Jan. 29, 1924. 1,482,231

A. A. HASLER

APPARATUS AND METHOD OF TESTING SILK THREADS

Filed Jan. 19, 1922 2 Sheets-Sheet 1

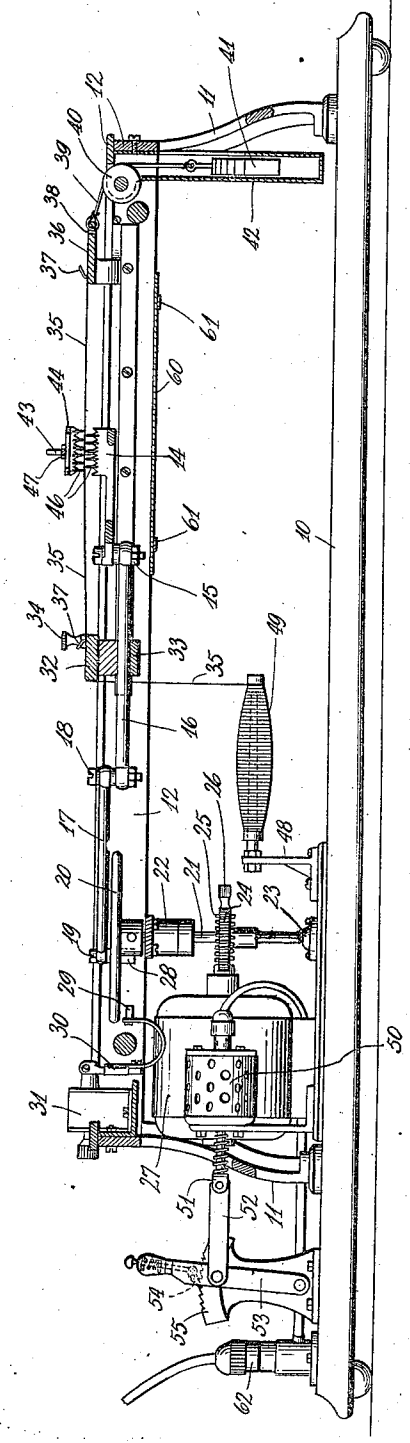

Fig. 1.

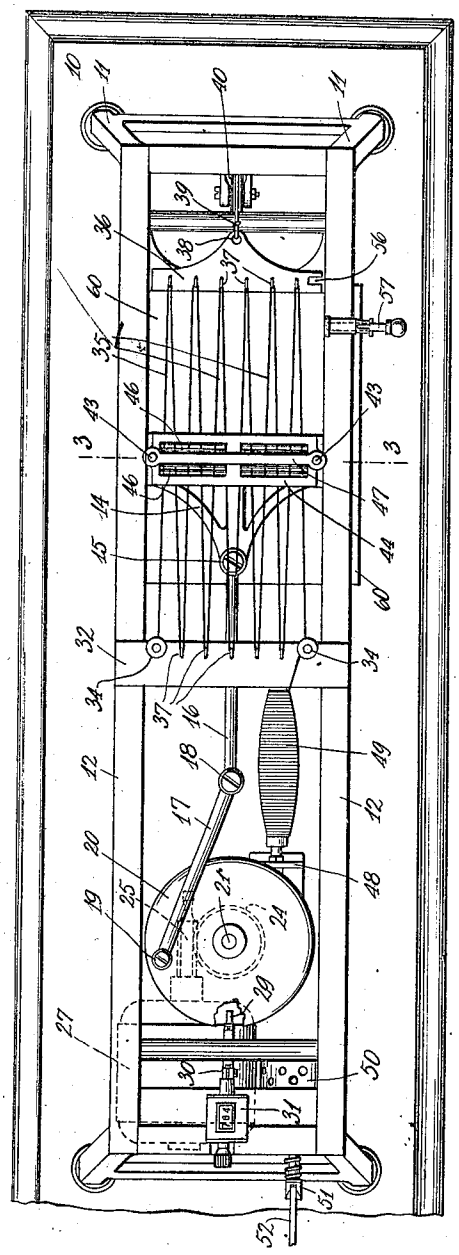

Fig. 2.

