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C. MACBETH

1,865,577

TENSION DEVICE FOR GOLF BALL WINDING MACHINES

Original Filed April 13. 1927

2 Sheets-Sheet 1

Fig. 1.

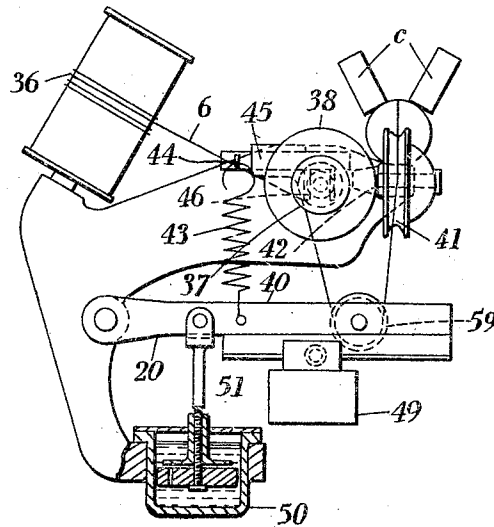
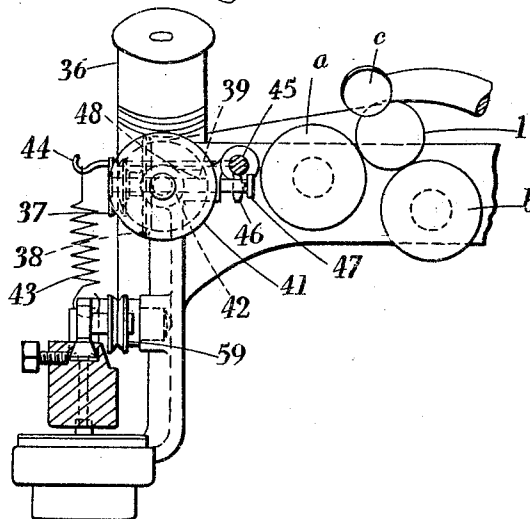


Fig. 2.



INVENTOR
John MacBeth
BY
B. Singer
ATTORNEY

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Fig. 3.

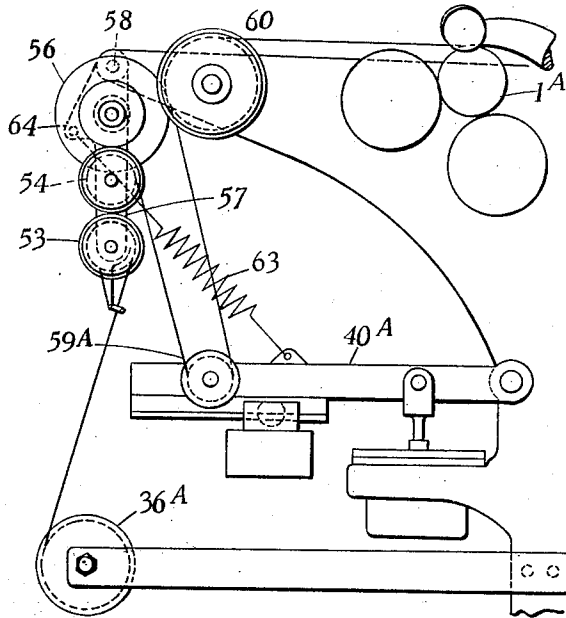
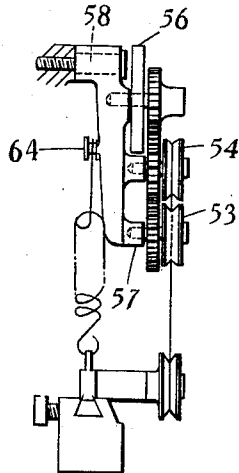


Fig. 4.



