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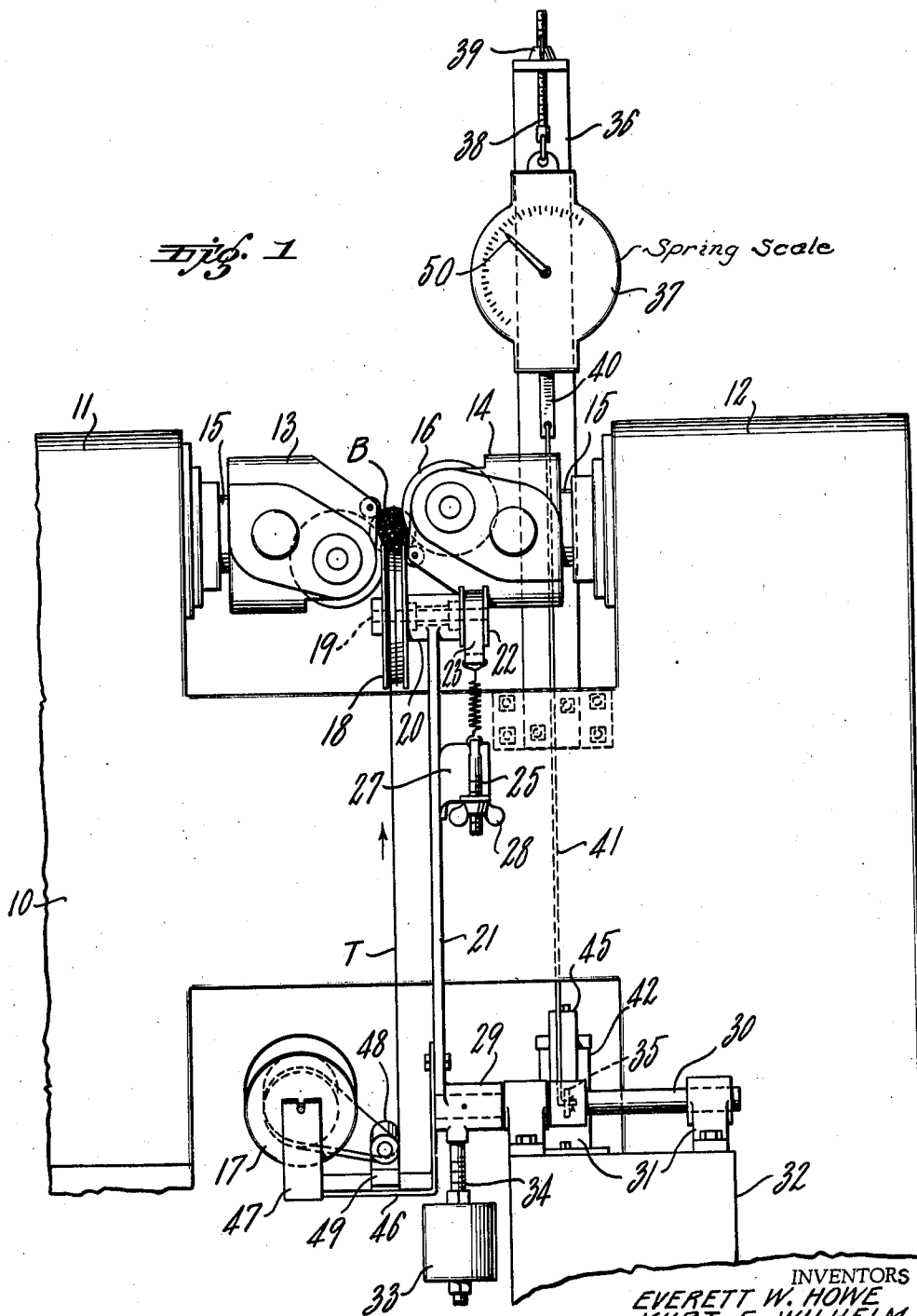
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THREAD TENSIONING MECHANISM

