

Sept. 19, 1950

E. DOLL

2,522,751

THREAD CONTROLLING AND DEFECT DETECTING DEVICE

Filed Dec. 1, 1947

2 Sheets-Sheet 1

Fig. 1

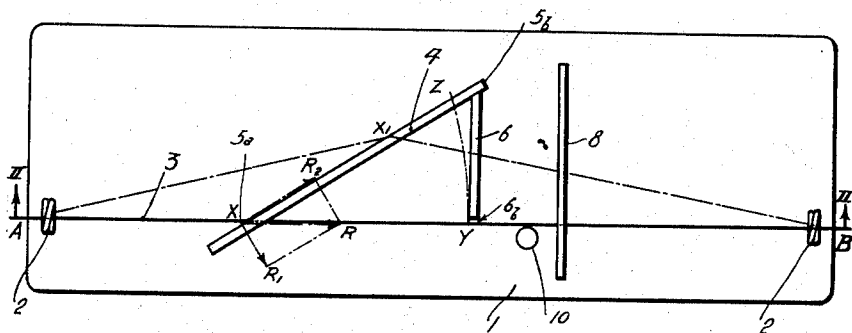


Fig. 2

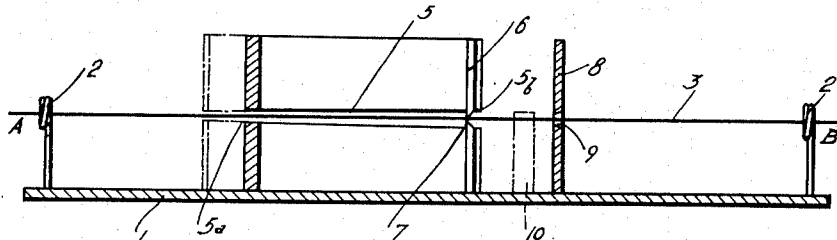
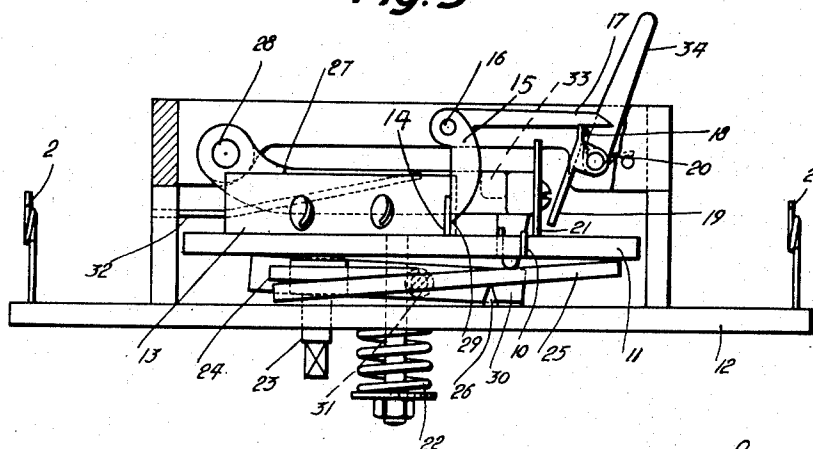


