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R. F. PARKS
SELF-LOCKING ADJUSTING SCREW ASSEMBLY
FOR YARN TENSIONING DEVICE
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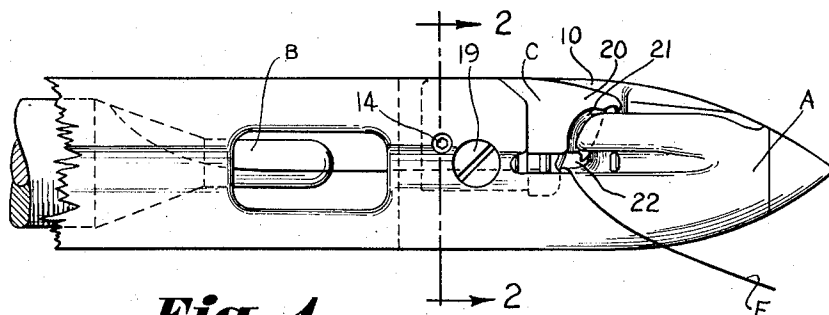


Fig. 1.

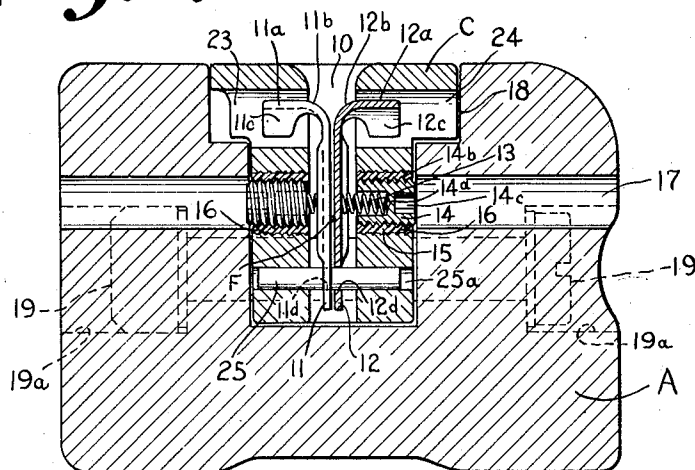


Fig. 2.

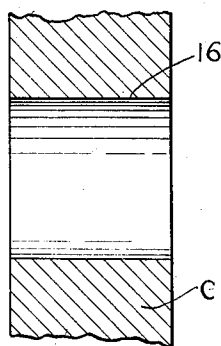


Fig. 3.

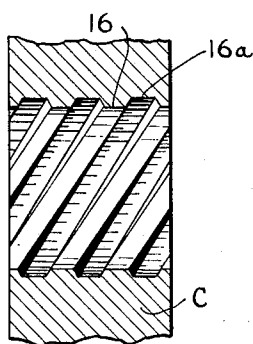


Fig. 4.

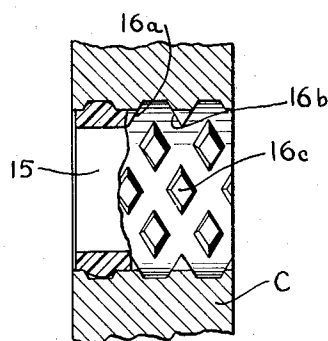


Fig. 5.

INVENTOR.
ROBERT F. PARKS

BY *Robert F. Parks*
ATTORNEY

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SELF-LOCKING ADJUSTING SCREW ASSEMBLY FOR YARN TENSIONING DEVICE

Robert F. Parks, Greenville, S. C., assignor to Steel Heddle Manufacturing Company, Paris, S. C., a corporation of Pennsylvania

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8 Claims. (Cl. 139—217)

This invention relates to devices for applying a predetermined amount of tension to filling yarn and more especially to a self-locking adjusting screw assembly for varying such tension.