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2 Sheets-Sheet 1



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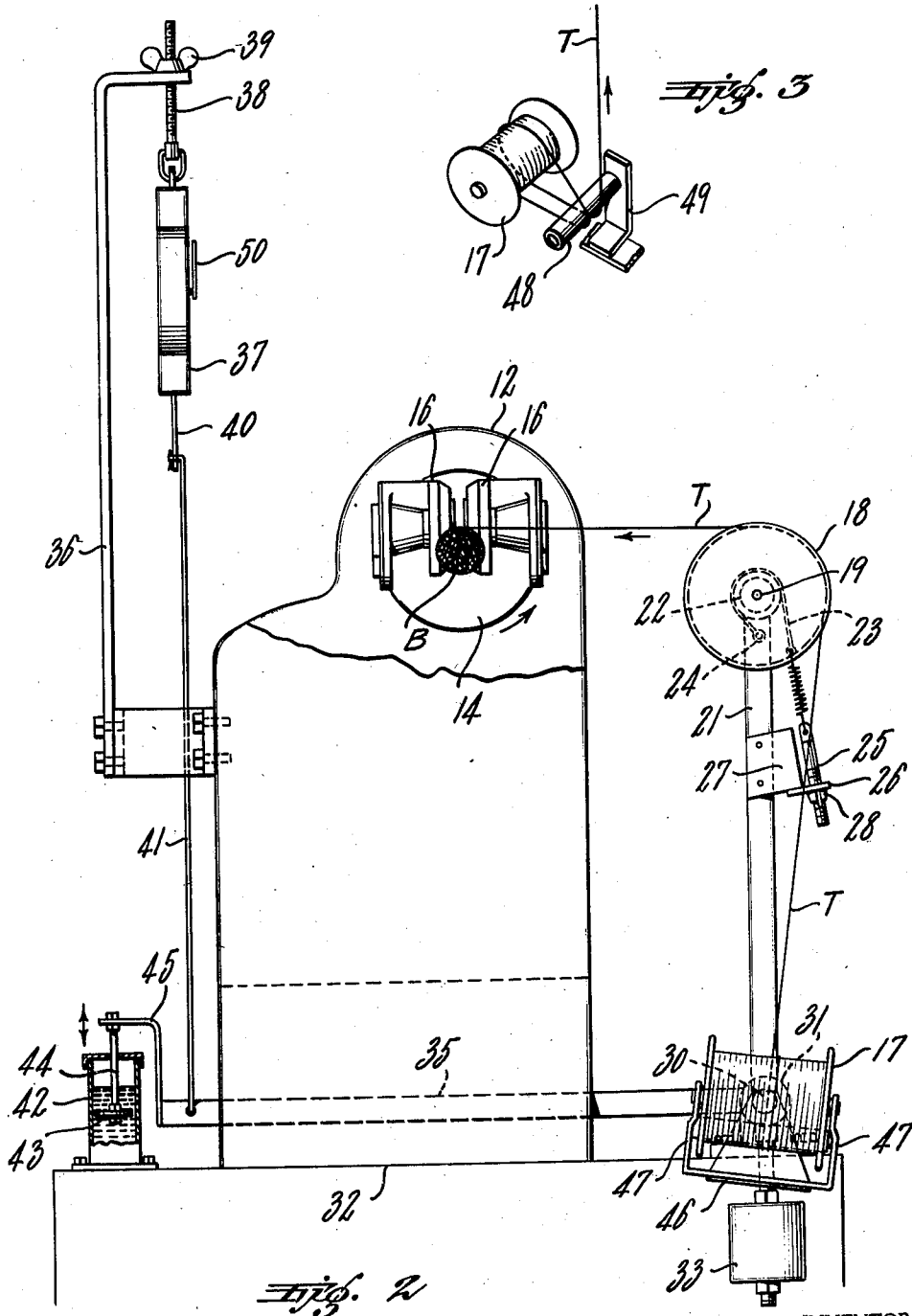
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THREAD TENSIONING MECHANISM

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17 Claims. (Cl. 242—3)

This invention relates to thread tensioning mechanism designed more particularly for use upon golf ball winding machines to tension a rubber strand as it is wound upon the ball core.

