Sept. 10, 1946. J. R. FISH 2,407,545

THREAD FRICTION TESTING DEVICE

Filed Jan. 13, 1944

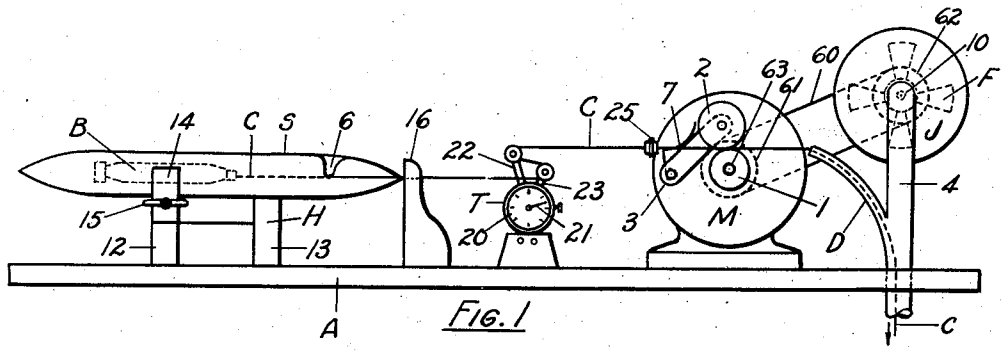


FIG. 1

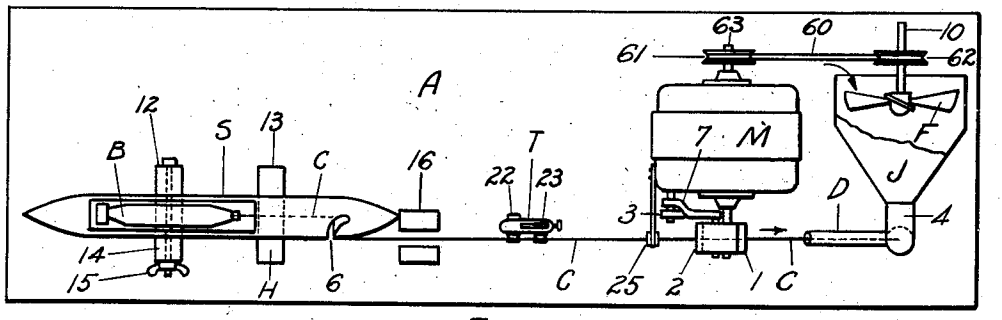


FIG. 2

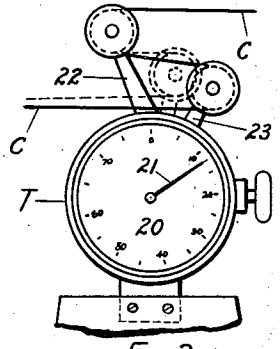


FIG. 3

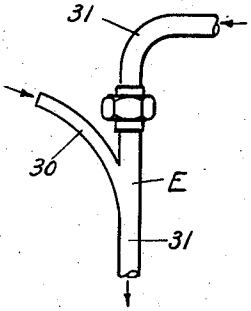


FIG. 4

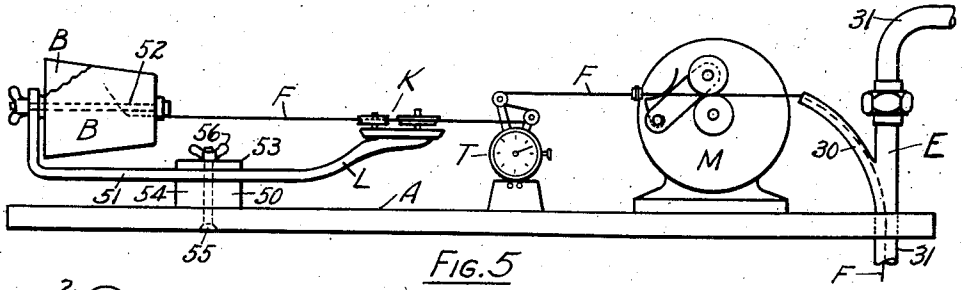


FIG. 5

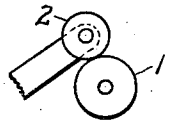


FIG. 6

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THREAD FRICTION TESTING DEVICE

Joseph Raymond Fish, Manchester, N. H.