Fig. 3



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Fig. 4

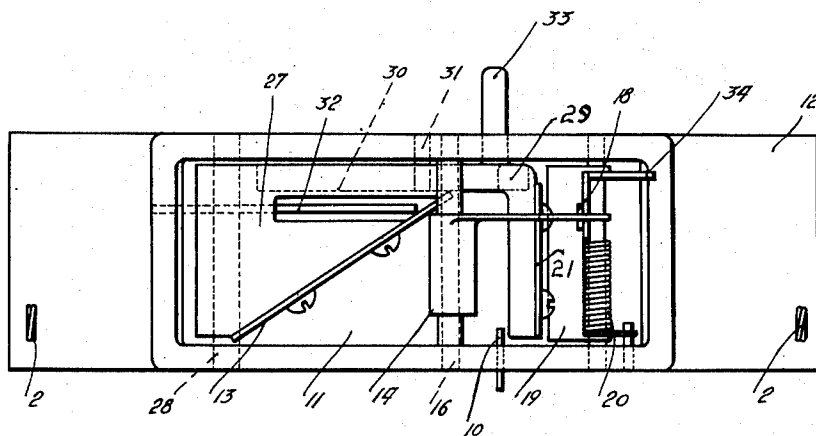


Fig. 5

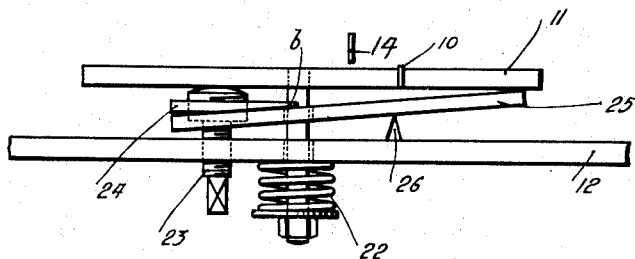
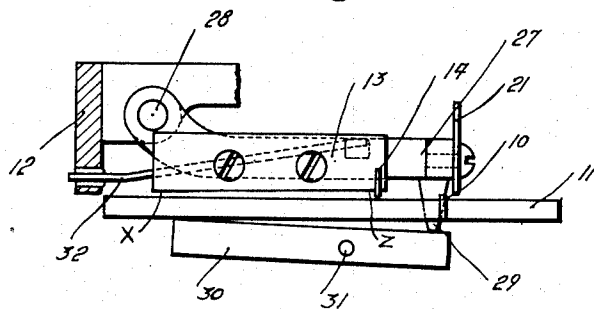


Fig. 6



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UNITED STATES PATENT OFFICE

2,522,751

THREAD CONTROLLING AND DEFECT
DETECTING DEVICE

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Application December 1, 1947, Serial No. 789,094
In France September 22, 1947

18 Claims. (Cl. 28—64)

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The present invention has for its object to provide a device for controlling and detecting defects in threads coming out of spinning and twisting frames with a view to removing the defects which appear on said threads and are likely to be prejudicial to their appearance and to their mechanical properties, while avoiding useless stoppings of said threads.

The devices which are generally used for this purpose often comprise a slot with two fixed edges through which passes the thread to be controlled, the plane of said edge being perpendicular or even oblique to the direction of circulation of the thread. The width of said slot is adjusted in such a manner that defects exceeding a certain diameter, but whatever their length, cannot pass therethrough, the thread being thus stopped and eventually broken if it is stretched further.

In certain cases, in order to insure a greater sensitivity, the stopping device is formed of a movable slotted plate which is shifted by the friction of the defect and through any mechanical means releases the closure of a second member which then clamps the thread energetically and insures the certain breaking thereof. The control principles and the operation of both devices are technically identical; they stop all the defects having a sufficient diameter for being clamped in the slot irrespective of the length of the defect.

Other arrangements which are more complicated are provided with successive blades in order that a defect having escaped one of them is stopped by an exactly similar blade located behind the first one but always irrespective of the length of the defect.

Furthermore, other arrangements provide means for avoiding the breaking when a knot passes but without giving the possibility of any discrimination between a well made knot (well made warper's knot) and a very thick knot (a badly made warper's knot or an ordinary knot) or even a large knot having a very distinct rounded form as it is often the case. Now, the passage of both these latter defects without any breaking is prejudicial to the appearance and to the mechanical properties of the threads. The devices of this kind are provided with movable mechanical members which shift to allow the passage of warper's knots and such defects which are presumed to be acceptable, which renders said devices unusable on modern great speed winding-machines because the inertia of such movable members would cause the breaking of the thread before the shifting could have oc-

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curred and this, more particularly, in the case of thin threads which are those which require the higher uniformity.

Now, while short defects such as well made or small knots, even of a certain diameter, cause no trouble during the subsequent use of the thread, this is no longer true for defects having the same diameter or even a smaller diameter, scarcely larger than the diameter of the thread, but having a noticeable length, nor for defects having a higher diameter than a well made warper's knot, and all these defects must be removed.

Experience shows that long defects which are often the finest ones tend to be flattened and to pass through the control slots without causing the breaking of the thread. It is thus necessary to provide a very narrow slot which must be adjusted with precision, but then the thread drawn constantly through a narrow slot breaks on the smallest knot, even if almost imperceptible, and more particularly it is unravelled on its whole length which is largely prejudicial to its appearance and its mechanical properties.

Furthermore, the precision of adjustment required in order that a device may be efficient irrespective of its degree of improvement requires, in all the existing devices, the constitution of records after experiments made on numerous thread diameters and the use of gauges; the adjustment of a device on starting with one quality of thread is a long operation which must be repeated on a very large number of devices used simultaneously, the production of each device being very small.

The device according to the present invention makes it possible to avoid all the above mentioned disadvantages, viz.:

- Unnecessary stops for insignificant defects,
- Passage of badly made or very large knots,
- Impossibility of use for high linear speeds owing to the inertia of the movable selecting members,
- Flattening of long defects,
- Unravelling of the thread,
- Material difficulty of adjusting each device and to determine the best suitable adjustment,
- Impossibility of ascertaining the getting out of order of a device for any reason through a simple observation,
- Clogging of the cleaners,

each of said disadvantages being sufficient when taken separately for making a device ineffective or practically unusable.

