Oct. 21, 1969 L. J. CASHORE 3,473,757

CORD TENSIONING DEVICE

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Fig. 3.

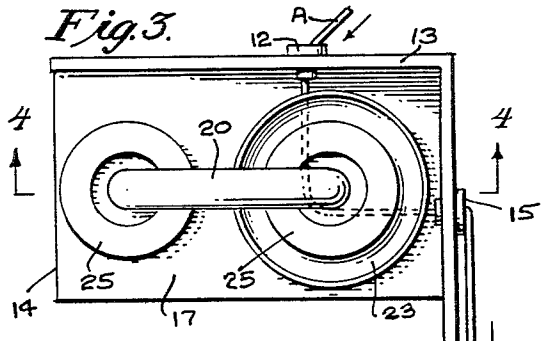
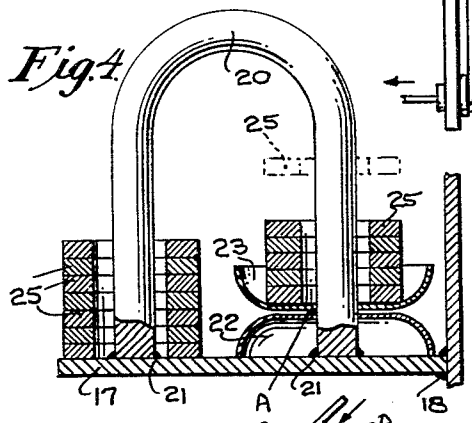


Fig. 4.



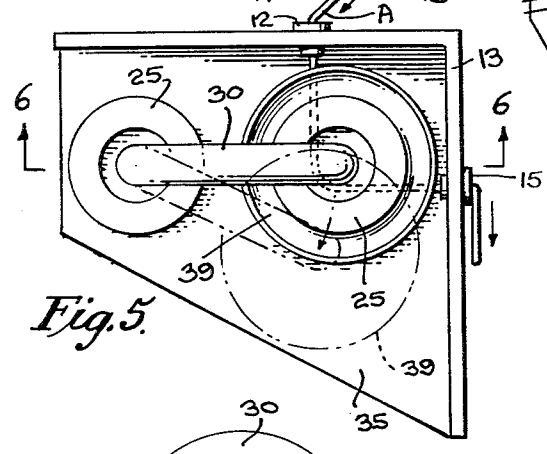


Fig. 5.

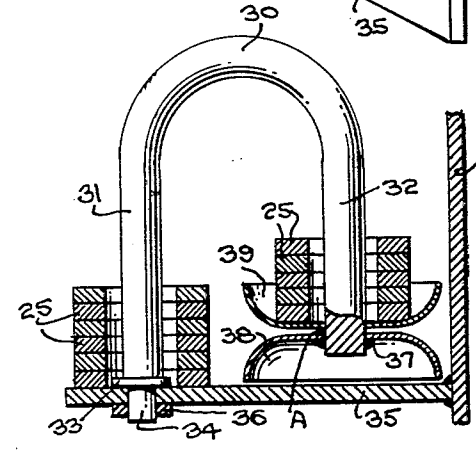


Fig. 6.

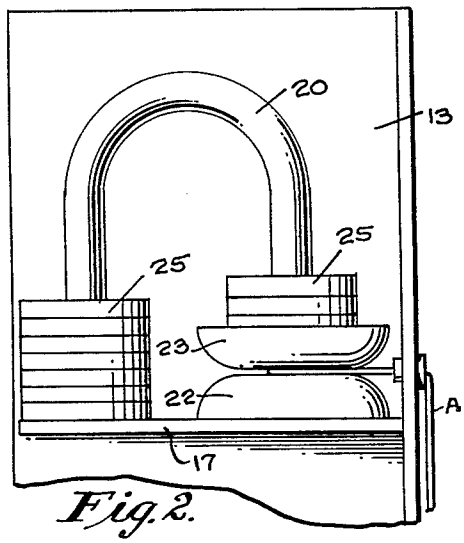


Fig. 2.