Golf balls as usually constructed consist of a core about which a rubber tape or thread is wound under considerable tension to form the ball body that is later provided with a protecting cover.

The better grade golf balls are wound under high tension, and after they are wound are subjected to an exacting compression test and are graded upon the basis of such test.

This compression test has been relied upon heretofore to determine whether or not a ball has been wound under the proper thread tension, but the trouble with such a test from the manufacturing standpoint is that it shows the compression properties of the wound ball and not the actual tension under which the thread should be wound to give the ball the desired properties.

Various devices have been provided heretofore to tension the rubber strand as it is wound upon the ball core, but the method employed heretofore for adjusting such tensioning devices has been to remove the ball from the winding machine to test its compression properties, and then adjust the thread tensioning device the amount the operator thinks will serve to impart the desired hardness to the ball.

Even if the operator by using the empirical method just described succeeds in getting the right thread tension, this particular adjustment of the thread tension device may not produce the proper tension upon the thread for any substantial length of time, as changes in the adjustment of the thread tension device may be required at frequent intervals to keep the tension constant, due to changes in the initial tension of the thread, changes in the speed of winding as the size of the ball increases, and changes in the friction of the braking means or other thread retarding means.

So far as applicants are aware no means has been available heretofore for accurately measuring the actual tension on the rubber thread as it is being wound on the ball core.

The primary feature of the present invention resides in thread tensioning mechanism adapted for use upon golf ball winding machines and other types of winding machines, and constructed to measure accurately the actual tension of the thread at the instant it reaches the winding position. Through the employment of a tensioning and measuring device such as herein contem-

plated the desired winding tension upon the thread can be secured throughout the ball winding operation.

A more specific feature of the present invention resides in a thread tensioning device supported for limited movement relative to the ball winding position in response to variations in the tension of the thread being wound on the ball, and in means controlled by the movement of such device for accurately measuring, weighing or indicating in absolute units (not empirical) the tension upon the thread at the ball.

A further feature of the present invention resides in the arrangement whereby the force required to unwind the thread from its supply spool and to advance it to the tensioning device of the present invention, does not affect the movement of such device so that it may move solely in response to variations in the tension of the thread at the ball.

Through the employment of the present invention whereby the tension of the thread is or may be accurately measured as it goes onto the ball, during the entire winding operation, balls may be produced that are wound with a highly uniform tension to thereby produce balls of very uniform compression properties. This makes possible the consistent winding of hard compression balls, and it is believed that through the present invention the tension of the thread upon golf balls may be controlled more accurately than was possible heretofore.

The above and other features of the invention and novel arrangement of parts will be hereafter described in connection with the accompanying drawings illustrating one good practical form thereof.

In the drawings:

Fig. 1 is a front elevation of one well known type of golf ball winding machine having the present device associated therewith.

Fig. 2 is an end view of Fig. 1, looking towards the right, the upper part of the machine being broken away to give a full view of the ball; and

Fig. 3 is a perspective view of means for controlling the unwinding of the thread from its supply spool.

The present invention may be employed to control accurately the tension of a thread, strand or filament that is being wound upon a core, spool or other form of take-up means, but is particularly well adapted for use in controlling the tension of rubber or elastic strands, which are more sensitive to tension variations than the ordinary textile thread or strand, and as above stated the

invention has been developed more particularly for use upon golf ball winding machines. The rubber strand wound upon the golf ball core to form the ball body may have the form of a wide tape, or of a tape or thread the width of which does not greatly exceed its thickness, such strands are herein referred to as "threads."