Devices which apply predetermined amounts of tension to the filling are usually in the form of a metal threading block contained in the shuttle carrying the filling yarn. This metal threading block usually contains two or more metal tension pads which are held in contact with the yarn by the pressure exerted thereon by relatively light springs. Fine adjustments of the pressure, and hence the tension, exerted on the yarn by these pads are made possible by means of small set screws carried by the threading block for positioning light springs which bear directly upon the tension springs. In the course of weaving cloth, severe impact and vibration is imparted to the threading block assembly due to the action of the loom. This impact and vibration tends to cause these tension adjusting screws to move and thereby disturb the original setting of tension to be applied to the yarn. This causes great difficulty in weaving, as it is imperative that a constant amount of preselected tension be applied to the yarn during the process of weaving. Many means of locking the tension screw have been used with varying degrees of effectiveness. One such type of locking means employed a spring wire applying pressure directly to the threads of the adjusting screw in an attempt to cause binding of the metallic external and internal threads used in the assembly. Another type of locking device included a metallic bushing containing internal threads, which was pressed into the threading block. This bushing was serrated and constructed of spring material. The slotted portions were bent inwardly applying pressure to the outside diameter of the screw threads. Both of these locking devices have many disadvantages in that since the pressure is applied at only one point along the length of the screw it is not effective at extreme ranges of adjustment of the screw. Due to variations in manufacture and the close tolerances required for this type of locking device the locking force exerted thereby varies from the point at which it is difficult to adjust the screw due to extreme binding of the screw, to the point where very little or no locking pressure is exerted on the screw.

Accordingly, it is an object of this invention to provide means for adjusting a yarn tensioning device including a novel self-locking adjusting screw assembly.

Another object of this invention is to provide a self-locking adjusting screw assembly for use with a yarn tensioning device having a uniform locking action at any desired setting of the adjusting screw.

Another object of this invention is to provide a self-locking adjusting screw assembly for yarn tensioning devices including a bushing constructed of a deformable material.

An important object of this invention is to provide an adjusting screw assembly of the character described including means preventing the deformable bushing from being pushed out of the bore of its hole by the action

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of the screw threads of the adjusting screw when the adjusting screw has been turned to its extreme limit and bottomed solidly against the tension pads.

Another object of this invention is to provide an adjusting screw assembly of the character described in which the gripping action developed between the deformable bushing and the bore of its hole exceeds the gripping action developed between the deformable bushing and the threads of the screw when the screw has been turned to its extreme limit.

Still another object of this invention is to provide a self-locking screw assembly of the character described in which the bore of the hole into which the deformable bushing is placed includes right-hand and left-hand threads.

A further object of this invention is to provide an assembly such as described in which the right-hand and left-hand threads of the bore are not matching threads to the threads of the screw.

Yet another object of this invention is to provide a device of the character described in which bore is characterized by a plurality of relatively small substantially diamond shaped protuberances to which the outer surface of the deformable bushing conforms.

The construction designed to carry out the invention will be hereinafter described, together with other features thereof.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawing forming a part thereof, wherein an example of the invention is shown and wherein:

Figure 1 is a side elevation showing a shuttle having a self-locking adjusting screw assembly constructed in accordance with the present invention.

Figure 2 is an enlarged transverse sectional view, taken on the line 2—2 in Figure 1, illustrating parts of the self-locking adjusting screw assembly in section.

Figure 3 is an enlarged transverse sectional view illustrating the first step in constructing the bore, in which the adjusting screw device is positioned, in accordance with the present invention.

Figure 4 is a transverse sectional view similar to that shown in Figure 3 illustrating the second step in constructing the bore, and

Figure 5 is a sectional view similar to Figures 3 and 4 showing the bushing positioned within the completed bore.

Efforts have been made to construct a suitable self-locking adjusting screw assembly which included a relatively thin bushing constructed of a synthetic polymeric material. This bushing was placed within a hole or bore within the threading block and the bore was provided with screw threads and with a plurality of broached notches to prevent the bushing from turning within the bore when the adjusting screw was threaded therein. The resulting compression of the deformable bushing provided a constant pressure between the internal threads within the bore and the external threads on the screw. However, it was found that when the adjusting screw was turned to its extreme limit and bottomed solidly against the tension pad, a further turning of the adjusting screw caused the bushing to be pushed or backed out of the bore by the action of the screw threads of the adjusting screw, thus destroying the further use of the assembly. Since it is impossible to accurately determine the position of the adjusting screw in view of its remote position within the shuttle, this backing out of the bushing occurred frequently during adjustment. After many efforts were made to overcome this defect, a suitable structure was developed providing a solution to this problem and

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it is this structure that forms the subject of the present invention and which is set forth in detail below.