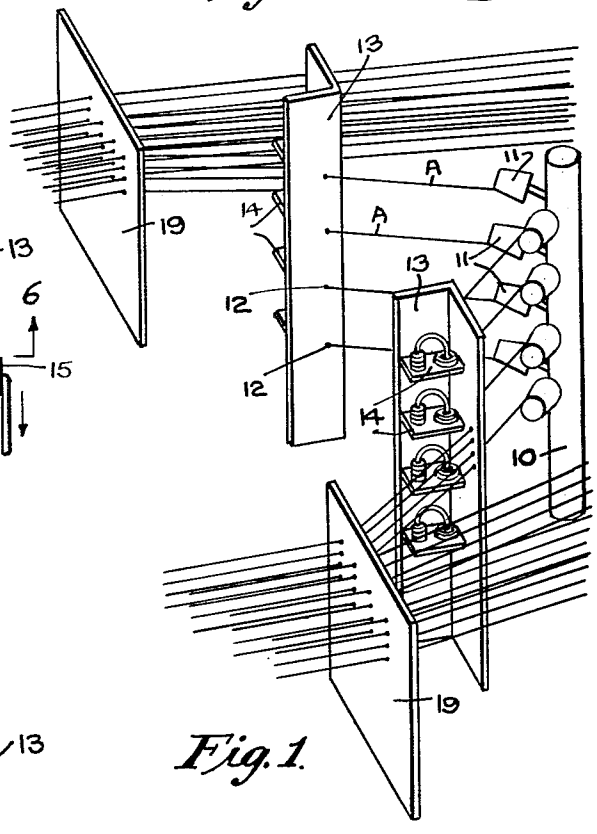


Fig. 1.

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Fig. 7.

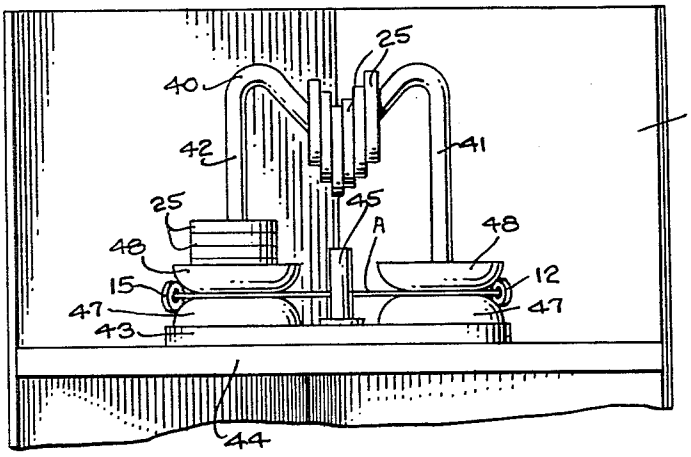


Fig. 11.

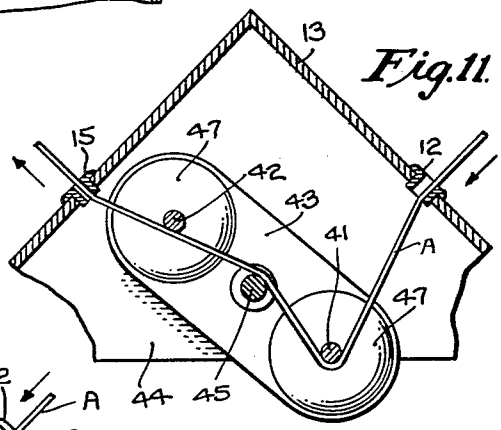


Fig. 8.

