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G. F. WATERS
STRETCHING DEVICE

2,161,394

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FIG. 1.

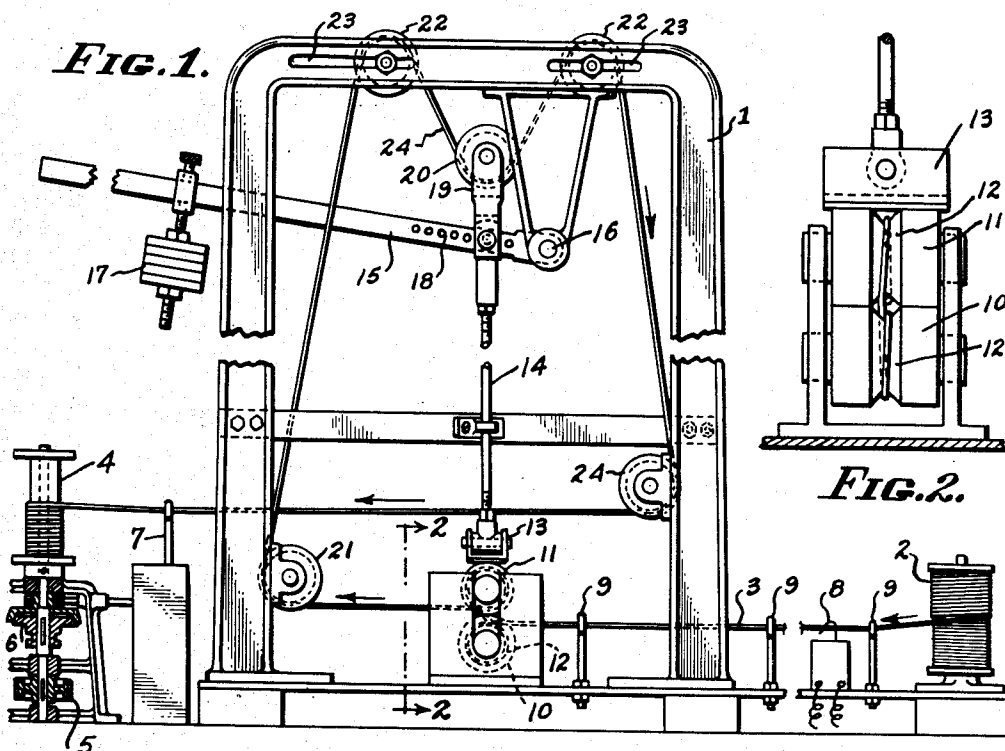


FIG. 2.

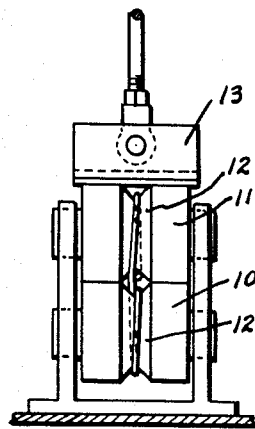


FIG. 4.

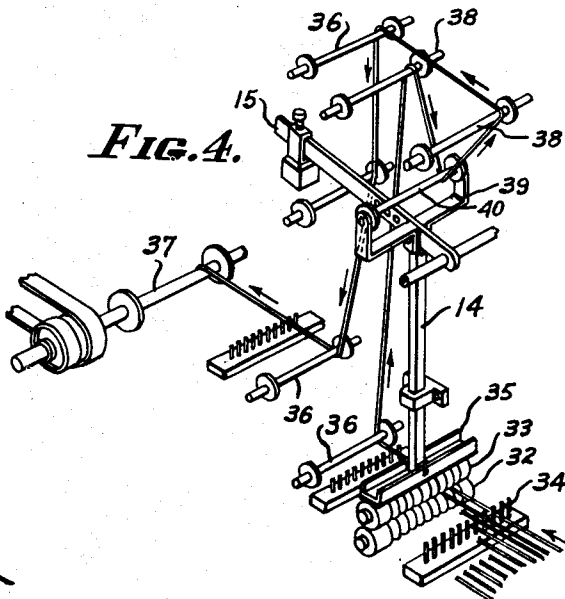
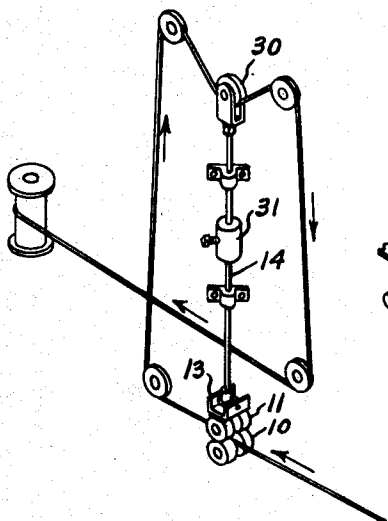


FIG. 3.



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2,161,394

STRETCHING DEVICE

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4 Claims. (Cl. 28—57)

My invention relates to means for stretching single or multiple strands of yarn, thread, cord, rope made from cotton or other materials, or strips of narrow fabric either braided or woven, or leather or other materials in their natural state or fabricated wherever a reduction in elasticity is desired. In the following specification I have used the term linear member to designate in general such materials which are stated above, without limitation.