The device according to the invention com-

prises two thread guides of a known type determining the axis of circulation of the thread and between said thread guides in the direction of circulation of the thread, successively, a selecting blade arranged obliquely with respect to the axis of circulation of the thread and provided, in a horizontal plane containing said axis, with a slot the opening of which is slightly larger than the diameter of the thread and through which the thread circulates, a first stopping member provided, perpendicularly to the axis of circulation, with a slot-shaped passage located in the plane of the slot in the oblique blade said member extending between the front end of the oblique blade and a point in the neighbourhood of the axis of circulation of the thread without reaching the latter, the thread circulating normally outside said member and the opening of said passage being substantially equal to the diameter of the thread, and, after this first stopping member, a second stopping member comprising a slot perpendicular to the axis of circulation of the thread and offering to the latter a passage equal to the diameter of a well made knot, the thread always circulating through said member.

Two embodiments of the device according to the invention are described hereafter with reference to the appended drawings, in which:

Figure 1 is a diagrammatical plan view of a simple type of said device.

Fig. 2 is a sectional view through line II—II of Fig. 1.

Fig. 3 is an elevational view showing a practical embodiment of a device with adjustment of the width of the slots.

Fig. 4 is a plan view corresponding to Fig. 3.

Fig. 5 is a detail view showing the adjustment means of the slope of the base plate of the device of Fig. 3.

Fig. 6 is a detail view showing the levers for controlling the adjustment of the progressive opening of the oblique plate and of the second stopping member in the device of Fig. 3.

The device shown in Figs. 1 and 2 comprises a base plate 1, two pig tail thread guides 2 between which the thread 3 circulates from A towards B and between said thread guides, successively, a blade 4 oblique with respect to the axis of circulation of the thread and provided in the horizontal plane containing a slot 5 at said axis the width of which increases in the downstream direction, or the direction of travel of the thread, from the entrance point 5a where it is slightly larger than the diameter of the thread, till the exit point 5b where it is scarcely smaller than the diameter of an acceptable knot. A blade 6 is perpendicular to the downstream direction AB, provided in the horizontal plane of circulation of the thread with a slot 7 the width of which is scarcely larger than the diameter of thread 3, said blade 6 extending between the end 5b of the slotted blade 4 and a point 6b near the axis AB without reaching the latter and, lastly, a slotted blade 8 perpendicular to the axis AB, the slot 9 of this blade the width of which is slightly larger than the diameter of a well made knot being located in the horizontal plane of circulation of the thread. An abutment 10 limits the displacement of the thread on the side opposed to plate 6.

Any defect appearing before the oblique blade 4 creates a resistance resulting in a force R which can be resolved into a force R₁ perpendicular to the plane of the plate and a force R₂ acting in

the direction 5a—5b. Under the influence of R₂ the thread is displaced towards 5b while forming an angle and this until the point where the width of slot corresponds to the passage of the diameter of the defect. Two cases may occur:

(1) The defect has a larger diameter than the thread and a smaller diameter than a warper's knot. The defect passes below the oblique blade at the point X₁ where the width of the slot is equal to the diameter of said defect. At this moment the thread which was displaced laterally has entered the slot 7 of blade 6. Two possibilities then arise:

(a) The defect has a length which is smaller than the distance, measured on the line passing through X₁ and the exit pig tail, which separates point X₁ from the arc of circle YZ centered on the entrance pig tail and tangent to blade 6; in this case, after having passed through the oblique slot 5 the thread is freed and returned immediately to its normal position before it resumes its forward movement; the defect passes on the side of blade 6 and through the device without causing any stopping since it is necessarily thinner than the opening of the next following blade 8;

(b) The length of the defect is longer than the distance from X₁ to the arc of circle YZ; the defect is clamped in slot 7 of blade 6 and the thread is broken.

The shape of the triangle with a circular side X, Y, Z shows that the larger the defects, the smaller the minimum distance on which they are stopped; all the defects which find their way through slot 5 between point Z and the end 5b are stopped, even if they have the shape of a simple point.