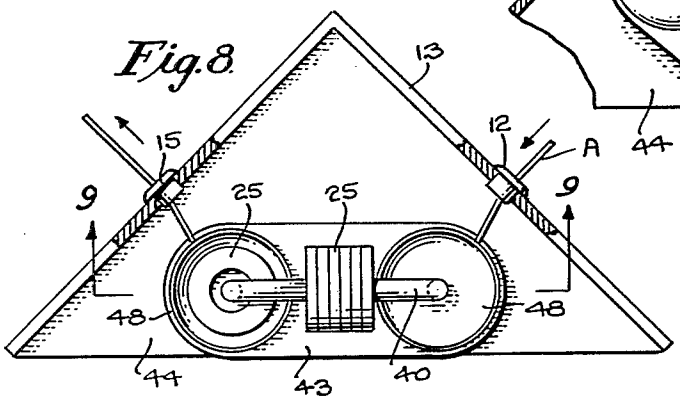


Fig. 10.

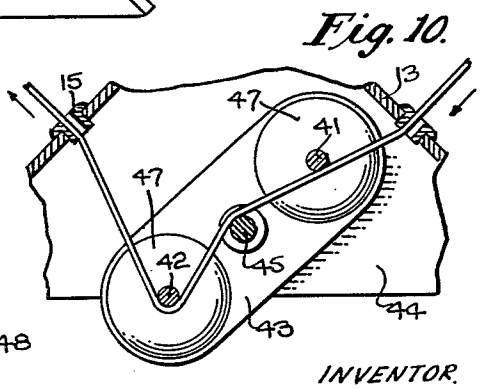
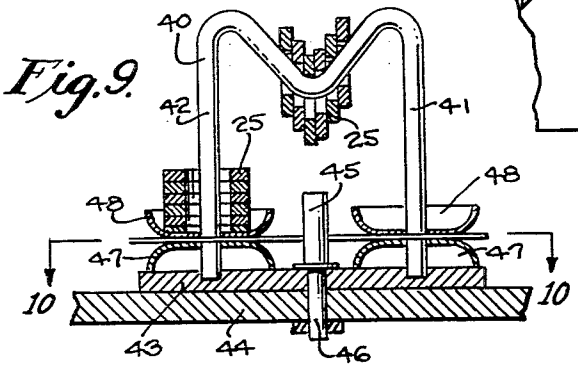


Fig. 9.



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3,473,757

CORD TENSIONING DEVICE

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Continuation-in-part of application Ser. No. 440,822, Mar. 18, 1965. This application Aug. 9, 1967, Ser. No. 659,514

Int. Cl. B65h 59/28

U.S. Cl. 242—150 8 Claims

ABSTRACT OF THE DISCLOSURE

A cord tensioning device having a pair of coacting dish-shaped members disposed upon a vertically extending post with their convex surfaces in engagement with one another, the upper member being freey movable upon the post and adjustably weighted by discrete washer-like weights held captive on the post for shifting onto and off of said upper member to vary the pressure of the plates on the cord as it passes therebetween and about said post. In one form of the device the supporting post is of inverted U-shape with a single pair of said plates disposed on one leg of the post along which a selected number of the washer-like weights may be shifted to vary the tensioning pressure of the plates. In another form, the inverted U-shaped post is swingable about one leg thereof as an axis to increase or decrease the frictional engagement of the cord against the post as the cord passes between the pressure plates. In still another form of the device, the post is M-shaped with each outer leg thereof fitted with a pair of coacting pressure plates and carries a plurality of weights which may be selectively shifted onto one or the other of the topmost plates of each paired set thereof. Provision is made for swinging the M-shaped post about a central vertical axis to further vary the degree of tension imposed upon the cord by its frictional engagement with the post as it passes between the plates on said post.

This application is continuation-in-part of my pending application Ser. No. 440,822, filed Mar. 18, 1965 (now matured as United States Patent No. 3,343,410) in which I describe and claim my invention of an apparatus for detecting creel cord irregularities.

