(12) UK Patent (19) GB (11) 2 207 073 (13) B

(54) Title of Invention

A knife

(51) INT CL[5]; **B26B 1/08**

(21) Application No
8717623.6

(22) Date of filing
24.07.1987

(43) Application published
25.01.1989

(45) Patent published
15.05.1991

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(52) Domestic classification
(Edition K)
B4B B130E B130H B130J
B130QX B130R

(56) Documents cited
None

(58) Field of search

As for published application
2207073 A *viz:*
UK CL **B4B, B4K**
INT CL **B26B**
updated as appropriate

2207073

FIG. 1

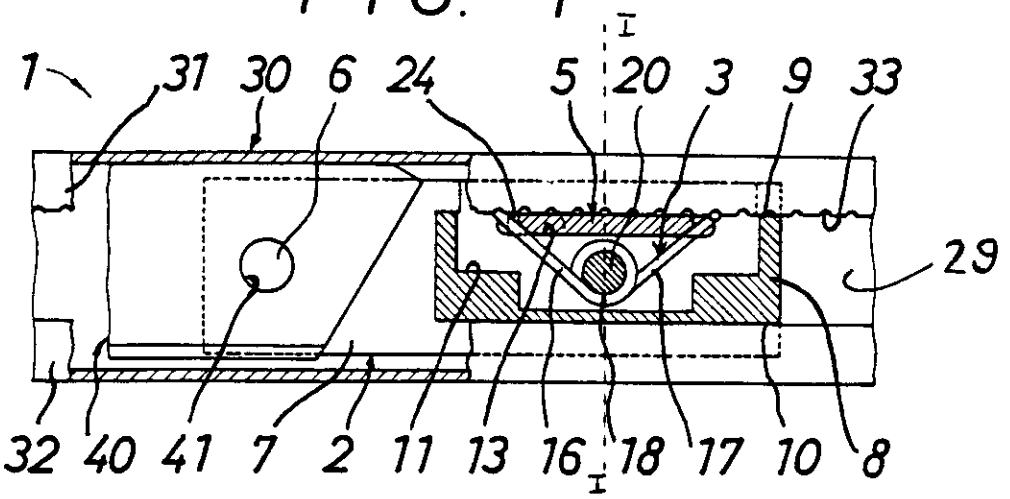

FIG. 2

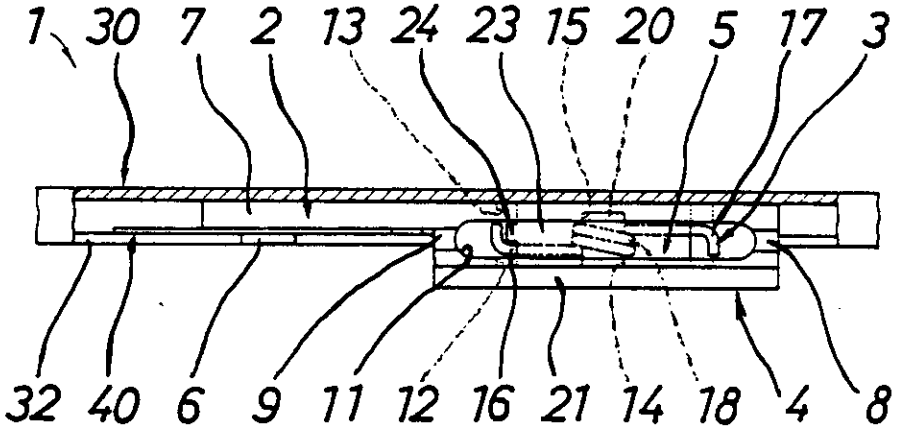

FIG. 3

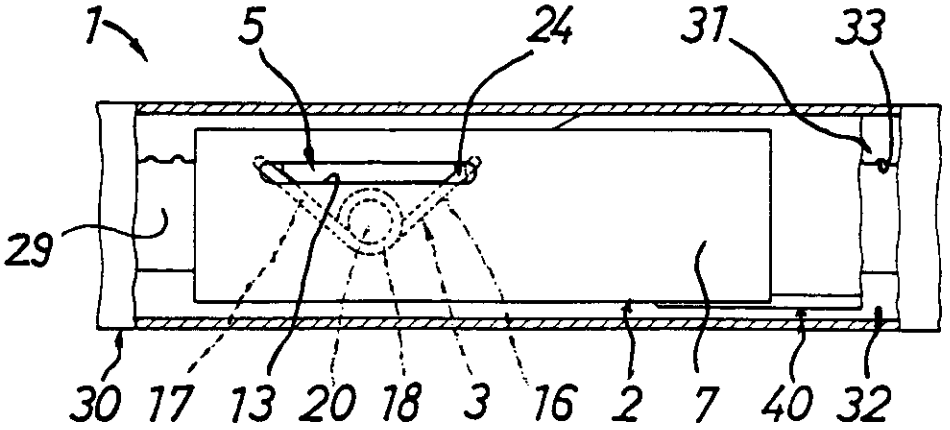

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FIG. 4