(2) The defect has a diameter equal to or larger than that of a warper's knot; it then slides on the whole length of the oblique blade 4, shifting the thread in the slots 5 and 6 till it leaves at their other end 5b. As soon as the defect escapes at the end of the oblique blade 4, after having passed blade 6 which could not act upon the defect owing to the protection afforded by the oblique blade 4 the thread is freed as in the first case and tends to resume its place by passing through the slots again but in the reverse direction, the defect describing an arc of circle centered on the entrance pig tail and passing through the downside end 5b of the oblique blade 4. When moving further, the defect engages blade 8. Two possibilities may again arise:

(a) If the defect is a well made warper's knot it passes through slot 9 adjusted for this purpose.

(b) If the diameter of the defect is larger than that of a warper's knot, e. g. a large plug or a badly made knot, it is arrested by blade 8 and the thread is broken if it is stretched further.

The abutment 10 limits the displacement of the returning thread in order to avoid that the thread carried along through the rapidity of this movement and the weight of a thick defect leaves on the other side of the device, thus being likely to pass beside the slot 9.

Experience shows that for obtaining a good result the ratios of the openings of the three slots 5 (at point X) 7 and 9 must be approximately the following, irrespective of the thickness of the thread:

$$\text{Opening 7} = (\text{opening 5 at point X}) \times 0.9$$

$$\text{Opening 9} = (\text{opening 5 at point X}) \times 1.3$$

$$\text{Opening 5 at point Z} = (\text{opening 5 at point X}) \times 1.4$$

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In the device shown in Figs. 3 and 4 the axis of circulation of the thread is again defined by the thread guides 2. The thread circulates on a plate 11 the plane of which contains the axis of circulation of the thread, said plate being itself secured on a base plate 12 carrying the thread guides 2 by means of a device which will be hereafter described. Co-operating with said plate 11 in order to create slot-shaped openings equivalent to those above described are an oblique blade 13 and a blade 14 carried by one of the arms of a bell crank lever 15 pivotally mounted at 16 and the other arm of which carries a step 17 which retains, through a finger 18, the stopping flap 19 urged towards the base plate 11 by a return spring 20. The slot corresponding to 9 is created by a blade 21 the lower edge of which leaves between it and the base plate 11 an interval which is very slightly larger than the diameter of a warper's knot.

The widths of the so created slots must be adjusted proportionally according to the diameter of the thread to be controlled. This adjustment is effected by actuating a single member forming part of a device which will be described hereafter with reference to Figs. 3 and 4 as well as to Figs. 5 and 6 which are detail views of the same.

The base plate 11 is urged downwards by a spring 22 and rests, on the one hand, upon the head of a two-pitch screw 23 the other end of which comprises a square onto which a set wrench can be applied; the pitch of the upper part of screw 23 is double of that of the lower part. The fine pitch of said screw is screwed into the frame 12 and mounted on the second thread is a nut 24 below which a lever 25 comes to rest which is pivotally mounted around a knife 26, the plate 11 resting, on the other hand, upon the other end of said lever 25.

If the two-pitch screw is turned in one direction or in the other by means of the set wrench, the part of the plate 11 which rests upon the head of the screw 23 is shifted according to the movements of said head.

The nut 24 which comprises a forked part b preventing its rotation is shifted along the screw on twice the distance in a direction opposite to that of plate 11 owing to the double pitch of the first one. This results in that when plate 11 is raised (lowered) at this end by a certain amount the nut is, on the contrary, lowered (raised) by the same amount and transmits this movement to lever 25. Said lever, while rocking around knife 26, imparts to the other end of the plate a movement in the same direction as that imparted to the part resting on the screw and which is equal or proportional to that of the head of the two-pitch screw, according as the position of knife 26 is chosen at the centre or off-set towards one of the ends of lever 25. Thus, for obtaining below blade 14 an opening equal to 0.9 of the opening below blade 13 at point X said knife is slightly off-set towards that end of lever 25 upon which the plate 11 rests directly. Once determined said position of knife 26 remains valid irrespective of the thickness of the thread.

It remains to determine the automatic adjustment of the opening in blade 21 and of the progressive opening (which is not indispensable but insures a more regular working) from X to Z of the oblique blade 13, as shown in Fig. 6.

Both said blades are secured to a single support 27 pivotally mounted around an axis 28

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which comprises, beside the planes on which blades 13 and 21 are secured, a finger 29 passing through an opening in plate 11 and resting upon one of the ends of a rocking lever 30 pivoting freely around a shaft 31 and the other end of which directly rests below plate 11 while following its movements freely in case of adjustment by the two-pitch screw 23 owing to the downward pressure exerted on support 27 by spring 32.

