

SPECIFICATION

A knife having a longitudinally guided knife blade

5 This invention relates to a knife having a substantially hollow elongate handle, a knife blade guided within said handle for longitudinal movement into an extended and retracted position, and an actuating part engaging the knife blade at least indirectly and guided at the handle end and having an actuating member extending outwardly through an elongated slot in the handle.

Knives of the above-described kind, by reason of their handiness and versatility of application, have gained wide use in the fields of industry, crafts, do-it-yourself and domestic jobs. They have, longitudinally displaceable in a handle, a knife blade which can be operated from outside via a slider which is moved by the hand holding the knife. For the purpose of use, the knife blade is moved out of its retracted position or position of rest in the handle by being pushed out through an end slot in the handle and into an extended working position. Where such knives are concerned, the knife blade only returns to its position of rest in the handle when it is pushed back again by manual operation of the slider.

However, it occurs in practice that after using the knife, the knife blade does not always return to its starting position or position of rest in the handle, for some reason or another, but remains in its working position. Then, however, the protruding knife blade represents a not inconsiderable source of danger which can lead not only to physical injury but also to damage to clothing or the like.

It is an object of the invention so to construct the knife of the above-described kind, overcoming the aforesaid disadvantages by constructionally simple means, that the overall handling of the knife can be regarded as particularly reliable in terms of functioning and safe with regard to operation.

Accordingly, the present invention consists in a retractable blade knife comprising a blade retainer longitudinally movable against the action of a tension spring in a hollow handle and retained in its retracted inoperative position by said tension spring, an actuating member extending outwardly from the blade retainer through the handle, a locking step in the path of movement of the actuating member on which said member can be locked with the blade protruding from the handle by the application of a transverse pressure thereto but from which it is released when said transverse pressure is released whereby the blade is automatically retracted to its inoperative position within the handle.

Preferably, the depth of the locking step is substantially less than the depth of the actuating member.

A major advantage of the knife of the invention in comparison with previously known constructions lies in the fact that the working position of the knife blade can in this case only be quite intentionally established, that is when the knife blade is held in its working position by a transverse pressure on the actuating member. Any interruption, that is removal

of the transverse pressure on the actuating member results in the knife blade instantly returning to its inoperative position within the handle. By virtue of the practically automatic disappearance of the sharp knife blade into the handle, it is no longer possible for anyone to injure himself on the blade when the knife is not in use; nor can the blade lead to other damage, e.g. to working clothes. Thus, the present knife can be described as generally safer and will thus meet even the most exacting safety requirements, because it is only in an instance of use, i.e. when quite intentionally exposed by the hand operating the knife, that the knife blade is moved into its working position. Even if in this case the knife is set aside, even temporarily with the idea of using it again immediately on the work site, so that the transverse pressure on the actuating member is removed, the blade will automatically return to its retracted position inside the handle, so excluding any possibility of danger. For every use of the knife, it is always necessary for the blade again to be moved into its working position.

Constructionally, the knife is expediently so shaped that this necessary transverse pressure on the actuating member, for holding the knife blade in its working position, can be effected by pressure of the thumb of the hand using it. In this way, single-handed use of the knife is possible.

In a preferred embodiment the tension spring engages the actuating member for sliding actuation of the knife blade so that from the point of view of place and space, the retracting device can be space-savingsly accommodated.

However, it is alternatively readily possible for the tension spring to act directly on the knife blade itself or on a blade holder. By virtue of the fact that, as in the present case, the retracting device does not directly engage the blade or blade holder, both these elements may without alteration retain their conventional structural design.

It is an important feature of the invention that retraction is effected by means of a tension spring. This enables the retracting effect exerted constantly on the knife blade to be produced by a conventional coil spring which occupies only relatively small space and can thus be space-savingsly and functionally reliably accommodated in the handle. By reason of the fact that the tension spring can engage the actuating member which is coupled to the knife blade, a relatively short spring is adequate because it can engage a component which is immediately adjacent to it.

For easy, pleasing and effortless operation, a further advantage of the invention resides in the knife blade being temporarily arrestible in its protruding working position while the restoring force of the tension spring is maintained, arresting being effected by a transverse pressure applied at an arresting place on the handle side.

This measure does in fact permit of fatigue-free working with the knife insofar as the knife blade only needs to be pushed into the arresting position by the pressure of the thumb of the operating hand, so that in this case it is not additionally necessary to counteract the restoring force of the tension spring.