Cord reinforced fabrics are generally made in a continuous flow type of process in which hundreds of separate cords are drawn from individual supply reels from which they pass into a creel board which integrates these separate cords into horizontally and vertically spaced parallel arrays which ultimately may be several feet in overall width and height, and in which the cords are moving longitudinally at relatively high speed. With several hundred cords being drawn through the creel at high speed it is not always possible to detect breakage of an individual cord in a planar array of the cords or sag of any given cord out of its proper plane, both of these conditions resulting from improper tension of the cord at some preceding point in the creel mechanism. A sagging cord or the absence of a cord due to a break will obviously result in weak sections in the finished cord reinforced fabric which will render the finished product in which the fabric is used subject to failure either prematurely or under operating conditions normally well within the capabilities thereof.

Having in mind the foregoing, it is an object of my invention to provide novel cord tensioning apparatus superior to presently used devices and by means of which a relatively fine control can be exercised over the tension of any given cord in the array.

The foregoing and other objects of my invention will become clear from a reading of the following specification

in conjunction with an examination of the appended drawings, wherein:

FIGURE 1 is a perspective view of one section of a typical creel structure illustrating the spool standards, angle posts and tensioning devices by means of which the various cords are delivered and through a creel thread board for integrating the separate cords into the aforesaid horizontally and vertically spaced arrays thereof.

FIGURE 2 is an enlarged side elevational view of the novel cord tensioning device according to the invention as seen on a smaller scale in the showing of FIGURE 1;

FIGURE 3 is a plan view of the tensioning device illustrated in elevation in FIGURE 2;

FIGURE 4 is a vertical sectional view through the novel thread tensioner as would be seen when viewed along the line 4—4 of FIGURE 3;

FIGURE 5 is a plan of a modified construction of the cord tensioning device;

FIGURE 6 is a vertical sectional view as taken along the line 6—6 of FIGURE 5;

FIGURE 7 is a side elevational view of a still further modified construction of the cord tensioning device;

FIGURE 8 is a top plan view of the device shown in FIGURE 7;

FIGURE 9 is a vertical sectional view thereof as taken along the line 9—9 of FIGURE 8; and

FIGURES 10 and 11 are each horizontal sectional views as taken along the line 10—10 of FIGURE 9 respectively showing the device in differently adjusted tensioning conditions.

In the several figures, like elements are denoted by like reference characters.

Referring first to FIGURE 1, it will be observed that it illustrates one of the many spool standards **10** employed in a typical creel system such as that shown and described in my copending application aforesaid and upon which are mounted in spaced relation a plurality of cord or thread spools **11**. The spools **11** each have led off therefrom its individual cord A which passes through a porcelain eyelet **12** fitted in one side leg of an angle post **13**, thence through a cord tensioning device of the present invention designated generally as **14**, thence through a second porcelain eyelet **15** in the other side leg of the angle post **13** and finally through a third eyelet **16** in vertically spaced relation to the eyelet **15**. The several cord tensioning devices **14** of each angle post **13** are disposed at vertically spaced levels corresponding to the levels of the cord spools **11** on the spool standard **10** immediately associated with a given angle post.

Each of the tensioning devices **14** includes a flat base **17** welded, as at **18**, or otherwise secured within the angle of a post **13**. Each post **13** is provided with a plurality of these vertically spaced tensioning devices, one such device being provided for each of the several cords which traverse the post in the course of their run from their supply spools toward a creel board, such as the board **19** of FIGURE 1. Extending above the base **17** is an inverted U-shaped member **20** having its lower terminal ends welded, as at **21** to the upper surface of the base **17** to fixedly secure the member in position. Closely embracing the innermost one of the vertical legs of the member **20** and seated upon the base **17** is an inverted dish-shaped cord-engaging plate **22** having a substantially flat central top surface the marginal portion of which is rounded to smoothly merge into the circumferential wall of the plate. Seated upon the fixed plate **22** is an upper dish-shaped cord-engaging plate **23** of the same form as the fixed lower plate **22** but with the hollow or dished upper surface thereof facing upward so that its smooth bottom surface may seat downward upon the cord to be tensioned. The upper plate **23** is centrally apertured to permit it to move freely on its supporting leg **24** of the member **20** rela-