Referring more particularly to the drawing, the letter A designates a shuttle of the type which is employed in a loom for the purpose of carrying filling yarn to be woven into cloth. The filling F in the drawing is carried by the bobbin B which is positioned in the usual recess within the shuttle provided therefor. The bobbin B is carried by the shuttle A in such a manner that it may readily be changed in favor of a full bobbin when the filling thereon has become almost exhausted. The filling F extends from the bobbin B and is positioned within the threading block C for delivery in the weaving operation.

It will be noted that the yarn F is threaded into the threading block C in the vertical longitudinal threading channel 10 and between the vertical pads 11 and 12 positioned within the threading channel 10. The pads 11 and 12 are urged together by means of the relatively light coil springs 13 which are carried by the adjusting screws 14 within drilled holes 14a provided therefor to impart tension to the filling F. The adjusting screws 14 are provided with external screw threads 14b and with sockets 14c to accommodate a suitable wrench for threadably adjusting same. A deformable insert 15, which is preferably constructed of a synthetic polymeric material such as "nylon" or "Teflon" manufactured by E. I. du Pont de Nemours and Co., Inc., of Wilmington, Delaware, is positioned within a hole or bore 16 within the threading block C. A bushing constructed of such resilient, deformable material is not materially effected by the presence of oil or grease as would be the case in most devices which are dependent upon friction for their operation. A pair of horizontal, transversely extending bores 17 are placed within the shuttle body A so as to gain access, by means of a suitable wrench, to the adjusting screws 14. The bore 16 within the threading block C together with the above parts relating to the tension adjusting screw 14 constitute the assembly with which this invention is concerned.

Referring now particularly to Figures 1 and 2, it will be seen that the threading block C is positioned within a recess 18 provided within the shuttle body A therefor. The threading block C is firmly seated in position within the recess 18 by means of the screws 19 which are countersunk within the shuttle body as at 19a. The filling yarn F is threaded under the usual horn 20, carried by the threading block C, and passes down into the longitudinal channel 10 and the slot 21 to be carried between the tension pads 11 and 12 and delivered from the usual shuttle eye 22. The pads 11 and 12 are provided with the usual diverging projections 11a and 12a and with curved intermediate portions 11d and 12d over which the yarn is guided. The yarn is further protected by the downwardly diverging lips 11c and 12c. The diverging projections 11a and 12a are received by recesses 23 and 24 within the threading block C. The pads 11 and 12 are slideably positioned adjacent their lower ends on the pin 25 which is carried within a suitable bore 25a within the threading block C as by a pressed fit. The pin 25 passes through holes 11d and 12d within the pads 11 and 12 respectively.

Referring more particularly now to the Figures 3, 4, and 5, the method of constructing the assembly which forms the subject of the present invention will become apparent. A suitable bore 16 is first tapped within the threading block C. A fast lead tap is then threaded first in one direction or counterclockwise to produce the threaded portion 16a and then a fast lead tap is threaded in the other direction or clockwise as at 16b. A plurality of relatively small diamond shaped protuberances 16c are thus formed within the bore 16 in rows of alternately spaced protuberances. A bushing 15 constructed of a deformable material, of the type described above, is then positioned within the bore 16 so as to substantially con-

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form to the surface of the protuberances 16c. This may be accomplished by pressing the bushing 15 into the bore 16 and then threading a screw (not shown) of a slightly smaller size than the adjusting screw 14 into the hole within the bushing so as to press the outer surface of the bushing to conform to the bore 16 as is shown in Figure 5. Preferably these threads 16a and 16b are not matching threads to the external threads of the screw 14. The construction of the bore may be accomplished in a number of ways only one of which has been described.

Therefore, in an assembly constructed in accordance with the present invention when a screw is moved to its extreme limit and bottomed on the tension pad, it has been found that, although the strength of the bushing is exceeded and the screw continues to turn within the nylon bushing, this bushing remained in place within the bore and when the screw is turned in the opposite direction, bringing it out of contact with the tension pads that the device operates as efficiently as before.