When the knife blade is moved into its working position by a sliding manipulation, it is possible perceptibly to note when the extreme extended position is reached because there can be a click engagement. The knife blade can, therefore, be held in the working position with a kind of operating artifice. The knife of the invention has this mechanical arresting occur preferably between the actuating member and the handle. Also in this case, at any interruption in the transverse pressure, the restoring force of the tension spring will again predominate, the mechanical latching will be overcome and the knife blade will then instantly return to its position of rest in the handle.

The immediate release of the knife blade from the arresting position is also encouraged if the actuating member which engages the locking step is longitudinally curved, an attachment for the tension spring being provided centrally of the actuating member on which one end of the tension spring is anchored. In this way, the tension spring is in a position to exert a certain tilting moment on the actuating member, linked with removal of the support.

The temporary mechanical latching of the knife blade in its working position is expediently achieved in the preferred arrangement in that the actuating member and the tension spring are mounted in an insert providing at least part of the handle itself and supplementing the shape thereof, said insert having an elongated recess to house the tension spring, a guide for the actuating member, an end abutment shoulder against which the actuating member abuts when it is in its retracted inoperative position, an abutment shoulder to provide the locking step to retain the actuating member in its extended working position and means for connecting the insert to the handle. The handle is preferably provided with a blade guide extending over the whole length thereof, the insert being constructed as a slider and the means for connecting the slider to the handle comprising guide means thereon which fit into the blade guide in the handle and are retained therein due to at least frictional engagement therewith.

Thus, arresting of the knife blade is effected at two components which slide directly on each other by surface contact. By virtue of the fact that the actuating member has on the side facing towards the abutment shoulder a slightly convex curvature, when the tipping moment brought about by the tension spring occurs, releasing or sliding of the actuating member out of contact with the abutment shoulder is facilitated. In this connection, attention is drawn to the fact that also several abutment shoulders could be provided, for example to allow selection of different cutting depths.

By virtue of the fact that parts of the handle, that is the knife blade guide in its extension, are utilised in order to provide space to accommodate the insert, separate measures need not be taken for this purpose. The necessary space to accommodate the insert is filled out by it so that a closed design of handle can be achieved.

As previously mentioned, it is advantageous for the tension spring to act indirectly on the knife blade,

in fact via the actuating member, so that blades of conventional design can be used without alteration. Moreover, it also contributes to the safety of the knife if the blade on its side remote from the cutting edge is enclosed by a blade holder, also previously mentioned, which not only reduces the risk of injury but furthermore imparts additional guidance to the blade within the handle when the blade is in its extended working position. Likewise, it is also

possible to turn the blade around so that it can be used at two places. Furthermore, the use of so-called snap-off blades, that is blades which have break-off cutting portions, is possible.

In order that the invention may be more readily understood, reference is made to the accompanying drawings which illustrate diagrammatically and by way of example an embodiment thereof, and in which:-

Figure 1 is a side view of the knife;

Figure 2 is a plan view of *Figure 1*;

Figure 3 is a side view corresponding to *Figure 1*, with the knife blade in the extended working position;

Figure 4 is an exploded view of the handle with the knife blade inserted and with an insert, in side view;

Figure 5 is a plan view corresponding to *Figure 4*, shown partly in section;

Figure 6 is an enlarged cross-sectional view on the line VI-VI of *Figure 1*; and

Figure 7 is a plan view of the insert by itself, the actuating part being supported via the actuating member at the arresting point provided to correspond with the extended position of the blade.

The knife illustrated has an elongate handle 10 which, viewed from the side, has a substantially parallelogram shape. The handle 10 is assembled as a synthetic plastics moulding from two substantially shell-shaped components 10a and 10b which, in the zone of a common joint 11, abut and are rigidly connected to each other. Viewed in plan, the handle, at the working end 'A' of the knife, tapers conically on both sides. The substantially hollow handle 10 has, extending in the longitudinal direction thereof, a guide means 12 for a knife blade 13. The blade 13 consists of a rectangularly contoured strip-shaped blade portion which, on its side remote from a cutting edge 14, is straddled by a cross-sectionally substantially U-shaped blade holder 15 mounted on the cutting edge of this opposite side of the blade.