When the plate is lowered, thus opening the slots below the three blades 13, 14 and 21, lever 30 rocking around shaft 31 acts upon finger 29 of support 27 of blades 13 and 21 while raising it; the slot opened below plate 21 by the lowering of plate 11 is thus amplified by the raising of said blade 21 fast with support 27. The rocking points of the support and the rocking lever are calculated in order to obtain a total opening at this point of about 1.6 times the opening obtained at point X (this opening of 1.6 X corresponds to the passage of a warper's knot the diameter of which is always substantially proportional to that of the thread).

In order that this proportionality may be observed it is necessary that when the plate is raised until it engages blade 14 both other blades 13 and 21 must also be engaged. This is the initial mounting adjustment.

The progressive opening from X to Z of blade 13 is obtained simultaneously since said blade is fast with blade 21. If it is desired, for example, to obtain at Z an opening equal to 1.4 times the opening at X, it is sufficient, the opening below blade 21 being equal to 1.6 times the opening at X, that point Z is at $\frac{2}{3}$ of the distance from point X and from blade 21.

Support 27 comprises, furthermore, a finger 33 projecting outside the frame adapted for making it possible for the operator to raise it in order to free a defect caught in the device. By raising support 27 both blades 13 and 21 secured to said support are raised and, furthermore, blade 21 acting through its upper edge upon the two-armed lever 15 causes blade 14 to rock and opens slot 4. During this operation the operator retains the arresting flap 19 through its engaging finger 34 in order that it does not come to clamp the thread. It is upon said finger 34 that the operator acts in order to return it to its position when it drops down upon the thread owing to the working of the stopping device. When finger 33 is no longer acted upon all the blades automatically return to their correct position under the influence of spring 32; thus the thread which has been knotted again may be controlled further.

The adjustment of the device is effected without any gauge and without it being necessary to know the exact characteristics of the thread. To this end, the adjustment is proceeded with as follows:

Before the thread is set in motion, the screw 23 is first adjusted to open the slots to an extent beyond that required for the subsequent operation of the device, and if desired, to their maximum open positions.

The thread is then set in motion and the device is closed by means of the adjustment wrench until it is observed that owing to the clamping at X below blade 13 the thread carried along by its movement is off-set in the direction of Z.

The device is then slightly loosened for causing the thread to circulate below blade 13 again in the neighbourhood of point X while maintaining

it in a certain vibration due to the rubbing against blade 13. This vibration which is easily perceptible in the course of an inspection is the proof that the device is not too widely open, which would render it ineffective; the permanent off-setting of the thread in the direction of Z indicates, on the contrary, a too strong clamping which would cause breakings for the smallest defect, the thread being then, contrary to the principle of the present device, constantly engaged below blade 14.

In both the specification and claims, the use of the term "upstream end" and "downstream end" is intended to mean respectively, the ends from which and toward which the thread is travelling.

What I claim is:

1. A device for controlling and detecting defects in textile threads which comprises two thread guides of known type determining the axis of circulation of the thread and, between said thread guides, in the direction of the circulation of the thread, successively, a selecting blade arranged obliquely with respect to the axis of circulation of the thread and provided, in a horizontal plane containing said axis, with a slot the opening of which is slightly larger than the diameter of the thread, a first stopping member provided, perpendicularly to the axis of circulation, with a slot-shaped passage located in the plane of the slot in the oblique blade between the downstream end of said blade and a point in the neighbourhood of said axis without reaching the latter, the opening of said passage being substantially equal to the diameter of the thread and, on the downstream side of this latter unit, a second stopping member perpendicular to the axis of circulation of the thread and offering to the latter a passage equal to the diameter of a well made knot on the thread.

2. A device for controlling and detecting defects in textile threads which comprises two thread guides of known type determining the axis of circulation of the thread and, between said thread guides, in the direction of the circulation of the thread, successively, a selecting blade arranged obliquely with respect to the axis of circulation of the thread and provided, in a horizontal plane containing said axis, with a slot the opening of which widens out from the entrance end to the exit end, said slot having at its most closed point an opening equal to the diameter of the thread and at its most opened point an opening which is slightly smaller than the diameter of a warper's knot made on the thread, a first stopping member provided, perpendicularly to the axis of circulation of the thread, with a slot-shaped passage located in the plane of the slot in the oblique blade between the downstream end of said oblique blade and a point in the neighbourhood of said axis without reaching the latter, the opening of said passage being substantially equal to the diameter of the thread and, finally, on the downstream side of this unit, a second stopping member perpendicular to the axis of circulation of the thread and offering to the latter a passage equal to the diameter of a well made knot on the thread.