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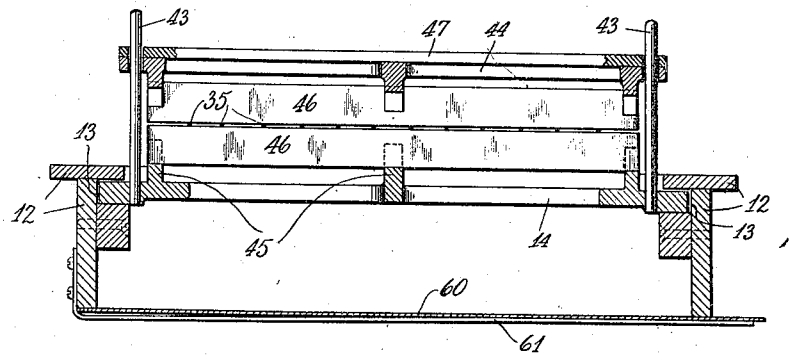

Fig. 3.

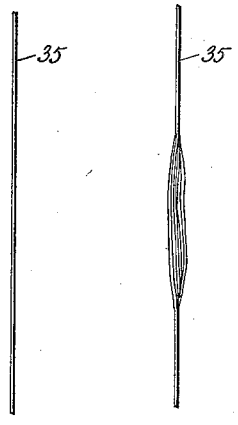

Fig. 4.

Fig. 5.

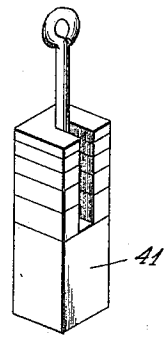

Fig. 6.

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Patented Jan. 29, 1924. 1,482,231

UNITED STATES PATENT OFFICE.

ALBERT AUGUST HASLER, OF HAZLETON, PENNSYLVANIA, ASSIGNOR TO DUPLAN SILK CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

APPARATUS AND METHOD OF TESTING SILK THREADS.

Application filed January 19, 1922. Serial No. 530,266.

To all whom it may concern:

Be it known that I, ALBERT AUGUST HASLER, a citizen of the United States, and a resident of Hazleton, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus and Methods of Testing Silk Threads, of which the following is a specification.

The raw silk thread used in the weaving of silk fabric consists of a multitude of fibres of almost imperceptible diameters which are known to the trade as "grege" fibres and which are obtained directly from the silk cocoons. These fibres are coated with a viscous gum known as sericin which is exuded by the worm in spinning the cocoon. In preparing the thread from the "grege" fibres, several cocoons are first steeped in boiling water which softens the sericin, and the ends of the "grege" fibers are then loosened from several cocoons, the number of which will vary according to the thickness of the thread desired. These fibres are then brought together through guiding means and wound upon a suitable reel under tension. As the sericin is softened to a viscous condition by the boiling water, the bringing of the "grege" fibres into contact under suitable tension while in this condition causes the individual "grege" fibres to cohere and as the fibres cool, this cohesion between the fibres becomes quite strong in the resultant thread, and will vary with different grades of silk according to the quality as well as quantity of the sericin which varies greatly in different lots of cocoons.

It has been found that the strength and durability of the thread and consequently of the resultant fabric woven therefrom has been found to be due largely if not entirely to the various degrees of cohesion between the fibres which make up the thread. It has been found extremely difficult in practice to devise any satisfactory method for testing this cohesion between the silk fibres and consequently the selection or rejection of samples of thread in order to insure the production of a fabric of a certain predetermined standard has been largely a matter of more or less uncertainty depending in a large measure upon the personal experience, knowledge and judgment of the individual making the test with consequently wide variations in the results of tests made by different individuals upon the same samples.

It is therefore the principal object of this invention to devise a method for the testing of a raw silk thread which will practically eliminate the human equation heretofore prevailing in or predominating such tests, a method in which the various factors or elements contributing or entering into the test may be measured with great precision and accuracy, and as a result of such tests reliable and valuable standards can be established which will effectually determine the relative merit of the sample thread under examination.