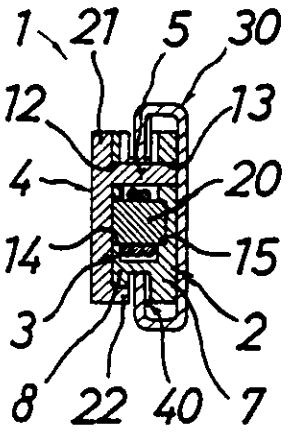


FIG. 5

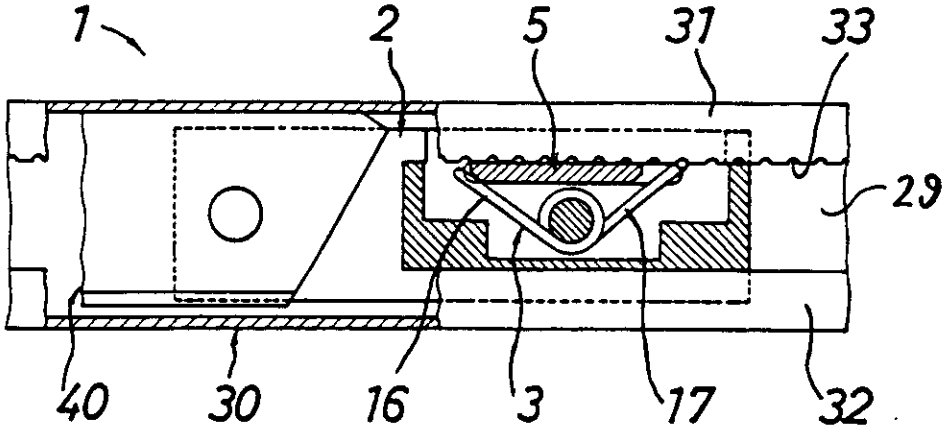


FIG. 6

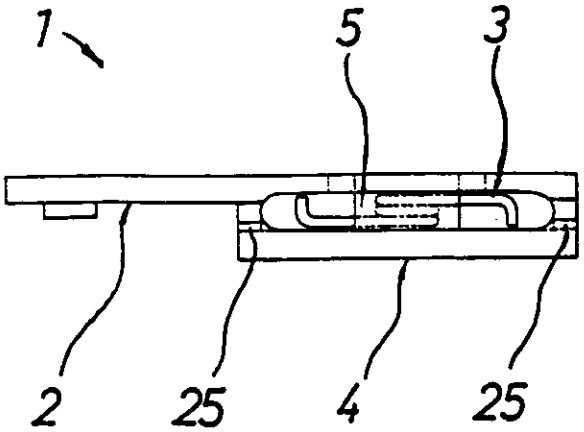


FIG. 8

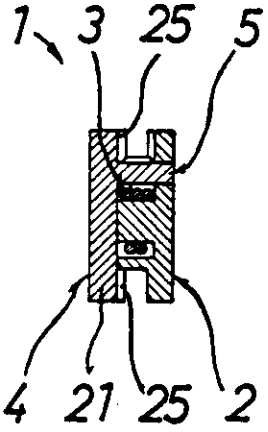


FIG. 7

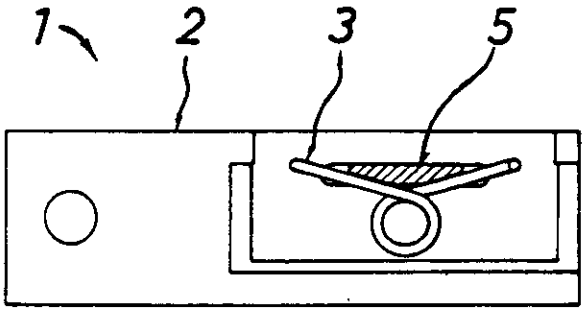
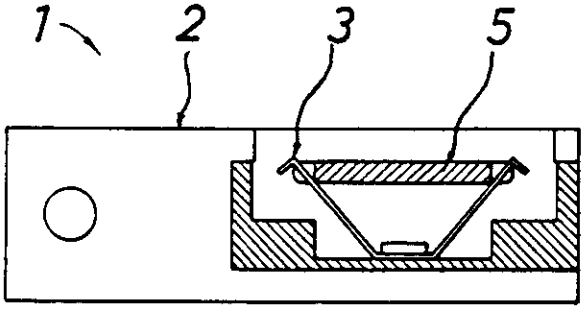


FIG. 9



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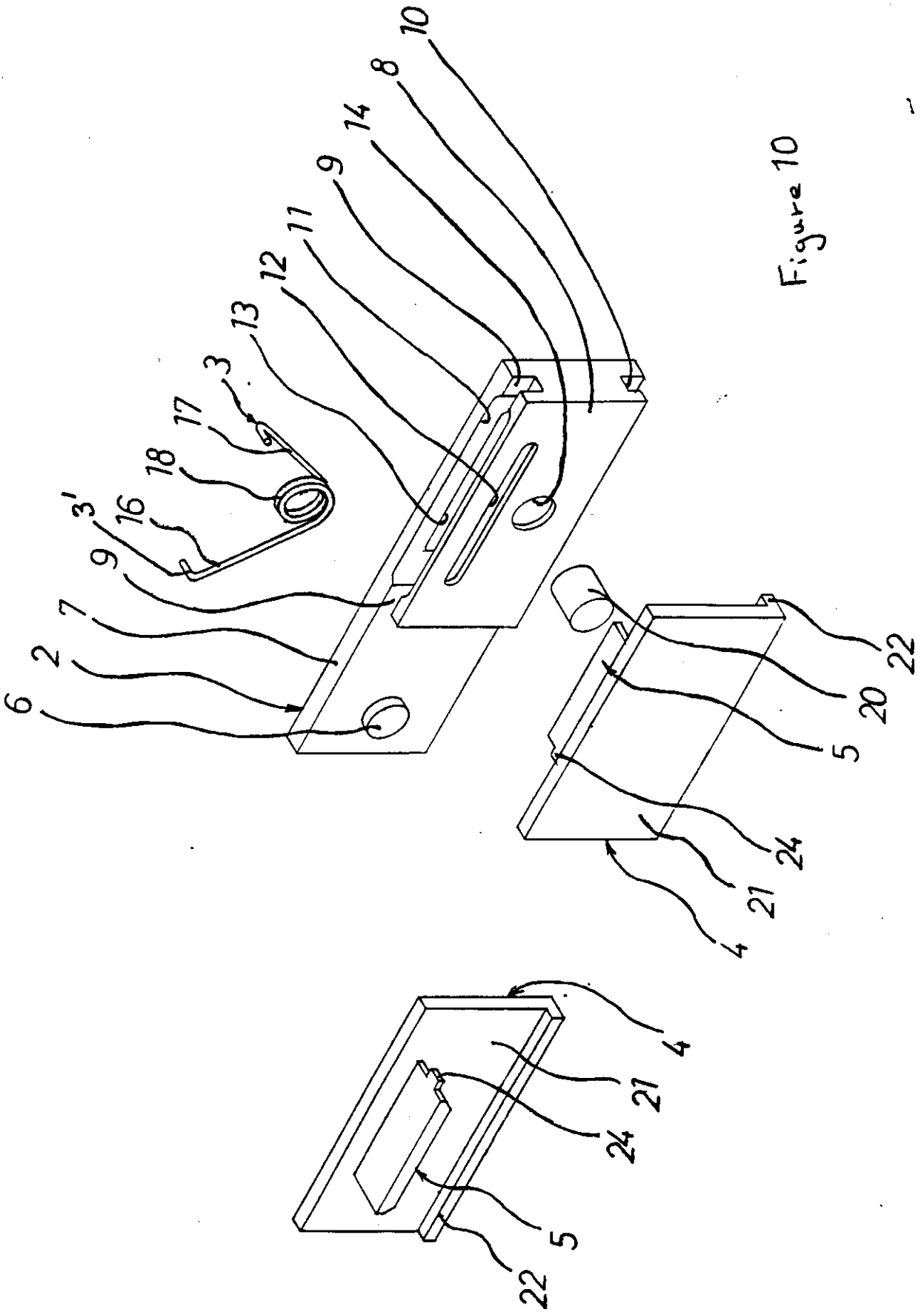

