

Dec. 20, 1960

D. L. SHARPS
YARN DEFECT DETECTOR
Filed June 28, 1957

2,964,828

Fig. 1

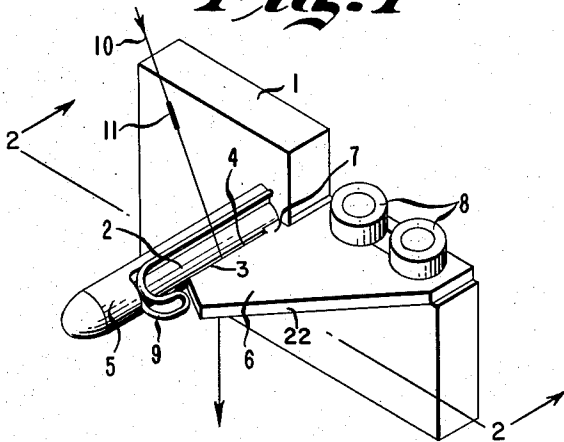


Fig. 2

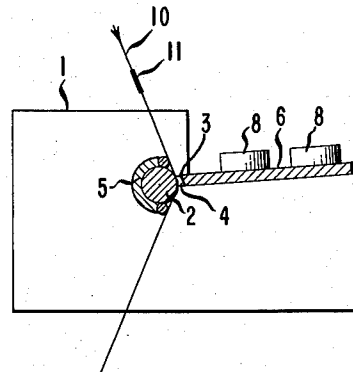


Fig. 4

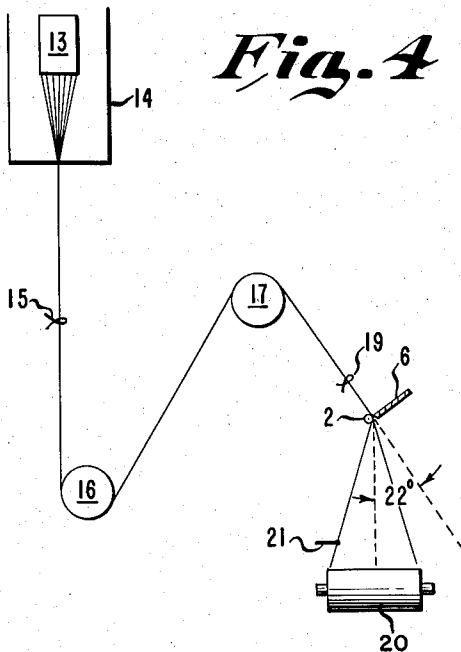


Fig. 3



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YARN DEFECT DETECTOR

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Filed June 28, 1957, Ser. No. 668,682

1 Claim. (Cl. 28—64)

This invention relates to novel apparatus useful in the manufacture of funicular structures. More specifically it is concerned with a cleaner and defect inspection device useful in the manufacture of threads, yarns, filaments, and the like.

Thread cleaners consisting of a narrow slot of fixed width are well-known in various embodiments, some involving sharp edges, some involving fairly elaborate cut-down mechanisms, and the like. All these devices are designed to catch slubs or other abnormalities in the yarn which are larger than the pre-established slot width. They permit, however, the passage of such defects as sections where filaments have fused together without enlarging the total diameter of the yarn bundle. This occurs sometimes on melt-spinning machines and results in subsequent breakdowns or other handling difficulties.

An object of the present invention is to provide a cleaner for funicular structures which is sensitive to fused sections of melt spun filaments.

Another object is to provide a novel and useful self-stringing cleaner for a funicular structure which cleaner is highly resistant to abrasion.

A further object is to provide a process for cleaning melt-spun funicular structures wherein fused sections cause breakage of the continuous thread line.

These and other objects will become apparent in the course of the following specification and claims.

The invention will be more readily understood by reference to the drawings herein:

Figure 1 is a perspective view of the cleaner device of the present invention;

Figure 2 is a sectional elevation taken along line 2—2 of Figure 1 of the members forming the inspection slot of the present invention;

Figure 3 is a plan view of the curved surface, surface support, and slot guard, showing a modification of the guard;

Figure 4 is a diagrammatic illustration of a spinning system employing a cleaner guide as described and claimed in the present invention.

Referring to Figure 1, a mounting base 1, which serves the purpose of providing an anchor to maintain the other elements of the structure in fixed relation, and to mount the cleaner upon a spinning device, has a pin or curved surface 2 and a blade or cutting edge 3 protruding therefrom and spaced to provide an adjustable inspection slot 4, blade 3 lying parallel to the axis of curvature of curved surface 2. Curved surface support 5 provides structural rigidity for curved surface 2. Blade support or plate member 6, which includes spacing feeler 7, provides adjustable mounting means for blade 3 to block 1 with anchoring bolts 8. A slot guard 9 is provided at the open end of adjustable inspection slot 4. Thread line 10 enters from the top of the apparatus as shown, moving in the direction of the arrow, and containing an obstruction caused by fusion 11, leaving the apparatus below adjustable inspection slot 4.

