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LINE TENSION MEASURING INSTRUMENT

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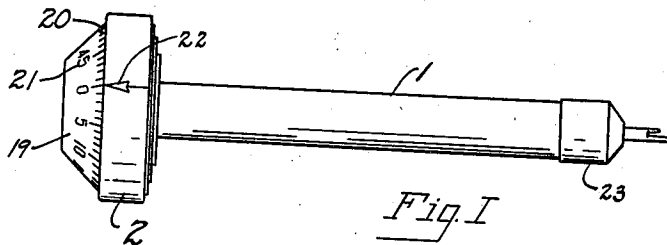
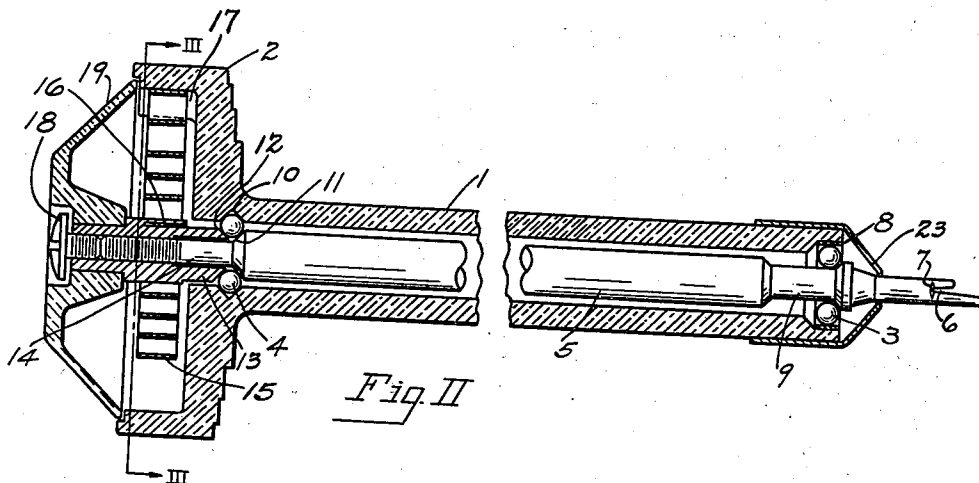
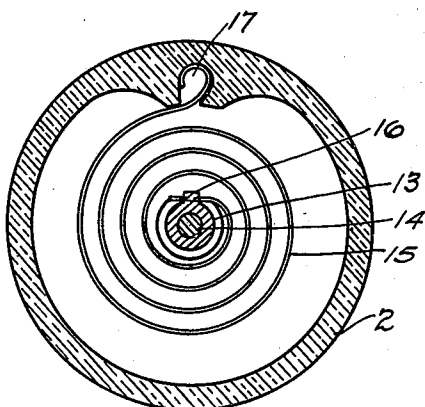
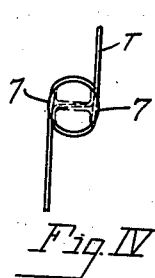
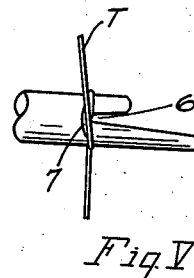


Fig. III

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LINE TENSION MEASURING INSTRUMENT

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9 Claims. (Cl. 265-1)

This invention relates to force measuring instruments and particularly to instruments for determining the resistance or pull exerted upon a thread or line and one of its principal objects is to provide a device which may be readily connected to a thread or line while such thread or line is in place in a machine.

Another object is to provide a device of this class having at one end a rotatable projection for engagement with a thread or line and at the other end an indicator for automatically showing the force exerted upon such thread or line.

Another object is to provide a device of such shape and compactness as to be easily manipulated for the purpose of determining force or resistance exerted upon or through a thread or line.

Another object is to provide a device of this kind having maximum simplicity of mechanism.

And another object is to provide novel and effective means whereby a rotatable projection can be connected to a line or thread.

Other objects and advantages will be apparent from the following description, in which reference is had to the accompanying drawing illustrating a preferred embodiment of my invention and wherein similar reference numerals designate similar parts throughout the several views.

In the drawing:—

Figure I is an elevational view of the device of my invention.

Figure II is an enlarged sectional view taken upon a plane passing through the longitudinal axis of the device, the central rotatable shaft being shown in elevation and a part being broken out for the purpose of shortening the figure.

Figure III is a vertical sectional view taken on the line III—III of Figure II.

Figure IV is a further enlarged end view of a thread engaging projection of my device showing a thread engaged thereby; and

Figure V is a similarly enlarged side view of the thread engaging projection showing a thread engaged thereby.

Referring to the drawing in detail, the body of the device consists of a barrel 1 upon one end of which is formed a casing 2, the barrel and casing preferably being integrally formed of light, durable material such as synthetic resin. In an embodiment of my invention intended for measuring tension on thread in sewing machines, the barrel is comparable in size to that of a large fountain pen and constitutes a handle, while the casing is comparable in size to that of a large watch.

Rotatably mounted in ball bearings 3 and 4 within the barrel 1 is a shaft 5 having one end formed, as illustrated in Figures IV and V, with an end notch 6 and side grooves 7 adapted to receive a thread T, one of the furcations formed by the end notch 6 being shortened to facilitate thrusting the notch over a thread T. The ball bearing 3, which is subjected to radial load when the device is in use, is equipped with a metallic outer ball race 8, the inner race being formed by a reduced portion 9 of the shaft 5. The outer race of the ball bearing 4 is formed by an annular V-shaped groove 10 cut into the interior of the barrel 1, the inner race being formed by a beveled shoulder 11 on the shaft 5 and the beveled end 12 of a sleeve 13 which is threaded onto the reduced end 14 of the shaft 5. The thrust and radial loads to which the bearing 4 is subjected are very slight; hence no hardened race is needed in this bearing.