Figure 10

A KNIFE

This invention relates to a knife of the type wherein successive predetermined segments of the knife blade can be broken off, and in particular, the invention relates to an improvement in the locking and sliding arrangement for the successive movement of the segmented blade.

A knife of the aforementioned type is known from Japanese utility model provisional publication number 58-136075. This knife comprises a body receiving a slider member equipped with a coupling lug for connection to a segmented blade. A single elastic hook is provided on the slider member which can be engaged into one of a large number of stopper recesses formed on the body. An adjuster, mounted for movement on the slider member, is movable from a neutral position to a forward or reverse sliding position and includes a binding protrusion to hold the elastic hook in its engaging position with a stopper recess whilst the adjuster is in a neutral position but when the adjuster is moved from its neutral position, the urging of the elastic hook into engagement with the stopper recess is removed. A restoring elastic body is

interposed between the slider member and the adjuster to urge the adjuster to its new position.

It can be seen that this prior art device requires the restoring elastic body to bring the adjuster to its neutral position and also requires the binding protrusion to hold the elastic hook in its state of engagement with the stopper recess. Consequently, this prior art knife requires rather a large number of components so that its structure is relatively complex increasing the resulting manufacturing costs, and the complexity thereof increases the production costs and reduces the reliability of its functions.

It is an object of the present invention to overcome the aforementioned problem and to provide a knife of a simplified structure with a relativley reduced number of component parts, and which functions without the necessity of enhancing the assembly accuracy.

According to the present invention there is provided a knife of the type suitable for a blade wherein succesive segments of the blade can be broken off, the knife comprising:

an elongate body having a groove for slidably receiving

the blade;

a slot aligned parallel to said groove;

an adjuster element slidably received in said groove and connected to the blade in said body whereby sliding of the adjuster element along the groove produces a corresponding retraction or extension of the blade into or from the body, the adjuster element having a first resilient member angled to engage a recess located towards one end of the adjuster element and a second resilient member oppositely angled to engage a recess located towards the other end of the adjuster element whereby the sliding movement of the element is prevented;

and a release means longitudinally slidable relative to the adjuster element from a neutral position to a position to contact one or other resilient members to cause disengagement from the respective recess whereby sliding movement of the adjuster element can take place, the resilient members acting to urge the release means to the neutral position.

In this way, the knife has a simple structure reducing the cost and facilitating manufacturing assembly. In adddition, the simplicity of the adjuster element does not necessitate improved assembly accuracy and the adjuster element functions in a smooth and flawless manner. The employment of the resilient members to both prevent sliding movement of the blade and also return the release means to its neutral position reduces the number of parts compared with the prior art. Furthermore, the location of the resiliant members in spaced apart recesses produces a steady and stable holding of the knife blade.