3. A device for controlling and detecting defects in textile threads, which comprises two thread guides of known type determining the axis of circulation of the thread and, between said thread guides, in the direction of the circulation of the thread, successively: a selecting blade arranged obliquely with respect to the axis

of circulation of the thread and provided, in a horizontal plane containing said axis, with a slot the opening of which widens out from the entrance end to the exit end, said slot having at its most closed point an opening equal to the diameter of the thread and at its most opened point an opening which is slightly smaller than the diameter of a warper's knot made on the thread, a first stopping member constituted by a cleaning device provided with a slot formed of a blade perpendicular to the axis of circulation of the thread and in which a slot is provided which is open at both its ends and the width of which is substantially equal to the diameter of the thread, said slot being located in the plane of circulation of the thread between the downstream end of the slot in the oblique blade and a point in the neighbourhood of said axis of circulation without reaching the latter and, finally, on the downstream side of this unit, a second stopping member constituted by a defect detecting device provided with a slot formed of a blade perpendicular to the axis of circulation of the thread and in which a slot is provided which is open at both its ends, and the width of which is substantially equal to the diameter of a well made knot on the thread.

4. A device for controlling and detecting defects in textile threads which comprises two thread guides of known type determining the axis of circulation of the thread to be acted upon and between which is arranged a base plate on which the thread may slide longitudinally and laterally, and three blades arranged above said base plate substantially perpendicularly to the plane of the latter and each providing against said base plate a passage slot for the thread, the first blade being arranged obliquely with respect to the axis of circulation of the thread and providing a passage slot the width of which is slightly larger than the diameter of the thread, the second blade extending substantially perpendicularly to the axis of circulation of the thread between the downstream end of the oblique blade and a point in the neighbourhood of said axis without reaching the latter, and providing a passage slot the width of which is substantially equal to the diameter of the thread, and the third blade, substantially parallel to the second blade, providing a passage slot the width of which is substantially equal to the diameter of a well made knot on the thread.

5. A device for controlling and detecting defects in textile threads which comprises two thread guides of known type determining the axis of circulation of the thread to be acted upon and between which is arranged a base plate on which the thread may slide longitudinally and laterally, means being provided to shift said plate perpendicularly to its plane, and three blades arranged above said base plate substantially perpendicularly to the plane of the latter and each providing against said base plate passage slot for the thread, the first blade being arranged obliquely with respect to the axis of circulation of the thread and providing a passage slot the width of which is slightly larger than the diameter of the thread, the second blade extending substantially perpendicularly to the axis of circulation of the thread between the downstream end of the oblique blade and a point in the neighbourhood of said axis without reaching the latter, and providing a passage slot the width of which is substantially equal to the diameter of the thread, and the third blade, substantially parallel to the

second blade, providing a passage slot the width of which is substantially equal to the diameter of a well made knot on the thread.

6. A device for controlling and detecting defects in textile threads which comprises two thread guides of known type determining the axis of circulation of the thread to be acted upon and between which is arranged a base plate on which the thread may slide longitudinally and laterally, and three blades arranged above said base plate substantially perpendicularly to the plane of the latter and each providing against said base plate a passage slot for the thread, the first blade being arranged obliquely with respect to the axis of circulation of the thread and providing a passage slot the width of which is slightly larger than the diameter of the thread, the second blade extending substantially perpendicularly to the axis of circulation of the thread between the downstream end of the oblique blade and a point in the neighbourhood of said axis without reaching the latter, and providing a passage slot the width of which is substantially equal to the diameter of the thread, said blade being carried by one of the arms of a two-arm lever pivotally mounted on a shaft parallel with the direction of the blade and the other arm of which is provided with a step arranged to maintain, against the action of a return spring which tends to press it down onto the polished plate, a flap pivotally mounted on a shaft parallel with the articulation shaft of the two-arm lever, and the third blade, substantially parallel to the second blade, providing a passage slot the width of which is substantially equal to the diameter of a well made knot on the thread.

7. A device for controlling and detecting defects in textile threads which comprises two thread guides of known type determining the axis of circulation of the thread to be acted upon and between which is arranged a base plate on which the thread may slide longitudinally and laterally, means being provided to shift said plate perpendicularly to its plane, and three blades arranged above said base plate substantially perpendicularly to the plane of the latter and each providing against said base plate a passage slot for the thread, the first blade being arranged obliquely with respect to the axis of circulation of the thread and providing a passage slot the width of which is slightly larger than the diameter of the thread, the second blade extending substantially perpendicularly to the axis of circulation of the thread between the downstream end of the oblique blade and a point in the neighbourhood of said axis without reaching the latter, and providing a passage slot the width of which is substantially equal to the diameter of the thread, said blade being carried by one of the arms of a two-arm lever pivotally mounted on a shaft parallel with the direction of the blade and the other arm of which is provided with a step arranged to maintain, against the action of a return spring which tends to press it down onto the polished plate, a flap pivotally mounted on a shaft parallel with the articulation shaft of the two-arm lever, and the third blade, substantially parallel to the second blade, providing a passage slot the width of which is substantially equal to the diameter of a well made knot on the thread.