INVENTOR
Colin Macbeth
BY *B. Singer*
ATTORNEY

UNITED STATES PATENT OFFICE

COLIN MACBETH, OF BIRMINGHAM, ENGLAND, ASSIGNOR TO DUNLOP RUBBER COMPANY LIMITED, OF LONDON, ENGLAND, A CORPORATION OF GREAT BRITAIN

TENSION DEVICE FOR GOLF BALL WINDING MACHINES

Original application filed April 13, 1927, Serial No. 183,561, and in Great Britain June 3, 1926. Divided and this application filed July 22, 1929. Serial No. 380,016.

This invention has reference to machines for winding elastic thread upon a centre or core in the manufacture of golf and like balls, and to other machines for dealing with thread under tension, in which the ball-core or other work whereto the thread is delivered serves to draw the said thread through a tension-regulating gearing interposed between the said work and a thread-supply bobbin or the like, which tension gearing comprises rotary members geared together and rotated by the passing thread.

This application is a division of my co-pending application No. 183,561, filed April 13, 1927.

As applied to the production of such ball-cores or the like, it is the practice, in order to realize tight winding, to stretch the thread by the tensioning gear to a degree exceeding the elastic limit of such thread. Consequently the imposition of abnormal resistance to the thread delivery (occasioned, for instance, by snarling or increased friction at the supply-bobbin or when a full bobbin is in use) may easily result in breakage of the thread if such abnormal resistance is not automatically compensated for in or by some part of the machine. On the other hand, sometimes the bobbin over-runs or other conditions arise which result in a decrease in the normal thread-tension as predetermined by the tensioning gears and would lead to irregularity in the thread feed or delivery if not automatically compensated for.

The present invention proposes to provide, in conjunction with the thread-tension gearing of a machine of the type referred to, a mechanism which automatically compensates for, or safeguards against the normal or predetermined working stretch or tension of the thread being affected or altered by disturbing delivery factors such as above referred to.

To realize this according to the present invention, the effect of variable resistance on the tensioned thread is compensated for in the machine by loading a loop of the said thread by a displaceable member whose displacement consequent upon variation or alteration of the normal or predetermined tension

in the loop realizes or permits of regulation or variation in the thread-feed action of certain elements of the tensioning-gear.

For example, in one application of the invention to golf-ball winding machines, a thread-guide tension pulley, which is driven by the drawing of the thread onto the core, is adapted to frictionally drive, directly or indirectly, another tension-pulley which draws the thread from the supply bobbin. These driving and driven pulleys are adapted to predetermine and apply the normal tension whereby the thread is stretched (usually beyond its elastic limit) prior to being taken up in the core, whilst to render the mechanism self-compensating for dealing with variable thread feeding, or to take care of varying resistance factors which might otherwise break the thread or affect the feed, there is embodied in the machine, an intermediate guide-pulley which is associated with a loaded and displaceable lever or similar member, and around which the thread is looped or constrained to pass in its run from the driven to the driving tension-pulley. This loaded lever or member is adapted to control, or permit of slip or variation in, the friction drive of the thread take-off pulley in such a manner that any factor imposed on the thread feed between the bobbin and the said take-off pulley will be reproduced in the loaded loop and result in or permit of a displacement of the loading member, and, through the actuation of a suitable intermediate or control mechanism, bring about a compensating acceleration or variation of the rate of thread take-off from the supply bobbin.

A constructional form of such a machine is shown diagrammatically in Figures 1 and 2 of the accompanying drawings, in which

Figure 1 is a side elevation and

Figure 2 is a view looking from the right hand side of Figure 1.

Figures 3 and 4 show an alternative construction.

In Figures 1 and 2, *a* and *b* indicate any suitable system of ball-driving rollers that impart the rotational drive to the ball core 1 being wound, and which may control its axes of rotation; the core being located in

relation to, and maintained in frictional driving contact with, the said rollers *a*, *b*, by superimposed rollers such as *c*. The frictional driving of the core by this mechanism 5 draws the elastic thread 6 from a supply or let-off bobbin 36 which is mounted upon a spindle bracketed to the body of the machine.