Examples of the present invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 illustrates a frontal side view of a portion of a knife embodying the present invention partly broken away at the adjuster element.

Figure 2 illustrates a plan view of the knife shown in Figure 1 partly broken away at the adjuster element.

Figure 3 illustrates a rear side view of a portion of the knife shown in Figure 1 partly broken away at the adjuster element.

Figure 4 illustrates a cross-section of the knife shown in Figure 1 through lines I-I.

Figure 5 illustrates the operation of the adjuster element shown in Figure 1.

Figures 6 to 9 illustrate alternative embodiments of the adjuster element.

Figure 10 illustrates the components comprising the adjuster element and release means of figures 1 to 5.

Referring to the Figures 1 to 4 and 10, a knife 1 comprises an elongate body 30 having a C-shaped cross-section. Typically, the body 30 is formed from an elongate plate with the edges parallel to the long axis thereof overturned to give lips 31 and 32 which define the generally C shape. A groove is formed within the C-shaped body. A slot 29 is defined between the lips 31 and 32. The lower edge of the upper lip 31 (as illustrated) includes a plurality of

indents or recesses 33, the purpose of which will be apparent hereinafter.

An adjuster element 2 comprises a substrate 7 having a dimension slightly less than the height of the C shaped body 30. Thus, when the adjuster element 2 is inserted into the C-shaped body, the element can slide therealong but cannot be pulled through the slot 29. At one end of the substrate 7, there is provided a stud 6 for location in the aperture 41 of a blade 40, as illustrated in Figure 1. A plate 8 extends approximately half way along the substrate 7, as illustrated in Figure 10, and is integrally connected with the substrate 7 at either end. At the connecting locations the plate 8 narrows so as to define upper and lower grooves 9 and 10 respectively which each respectively receive the upper and lower lip 31 and 32 when the adjuster element 2 is located in the body 30. The opposing faces of the plate 8 and substrate 7 have recessed faces 11 so as to define a space capable of receiving a spring 3. The spring 3 comprises a spring wire wound to define an aperture 18 with mirror image side arms 16 and 17 extending therefrom. The spring 3 is aligned and fixed in position by insertion of a pin 20 through an aperture 14 formed in the plate 8, through

the spring aperture 18 to be received in a corresponding aperture 15 formed in the recessed face 11 of substrate 7. The pin 20 lies flush with the surface on the plate 8. Thus, the spring 3 is locked in position illustrated, this being its normal position.

The plate 8 and substrate 7 include, respectively, slots 12 and 13 which are formed parallel to the slot 29. A release means in the form of a slider knob 4 comprises a plate 21 with an actuating element 5 extending perpendicularly therefrom. The element 5 is sized to easily pass through the apertures 12 and 13. A small protrusion 24 on the side of the actuating element 5 is formed and constructed in consideration with the size of the element 5 so that when the actuating element is inserted through apertures 12 and 13, the element 5 can pass between the arms 16 and 17 of the spring 3 but the protrusion 24 is obstructed. When the side arm 16 of the spring 3 is depressed slightly the protrusion 24 can pass whereupon the side arm 16 rises again to prevent passage of the protusion 24. Accordingly, by this means , the slider knob 4 is locked to the substrate 7, as illustrated in Figure 2. When the adjuster element 2 is fixed to the blade 40

and the adjuster element and blade inserted into the body 30, the side arms 16 and 17 of the spring 3 are depressed by lip 31 so that elbows 3' on the side arms 16 and 17 are resiliently urged into the recesses 33 as illustrated.