tively to the bottom plate 22 and thereby coact with the latter to frictionally engage the cord which moves between the plates 22 and 23. Held captive on the U-shaped member 20 are a plurality of centrally apertured metal washer-like weight units 25 which may be shifted from one leg of the member to the other so that any desired number of such units may be added to or removed from the upwardly presenting plate 23 to thereby incrementally adjust the tensioning pressure exerted on the cord by the combined weight of the plate 23 and the weight units 25 pressing against the inverted fixed bottom plate 22. Any desired weight increment may be adapted, a few grams per unit having been found to be satisfactory.

It will be apparent that as a given cord is fed from its supply spool 11 on the standard 10 through the tensioning device 14 carried by the angle post, said given cord is in frictional engagement with the inner leg 24 of the tensioning device 14 as it traverses a substantially right angular path about said leg. This frictional engagement imparts a certain degree of tension to the cord as it is drawn through the eyelets 12 and 15 about the leg 24 of the tension device, which tension is increased somewhat by the friction encountered by the cord as it passes between the plates 22 and 23. This friction against the cord as it moves about the leg 24 and between the plates 22 and 23 imparts to it a minimum tension which may be increased as desired by shifting one or more of the weights 25 from the stack thereof on the outer leg of the inverted U-member 20 to the inner leg 24 of said member and thence upon the upper plate 23 to increase the tensioning pressure of the latter against the cord moving between the plates 22 and 23. Thus, any desired incremental increase in tension may be provided for the cord passing through the tension device 14.

FIGURES 5 and 6 show a modified construction of the tension device wherein the inverted U-shaped member 30 which holds captive the several shiftable weights 25 is provided with an outer leg 31 of greater length than its inner leg 32. The longer leg 31 is flanged, as at 33, and provided with a portion 34 depending from the flange 33 for projection through an opening formed in the base member 35. A nut 36 or other suitable securing device secures the member 30 to the base member 35.

The shorter leg 32 of the inverted U-shaped member 30 has fixed thereto, as by welding 37, an inverted plate 38 similar to the plate 22 of the device shown in FIGURE 1, the lower edge of which plate 22 is spaced above and so is free of the base member 35. An upper dish-shaped plate 39, similar to the plate 23 of FIGURE 1, is movable freely upon the leg 32 for coaction with the bottom plate fixed upon said leg to frictionally engage the cord passing between the plates 38 and 39 and about the leg 32.

As in the first described form of the tensioning device, the tensioning pressure upon the cord may be incrementally adjusted by shifting the captive weights 25 onto or off of the upper plate 38. In addition, however, by pivotally supporting its longer leg 31 upon the base 35 as shown, the U-shaped member may be swung about the vertical axis of said longer leg to present the leg 32 in any desired adjusted position between its full line and dotted line positions shown in FIGURE 5. By such last-mentioned adjustment the angle of travel of the cord between the eyelets 12 and 15 and about the leg 32 may be changed to corresponding increase or decrease the frictional engagement of the cord with the leg 32, to thereby provide in concert with the adjusted frictional engagement afforded by the coacting plates 38 and 39 an extremely fine control of the tension upon the cord as it is drawn through the creel from its supply spool.

FIGURES 7 to 11 illustrate still another modified form of the tensioning device of the present invention. In this construction of the device, two sets of coacting upper and lower dish-shaped plates are respectively supported upon the outer vertically extending legs of an M-shaped member 40. The opposite legs 41 and 42 of this M-shaped member 40 are suitably fixedly secured to an auxiliary support 43 which in turn rests upon the main supporting base 44 of the device. The auxiliary support 43 is centrally provided with an upwardly extending vertical post 45 having a flanged depending portion 46 which projects downwardly into the base 44 as a pivot about which the auxiliary support may be horizontally swung from its normal position shown in FIGURE 8 into one or the other of the two extreme positions respectively shown in FIGURES 10 and 11. Any suitable means may be employed for securing the auxiliary support 43 in its adjusted position, such as a nut threaded upon the pivot extension 46.