The particular embodiment of the invention shown in the drawings is well adapted for use on various types of golf ball winding machines and is illustrated as applied to a golf ball winding machine of the general type disclosed in the Cobb Patent No. 1,270,099. The winding machine shown comprises the metal frame or casing 10 having the housings 11 and 12 which are spaced apart to provide therebetween an opening in which the ball supporting and rotating heads 13 and 14 operate. These heads are supported and rotated by axially aligned shafts 15, that are mounted for limited longitudinal movements so that the heads may hold therebetween different size balls. The heads 13 and 14 rotate at the same speed and turn the ball upon the longitudinal axis of the shafts 15 to wind the thread in a plane extending through the center of the ball at right angles to this axis. The ball is actually supported by the disks 16 which are periodically rotated upon the heads 13 and 14 to turn the ball relative to said heads, as more fully set forth in the above mentioned patent.

In the construction shown the rubber thread T is supplied to the golf ball core or body B under the desired tension from a position in front of the winding machine as will be apparent from Fig. 2. This thread is led upwardly from a supply spool 17 to a thread tensioning wheel or drum 18 to pass partly or entirely around this wheel and then horizontally to the ball B as shown. The thread may extend around the tension wheel 18 for only about one-fourth of a revolution, or it may extend entirely around this wheel for slightly more than a complete revolution as desired. The wheel is preferably provided with a slightly tapered thread engaging surface as shown, so that if the thread passes around the wheel for more than one complete revolution the adjacent coils will be separated sufficiently to prevent one from contacting the other.

The wheel 18 is rigidly secured to a shaft 19 which is rotatably mounted in a boss 20 formed at the upper end of the lever 21. The opposite end of this shaft 19 has rigidly secured thereto a brake drum 22 having cooperating therewith the brake band 23, one end of which band is secured to a pin 24 upon the lever 21 and the other end of this band is provided with a spring. The lower end of this spring is fastened to an adjustable bolt 25 which projects through a hole in a flange 26 that is supported by a bracket 27 secured to the lever 21. This bolt is provided with a wing nut 28 which may be rotated by the fingers to vary the braking action of the band 23, upon the brake drum 22.

It will be apparent from the mechanism so far described that the rotation of the heads 13 and 14 to rotate the ball serves to pull the thread T upwardly from the source of supply 17 to the tension wheel 18 and to turn this wheel against the opposition of the friction mechanism 22, 23 to thereby tension the thread as it passes from the upper portion of the wheel 18 to the ball B. It will also be seen that the tension upon the thread T may be increased or decreased as desired during the winding operation by simply turning the wing nut 28.

The difficulty heretofore, however, has been that the operator had to guess as to the amount of tension to place on the thread, as no means was known prior to the present invention for accurately measuring the actual tension of the thread at the instant it was being wound upon the ball. The means of the present invention whereby this tension may be measured continuously with a high degree of accuracy throughout the ball winding operation will now be described.

The lever 21 serves to support the tension wheel 18 for limited movement toward and from the ball winding position, and in the construction shown this lever is fulcrumed at a point vertically below the wheel 18 as will be apparent from Figs. 1 and 2 wherein it will be seen that the lever 21 is provided at its lower end with the boss 29 which is rigidly secured to the horizontally extending shaft 30. This shaft is rotatably supported in the bearings 31 bolted to the table or support 32 upon which the casing 10 is mounted. The weight of the upwardly extending lever 21 and wheel 18 is preferably counterbalanced by a weight 33 which is adjustably mounted on the threaded rod 34 extending downwardly from the boss 29.

The rocking shaft 30 has rigidly secured thereto to extend rearwardly therefrom the horizontal arm 35 which projects through an opening in the lower portion of the casing 10. The arrangement is such that the upwardly extending lever 21, shaft 30 and arm 35 form a bell-crank construction.

To the rear of the casing 10 is secured the upwardly extending bracket 36 that forms a gallows from which is suspended a spring scale 37 that serves accurately to weigh, preferably in pounds and ounces, the actual tension of the thread T as it is wound on the ball B. The scale 37 is suspended from the gallows 36 by the threaded bolt 38 having the adjustable wing nut 39. The vertical sliding bar 40 of the spring scale 37 is connected to the outer end of the arm 35 by the connecting rod 41.