Application January 13, 1944, Serial No. 518,075

1 Claim. (Cl. 73—160)

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This invention has to do with determinating and regulating the tension of textile threads in the various processes of twisting, spooling, warping and more particularly in connection with shuttles in looms. It is particularly advantageous where synthetic yarns, such as rayon, are being used in shuttles and still more specifically where the shuttles are being operated in an automatic loom in which there must be a bunch near the head of the bobbin with which bunch the feeler indicates transfer, for the replacement of the old bobbin with a new bobbin, cooperates.

I am aware that tension meters arranged so that yarn or thread can be pulled through them and the tension recorded on a dial are in common use and I make no claim to their construction but use a tension meter as part of my device.

As now produced, the characteristics of synthetic yarn with reference to stretching or distorting are known to the manufacturers and the fact is also known that if there is too much pull or holding back of the thread, it may stretch and make a bad place in the cloth and on the other hand, if the tension is not sufficient, the thread throws out or loops and there is a loose pick which is also objectionable.

It is one of the purposes of this device to test thread running out from a bobbin in a shuttle before the shuttle is run in the loom, to determine the best average tension to produce on the thread as it runs out. This tension may be produced by the pressure of adjustable springs against friction plates in the shuttle or of the muskrat or other fur generally in use in the shuttle in contact with the yarn mass on the bobbin in running synthetic yarn such as rayon. The tension is usually produced by a number of factors including the plates and the fur.

There are many variables in running yarn out of the shuttle eye in a loom, such as the fact that the pull at the tip of the cone when starting a new bobbin is different from the pull at the base of the cone, because the base is of greater diameter than the tip. The pull at the front, at the middle, and at the back of the bobbin are substantially different. The pull when the yarn is unwinding from the back of the bunch on the bobbin near the head is greater than at the front. A constant speed of withdrawal is highly desirable in determining the best average tension for a given speed.

The speed of the thread in running through my device can be adjusted to the relative speed of the loom in which the shuttle is to be used

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and I find that usually a speed of twenty-five per cent faster than that of the flight of the shuttle during the pick is desirable. This speed should remain constant until all of the yarn on the bobbin, which may be two thousand yards more or less, is run off.

The device consists of a suitable base with a stand for holding the shuttle, arranged to direct the yarn from the shuttle through a tension meter and then between rolls driven by a motor at a uniform predetermined speed. The yarn after passing the pulling point between the rolls, must be disposed of and got out of the way as it has a tendency to blow around and get mixed up with the fresh yarn and with the pulling rolls.

On the other hand, if it is simply wound on a spool, as the spool builds up, the speed of delivery varies and this alters the calculations and averages.

To avoid this objection, I prefer to use beyond the pulling rolls a thread receiver which is preferably a goose neck into which the yarn runs and from which it is carried along as fast as it is delivered from the rolls with no slack, by an induced vacuum or current of air caused by another current or jets of air operating on the aspirator principle.

In the drawing,

Fig. 1 is an elevational view and Fig. 2 is a plan view of a self-contained device with a shuttle in place.

Fig. 3 is an elevation of a tension meter; Fig. 4 is an elevation of a modified form of pneumatic thread take up device.

Fig. 5 is an elevational view of a device similar to Fig. 1, but with another type of yarn package holder with a yarn package in place and with the type of pneumatic take up device shown in Fig. 4.

Fig. 6 is a detail of the thread removing rolls with a different adjustment from that shown in Fig. 1.

In the drawing, A represents a base upon which are arranged in order as from left to right a stand or thread package holder H for a shuttle S, carrying a bobbin B, the thread C from which is to be tested. Thread C runs past a suitable stop 16 and from there through a tensiometer T of a well known type and from there to a thread receiver J including a goose neck D which extends down through base A. It is preferably caught in a waste can, not shown, below the base A or the waste thread can be allowed to pile up on the floor.

M is a motor, shown as of the electric type,

which drives a friction roll 1 in engagement with an idle roll 2. Roll 2 is carried by arm 3 pressed by spring 7 to engage roll 1 whereby both rolls are driven at the same surface speed in the path of the thread C.

The speed of the motor can be regulated in any suitable way and the speed of the rolls can also be varied by substituting larger or smaller rolls for 1 and adjusting roll 2 with reference to the size of roll 1. See Fig. 6.

It is important that as the thread is pulled between feed rolls 1 and 2 it should travel at a constant speed instead of at a variable speed as it would if it were wound on a positively driven spool or reel.

As shown, thread package holder H includes a support with two legs 12 and 13, of which 12 carries a jaw 14 and clamping screw 15. A stop 16 to steady the end of a shuttle S is also a part of holder H.