In this position, the adjuster element and hence the blade is locked in position against forward or reverse movement thereof. If forward movement is attempted (towards the left of the figures), the side arm 16 will tend to bend more into the recess 33 and thereby lock and restrain the slider element from movement even more. A similar situation arises when reverse movement is attempted (towards the right of the figures) because the side arm 17 is urged upwards further into the appropriate recess 33. However, since the actuating element 5 is shorter than the inter arm distance between the side arm 16 and 17 as it could pass therebetween and this distance is shorter than the slots 12 and 13, forward or reverse pressure on the knob 4 causes relative movement between the knob and the substrate 7. When the actuating element is moved it controls either side arm 16 or 17 according to the direction of the the movement. When this action happens, the side arm 16 or 17 is depressed to release

the appropriate side arm from the recess 33 thereby removing the restraint on sliding movement and permitting forward or reverse movement of the slider element 2 and hence blade 40. This situation is illustrated in Figure 5 for forward movement.

The advantage of the present invention is that the knob 4 is normally located in a neutral position and is urged into that neutral position by the side arms 16 and 17. When movement of the knife blade is required, the knob 4 is moved longitudinally parallel to groove 29 to urge either side arm 16 or 17 out of its appropriate recess thereby freeing the slider element 2 for longitudinal movement. Once the knob 4 is released, the upward urging of the side arms 16 and 17 move the actuating element 5 and hence the knob 4 back into the neutral position wherein the adjuster element 2 is locked in position. In the neutral position no matter whether forward or reverse movement is applied to the blade or the slider adjustment 2, either side arm 16 or 17 will resist the motion serving, as it were, a prop. It is apparent that when movement is attempted wherein the distance between a recess receiving an elbow and the wound portion is to be shortened the movement is restricted, and when movement is attempted wherein the

distance between a recess receiving an elbow and the wound portion is to be lengthened, the movement is not restricted.

Consequently, the knife of the present invention is automatically locked against longitudinal movement unless the slider knob 4 is actuated by a user, for example by applying a thumb thereon. When the knob 4 is moved forwardly or backwardly, it disengages the appropriate side arm 16 or 17 and the non-disengaged side arm 16 or 17 does not resist the movement for the aforementioned reason and the non-disengaged side arm can ride over the recesses 33.

In the embodiment shown in Figures 1 to 5 and 10, the spring element 3 is made of an approximately V-shaped torsion wire spring comprising the forward angled side arm 16, the backward angled side arm 17 and a wound portion 18 connecting the side arms 16 and 17. The free ends of the side arms are bent horizontally at elbows 3'. However, the present invention is not limited to this embodiment. For example, the embodiments shown in Figures 6 to 9 illustrate alternative forms for the spring member 3 and its location on the adjuster element 2 and the fixing of

the sliding knob 4 on the adjuster element. For example, as shown in Figures 6 to 8, the plate 8 may be absent and the slot for receiving element 5 may be provided only in the substrate 7. The pin 20 is then attached to the substrate 7 thus making the apertures 14 and 15 unnecessary. In the embodiments shown in Figures 6 to 8 , the plate 21 includes protrusion 25 on the upper and lower portions thereof on the rear side. These upper and lower protrusions 25 are positioned to prevent the adjuster element 2 and the slider knob 4 from moving vertically relative to one another whilst at the same time allowing the slider knob 4 to longitudinally slide in relation to the slider adjuster 2.

Although the earlier emodiment showed the spring means 3 to be a V-shaped torsion wire spring, it is possible for this spring to be an approximately gamma shaped tosion wire spring as shown in Figures 6 to 8 or an approximately V-shaped plate spring made from spring steel or synthetic resin as shown in Figure 9.

In the embodiments described above, the side arms of the spring 3 are shown as one integral piece. However, the side arms 16 and 17 may be separate

units. Furthermore, although the side arm 16 is forward slanting and the side arm 17 is rearward slanting, it is possible to produce a spring means 3 in an approximate C-shape wherein the forwardly slanting side arm is located to the rear of the fixing pin 20 and the rearwardly slanting side piece is located forward of the pin 20.

Preferably, the spring 3 is fitted to the adjuster element 2 with the pin 20. Nonetheless, it is possible for the spring means 3 to be fixed to the adjuster element by means of a screw or by insertion into the main body of the adjuster element. If the material of the adjuster element and the spring is the same, the spring may be formed as an integral part thereof.