The arrangement is preferably such that the distance from the point where the rod 41 is secured to the arm 35 to the fulcrum 30 is equal to the distance from this fulcrum to the top of the tension wheel 18, so that the horizontal lever arm and vertical lever arm of the bell-crank have a one to one ratio.

It will be seen from the foregoing that the tension of the horizontal strand of the thread T tends to pull the wheel 18 towards the ball B and that this pull is yieldingly resisted by the spring scale 37. If the ratio of the lever arms 21 and 35 is one to one as above mentioned then the reading of the scale 37 will show in pounds and ounces the tension at any instance upon the thread T being wound on the ball.

In order to prevent the bell crank lever from oscillating unduly a dash pot 42 is preferably provided containing relatively heavy oil, and in this dash pot is provided the loosely sliding piston 43 secured to the stem 44 the upper end of which is bolted to the bracket 45 that is rigidly secured to the outer end of the arm 35.

It is important to so position the thread supply spool 17 that any pull exerted on the thread T to unwind it from this spool will not affect the swinging movement of the lever 21. This is accomplished by mounting the spool on the lever 21, and the spool is preferably positioned adjacent the lever trunnion as shown so that the change in the weight of the spool as its size de-

creases will not disturb the balance of the lever 21, 34. In the construction shown the spool 17 is mounted in alignment with the rocking shaft 30. The spool 17 has supporting trunnions and is supported by the bracket 46 bolted to the bell crank lever and provided with the space uprights 47 each having a notch at its upper end to receive a spool trunnion and rotatably support the spool.

In order to prevent the spool 17 from over-running and to facilitate the pulling of the thread loose from the spool, the free running roll 48 is provided which is rotatably supported by an upright 49 extending upwardly from the bracket 46. The arrangement is such that the thread T as it is unwound from the spool 17 passes around the roll 48 and back around the mass of rubber on the spool and then again around this roll and upwardly towards the drum 18 as shown in Fig. 3.

It will be seen from the foregoing that by mounting the supply spool 17 as shown any tension which is exerted upon the portion of the thread T extending from this spool upwardly to the tension wheel 13 will act as an increased load opposing the rotation of the wheel 13, but will not influence the swinging movement of the lever 21. The only force in the present construction, other than the weight of the arm 35, that urges the wheel 13 towards the ball B is the tension of the horizontal strand of the thread T extending from this wheel to the ball, and the only force that opposes this movement is the upward pull of the bar 40 of the scale 37 on the arm 35. Therefore the scale 37 serves to weigh or measure accurately the tension of the thread being delivered at the ball, and the amount of this tension is shown on the scale by the position of the pointer 50.

In adjusting the thread tensioning and measuring device of the present invention preparatory to winding thread upon the ball at a predetermined tension, the position of the scale 37 is adjusted by the wing nut 39 so that the lever 21 is in an approximately vertical position. The winding machine is then started up and the wing nut 28 is adjusted from time to time by the machine operator to thereby keep the scale pointer 50 at the desired reading.

The present construction makes possible for the first time, so far as applicants are aware, to control with exactness the tension of the thread being wound on the ball, and thereby turn out balls all of which will have with a high degree of exactness the desired compression properties.

Having thus described our invention, what we claim and desire to protect by Letters Patent is:

1. A golf ball winding mechanism comprising core-rotating means, thread tensioning mechanism supported in spaced relation to said means, a support therefor mounted for limited movement relative to the ball winding position and adapted to support said mechanism for movement in response to variations in the tension of the thread being wound on the core, a thread supply package mounted on said support so that it remains a fixed distance from said mechanism as the latter moves bodily, and spring means for balancing the pull of the thread on said support whereby the actual tension of the thread as it is wound on the ball may be weighed.