A further object of this invention is to devise an apparatus for carrying out the method in which the various elements or principal parts which contribute directly to the test may be varied or predetermined within any desirable limit of accuracy.

With these and such further objects in view as will be apparent to one skilled in the art from a reading of the following specification, the invention consists in the method and apparatus for carrying out the method, of which a preferred embodiment is shown in the accompanying drawings, forming a part hereof and described in detail in the following specification:

Referring to the drawings,

Fig. 1 is a longitudinal cross sectional view of the apparatus.

Fig. 2 is a plan view partly broken away.

Fig. 3 is a transverse cross section along the line 3—3 of Fig. 2.

Fig. 4 is a detail view, showing a thread of silk before being tested in the machine.

Fig. 5 is a view of the thread after being subjected to a testing in the machine, and

Fig. 6 is a detail of the weight 41, showing the manner in which the riders are placed thereon.

As shown in the drawings, a suitable base has supported thereon by means of the legs 11, a frame 12, said frame being provided with suitable guideways 13, in which is mounted for reciprocation, a lower scraping blade holder 14, to which is pivotally connected as at 15, a link 16, which is driven by means of a connecting rod 17 pivotally connected at one of its ends as at 18 to said link and at its other end to a crank pin 19.

The crank pin 19 projects upwardly from the face of a crank disk, 20, which is mounted upon a vertical shaft 21, suitably supported at its upper end in a bearing 22 attached to the lower part of the frame and mounted in its lower end in a cupped shaped bearing 23. Intermediate its ends, the shaft 21 is provided with a worm gear 24 which meshes with a worm 25 fixedly secured upon the projecting armature shaft 26 of a motor 27.

The crank pin 19 is extended through the disk 20 and projects below the disk as at 28, and is adapted when the disk is rotated to contact with a trip finger 29 mounted on the lower end of a pivoted arm 30 which is secured to the outer end of a shaft projecting from a counter generally indicated by the numeral 31.

Situated intermediate the ends of the frame 12 is a stationary cross piece 32 which is provided at its lower side with a bearing 33, through which the rod 16 is journalled. Projecting upwardly from the top of the cross piece 32 are a pair of knurled thumb screws 34 which are adapted to be screwed down upon and retain the ends of a thread 35. At suitably spaced intervals along the stationary cross piece and movable cross piece 36 are located a series of thread fastening means which may be of any desirable form, but which are shown as slightly bent hooks 37, around which the thread may be looped as clearly shown in Figs. 1 and 2 of the drawing.

The movable cross piece 36 is provided with an eye 38 to which may be secured one end of the cord 39 which passes over a sheave roller 40 and has secured to its other end a series of weights 41 of different sizes. A housing 42 is preferably provided to enclose the weights 41.

The scraping blade holder 14 is provided with a pair of upwardly projecting pins 43 over which may be placed a cooperating scraping blade member 44. Both of the scraping blade members are provided with projecting lugs 45 which are suitably slotted to frictionally engage scraping blades 46. It will be noted from Fig. 1 of the drawing, that the upper and lower blades are arranged in offset vertical planes, so as to eliminate a direct cutting action between the opposed blades. If desired additional weights as indicated at 47 may be placed upon the pins 43 if it is desired to subject the thread to a heavier scraping action. A suitable bobbin holder as shown at 48 may be provided to hold a bobbin 49 having thereon a thread to be tested. The speed of the motor may be regulated by a rheostat 50, the operating arm 51 of which is connected by a link 52 to a pivoted operating arm 53 provided with a spring pressed pawl 54 adapted to engage the teeth of a ratchet segment 55 the various teeth of the ratchet corresponding to the contact points of the various coils of the rheostat.

The movable cross piece 36 is preferably provided on one side with a notched opening 56 in which is adapted to be engaged a spring pressed locking pin 57 when the pin and notch are in alignment. A suitable card 60 which may have either a black or white surface or may be colored with any desirable color may be inserted underneath the threads upon spring clips 61 for the purpose of observing the condition of the thread. A suitable two plug electrical connection 62 is provided to conduct the current to the rheostat and motor from the usual current supply.