Each of the legs 41 and 42 of the M-shaped member is fitted with a pair of dish-shaped members 47 and 48 respectively similar to the members 22 and 23 of the device shown in FIGURES 1 to 4. Also, the member 40 holds captive on the central portion thereof a plurality of washer-like weights 49 any desired number of which may be shifted onto either or both of the upper plates 48—48. Thus, either one of the plates 48 to the exclusion of the other may be adjustably weighted to provide a desired tensioning pressure upon the cord passing between such weighted plate and its coacting bottom plate 47 or both plates may be equally or unequally weighted as the cord tensioning conditions may require.

In this last described modification of the tensioning device, the cord drawn from its supply spool traverses a sinuous path as it passes through the device in frictional engagement with the legs 41 and 42 of the M-shaped member 40 and the post 45 centered between said legs, as best appears in FIGURES 10 and 11. In the normally adjusted position of the auxiliary support 43, as shown in FIGURE 8, the frictional engagement of the cord with legs 41 and 42 of the member 40 is at its minimum value, and the cord tensioning adjustment is obtained primarily by weighting one or both of the upper plates 48—48 to provide the same with the desired tensioning pressure against their coacting bottom plates. However, when the auxiliary support 43 is swung horizontally about its pivot, depending upon the direction of swing, the frictional engagement of the cord with one or the other of the legs 41–42 of the M-shaped member 40 is greatly increased. Thus, in the adjusted position of the tensioning device as shown in FIGURE 10, the leg 41 of the member 40 imposes minimum tensioning friction against the cord, while the leg 42 imposes considerable friction thereagainst since the cord in passing about said leg 42 contacts 180 degrees or more of its circumference.

In some instances it is desirable that the cord be snubbed about that leg, e.g., leg 42, which is forward of the central post 45 of the tensioning device, as seen in FIGURE 10, while in other instances, the desired tensioning is obtained by maximum snubbing of the cord about that leg, e.g., leg 41, which is rearward of the central post 45, as shown in FIGURE 11. In either case, the tensioning of the cord by frictional engagement thereof with one or the other or both of the legs 41 and 42 of the M-shaped member may be additionally controlled by loading either one or both of the plates 48 with the desired complement of weights 25. Thus, an extremely fine adjustment of the cord tension may be obtained by varying the frictional restraint upon the cord as desired through a combination of tensioning pressures imposed upon the cord as it moves past the legs 41 and 42 of the member 40 and between the coacting plates 47 and 48 mounted upon each of said legs.

Having now described my invention in connection with particularly illustrated embodiments thereof, it will be appreciated that still other variations and modifications of my invention may now occur from time to time to those persons normally skilled in the art without departing from the essential scope or spirit of my invention, and accordingly it is intended to claim the same broadly as well as specifically as indicated by the appended claims.

What is claimed as new and useful is:

1. A thread tensioning device disposable along the course of a thread between the thread supply and the thread drawing point and through which device the thread is drawn, comprising in combination, a horizontal support member for said device, smooth surfaced post means having a pair of laterally spaced parallel legs projecting upward from said horizontal support and a central bridging portion extending between the upper ends of said legs, a pair of oppositely dished thread pressure disks having smooth surfaces disposed in juxtaposed relation for frictionally engaging the thread passing therebetween said pair of pressure disks being held captive upon at least one of said legs with the topmost one thereof free for movement on said one leg, said last-mentioned one leg of said post means being pivotally mounted for swinging movement about the other leg of said post means, a plurality of relatively light weights held captive to said post means above said topmost pressure disk but freely movable on said post means between a position of seating disposition on and a position completely disengaged from said topmost pressure disk, whereby a thread may be variably incrementally tensioned as desired by passing the same between the facing smooth surfaces of said thread pressure disks and about the leg of said post means upon which said disks are held captive and thereafter shifting onto or removing from said topmost disk the desired number of said captive weights to respectively incrementally increase or decrease the clamping pressure on said thread exerted by said pair of pressure disks, and means for swinging said post means about a fixed center of rotation for adjustably varying the angle of travel of the thread about the leg of the post means upon which said pair of pressure disks are held captive.