2. A golf ball winding machine comprising core-rotating means, thread tensioning mechanism supported in spaced relation to said means

and including a drum-like member adapted to be engaged by the thread and rotated against brake resistance by the advancing pull exerted on the thread as it is wound on the core, a support for said member movable relative to the core-rotating means in response to variations in the thread tension at the ball, a thread supply package supported a fixed distance from said member as the latter moves so that the force required to advance the thread to said tensioning mechanism from said package does not appreciably affect the movement of said support, and means for balancing the pull of the thread on said mechanism whereby the actual tension of the thread as it is wound on the ball may be weighed.

3. A golf ball winding machine comprising core-rotating means, thread tensioning mechanism spaced from the ball winding position and including a drum-like member adapted to be engaged by the thread and rotated against brake resistance by the advancing pull exerted on the thread as it is wound on the core, a support for said member movable relative to the ball winding position in response to variations in the thread tension at the ball, a thread supply package mounted on said support, means for balancing the pull of the thread on said support whereby the tension of the thread as it is wound on the ball may be accurately weighed, and adjustable means on said support for varying said brake resistance.

4. A golf ball winding machine comprising core-rotating means, thread tensioning mechanism supported in spaced relation to said means, a support for said mechanism mounted for limited movement relative to the ball winding position in response to variations in the tension of the thread being wound, a thread supply package positioned so that it remains a fixed distance from said mechanism as the latter moves, whereby the force required to advance the thread to said tensioning mechanism does not affect the movement of said support, and spring means opposing the pull of the thread on said support whereby the support is urged in one direction solely by the pull of the thread leaving the same and in the opposite direction solely by said spring.

5. A golf ball winding machine comprising core-rotating means, thread tensioning mechanism supported in spaced relation to said means, a support for said mechanism mounted for limited movement relative to the ball winding position in response to variations in the tension of the thread being wound, a thread supply package positioned so that it remains a fixed distance from said mechanism as the latter moves, whereby the force required to advance the thread to said tensioning mechanism does not affect the movement of said support, spring means opposing the pull of the thread on said support whereby the support is urged in one direction solely by the pull of the thread leaving the same and in the opposite direction solely by said spring, and adjustable means on the support for varying the tension exerted on the thread.

6. A golf ball winding machine comprising core-rotating means, thread tensioning mechanism supported in spaced relation to said means, a support for said mechanism mounted for limited movement relative to the ball winding position in response to variations in the tension of the thread being wound, a thread supply package positioned so it remains a fixed distance from said mechanism as the latter moves, whereby

the force required to advance the thread to said tensioning mechanism does not affect the movement of said support, and spring means opposing the pull of the thread on said support and adapted to measure accurately in units of weight the tension of the thread as it is wound on the ball.

7. A golf ball winding machine comprising core-rotating means, thread tensioning mechanism supported in spaced relation to said means, a support for said mechanism mounted for limited movement relative to the ball winding position in response to variations in the tension of the thread being wound, a thread supply package positioned so that it remains a fixed distance from said mechanism as the latter moves, whereby the force required to advance the thread to said tensioning mechanism does not affect the movement of said support, and spring means opposing the pull of the thread on said support by a force directly proportional to the actual thread tension at the ball.

8. A golf ball winding machine comprising core-rotating means, thread tensioning mechanism supported in spaced relation to said means, a support for said mechanism mounted for limited movement relative to the ball winding position in response to variations in the tension of the thread being wound, a source of thread supply positioned so that the force required to advance the thread to said mechanism does not affect said movement of the latter, means yieldingly opposing the pull of the thread on said support, and indicating means connected to said support and so actuated by the support movement that its reading excludes all forces except the actual tension of the thread at the ball.

9. A golf ball winding machine comprising core-rotating means, thread tensioning mechanism including a drum-like member adapted to be engaged by the thread and rotated against brake resistance by the advancing pull exerted on the thread as it is wound on the core, a pivoted lever having a laterally extending arm and upwardly extending arm the latter of which supports said member for limited movement towards and from the ball winding position in response to variations in the thread tension at the ball, spring means acting upon the laterally extending arm to oppose the pull of said thread, and a thread supply spool mounted approximately on the axis about which the lever swings.