Journalled in the frame in convenient relation to the rollers *a*, *b*, is a pulley 41 whose spindle carries a friction cone 42 contacting with a complementary cone 38 fixed in relation to a second pulley 37 whose spindle is slidably journalled in its frame-bearing to 15 permit of the relative positions of the cone and pulley unit 38—37 being changed in relation to the unit 41—42 for drive-variation purposes as hereinafter described. This arrangement provides for the friction-drive of 20 the unit 38—37 by the thread-driven unit 41—42, and for the normal tensioning of the thread during its pulley-guided run from the supply-bobbin to the core.

In the example of gearing shown, the friction drive cones when operating normally provide a speeding-up rate of 4 to 1 between the driving and driven units, whilst the pulley of the driving unit is twice the diameter of the driven-unit pulley, but it will be understood that since the drive-ratio and pulley-diameters are the factors which determine the degree of stretch or tension that is applied to the thread by the gearing, the machine may be adapted to realize any desired 35 normal tensioning action by selecting and fitting suitable feed and guide units.

The thread, after being taken from the bobbin, is passed one or more times round the driven pulley in order to give a grip or resistance for drawing the thread off the bobbin 40 without thread slip and to enable the normal tension to be applied by the action of the thread-driven pulley, whilst in order to realize the tension-compensating control, 45 there is fulcrumed to the frame of the machine, a weighted lever 40 carrying an intermediate thread-guide pulley 59 and the thread, after leaving the pulley 37, is passed or looped round the pulley 59 and thence to 50 the thread-driven pulley 41.

This loaded lever unit 40—49 is connected by a spring 43 to a lever 44—45 which is suitably journalled or pivoted in the frame and has a forked end 46 bearing on a collar 55 or abutment 47 on the shaft 48 that carries the driven cone and pulley unit 38—37, this shaft, as already stated, being displaceable longitudinally within its bearing. Thus the loaded lever-unit 40—49 not only loads the 60 thread loop but also, through the spring 43 and lever 44, 46, functions to maintain the cone of the disc 38 in frictional driving contact with the driving cone 42.

The weight 49 on the lever 40 is adjustable 65 for enabling the thread-loop load and drive

friction factors to be determined and varied in accordance with requirements, whilst to eliminate or suppress any tendency of the mechanism to "hunt" during operation, the said lever may be connected as shown to a 70 dash-pot device such as 50, 51.

As will be obvious from Figure 1, the mechanism described introduces into the thread feed and tension system, a loaded thread-loop 75 which, so long as the predetermined thread-tension is not affected or disturbed by the superimposition of any abnormal resistance to the feed, permits of the loaded lever and intermediate drive control mechanism to function so that the unit 41—42 drives the 80 unit 38—37 at the prescribed maximum speed. If, however, the feed is subjected to extra resistance (as for instance due to a full bobbin being in use, or to increased friction, or to thread-snarling at the bobbin) such as 85 tends to check or brake the unit 38—37, this, by correspondingly increasing the tension of the thread in the loaded loop, pulls up or displaces the loading lever 40 and 49 and eases the load on the drive control spring 43 90 with the result that the drive-maintaining thrust of the spring-loaded lever 44—46 upon the tension-feed unit 38—37 is correspondingly eased or relieved to permit of a slip 95 in the drive between the transmission cones 42, 37. Such slip enables the speed of the driven cone and pulley to change in relation to that of the driving unit to compensate the effect of the extra feed resistance and maintain the delivered thread at the predetermined tension, whilst when the extra resistance disappears, the relaxation of tension in the loaded loop permits the loading lever to 100 drop and, through the spring and lever control mechanism, restore the thread feed and tension drive to normal. I prefer to arrange the gearing with proportions such as will require that there shall be a constant state of slippage (in greater or less degree) of the 110 friction gearing.