The devices used for the above purpose in the past, with which I am familiar, have consisted in a stretching device, wherein the material was subjected to the desired tension, and a reel or other take-up device for collecting the stretched material. Where the take-up device was a reel or spool, the rate of take-up increased as the reel diameter became greater, due to accumulation of material thereon. Therefore, a frictional slip drive on the take-up device was necessary to prevent breakage of the material, and the material was wound upon the spool at tension in various degrees below that attained in previous parts of the devices. This constitutes a serious defect in the above class of stretching devices, because certain materials, due to their elasticity, will immediately shrink to a considerable extent if not retained for some time in the completely stretched condition.

An object of my invention, therefore, is to provide a stretching device wherein the material is wound and retained upon the spool or reel at the point of greatest tension and attenuation.

Another object of my invention is to provide a novel control whereby an exact and predetermined elongation of a linear member may be attained, limited only by the breaking point of the material in question. By my device the amount of pull or tension on the yarn or other linear material may be easily and quickly varied over a very wide range. Due to its simplicity and safety, the operation may be very rapid, two hundreds yards a minute being easily attained, and the units are small and can be operated from a single operating unit in considerable numbers without taking up much floor space.

As stated above, the device may be made to operate on a multiple series of strands at one time. Furthermore, there is a considerable length of material between the point of application of tension and the take-up which acts to produce a more uniform stretch in linear material which has thicker and thinner portions where the thicker portions will stretch more readily than the thinner portions since there is

not much chance that the entire span between the take-up device and the point of application of the opposing force will be spanned by unevenness in the weaving or spinning of the linear material. In the appended drawing the several modifications are illustrative of my invention, and I will describe the same, the novelty therein being set forth in the appended claims to which reference is hereby made.

In the drawing:—

Fig. 1 is a side elevation of one of my devices.

Fig. 2 is a front elevation of the tension applying member.

Fig. 3 is a diagram showing a modified construction.

Fig. 4 is a diagram showing a possible multiple arrangement.

Referring to Fig. 1, I have illustrated a frame 1. At one side I have illustrated a supply 2 of thread or twine 3. The supply, however, may come from a treating bath such as, for example, water where thread or twine is concerned. Another alternative would be to take the supply direct from the twisting machine, from which the material may emerge in a dampened condition. At the other side of the machine is a take-up device in the form of a reel 4 driven by mechanism 5 through a clutch 6, which clutch may be magnetically controlled, or may consist of the tight and loose pulley arrangement commonly known. A traverse motion 7 may be employed to assure an even winding of the linear element on the reel. The material is shown as being passed first under a loop 8 which is held up by the material so long as it does not break, but if the material should break and the loop is permitted to fall, it will energize a magnetic or mechanical device which will disengage the clutch 6. Such arrangements being common, I have not illustrated them in detail.

I have shown guides 9 whereby the material, in this instance twine, is guided to the tension applying device. A preferred form of this device is illustrated best in Fig. 2, consisting of a pair of grooved rolls 10 and 11 supported in suitable standards and free to rotate in contact with each other. There are grooves 12 in the rollers and the filament or cord passes around the lower roller 10 in its groove and thence in the opposite direction around the roller 11 in its groove. To resist movement of the thread about this device, a brake shoe 13 is applied in this instance to the upper roller, the object of the grooves in the rollers being that the filament or linear member will not slip, so that the force applied by the

brake shoe 13 will restrain the movement, at this point, of the material to be stretched.

The brake shoe is mounted on a rod 14, suitably guided and pivoted in this instance to a lever 15, fulcrumed at 16 on a suitable part of the frame. An adjustable weight 17 is applied to this lever so as to vary the force applied to the brake shoe. Also pivotally secured to the lever 15 either on the same stud that supports the rod 14, or by an independent stud in any one of a series of holes 18 in the lever, is a yoke 19, supporting a pulley 20. The filament or other linear member is led from the tension device around suitable guides, such as a pulley 21, to a pair of adjustable pulleys 22 at the top of the machine. The supporting pins of the pulleys 22 are adjustable in slots 23 in the frame to accommodate different positions of the pulley 20.

Between the two pulleys 22 the material is brought down under the pulley 20 so as to form a loop 24 of the material in a supporting relation to the pulley 20. A preferred arrangement will be to have the two branches of the loop 24 at about a forty-five degree angle with relation to each other. From the pulley 22 the filament is passed down around a suitable guide such as the pulley 24, from which it passes to the take-up device, in this instance the reel 4.

