

PATENT SPECIFICATION (11)

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- (21) Application No. 5291/75 (22) Filed 7 Feb. 1975 (19)
 (31) Convention Application No. 2313/74 (32) Filed 20 Feb. 1974 in
 (33) Switzerland (CH)
 (44) Complete Specification published 9 Nov. 1977
 (51) INT. CL.² B26D 3/16
 (52) Index at acceptance
 B4B 70H



(54) FILAMENT CUTTING ARRANGEMENT

(71) We, ZELLWEGER USTER LTD, a Swiss company, of CH 8610 Uster, Switzerland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a high-performance cutting arrangement for filament monitoring systems, particularly but not exclusively for use in draw-twisting machines, texturing machines and the like.

Conventional monitoring systems for draw-twisting machines, texturing machines and the like, comprise cutting units in which the filament to be cut is guided past a cutting blade between two guide members, gripping means for holding the cut end of the filament being provided immediately adjacent the cutting blade. In arrangements of this kind, the cutting blade and the gripping edge come into contact with an abutment under the action of an electromagnet activated by the cutting pulse. Although arrangements of this kind are adequate for fine and medium filaments in particular, they require large and expensive magnets to increase their performance, i.e. for treating thick and correspondingly strong filaments.

The present invention provides a filament cutting arrangement for filament monitoring systems for use in draw-twisting machines, texturing machines and the like, the said arrangement comprising an abutment or anvil, a slide which is spring-loaded for movement towards the abutment or anvil and which supports a filament cutter and a filament gripper and a filament guide through which a filament can travel in a direction transverse to the direction of movement of the slide, and an electromagnet operable to release the slide to permit the slide to move under action of its spring-loading whereby the filament is brought to the abutment or anvil and is cut by the cutter.

In one advantageous embodiment of the invention, the abutment or anvil is in the form of a piece of U-shaped metal with symmetrical sides which can be inserted in

at least two different positions, so that the cutting blade can strike several surfaces of the abutment before it has to be replaced.

The impact force required for cutting and gripping is taken from a power store, whilst the cutting pulse is responsible solely for releasing the power store. Thus, it is possible to obtain strong cutting forces and long strokes for the slide with relatively little outlay in terms of control systems.

Since the slide is returned to its starting position and, at the same time, the power store placed under tension, for example, by hand, there is no need for correspondingly powerful magnets.

One embodiment of the invention will now be described by way of example in the following with reference to the accompanying drawings, wherein:

Figure 1 is a side elevation, partly in section, of a cutting arrangement in its starting position.

Figure 2 is a side elevation in section of the same cutting arrangement on completion of the cutting operation.

Figure 3 is a plan view of those parts of the cutting arrangement actually involved in cutting in their starting position.

Figure 4 is a plan view of the same parts of the cutting arrangement in their end positions.

Figure 5 shows a structural detail.

In the arrangement shown in Figure 1, a slide 4 is mounted in corresponding guide openings 2, 3 in a housing 1. The slide includes in longitudinal order a shaft 5, a blade holder 6, a filament guide 7 and a return button 8. A spring 9 is fitted over the shaft 5. One end of the spring 9 is supported by the housing 1 and its other end rests on the blade holder 6, pressing the slide 4 toward the right of the drawing. An electromagnet 10, for example a hinged armature magnet, is built into the lower part of the housing 1. The armature of this magnet is mounted on a yoke plate 12, whilst its free end 13 forms the pole face against the yoke 14. The armature 11 is held in its rest position and applied to the yoke plate 12 by a leaf spring 16. The armature 11 has a pro-

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section 15 which co-operates with a nose-like projection 17 on the slide 4 in such a way that, when the slide 4 is pressed to the left of the drawing, the projection 15 of the armature 11 swinging upwards under spring pressure engages behind the aforementioned nose-like projection 17 and, hence, holds the slide 4 firmly against the thrust of the compressed spring 9. If an electrical cutting pulse is then applied through a plug and socket 18 to the winding of the electromagnet 10, the armature 11 is drawn against the yoke 14, so that the projection 15 releases the nose 17. As a result the slide 4 is urged to the right by the compressed spring 9.

The cutting operation is initiated as follows:

The filament 20 travelling through in the filament guide 7 is brought up an abutment or anvil 21. A cutting blade 22 is accommodated in the blade holder 6 before the filament guide 7 looking in the direction of travel of the filament 20, striking a component surface of the abutment 21, and hence, cutting the filament 20 with the movement of the slide 4.