With adjusting screws left motionless in position for a period of about 30 seconds or longer the force required to start the screws in motion is greatly increased. It is thought that this is due to the nylon or resilient bushing flowing into all the irregularities of the screw threads and that the deformable material must be forced out of these irregularities before the screw is allowed to turn. This action is accompanied by a definite breaking loose of the screw from its locked position involving a force considerably greater than that required to continue to turn the screw after it is in motion. If the screw is allowed to remain motionless for a short period of time, the original locking effect is again experienced upon the application of further efforts to move the screw.

This initial locking force produced by this assembly is sufficient to prevent movement of the screw through vibration or forces other than the actual application of the force required to initially turn the adjusting screw. This device in no way damages or excessively abrades the screw threads, since the synthetic polymeric material of the type described is a fairly good bearing material and offers very little resistance to the movement of the screw while it is in motion. It is thus seen that a means for adjusting a mechanism of materially light load characteristics, easily yet providing a positive locking or holding action to prevent movement or loss of adjustment when subject to vibration, has been provided.

While a preferred embodiment of the invention has been described using specific terms, such description is for illustrative purposes only, and it is to be understood that changes and variations may be made without departing from the spirit or scope of the following claims.

What is claimed is:

1. In a shuttle having a threading block with a bore therein and tension pads, a self-locking adjusting screw assembly including, right and left hand threads carried by the bore, a bushing constructed of a synthetic polymeric material substantially conforming to said threads, and a screw carried by said bushing so as to exert pressure against said tension pads.

2. In a shuttle having a threading block with a bore therein and tension pads, a self-locking adjusting screw assembly including, a plurality of substantially diamond shaped protuberances carried by the bore, a bushing constructed of a synthetic polymeric material substantially conforming to said protuberances, and a screw carried by said bushing so as to exert pressure against said tension pads, said protuberances being of sufficient number and so spaced that the friction developed between the bushing and said protuberances exceeds the friction developed between the bushing and the screw.

3. In a shuttle having a threading block with a bore therein and tension pads, a self-locking adjusting screw assembly including, a plurality of alternately spaced rows of protuberances carried by the bore, a bushing constructed of a synthetic polymeric material substantially

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conforming externally to said protuberances so as to exert pressure against said tension pads, and an externally threaded element carried by said bushing, said protuberances being so shaped and spaced that the friction developed between the bushing and said protuberances exceeds the friction developed between the bushing and the threaded element.

4. In a shuttle having a threading block with a bore therein and tension pads, a self-locking adjusting screw assembly including, a plurality of alternately spaced rows of substantially diamond shaped protuberances carried by the bore, a bushing constructed of a synthetic polymeric material substantially conforming externally to said protuberances, and an externally threaded element carried by said bushing so as to exert pressure against said tension pads, said protuberances being of sufficient size and number that the friction developed between the bushing and said protuberances exceeds the friction developed between the bushing and the threaded element.

5. In a shuttle having a threading block with a bore therein and tension pads, a self-locking adjusting screw assembly including, a bushing constructed of a synthetic polymeric material carried by the bore, an externally threaded element carried by said bushing so as to exert pressure against said tension pads, and right and left hand threads which do not match the external threads of said element carried by said bore defining a plurality of spaced diamond shaped protuberances, whereby the external surface of said bushing substantially conforms to said pro-

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tuberances developing greater gripping action therebetween than is developed between the bushing and said element.

6. A threading block having a bore therein, the bore having right and left hand threads, a bushing constructed of a synthetic polymeric material substantially conforming to said threads, and a screw carried by said bushing.

7. A threading block having a bore therein, a plurality of substantially diamond shaped protuberances carried by the bore, a bushing constructed of a synthetic polymeric material substantially conforming to said protuberances, and a screw carried by said bushing.

8. A threading block having a bore therein, a plurality of protuberances carried by the bore, a bushing constructed of a synthetic polymeric material substantially conforming externally to said protuberances, and an externally threaded element carried by said bushing, said protuberances being so shaped and spaced that the friction developed between the bushing and said protuberances exceeds the friction developed between the bushing and the threaded element.

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