The operation of the apparatus and the manner in which the method is carried out is as follows: The one end of the thread is secured under one of the thumb screws 34, the movable cross member having been brought up into alignment and engaged with the stop pin 57. The thread 35 is then wound around the various hook members 37 and finally is clamped by the other knurled nut 34. It will be understood that the upper scraping blade member 44 has been removed and after placing the thread upon the cross pieces, the upper scraping blade member is then placed over the pins 43 with the blades 46 contacting with the thread 35. The stop pin 57 is then withdrawn, allowing the weights 41 to exert a tension upon the thread and hold it in taut condition. The pivoted arm 53 is then moved to actuate the rheostat and energizes the motor. The rotation of the motor through the worm 25 and worm wheel 24, shaft 21, and crank pin 19, causing the scraping blades to be reciprocated across the threads in an obvious manner. Upon each rotation of the crank disk, the projecting pin 28 will strike the counter actuating arm and cause the counter to register each reciprocation of the scraping blades. The reciprocation of the blades in contact with the thread after a certain number of reciprocations will cause the strands of the threads to be scraped loose in the manner shown in Fig. 5. It will be understood that the weights 41 may be varied as desired by adding or removing the riders so as to secure any desired tension upon the thread. It will also be understood that the speed of the reciprocation of the scraping blades may be varied by means of the rheostat 50, and that any desired pressure between the scraping blades may be obtained by placing additional weights 47 upon the upper scraping member.

It will thus be seen that with an apparatus such as disclosed that the tension of the thread will be constant and that this tension may be varied as desired, that the pressure between the scraping blades will

be constant, may also be varied and likewise that the velocity of the scraping members will be constant but that different speeds may be maintained according to the conditions desired.

It will be noted that as the opposed blades 44 and 46 are arranged in offset relation that the thread will be placed under flexure between the blades as they are reciprocated over the thread.

As seen in Fig. 2 of the drawing, the thread is twined around the fastening members 37 so as to lie in oblique lines with respect to the sides of the machine thereby preventing the thread from producing notches in or scoring the scraping blades, thus insuring that any wearing on the blades will be distributed evenly across their lower surfaces.

While I have used the term scraping to apply to the action of the blades 44 and 46, this term is not intended to be descriptive of or limited to a cutting action by the blades, which are slightly rounded on their outer or thread contacting faces, so as to avoid a direct cutting action. The term scraping as used in the claims hereunto appended therefore is not to be taken in its more limited or narrow meaning implying necessarily a cutting action, or the direct removal of a material part of the surface of the thread.

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

1. The method of testing a silk thread which consists in placing the thread under a predetermined tension and subjecting opposite sides of the thread while under tension to a reciprocating scraping action.

2. The method of testing a silk thread which consists in placing the thread under a predetermined tension while subjecting opposite sides of the thread to a reciprocating scraping action of a known constant velocity.

3. An apparatus for testing silk thread comprising means for placing the silk under tension means for subjecting the silk to a scraping action comprising opposed scraping blades in contact with opposite sides of the thread and means for causing relative reciprocation between the thread and the scraping blades.

4. An apparatus for testing silk thread comprising means for placing the silk under tension means for subjecting the silk to a scraping action comprising opposed scraping blades in contact with opposite sides of the thread said blades located in offset relation to each other and means for causing relative reciprocation between the thread and scraping blades.

5. An apparatus for testing silk thread comprising means for placing the silk under tension, means for subjecting the silk to a scraping action comprising a plurality of opposed scraping blades in contact with opposite sides of the thread and means for causing relative reciprocation between the thread and the scraping blades.

6. An apparatus for testing silk thread comprising means for placing the silk under tension, means for subjecting the silk to a scraping action comprising a plurality of opposed scraping blades located in offset relation to each other and adapted to contact with opposite sides of the thread and means for causing relative reciprocation between the thread and scraping blades.

7. An apparatus for testing silk threads comprising means for placing the thread under tension, scraping means adapted to contact with the thread and means to cause relative reciprocation between the scraping means and thread, said thread arranged in oblique lines with respect to the path of said reciprocation of said scraping means whereby scoring of the scraping means by said reciprocation will be prevented.