10. A golf ball winding machine comprising core-rotating means, thread tensioning mechanism including a drum-like member adapted to be rotated against brake resistance by the pull exerted on the thread as it is wound on the core, a pivoted lever having an upwardly extending arm on which said member is mounted for movement towards and from the winding ball position in response to variations in the thread tension at the ball, a brake acting directly upon said member to oppose said rotation, a counterbalancing weight for said lever, and spring means for opposing the pull of the thread on said mechanism whereby the actual tension of the thread at the ball may be determined.

11. A golf ball winding machine comprising core-rotating means, thread tensioning mechanism including a drum-like member adapted to be rotated against brake resistance by the pull exerted on the thread as it is wound on the core, a pivoted lever for supporting said member for movement towards and from the ball winding position in response to variations in the thread tension at the ball, a brake acting directly upon said

member to oppose its rotation, a dash-pot for dampening the oscillations of the lever, and spring means for opposing this pull of the thread on said lever whereby the actual tension of the thread being wound on the ball may be determined.

12. A golf ball winding machine comprising core-rotating means, thread tensioning mechanism including a drum-like member adapted to be engaged by the thread and rotated against brake resistance by the pull exerted on the thread as it is wound on the core, a pivoted lever having an upwardly extending arm for supporting said member for movement towards and from the ball winding position in response to variations in the thread tension at the ball, an arm extending laterally from said lever, a dash-pot for dampening the oscillations of the lever, and spring means connected to the laterally extending arm to oppose the pull of the thread on said lever whereby the actual tension of the thread being wound on the ball may be determined.

13. A thread winding machine comprising means for rotating a thread support to wind thread thereupon, thread tensioning mechanism supported for limited movement relative to the winding position in response to variations in the tension of the thread being wound, a source of thread supply positioned to remain a fixed distance from said mechanism as the latter moves so that the force required to advance the thread to said tensioning mechanism will not affect the movement of the latter, and spring means for balancing the pull of the thread on said mechanism whereby the actual tension of the thread being wound may be determined.

14. A golf ball winding machine comprising core-rotating means, thread tensioning mechanism supported in spaced relation to said means for movement bodily under the pull of the thread being wound on the core, a source of thread supply from which the thread extends to said mechanism and positioned so that it remains a fixed distance from said mechanism as the latter moves bodily, said mechanism being arranged so that it is moved in one direction solely by the tension of that portion of the thread extending from it to the core, and spring means for balancing the pull of the thread on said mechanism whereby the tension of the thread as it is wound on the core can be determined in absolute units.

15. A golf ball winding machine comprising core-rotating means, thread tensioning mechanism supported in spaced relation to said means for movement bodily under the pull of the thread being wound on the core, a source of thread supply from which the thread extends to said mechanism and positioned so that it remains a fixed distance from said mechanism as the latter moves bodily whereby the movement of said mechanism is not appreciably influenced by the tension of the thread passing thereto, and spring means for balancing the pull of the thread on said mechanism whereby the tension of the thread as it is wound on the ball may be accurately weighed.

16. A golf ball winding machine comprising core-rotating means, a drum-like thread tensioning member adapted to be engaged by the thread and rotated against brake resistance by the advancing pull exerted on the thread as it is wound on the core, means for supporting said member for movement bodily relative to the core-rotating means as the tension at which the thread is wound on the core varies, a source of thread supply which remains a fixed distance from said member as the latter moves, means for yieldingly

opposing the movement of said member and for indicating the thread tension, and a brake acting on said member to tension the thread.

17. A golf ball winding machine comprising core-rotating means, a thread tensioning drum 5 for tensioning the thread as it is wound on the core and provided with a brake, a support for sup-

porting the drum and brake for movement by the thread in response to variations in the tension at which it is wound on the core, and means for yieldingly opposing the movement of said support and for indicating the winding tension.

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