of the path of travel of the thread through the tensioning device is varied as the pivotal arm moves with respect to the fixed arm 7. It will thus be appreciated that with the improved tensioning device, the thread tension is automatically compensated for in event of a reduction in tension due to increased slack, as for example, when more than one loop is removed from the take-off bobbin 1, at one time or for any other reason which would directly effect the pull on the other side of the tensioning device, between the separating wire and the cop or bobbin upon which the thread is being wound.

Referring to Figs. 2 and 3, it will be noted that the thread guiding wires 10 and 14 are wound in opposite directions, that is, the spirals of thread guide member 10 may be formed with a left-hand spiral and the coils of thread guide member 14 would then be formed with spirals in the opposite direction. The purpose of this arrangement of the direction of the spirals is to provide complementary loops which will properly nest or interlace to form an opening of substantially uniform diameter between successive spirals when the pivotal arm is in its normal horizontal position.

In order to attach the thread guide members to the fixed and pivotal arms, the ends 18 and 18' are turned back upon the body portions 7 and 11 respectively, thus forming recesses 9 and 13 adapted to receive the ends of the wires. The other ends of the guide wires are inserted in openings 8 and 12 formed in the body portions 7 and 11. To properly support the tensioning device upon the winding frame or other support members 3 and 4, the body portion 7 is turned back upon itself, as shown in Fig. 3, to provide two openings or recesses adapted to receive the vertical rods 3 and 4. The portion of the body of the tension member which is turned back upon itself to form a clamp is provided with a screw member 15 intermediate of the recesses whereby it may be securely clamped to supporting rods 3 and 4 by means of nut 19 and thus hold the fixed arm of the tensioning device securely in the operative position.

Referring to Fig. 4, which is an enlarged detailed view of tensioning device 6 shown in Figure 1, it will be noted that the thread guiding wires 10 and 14 are supported upon the arms 7 and 11 by means of openings 8 and 12 formed in these arms together with slots 9' and 13' which are formed by slitting the material of the arms and pressing the cut-out portion outwardly to form an opening between the expanded material. It will also be noted that thread device 6, as shown in Fig. 4, differs slightly from the construction and arrangement of tensioning device 5 shown in Figure 1, as regards the method of mounting the thread guiding wires and also in the specific structure of the body portion of the fixed arm. According to the arrangement shown in Fig. 4, the body portion 7 is formed with a top flange 20 formed integral with the vertical portion 7'. In order to clamp the tensioning members to vertical rods 3 and 4, a suitable clamp 21 comprising a separate piece of metal shaped to conform with the configuration of rods 3 and 4 is provided. The clamping member 21 is secured to the fixed horizontal arm 7 through the medium of a bolt 15 and nut 19 of the character shown in Fig. 3.

The improved thread tensioning devices described above, are also designed to function as automatic stops for the purpose of cutting off power to the winding machine, in event of breakage of one of the threads. The automatic stop arrangement is formed by insulating the fixed horizontal arms 7 from the support 3 by means of a rubber sleeve 22 or other insulating material, more clearly shown in Figs. 3 and 4, the support rods 3 and 4 being suitably connected through conductors to a source of power and an electromagnetic device, not shown. The arms 11 of the individual tensioning devices are provided with inturned portions to form projections or contact members 23 whereby electrical connection is effected, to complete the circuit between rods 3 and 4 when the pivotal arm 11 drops down so that contact member 23 encounters rod 3, as shown in Fig. 2, wherein one of the arms is shown in the dotted line position, which it assumes in event that one of the threads becomes broken.

Referring to Fig. 5, a modified holder or support for a tensioning device is shown, adapted for use with standard machines. In some installations the bobbin 1 is mounted very close to the support members or other parts of the winding

machine frame used to mount the separating wires or the thread tensioning devices. In view of the fact that there is little space between the support members and the ends of the bobbins, it has been found that the tensioning devices and more particularly the supports therefor of the character shown in Figure 1, are rather awkward and sometimes difficult to manipulate, particularly in the threading operation and also to enable withdrawal or insertion of a bobbin upon a spindle. A modified form of bracket or support is therefore provided so that the thread tensioning device may be moved about its point of support so as to provide clearance in the vicinity in the front of the bobbin.