2. A thread tensioning device disposable along the course of a thread between the thread supply and the thread drawing point and through which device the thread is drawn, comprising in combination, a horizontal support member for said device, smooth surfaced post means having a pair of laterally spaced parallel legs projecting upward from said horizontal support and a central bridging portion extending between the upper ends of said legs shaped to hold thereon a plurality of weights of which a desired number are free to be shifted from said bridging portion onto either one or both of said laterally spaced legs, each of said leg holding captive thereon a pair of oppositely dished thread pressure disks having smooth surfaces disposed in juxtaposed relation for frictionally engaging the thread passing therebetween, the topmost one of each said pair of pressure disks being free for movement on its supporting leg, a plurality of relatively light weights freely movable on said post means between a position of seating disposition on and a position completely disengaged from said topmost pressure disks of either one or both of said pairs of pressure disks, whereby a thread may be variably incrementally tensioned as desired by passing the same between the facing smooth surfaces of said thread pressure disks and about the leg of said post means upon which said disks are held captive and thereafter shifting onto or removing from said topmost disk the desired number of said captive weights to respectively incrementally increase or decrease the clamping pressure on said thread exerted by said pair of pressure disks, and means for swinging said post means about a fixed center of rotation for adjustably varying the angle of travel of the thread about the leg of the post means upon which said pair of pressure disks are held captive.

3. A thread tensioning device as set forth in claim 2 wherein the bridging portion of said post means is of generally V-shape whereby said member is of generally M-shaped configuration.

4. A thread tensioning device as set forth in claim 2 wherein the two pairs of coacting pressure disks are disposed with their juxtaposed thread engaging surfaces lying in a common horizontal plane.

5. A thread tensioning device as set forth in claim 2 wherein said two-legged post means is mounted upon a platform swingable in a horizontal plane about a vertival axis disposed centrally between the two legs of said post means.

6. A thread tensioning device as set forth in claim 2 including a mounting platform for said two-legged post means and an auxiliary post extending vertically upward from said platform centrally between the two legs of said post means and in the vertical plane thereof whereby the thread, as it is drawn through the device, moves sinuously between and about the two legs of the post means and said auxiliary post.

7. A thread tensioning device as set forth in claim 6 wherein said auxiliary post serves in conjunction with the two laterally spaced legs of said post means to provide a three point contact with the thread as it passes between the two pairs of coacting pressure disks under the tensioning pressure respectively exerted thereby.

8. A thread tensioning device disposable along the course of a thread between the thread supply and the thread drawing point and through which device the thread is drawn, comprising in combination, a horizontal support member for said device, smooth surfaced post means having a pair of laterally spaced parallel legs projecting upward from said horizontal support and a centrally depressed bridging portion extending between the upper ends of said legs, a pair of oppositely dished thread pressure disks having smooth surfaces disposed in juxtaposed relation for frictionally engaging the thread passing therebetween held captive upon each of said legs with the topmost disk of each pair thereof free for movement on its supporting leg, a plurality of relatively light weights held captive to said post means above said pressure disks but freely movable on said post means, whereby a thread may be variably incrementally tensioned as desired by passing the same between the facing smooth surfaces of said thread pressure disks and about the leg of said post means upon which said disks are held captive and thereafter shifting onto or removing from either or both of said pairs of pressure disks the desired number of said captive weights to respectively incrementally increase or decrease the clamping pressure on said thread exerted by said pairs of pressure disks, said weights when removed from said pressure disks being normally held stored in said central depression of the bridging portion of said post means.

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