The goose neck D receives the thread C and extends down through base A and is joined by an air pipe 4 the two forming a V. This pipe 4 is shown as extending from a blower fan F carried by a shaft 10 driven by the motor M, the fan being so arranged that it forces a powerful current of air down through the air pipe 4 thereby creating a suction in goose neck D which carries along the end of the thread C as fast as it is delivered by the rolls 1 and 2. The disposal of the waste end of thread is important as it must be kept from jamming up the rolls 1 and 2.

The tensiometer T is fixed on base A and has a dial 20 with a hand 21, a fixed arm 22 and a movable arm 23 which connects with the hand 21 and moves it so as to indicate the tension or resistance of thread C as it runs out from the eye 6 of the shuttle S.

In this type of tensiometer, the short and movable arm 23, around which thread C travels first, should be level with shuttle eye 6 and the fixed arm 22 should preferably be level with the bite of rolls 1 and 2 so the thread C can go from it to a guide eye 25 about level with said bite.

In Figs. 1 and 2 for driving the fan shaft 10, I show a pulley 61 on the motor shaft 63 connected by a belt 60 with a pulley 62 on shaft 10.

Fig. 4 shows a thread remover E including a goose neck 30 which is the same as D, but instead of there being a fan attached to the driving motor, there is an air pipe 31 similar to 4 except that it connects with any of the pneumatic devices now in common use in mills for blowing off dust and so forth.

When using this device with synthetic yarn such as rayon, manufacturers can usually state with reference to denier or weight and other characteristics how much tension in grams the thread or yarn will stand without extending or spoiling its natural characteristics. If properly made, as the yarn has been quilted or wound on the yarn package, it was given a tension in grams below the safety limit.

With a shuttle it is best to pull off the yarn in my device perhaps twenty-five per cent faster than the normal picking motion will cause it to be pulled off, to compensate for the difference between such a smooth continuous withdrawal of the yarn as compared to the shifting tension to which the shuttle is subjected as it is driven back and forth, stopped and started, and also to take care of the difference in the pull at the tip of a yarn mass cone and a its base, and at the bunch near the head of the bobbin.

The device can also be used for testing the tension of tension devices such as K, shown in Fig. 5, which are used in connection with warpers or in fact in connection with numerous machines where tension devices are used to maintain an uniform tension on a thread which passes through them particularly where there are a number of threads or a great many ends such as in a warper and where it is highly desirable that the tension of all the threads which are wound up together, as on a warp beam, should be substantially the same.

While equalizing the tension is particularly important on rayon and other synthetic yarns, it is desirable in many cases with worsted, cotton, woolen and mixed yarns.

Also as many synthetic yarns react to some surfaces to a better advantage than to others, such as glass, steel, porcelain, copper, plastics, whichever type surface makes or gives the best result can be determined on this device.

In Fig. 5 I show a modification of my device in which A is a base upon which is a thread package holder L which includes a clamp 50 for thread package B in the form of a cone on which is wound thread F, the holder L also holding a tension device K.

With a shuttle, the tension or friction member is usually part of the shuttle but on a warper or spooler or similar machine, the thread may be wound on a spool which is carried by a horizontal spindle or it may be carried by a cone which stands vertically on its base while the thread therefrom unwinds axially upward over a guide and thence horizontally, but in either case, there is a friction device to prevent the thread from running off too fast. It is highly important that the friction of the hundreds of ends on such a machine should be as nearly as possible the same.

Therefore in this application of the device, the holder L may support a horizontal arm 51 which carries a hanger 52 and also a tension device K such as is being used in connection with such a spool and spindle.

In the warper or spooler, the thread runs off at a substantially uniform speed and by increasing the speed of my drawing off rolls and, if necessary, changing the type of tension device, the best type of such device and the best and fastest safe speed can be determined by watching the tensiometer while all or a large part of the spool is run off.

Clamp 50 includes the jaws 53 and 54, bolt 55 and wing nut 56.

The thread receiving and removing devices such as E, or J can be omitted when certain kinds of thread are being studied.

I claim:

The combination in a tension determining device for textile threads; a base; a holder for holding a thread package; means for removing the thread from the thread package held in the holder, including a motor, a roll driven thereby and a friction roll driven by said driven roll; a pneumatic thread receiving device including a tubular goose neck behind said rolls, an air pressure pipe which connects with the goose neck, and means to produce a current of air through said air pressure pipe away from the inlet to the goose neck; and a tension meter positioned between the thread package holder and said rolls.

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