The bracket comprises a base member 24, the supporting end thereof being formed with a flattened section having inwardly turned portions 25 adapted to form a recess which provides a seat for the member 26 mounted upon the vertical support 27. The base portion 24 is maintained in the operative horizontal position by means of inherent friction between the surfaces of this portion and member 26, together with spring 28 which fits around screw member 29 by means of which the tension upon the bracket or support may be varied. The stationary arm 30 of the thread tensioning device is formed as a continuation of the base portion 24 and is similar in construction and arrangement to stationary arm of the tensioning devices shown in Figs. 2 and 4. The pivotal arm 31 and the guide wire members 10 and 14 are similar to the corresponding looped wires of Figs 3 and 4. In this arrangement, the tensioning devices do not function as automatic stops, since a faller arm together with porcelain thread guide, designated generally by numeral 32 is used. When it is desired to remove or replace a bobbin, arm member 24 is pulled downwardly to the dotted line position, shown in Fig. 5, so that the area in front of the bobbin is clear. The base portion 24 is also provided with an opening 33 in line with the normal horizontal opening formed between the nested loops of the guide wires, the opening being constructed and arranged so that in normal operation the thread passes through its center, that is, the thread does not bear against the inner periphery of the opening.

While I have shown and described the preferred embodiment of my invention, I wish it to be understood that I do not confine myself to the precise details of construction herein set forth, by way of illustration, as it is apparent that many changes and variations may be made therein, by those skilled in the art, without departing from the spirit of the invention, or exceeding the scope of the appended claims.

What I claim is:

1. A thread tensioning device for winding machines and the like comprising a body portion having a support engaging section and openings to receive a thread guiding member, an arm pivotally mounted upon said body portion adjacent the support engaging section, the arm being provided with openings to receive a thread guiding member, thread guiding members attached to the body portion and the pivotal arm, each comprising a wire formed with a plurality of loops, the ends of the wire being seated in the openings formed in the body portion and pivotal arm respectively, said guiding members comprising respectively a right and left handed helix which intermesh and form a substantially continuous thread receiving passage through the helices when the pivotal arm is in the horizontal position.

2. A thread tensioning device for winding machines and the like comprising a body portion having a support engaging section formed at one end thereof and provided with a slot to receive an end of a thread guide member at the other end of the body portion, an arm pivotally mounted upon said body portion adjacent the support engaging section, said arm being formed with a slot to receive an end of a thread guide member at the end opposite its pivotal point, thread guiding members attached to the body portion and the pivotal arm, each comprising a wire formed with a plurality of loops, the ends of the wire being seated in the slots formed at the end of the body portion and the end of the pivotal arm, said guiding members comprising respectively a right and left handed helix which intermesh and form a substantially continuous thread receiving passage through the helices when the pivotal arm is in the horizontal position.

3. A thread tensoning device for winding machines and the like comprising a body portion having a support engaging section formed at one end thereof and provided with a slot to receive an end of a thread guide member at the other end of the body portion, an arm pivotally mounted upon said body portion adjacent the support engaging section, said arm being formed with a slot to receive an end of a thread guide member at the end opposite its pivotal point, thread guiding members attached to the body portion and to the pivotal arm, each comprising a wire formed with a plurality of loops, the ends of the wire being seated in the slots formed at the end of the body portion and the end of the pivotal arm, said guiding members comprising respectively a right and left handed helix which intermesh and form a substantially continuous thread receiving passage through the helices when the pivotal arm is in the horizontal position.

4. A thread tensioning device for winding machines and the like comprising a body portion having a support engaging section formed at one end thereof, the free end of the body portion being bent back upon itself to form a slot to receive an end of a thread guide member, an arm pivotally mounted upon the body portion, the free end of the arm being bent back upon itself to form a slot adapted to receive the end of a thread guide member, thread guiding members attached to the body portion and the pivotal arm, each comprising a wire formed with a plurality of loops, the ends of the wire being seated in the slots formed at the end of the body portion and the end of the pivotal arm, said guiding members comprising respectively a right and left handed helix which intermesh and form a substantially continuous thread receiving passage through the helices when the pivotal arm is in the horizontal position.

MICHAEL J. McHALE.