Yieldable resistance to the pull upon the thread T is provided by a flat spiral spring 15, the inner end of which is anchored to a projection 16 on the sleeve 13, while the other end is anchored in a socket 17 formed in the casing 2. The sleeve 13 is locked to the shaft 5 by means of a locking screw 18.

Mounted upon the sleeve 13 and fixedly secured thereto is a dial 19, also made of light, durable material such as synthetic resin, provided with graduations 20 and numerals 21 which cooperate with an index 22 on the casing 2 to indicate pull upon the thread T. A ferrule 23, forced over the end of the barrel 1, serves to exclude dirt from the ball bearing 3 and give the device a finished appearance.

In using the device the notch 6 is thrust over the thread so that the thread is straddled by the furcation formed by the notch. The entire instrument is then turned to the right to wind the thread about the end of the shaft in the manner shown in Figures IV and V, the portions lying in the side notches 7 acting to bind the adjacent portions and prevent slippage. The instrument is then given another right turn to wrap the thread about the unnotched portion of the shaft and the instrument while held with its case perpendicular to the direction of extension of the thread is bodily moved in a direction to exert a pull upon the thread.

The pull of the thread, acting upon the periphery of the shaft extension, rotates it against the resistance of the spring 15, and the dial 19, which is so mounted as to rotate with the shaft 5, turns to a position in which the pull upon the thread

is indicated by the condition of registration of the graduations and numerals on the dial with the index 22 on the non-rotating casing 2. If, for example, the thread passes through so-called

5 "tension means" on a sewing machine, the amount of resistance exerted by such tension means to the movement of the thread will be indicated by the co-operating dial and index 22. The effect of a given setting of the tension device

10 upon any particular type of thread or thread finish may thus be readily and accurately determined.

The embodiment of my invention herein shown and described is to be regarded as illustrative only, and it is to be understood that the invention is susceptible to variation, modification and change within the spirit and scope of the subjoined claims.

Having described my invention, I claim:

- 20 1. In a device of the class described, in combination, an elongated barrel adapted to serve as a handle, a rotatable shaft extending longitudinally of said barrel, means at one end of said shaft for fastening a line thereto whereby a pull on said
- 25 line will exert a turning effort on said shaft, means for yieldably resisting such turning effort, and means for indicating the amount of such turning effort.
- 30 2. In a device of the class described, in combination, an elongated barrel adapted to serve as a handle, a casing at one end of said barrel, a rotatable shaft extending longitudinally of said barrel, means at one end of said shaft for fastening a
- 35 line to be wrapped about said shaft whereby a pull on said line will exert a turning effort on said shaft, means mounted within said casing for yieldably resisting such turning effort of said shaft, and means for indicating the amount of such turning effort.
- 40 3. In a device of the class described, in combination, an elongated barrel adapted to serve as a handle, a rotatable shaft extending longitudinally of said barrel, means at one end of said shaft for fastening a line thereto whereby a pull
- 45 on said line will exert a turning effort on said shaft, means for yieldably resisting such turning effort, and means at the other end of said shaft for indicating the amount of such turning effort, said indicating means including an indicator fixed
- 50 to said shaft.
- 55 4. In a device of the class described, in combination, a barrel adapted to serve as a handle, a casing at one end of said barrel, a rotatable shaft extending longitudinally of said barrel, means at one end of said shaft for fastening a
- 60 line to be wrapped about said shaft whereby a pull on said line will exert a turning effort on said shaft, means mounted within said casing for yieldably resisting such turning effort of said shaft, and means for indicating the amount of

such turning effort including a conical chart fixed to said shaft and bearing indicia co-operating with an index on said casing.

5. In a device of the class described, in combination, a barrel adapted to serve as a handle, a casing at one end of said barrel, a rotatable shaft extending longitudinally of said barrel, means at one end of said shaft for fastening a line to be wrapped about said shaft whereby a pull on said line will exert a turning effort on said shaft, a spiral spring mounted within said casing for yieldably resisting such turning effort of said shaft, and means for indicating the amount of such turning effort including a conical chart fixed to said shaft and bearing indicia co-operating with an index on said casing.

6. In a device of the class described, in combination, a rotatable shaft having an axially extending notch in its end and notches in its sides adjacent the bottom of said axially extending notch, said notches being adapted to receive and

fasten a line to be wrapped about said shaft whereby a pull on said line exerts a turning effort on said shaft, means for yieldably resisting such turning effort, and means for indicating the amount of such turning effort.

7. In a device of the class described, in combination, a rotatable shaft having an axially extending notch in its end, one of the furcations formed by said notch being shortened, said notch being adapted to receive a line to be fastened to and wrapped about said shaft whereby a pull on said line will exert a turning effort on said shaft, means for yieldably resisting such turning effort, and means for indicating the amount of such turning effort.

8. In a device of the class described, in combination, a rotatable shaft having an axially extending notch in its end and notches in its sides adjacent the bottom of said axially extending notch, one of the furcations formed by said axially extending notch being shortened, said notches being adapted to receive and fasten a line to be wrapped about said shaft whereby a pull on said line will exert a turning effort on said shaft, means for yieldably resisting such turning effort, and means for indicating the amount of such turning effort.

9. In a device of the class described, in combination, a long rotatable shaft, means at one end of said shaft for fastening a line thereto whereby a pull on said line will exert a turning effort on said shaft, an anti-friction bearing adapted for taking only radial loads adjacent said end of said shaft, torsionally acting means for yieldably resisting such turning effort, and a bearing adapted for taking radial and thrust loads supporting said shaft adjacent such torsionally acting means.