8. An apparatus for testing silk threads comprising spaced supports for the thread, scraping means located between said supports, means upon said supports to hold the thread along spaced lines angularly inclined to each other, means to cause relative reciprocation between said threads and scraping means, the space between said supports being free from obstructions whereby free visibility of said thread is permitted during the testing operation

9. An apparatus for testing silk threads comprising means for placing the thread under predetermined constant tension, scraping blades adapted to engage opposite sides of the thread, said blades being arranged in staggered relation to cause flexure of the thread between said blades, means to cause relative reciprocation between said blades and the thread and a free space being provided opposite each blade whereby the free passage of lumps, knots or foreign matter on the silk is permitted past said blades.

10. An apparatus for testing silk threads comprising a frame, a stationary cross piece and a movable cross piece, said cross pieces provided with means to engage a thread, a weight attached to said movable cross piece and adapted to exert tension on said threads and cooperating means on said frame and cross piece to engage and hold said movable cross piece in a fixed position.

11. An apparatus for testing silk threads comprising means for supporting the thread under predetermined constant tension, two sets of opposed scraping knives in contact with opposite sides of the thread, means to cause relative reciprocation between said thread and blades and the scrap-

ing blades of one set being arranged in staggered offset relation to the blades of the other set whereby said thread is maintained in a flexed condition by said blades during the testing operation and the passage of knots, lumps or foreign matter on the thread is permitted past said blades without jamming or breaking the thread.

12. The method of testing a silk thread which consists in placing the thread under a predetermined tension and subjecting opposite sides of the thread under tension to a scraping action while maintaining a constant pressure between the scraping means and the thread.

13. The method of testing a silk thread which consists in placing the thread under a predetermined tension and subjecting opposite sides of the thread while under tension to a reciprocating scraping action while maintaining a constant pressure between the scraping means and the thread.

14. The method of testing a silk thread which consists in placing the thread under a predetermined tension while subjecting opposite sides of the thread to a reciprocating scraping action of a known constant velocity while maintaining a constant pressure between the scraping means and the thread.

15 An apparatus for testing silk threads comprising scraping means, a pair of spaced supports, means on said supports to clamp a length of thread thereto, a plurality of thread engaging means arranged at spaced intervals along said supports and around which said length of thread is adapted to be threaded, said thread engaging means constructed and arranged to permit said length of thread to adjust itself when placed under tension and thereby maintain equal tension throughout said length of thread, means to hold said thread under tension and means to cause relative reciprocation between said scraping means and thread.

16. An apparatus for testing silk threads comprising spaced supports for the thread, scraping means located between said supports, means upon said supports to hold the thread along spaced lines angularly inclined to each other, means to cause relative reciprocation between said threads and scraping means, the space between said supports being free from obstructions whereby free visibility of said thread is permitted and means spaced below said supports to detachably secure a color card and provide a contrasting background against which the condition of the thread during the testing operation may be clearly observed.

17. In an apparatus for testing silk threads, means for supporting the thread under tension comprising a pair of supports having thread engaging means thereon to support a plurality of reaches of thread along transversely spaced lines, one of said supports being mounted for free movement longitudinally of said reaches of thread, means to normally urge said movable support away from said fixed support and maintain said thread under a predetermined constant tension, scraping means arranged in contacting engagement with said thread and means to cause relative reciprocation between said thread and scraping means.

18. In an apparatus for testing silk threads, means for supporting the thread under tension comprising a pair of supports having thread engaging means thereon to support a plurality of reaches of thread along transversely spaced lines, one of said supports being mounted for free movement longitudinally of said reaches of thread, means to normally urge said movable support away from said fixed support and maintain said thread under a predetermined constant tension, said thread engaging means constructed and arranged to permit movement of said thread therethrough and maintain equal tension of said thread in each of said reaches, scraping means arranged in contacting engagement with said thread and means to cause relative reciprocation between said thread and scraping means.

Signed at Hazleton, in the county of Luzerne and State of Pennsylvania, this 31st day of December A. D. 1921.

ALBERT AUGUST HASLER.