In addition, the blade holder 6 accommodates a gripping edge 23 (after the filament guide 7 looking in the direction of travel of the filament 20) which grips the filament between its end face and another component surface of the abutment 21. The end face of the gripping edge 23 comes into contact with the abutment 21 somewhat earlier than the cutting edge of the cutting blade 22, so that the filament 20 is first gripped and then cut. The different in the distance travelled by the gripping edge 23 and the cutting blade 22 is compensated by virtue of the fact that the gripping edge 23 is mounted for displacement in the blade holder 6 and is kept in its rest position under gentle spring pressure (spring 24). Figures 3 and 4 show the blade holder 6 with the filament guide 7, the reset button, the cutting blade 22 and the gripping edge 23 before and after release, respectively.

Figure 5 shows, as a structural detail, the configuration of the abutment 21 in the form of a piece of U-shaped metal which can be inserted into a corresponding opening in the housing 1. Because of its symmetrical configuration, it can be inserted in two different positions. In this way, it is possible, in the event of increasing wear of one pair of surfaces exposed to the action of the cutting blade and gripping edge, for another pair, of unworn surfaces to be moved into the cutting and gripping zone.

As the filament guide 7 is only laterally displaced with the slide 4 when the cut is made, the filament 20 does not come into contact with the cutting and gripping surfaces in its normal travel, so that premature

wear of those surfaces is avoided. In addition, there is enough empty space on either side of the filament guide 7 for fibres accumulating in that space to be removed before accumulating to such an extent that they interfere with the movement of the slide 4. The filament guide 7, may in addition, be provided with double guide slots to enable two separate filaments to be cut and gripped.

The use of the spring 9 for taking over the cutting work and supplying the gripping force has the effect that high cutting performances are obtained with minimal consumption of electricity. In addition, the gripping force remains intact even after the electrical cutting pulse has disappeared. By suitably dimensioning the leverage factors, the leaf spring 16 and the spring 9, the self-holding effect provided by the projection 15 and the nose 17 can be made such that it only needs a minimal force to swing the projection 15 away from the nose 17. In this way, it is also possible, where necessary, for the cutting arrangement to be manually operated by the application of an additional pressure from outside to the shaft 5.

In order to return the slide 4 to its starting position, it is sufficient to depress the reset button 8, which compresses the spring 9 until the projection 15 engages behind the nose 17 on the slide 4. The particular operational state can readily be ascertained at any time, for example from the projecting position of the reset button 8 on completion of cutting.

The blade holder 6 may with advantage be symmetrical with respect to the central axis of the slide 4, so that the cutting blade 22 may readily be inserted to the left or right and the gripping edge 23 to the right or left. As a result, the cutting arrangement is not affected by the direction of travel of the filament 20. The arrangement as a whole is compact in its design with small external dimensions, so that it may be used for every possible application.

WHAT WE CLAIM IS:—

1. A filament cutting arrangement for filament monitoring systems for use in draw-twisting machines, texturing machines and the like, the said arrangement comprising an abutment or anvil, a slide which is spring-loaded for movement towards the abutment or anvil and which supports a filament cutter and a filament gripper and a filament guide through which a filament can travel in a direction transverse to the direction of movement of the slide, and an electromagnet operable to release the slide to permit the slide to move under action of its spring-loading whereby the filament is brought to the abutment or anvil and is cut by the cutter.

jection 15 which co-operates with a nose-like projection 17 on the slide 4 in such a way that, when the slide 4 is pressed to the left of the drawing, the projection 15 of the armature 11 swinging upwards under spring pressure engages behind the aforementioned nose-like projection 17 and, hence, holds the slide 4 firmly against the thrust of the compressed spring 9. If an electrical cutting pulse is then applied through a plug and socket 18 to the winding of the electromagnet 10, the armature 11 is drawn against the yoke 14, so that the projection 15 releases the nose 17. As a result the slide 4 is urged to the right by the compressed spring 9.

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The filament 20 travelling through in the filament guide 7 is brought up an abutment or anvil 21. A cutting blade 22 is accommodated in the blade holder 6 before the filament guide 7 looking in the direction of travel of the filament 20), striking a component surface of the abutment 21, and hence, cutting the filament 20 with the movement of the slide 4.