8. A device for controlling and detecting defects in textile threads which comprises two thread guides of known type determining the axis of circulation of the thread to be acted upon and between which is arranged a base plate on which

the thread may slide longitudinally and laterally, and three blades arranged above said base plate substantially perpendicularly to the plane of the latter and each providing against said base plate a passage slot for the thread, the first blade being arranged obliquely with respect to the axis of circulation of the thread and providing a passage slot the width of which increases from the point of said blade located on the axis of circulation of the thread, where it is very slightly larger than the diameter of the latter, to the downstream end of said blade, where it reaches approximately one and a half times said diameter, the second blade extending substantially perpendicularly to the axis of circulation of the thread between said downstream end of the oblique blade and a point in the neighbourhood of said axis without reaching the latter, and providing a passage slot the width of which is substantially equal to the diameter of the thread, and the third blade, substantially parallel to the second blade, providing a passage slot the width of which is substantially equal to the diameter of a well made knot on the thread.

9. A device for controlling and detecting defects in textile threads which comprises two thread guides of known type determining the axis of circulation of the thread to be acted upon and between which is arranged a base plate on which the thread may slide longitudinally and laterally, means being provided to shift said plate perpendicularly to its plane, and three blades arranged above said base plate substantially perpendicularly to the plane of the latter and each providing against said base plate a passage slot for the thread, the first blade being arranged obliquely with respect to the axis of circulation of the thread and providing a passage slot the width of which increases from the point of said blade located on the axis of circulation of the thread, where it is very slightly larger than the diameter of the latter, to the downstream end of said blade, where it reaches approximately one and a half times said diameter, the second blade extending substantially perpendicularly to the axis of circulation of the thread between said downstream end of the oblique blade and a point in the neighbourhood of said axis without reaching the latter, and providing a passage slot the width of which is substantially equal to the diameter of the thread, said blade being carried by one of the arms of a two-arm lever pivotally mounted on a shaft parallel with the direction of the blade and the other arm of which is provided with a step arranged to maintain, against the action of a return spring which tends to press it down onto the polished plate, a flap pivotally mounted on a shaft parallel with the articulation shaft of the two-arm lever, and the third blade, substantially parallel to the second blade, providing a passage slot the width of which is substantially equal to the diameter of a well made knot on the thread.

10. A device for controlling and detecting defects in textile threads which comprises two thread guides of known type determining the axis of circulation of the thread to be acted upon and between which is arranged a base plate on which the thread may slide longitudinally and laterally, said plate, slidably mounted in a general frame and urged downwards by a spring, resting on one hand on the end of a two-pitch screw the smaller pitch of which is engaged in a tapped hole in the said general frame and the larger, which is double of the smaller, is engaged in a nut and, on the

other hand, on the end of a lever which rests on a knife and the other end of which is engaged under said nut, and three blades arranged above said base plate substantially perpendicularly to the plane of the latter and each providing against said base plate a passage slot for the thread, the first blade being arranged obliquely with respect to the axis of circulation of the thread and providing a passage slot the width of which increases from the point of said blade located on the axis of circulation of the thread, where it is very slightly larger than the diameter of the latter, to the downstream end of said blade, where it reaches approximately one and a half times said diameter, the second blade extending substantially perpendicularly to the axis of circulation of the thread between said downstream end of the oblique blade and a point in the neighbourhood of said axis without reaching the latter, and providing a passage slot the width of which is substantially equal to the diameter of the thread, said blade being carried by one of the arms of a two-arm lever pivotally mounted on a shaft parallel with the direction of the blade and the other arm of which is provided with a step arranged to maintain, against the action of a return spring which tends to press it down onto the polished plate, a flap pivotally mounted on a shaft parallel with the articulation shaft of the two-arm lever, and the third blade, substantially parallel to the second blade, providing a passage slot the width of which is substantially equal to the diameter of a well made knot on the thread.