It will be noted that at any given speed of operation as the material increases on the reel 4 a more rapid feeding action will occur due to the increased diameter, but this will have no effect on the continuous and even operation of my device. With the arrangement shown, as the tension on the material increases it exerts an upward pull on the pulley 20 which acts as a feed control pulley, because the upward pull on the pulley will release some of the pressure as applied to the brake shoe 13 which will decrease the tensioning force as applied to the material. The amount and position of the weight 17 on the lever 15, determines the amount of work that the feed control pulley must do to permit the tensioning device to alter the force applied by means of the brake shoe 13, with the result that as the weight on the lever is increased or moved away from the fulcrum of the lever the material is stretched more and more; but whatever amount of stretch is applied will be kept down to the limit of what it takes to elevate the feed control pulley. Thus any amount of tension may be applied to that portion of the material which lies between the tension applying device and the take-up reel. The stretching operation starts in the grooves on the feed rolls and continues gradually and uninterruptedly until the material is wound in position on the reel, spool, or other take-up appurtenance which is the place of greatest tension. The material will, of course, remain held firm in the stretched condition on the said take-up device.

In Fig. 3 I have illustrated a form in which the grooved rolls 10 and 11 have a brake shoe 13 applied to them through a rod 14, which carries a feed control pulley 20 directly on its upward end. In this instance the weight 17 will be applied direct to the rod 14 and more or less weights applied as the only means of increasing or decreasing the total force applied to the material being stretched.

In Fig. 4 I have shown a multiple arrangement with grooved rolls 32 and 33 having multiple grooves and material led thereto through a comb 34. A brake shoe 35 is wide enough to rest entirely across the upper roller 33 and the

several guides 36 direct the passage of material to the winding up device 37. The loop is set up by traversing suitable rods or rollers 38 and the feed control pulley device is in the form of a yoke 39 supporting a shaft 40. Otherwise the arrangement of the lever 15 and the rod 14 is the same as before. The preferred form of a multiple arrangement, however, would be similar to that shown in Fig. 1 providing separate feed control pulleys and grooved rolls for each strand of the material.

Referring to my first construction, it will be evident that the further the feed control pulley is moved from the fulcrum of the lever 15, the more sensitive the device will become, because slight movements of the pulley will cause a greater change in the load applied to the brake shoe. Also the nearer that the supporting loop about the control pulley approaches a straight line the less sensitive the device becomes, because it will require a greater application of tension to the material being stretched to effect a given magnitude of movement of the feed control pulley.

It will, of course, be apparent that the amount of movement of the feed control pulley will be very slight and in the nature of a "hunting" action.

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

1. A machine for the tensioning of filaments, comprising in combination with a supply reel and a take-up reel, a frame through which the filament passes between said reels, rotary means in said frame over which the filament passes in an extended path through said frame, and a tension applying device about which the filament passes, said device arranged to grip the filament so as to rotate therewith without slippage of the filament, a brake means applied to said device, said brake suspended over the device, a weight applied to said brake, said rotary means arranged to provide support for a loop of the filament which is passed around a rotary element which is mounted on the brake means thereby suspending the same, the tension applying means being located to engage the filament at the beginning of its extended path from the supply reel to the take-up reel.

2. A machine for the tensioning of filaments, comprising in combination with a supply reel and a take up reel, a frame through which the filament passes between said reels, rotary means in said frame over which the filament passes in an extended path through said frame, and a tension applying device about which the filament passes, said device arranged to grip the filament so as to rotate therewith without slippage of the filament, a brake means applied to said device, said brake suspended over the device, a weight applied to said brake, said rotary means arranged to provide support for a loop of the filament which is passed around a rotary element which is mounted on the brake means thereby suspending the same, the tension applying means being located to engage the filament at the beginning of its extended path from the supply reel to the take up reel, said rotary means, tension device and rotary element arranged to receive a plurality of filaments.

3. A machine for the tensioning of filaments, comprising in combination with a supply reel and a take up reel, a frame through which the filament passes between said reels, rotary means in

said frame over which the filament passes in an extended path through said frame, and a tension applying device about which the filament passes, said device arranged to grip the filament so as to rotate therewith without slippage of the filament, a brake means applied to said device, said brake suspended over the device, a weight applied to said brake, said rotary means arranged to provide support for a loop of the filament which is passed around a rotary element which is mounted on the brake means thereby suspending the same, the tension applying means being located to engage the filament at the beginning of its extended path from the supply reel to the take up reel, said brake means comprising a slidably guided rod, a brake shoe thereon, a rotary means at the upper end thereof, and a lever having an adjustable weight thereon, pivotally engaging the said means.

4. A machine for the tensioning of filaments, comprising in combination with a supply reel and a take up reel, a frame through which the filament passes between said reels, rotary means in said

frame over which the filament passes in an extended path through said frame, and a tension applying device about which the filament passes, said device arranged to grip the filament so as to rotate therewith without slippage of the filament, a brake means applied to said device, said brake suspended over the device, a weight applied to said brake, said rotary means arranged to provide support for a loop of the filament which is passed around a rotary element which is mounted on the brake means thereby suspending the same, the tension applying means being located to engage the filament at the beginning of its extended path from the supply reel to the take up reel, said brake means comprising a slidably guided rod, a brake shoe thereon, a rotary means at the upper end thereof, and a lever having an adjustable weight thereon, pivotally engaging the said means, said lever having a series of holes therein for reception of a pivot pin that engages the said means.

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