In addition, the blade holder 6 accommodates a gripping edge 23 (after the filament guide 7 looking in the direction of travel of the filament 20) which grips the filament between its end face and another component surface of the abutment 21. The end face of the gripping edge 23 comes into contact with the abutment 21 somewhat earlier than the cutting edge of the cutting blade 22, so that the filament 20 is first gripped and then cut. The difference in the distance travelled by the gripping edge 23 and the cutting blade 22 is compensated by virtue of the fact that the gripping edge 23 is mounted for displacement in the blade holder 6 and is kept in its rest position under gentle spring pressure (spring 24). Figures 3 and 4 show the blade holder 6 with the filament guide 7, the reset button, the cutting blade 22 and the gripping edge 23 before and after release, respectively.

Figure 5 shows, as a structural detail, the configuration of the abutment 21 in the form of a piece of U-shaped metal which can be inserted into a corresponding opening in the housing 1. Because of its symmetrical configuration, it can be inserted in two different positions. In this way, it is possible, in the event of increasing wear of one pair of surfaces exposed to the action of the cutting blade and gripping edge, for another pair, of unworn surfaces to be moved into the cutting and gripping zone.

As the filament guide 7 is only laterally displaced with the slide 4 when the cut is made, the filament 20 does not come into contact with the cutting and gripping surfaces in its normal travel, so that premature

wear of those surfaces is avoided. In addition, there is enough empty space on either side of the filament guide 7 for fibres accumulating in that space to be removed before accumulating to such an extent that they interfere with the movement of the slide 4. The filament guide 7, may in addition, be provided with double guide slots to enable two separate filaments to be cut and gripped.

The use of the spring 9 for taking over the cutting work and supplying the gripping force has the effect that high cutting performances are obtained with minimal consumption of electricity. In addition, the gripping force remains intact even after the electrical cutting pulse has disappeared. By suitably dimensioning the leverage factors, the leaf spring 16 and the spring 9, the self-holding effect provided by the projection 15 and the nose 17 can be made such that it only needs a minimal force to swing the projection 15 away from the nose 17. In this way, it is also possible, where necessary, for the cutting arrangement to be manually operated by the application of an additional pressure from outside to the shaft 5.

In order to return the slide 4 to its starting position, it is sufficient to depress the reset button 8, which compresses the spring 9 until the projection 15 engages behind the nose 17 on the slide 4. The particular operational state can readily be ascertained at any time, for example from the projecting position of the reset button 8 on completion of cutting.

The blade holder 6 may with advantage be symmetrical with respect to the central axis of the slide 4, so that the cutting blade 22 may readily be inserted to the left or right and the gripping edge 23 to the right or left. As a result, the cutting arrangement is not affected by the direction of travel of the filament 20. The arrangement as a whole is compact in its design with small external dimensions, so that it may be used for every possible application.

WHAT WE CLAIM IS:—

1. A filament cutting arrangement for filament monitoring systems for use in draw-twisting machines, texturing machines and the like, the said arrangement comprising an abutment or anvil, a slide which is spring-loaded for movement towards the abutment or anvil and which supports a filament cutter and a filament gripper and a filament guide through which a filament can travel in a direction transverse to the direction of movement of the slide, and an electromagnet operable to release the slide to permit the slide to move under action of its spring-loading whereby the filament is brought to the abutment or anvil and is cut by the cutter.



2. A cutting arrangement as claimed in claim 1, wherein the gripper is resiliently mounted in the slide and comes into contact with the abutment or anvil earlier than does the cutter. 20
3. A cutting arrangement as claimed in either preceding claim, wherein the cutter is a cutting blade and the blade and the gripper are replaceably mounted in the slide, so that the cutting arrangement can be adjusted to the direction of travel of the filament. 25
4. A cutting arrangement as claimed in claim 3, wherein the abutment or anvil is arranged so that it can be inserted into a corresponding opening in a housing in two positions so that different surfaces can be exposed to the cutting blade and gripper.
5. A cutting arrangement as claimed in any preceding claim, wherein the filament guide is provided with double guide slots.
6. A cutting arrangement as claimed in any preceding claim, wherein a projecting reset button is used to indicate the position of the slide.
7. A cutting arrangement for filament monitoring systems substantially as described with reference to the accompanying drawings.

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