11. A device for controlling and detecting defects in textile threads which comprises two thread guides of known type determining the axis of circulation of the thread to be acted upon and between which is arranged a base plate on which the thread may slide longitudinally and laterally, said plate, slidably mounted in a general frame and urged downwards by a spring, resting on one hand on the end of a two-pitch screw the smaller pitch of which is engaged in a tapped hole in the said general frame and the larger, which is double of the smaller, is engaged in a nut and, on the other hand, on the end of a lever which rests on a knife and the other end of which is engaged under said nut, and three blades arranged above said base plate substantially perpendicularly to the plane of the latter and each providing against said base plate a passage slot for the thread, the first blade being arranged obliquely with respect to the axis of circulation of the thread and providing a passage slot the width of which increases from the point of said blade located on the axis of circulation of the thread, where it is very slightly larger than the diameter of the latter, to the downstream end of said blade, where it reaches approximately one and a half times said diameter, the second blade extending substantially perpendicularly to the axis of circulation of the thread between said downstream end of the oblique blade and a point in the neighbourhood of said axis without reaching the latter, and providing a passage slot the width of which is substantially equal to the diameter of the thread, said blade being carried by one of the arms of a two-arm lever pivotally mounted on a shaft parallel with the direction of the blade and the other arm of which is provided with a step arranged to maintain, against the action of a return spring which tends to press it down onto the polished plate, a flap pivotally mounted on a shaft parallel with the articulation shaft of the two-arm lever, and the third blade,

substantially parallel to the second blade, providing a passage slot the width of which is substantially equal to the diameter of a well made knot on the thread, both the first and second above-mentioned blades being secured on a same supporting member pivotally arranged on a shaft parallel to the said second blade and applied by means of a spring on one end of a lever the other end of which rests beneath the movable base plate.

12. A device for controlling and detecting defects in textile threads, which comprises two thread guides of known type determining the axis of circulation of the thread to be acted upon and between which is arranged a base plate on which the thread may slide longitudinally and laterally, means being provided to shift said plate perpendicularly to its plane, and three blades arranged above said base plate substantially perpendicularly to the plane of the latter and each providing against said base plate a passage slot for the thread, the first blade being arranged obliquely with respect to the axis of circulation of the thread and providing a passage slot the width of which increases from the point of said blade located on the axis of circulation of the thread, where it is very slightly larger than the diameter of the latter, to the downstream end of said blade, where it reaches approximately one and a half times said diameter, the second blade extending substantially perpendicularly to the axis of circulation of the thread between said downstream end of the oblique blade and a point in the neighborhood of said axis without reaching the latter, and providing a passage slot the width of which is substantially equal to the diameter of the thread, and the third blade, substantially parallel to the second blade, providing a passage slot the width of which is substantially equal to the diameter of a well made knot on the thread.

13. A slub catcher for yarn comprising in combination a pair of relatively fixed guide means for travelling yarn, means for causing deflection of the path of the yarn in accordance with variations in the diameter thereof, said means being positioned between said guide means and comprising a structure arranged at an acute angle to the normal direction of travel of said yarn and having a tapered slit through which said yarn passes said slit increasing in width in the direction of said deflection of said yarn, and yarn arresting means cooperating with said deflection means.

14. A method of detecting diameter variations in filamentary material travelling between two relatively fixed points which comprises contacting the material intermediate the points by opposed surfaces diverging in a direction at an acute angle to the direction of travel between the fixed points to create a component of force tending to deflect the path of the material transversely with, and proportionately to, change in diameter, and detecting transverse deflections of the path.

15. A method of detecting variations in diameter of travelling filamentary material which comprises deflecting the path of travel of the material in accordance with the diameter of the material by passing the material through a slit increasing in width in a direction making an acute angle with the direction of travel of the material so that the material moves transversely in the slit as its diameter varies and the path of the material is deflected proportionately to diameter changes, and detecting deflections of the path of the material from a normal path.

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16. A slub catcher for filamentary material comprising in combination a pair of relatively fixed guide means for travelling filamentary material, a structure located between said guide means and having spaced surfaces defining a tapered slit, said structure being so oriented with respect to said guide means that filamentary material travelling between the guide means passes through the slit at an acute angle, and means for arresting the travel of the material upon a predetermined deflection of the travelling material toward the wider end of the tapered slit.

17. A slub catcher for yarn comprising a frame, yarn guide means mounted on said frame for passage of yarn therebetween, a member having an elongated tapered slit therein, said member being mounted on said frame between said guide means with the slit increasing in width in a direction making an acute angle with the direction of travel of the yarn, and means for arrest-

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ing the travel of the yarn when the yarn is deflected a predetermined distance toward the wider end of the slit.

18. The slub catcher according to claim 17 wherein said member comprises two parts defining the tapered slit, at least one of said parts being adjustably mounted on the frame so as to permit of variation in the width and taper of the slit, and wherein are comprised means for locking said part in adjusted position.

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The following references are of record in the file of this patent:

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