It will be apparent from the present invention that the adjuster element is of particularly simple construction and can be formed as an integral piece from, say, plastics material. The slider knob then provides a second piece to complete the knife. The structure is simple because the side arms of the spring are angled in an opposite manner to engage respective recesses on either side of the knife body.

Thus, a prop against sliding motion in either direction is produced. Accordingly, a knife can be made a simple structure and which functions smoothly and flawlessly without the necessity of having to improve the assembly accuracy. In addition, the means locking the adjuster element and hence the knife in place acts to return the release means to its neutral position. Consequently, a separate spring member for returning the release means to the neutral position is not needed in contrast to the prior art. Thus, a further reduction in the number of parts is effected. The simple structure of the knife reduces the cost and facilitates the assembly operation thereby reducing production costs.

CLAIMS

1. A knife of the type suitable for a blade wherein succesive segments of the blade can be broken off, the knife comprising:

an elongate body having a groove for slidably receiving the blade;

a slot aligned parallel to said groove;

an adjuster element slidably received in said groove and connected to the blade in said body whereby sliding of the adjuster element along the groove produces a corresponding retraction or extension of the blade into or from the body, the adjuster element having a first resilient member angled to engage a recess located towards one end of the adjuster element and a second resilient member oppositely angled to engage a recess located towards the other end of the adjuster element whereby the sliding movement of the element is prevented;

and a release means longitudinally slidable relative to the adjuster element from a neutral position to a position to contact one or other resilient members to cause disengagement from the respective recess whereby

sliding movement of the adjuster element can take place, the resilient members acting to urge the release means to the neutral position.

2. A knife as claimed in Claim 1 wherein the resilient members comprise an approximately V-shaped torsion wire spring.

3. A knife as claimed in Claim 1 wherein the resilient members comprise an approximately gamma shaped torsion wire spring.

4. A knife as claimed in Claim 1 wherein said resilient members comprise an approximately V-shaped plate spring.

5. A knife as claimed in Claim 1 wherein said resilient members comprise an approximately C-shaped spring means.

6. A knife as claimed in any preceding claim wherein the first resilient member is angled towards the blade and the second resilient member is angled away from the blade.

7. A knife as claimed in any preceding claim wherein the adjuster element and resilient members are an integral construction.

8. A knife as claimed in any preceding claim wherein the release means includes a release member located between the two resilient members and the release means longitudinal sliding movement causes the release member to act on one or other of the resilient members to cause said disengagement.

9. A knife as claimed in Claim 8 wherein the release member includes detents provided to locate with one or both resilient members to clip the release means to the adjuster element.

10. A knife of the type suitable for a blade wherein successive segments of the blade can be broken off substantially herein described with reference to the accompanying drawings.

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PAGE: 1

REGISTER ENTRY FOR GB2207073

Form 1 Application No GB8717623.6 filing date 24.07.1987

Title A KNIFE

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Classified to
B4B
B26B

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Publication No GB2207073 dated 25.01.1989

Examination requested 05.10.1987

Patent Granted with effect from 15.05.1991 (Section 25(1)) with title A KNIFE

12.05.1993 Application under Section 32 filed on 07.05.1993
Entry Type 8.1 Staff ID. KH1 Auth ID. F20

14.05.1993 Notification of change of Applicant/Proprietor name of
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dated 01.06.1988. Official evidence filed on GB2207073
Entry Type 7.2 Staff ID. KH1 Auth ID. F20

**** END OF REGISTER ENTRY ****

RENEWAL DETAILS

PUBLICATION NUMBER GB2207073

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DATE FILED 24.07.1987

DATE GRANTED 15.05.1991

DATE NEXT RENEWAL DUE 24.07.1994

DATE NOT IN FORCE

DATE OF LAST RENEWAL 12.07.1993

YEAR OF LAST RENEWAL 07

STATUS PATENT IN FORCE