An alternative constructional application of the invention is shown in Figures 3 and 4, where 36^A is the supply-bobbin from which the thread is passed round a pair of pulleys 115 53 and 54 that are mounted in a swinging arm 57 pivoted at 58 to the frame of the machine. These pulleys are geared together by spur-gears as shown in Figure 4 and the thread on leaving them is looped round a 120 guide-pulley 59^A journalled to a loaded lever 40^A before passing to the core-driven pulley 60 to the core 1^A. A drive-control spring 63 is interposed between the loading lever and the arm 57 which also carries a friction disc 56 adapted to be driven by a complementary 125 cone on the pulley 60 and to transmit that drive through spur gearing to the spur gears pertaining to the pulleys 53 and 54.

This alternative mechanism functions for 130 compensating purposes substantially in the

same manner as that already described with reference to Figures 1 and 2 since any factor that varies the tension of the loaded thread-loop brings about a displacement of the load-
 5 ing lever and an adjustment of the drive-maintaining effort of the spring 63 on the pulley-carrying arm 57 which permits if required of such slip or variation in the relative speeds of the driven and driving discs
 10 60—56 as may be necessary to compensate for the load variation on the thread.

The pulleys 53 and 54 being geared together they operate to control the rate of feed of the thread to the pulley 59^A of the
 15 loop-loading mechanism which in turn controls the friction drive in the manner already described, but the machine shown in Figures 3 and 4 provides an advantage over that described with reference to Figures 1 and 2
 20 in that it does not involve the twisting or displacement of the thread at right angles in its run through the tension gearing whilst the more direct feed of the thread enables a more compact construction of machine to be
 25 realized. Also whereas in Figures 1 and 2 an arrangement is shown which may necessitate the taking of the thread more than once round certain of the pulleys, thus involving the twisting of the thread itself, the arrangement shown in Figures 3 and 4 will prevent
 30 thread-slip round the pulleys 53, 54 in the manner shown in Figure 3 and eliminate twist. I may if desirable use more than two pulleys as 53, 54 in order to prevent thread
 35 slippage.

The application of the invention to other machines for dealing with thread under tension differs in no essential respect from its
 40 application to machines for winding tensioned thread on ball-cores or centres as herein described.

The compensating mechanism herein described is capable of application to existing machines embodying friction-driven gearing
 45 such as herein described for applying or realizing the normal tension of the thread.

Having described my invention, what I claim and desire to secure by Letters Patent is:—

50 1. A machine of the type referred to for tensioning thread comprising in combination a thread driving unit, a thread driven unit, friction means connecting said units, a weighted member engaging a loop of thread
 55 between said units and movement of which is due to variations of thread tension, and a tension spring connecting the friction means to the weighted lever whereby, on the weighted member being raised or lowered, the tension of said spring and friction between said
 60 units is varied to permit of more or less slip between the latter.

2. A machine of the type referred to for tensioning thread comprising a thread driving
 65 unit, a thread driven unit, friction means

connecting said units, a weighted member engaging a loop of thread between said units and movable by variations in thread tension, means for varying the contact pressure between said friction means and a spring connecting said movable member with said contact pressure adjusting means.

3. A machine of the type referred to for tensioning thread comprising a work-driven thread tensioning element embodying a friction unit, a second thread tensioning element frictionally driven from said first mentioned element, a weighted member engaging a loop of thread between said elements, means for
 75 varying the contact pressure between said friction elements and a spring connected to said movable member and controlling the contact pressure varying means.

4. A machine for winding india-rubber thread in the manufacture of the core of a golf ball comprising means for driving said
 85 core, a thread guiding pulley driven by said core, a second thread guiding pulley on which the thread is received from the source of supply, friction means connecting said thread
 90 guiding pulleys, a weighted member engaging a loop of thread between said pulleys and means subject to control of said weighted member for varying the contact pressure between the friction driving means according
 95 to variations in the thread tension.

In witness whereof I affix my signature.

COLIN MACBETH.

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