Figure 2 is a cross sectional elevation taken across line

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2—2 of Figure 1, showing in detail curved surface 2, normally a cylindrical ceramic member, embedded in surface support 5. The adjustable inspection slot 4 is formed by the relationship of blade 3 (which as shown is integral with blade support 6) and the curved surface 2. As can be seen in this figure, under normal operating conditions the yarn bundle of thread line 10 is flattened against curved surface 2 during its passage through adjustable slot 4. When a fused section of filaments which may not involve all the filaments in the yarn bundle reaches curved surface 2, flattening of the fused section of the yarn bundle is impossible and due to the differential in bending modulus, the fused section 11 protrudes into the cutting edge 3, causing breakage of thread line 10.

Figure 3 is a plan view of the curved surface 2 and its support 5 illustrating a modified slot guard 9. As shown in this figure, slot guard 9 is a solid curved surface integral with post cap 12 which fits over the end of surface support 5. As is obvious from the structure, slot guard 9 is positioned to prevent removal of the yarn from the slot by simple lateral movement of the thread line parallel to the slot.

Figure 4 is a diagrammatic presentation of a yarn spinning system employing the cleaner guide of the present invention. The yarn is formed in a melt spinning extrusion device 13, and after passing out of cooling column 14, it is led by yarn guide 15 to feed rolls 16 and 17 and thereafter to pin 2, yarn guide 19 determining the angle at which the thread line enters the cleaner device. After passing around the curved surface 2 of the cleaner device at an angle of wrap of about at least 10°, the yarn is wound upon bundle 20 whereupon even lay-down is provided by traverse guide 21. By the expression "angle of wrap" is intended the angular displacement of the thread line from its direction of approach to pin 2 caused by the positioning of the wind-up roll. As is obvious from the illustration, this angle varies due to the motion of traverse guide 21 perpendicular to the direction of the inspection slot. Generally this angle may be varied between about 10 and 40°. It is preferred that the angle of wrap be maintained at about 22°±9°. The preferred angular displacement is illustrated by the dotted lines in the drawing, the solid lines illustrating the approximate limits of yarn travel due to the traverse sweep under such conditions.

As will be obvious from a consideration of Figure 1, the device of the present invention is self-threading. When the spinning machine is first strung up, yarn is brought from the feed roll to the traverse of the wind-up and then inserted into the necessary guides. Upon contact of tensioned thread line 10 with tapered back or guiding edge 22 of the blade supporting plate member 6, the yarn bundle is fed toward slot guard 9, which positions it against curved surface 2 along which it thereafter moves by virtue of its tension into adjustable inspection slot 4.

As shown in Figure 2 the cutting blade may be integral with the blade support 6. The edge per se may be sharpened as shown. However, a 90° edge is satisfactory.

It is preferred that blade support 6 be angled, as shown, at an angle of about 10° above a horizontal line passing through the diameter of surface 2. Such an arrangement avoids interference with the traversing action of the filament below the cleaner guide device. This positioning is not critical to the operation of the device, however, and a blade with a horizontal support and even a blade whose support has an angle below the horizontal is satisfactory, provided yarn guides are employed to avoid interference due to traverse motion.

Figures 2 and 3 show the details of construction of the

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curved surface 2 and surface support 5. As previously mentioned, curved surface 2 is preferably formed of a ceramic. The commercially available "Alsimag" draw pin available from the American Lava Corporation has been found to give excellent service as the curved surface component. As is obvious from the drawing, this is the only part of the apparatus subject to wear, and it is easily replaceable. In employing the device of the present invention inspection slot 4 must be adjusted for yarn type, ends, and denier. Typical settings of the slot for a yarn of polyhexamethylene adipamide are shown in Table I.

Table I

DENIER	ENDS	SETTING (INCHES)
800-----	140	0.020
260-----	17	0.020
400-----	68	0.015
100-----	34	0.010
40-----	7	0.0075

Installation of the cleaner guides of the present invention in a conventional spinning system has been observed to decrease the number of defective pirns of drawn yarn by more than 65%. The device is particularly valuable since it detects not only defects due to protrusions but also defects arising by virtue of fused filaments within the yarn bundle.

Many obvious modifications will be apparent to those

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skilled in the art from a reading of the above without a departure from the inventive concept.

What is claimed is:

- A device for detecting defects in a running thread line, said device comprising: a mounting base; a cylindrically shaped pin projecting outwardly from said base; a generally triangular shaped rigid plate member having a cutting edge along one side, a guide edge along a second side thereof, and an aperture extending lengthwise of its third side; and means fixedly mounting the third side of said member on said base with said cutting edge fixed in spaced parallelism with said pin, said mounting means comprising at least one fastener normally engaging said plate and passing through said aperture into said base, said member being adjustable toward and away from said pin through the length of said aperture and having a spacing feeler projecting from said cutting edge toward said pin to provide a minimum thread clearance slot between the cutting edge and the pin, said guide edge being tapered toward the pin at the open end of the slot to facilitate threading of the slot.

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