The blade holder 15 serves to protect the unused cutting edge of the knife blade and to stabilise the position of the blade 13 particularly in the extended working position of the blade 13 shown in *Figure 3*.

The components 10a and 10b of the handle 10 have over substantial parts of their axial length a substantially C-shaped cross-section as can be seen particularly in *Figure 6*. The blade guide means 12 extends over the entire length of the handle and serves on its portion 12a which is remote from the working end as a housing for an insert 16 more particularly referred to hereinbelow.

The knife blade 13 is arranged for longitudinal displacement in the handle 10, within the guide 12 and is connected to a blade retainer 17 which carries on a strip portion 18 a transversely projecting

coupling lug 19 which engages a coupling aperture 20 on the knife blade 13 (see Figures 1 and 3). By means of a blade actuating member 21 which is constructionally, particularly integrally associated with the blade retainer 17, the blade retainer 17 is longitudinally displaceable in the handle 10. The blade retainer 17 has its actuating member 21 protruding through a longitudinal slot 22 provided on the wide side of the handle so that by a sliding movement this blade retainer 17 can move the blade 13.

The blade retainer 17 is combined with the insert 16 to form one common component. This insert 16 is substantially constructed as a slider which can be pushed into the handle 10 in the direction of the arrow 'C' in Figure 4, from the rear end of the handle 10 which is remote from the working end of the knife, and which in the assembled condition, Figures 1 to 3, supplements the construction of the handle. Formed in the end portion 16a of the insert 16 is an eyelet 23. Furthermore, the end portion 16a, viewed in end elevation, has contours corresponding to those of the handle 10.

Provided opposite the end portion 16a is a rectangular-shaped projection 16b which in the assembled condition of the knife fills in parts of the length of the slot 22 in the handle 10. The projection 16b has at oppositely disposed narrow sides guide ribs 24 which co-operate positively with the extended guide portion 12a in the handle 10. Frictional engagement maintains the insert 16 in the handle 10.

Formed inside the longitudinal projection 16b is a recess 25 which serves to accommodate a tension spring 26 and a guide portion 18a of the blade retainer 17. The guide portion 18a is guided in the recess 25 with lateral clearance. The tension spring 26, in the form of a coil spring, has its anchor portions 26b rigidly fixed in the insert 16 on a transverse pin 27. The traction portion 26a of the spring is attached to a lug 28 of the actuating member 21, which lug, in relation to the actuating member 21, projects inwardly and centrally in respect thereof. This lug 28 lies substantially in the same plane as the strip portion 18. The actuating member 21 has on its side facing towards the insert 16 a slightly convex supporting face 29. By virtue of this convexity and by the lateral clearance between the guide portion 18a and the recess 25, an easy tipping movement of the blade retainer 17 is possible during the release phase from an abutment shoulder 33 or locking step.

In the out-of-use position of the knife blade shown in Figure 1, the actuating member 21 has its rear edge portion 21a abutting against a rear shoulder 30 on the insert 16. The strip portion 18 has on its inside which is remote from the actuating member 21 a blade accommodating recess 31 in the zone of which the coupling lug 19 is also provided. The blade 13 through which the coupling lug 19 passes in the zone of the coupling aperture 20 has its end zone 13a which faces towards the actuating member 21 applied against a supporting strip 32 on the portion 18 which bounds the recess 31.

Both the blade retainer 17 and also the insert 16

are synthetic plastics injection moulded components which after assembly of the tension spring constitute one cohesive unit. The abutment shoulder 33 is provided at a predetermined distance from the shoulder 30 in the path of movement of the actuating part 17, particularly in a sliding or bearing zone of the actuating member 21. The shoulder 33 is disposed at a place which corresponds to the fully forward position of the knife blade 13 for the purpose of its use.

In the embodiment described, the tension spring 26 acts continuously to automatically retract the knife blade 13 into the handle 10. This means that when the knife is to be used for cutting, the restoring force of the tension spring has to be overcome upon movement of the knife blade 13 in the direction 'KA' of Figure 1, the spring 26 being tensioned thereby. Movement of the blade is effected in that the thumb of the hand gripping the handle is applied against the face of the actuating member 21 which is then moved in the direction 'B' of the arrow in Figure 1 until the position of the blade as shown in Figure 3 is reached. By virtue of the location of the abutment shoulder 33 in the zone of forward movement of the member 21, when the fully extended position of the knife blade is reached, as shown in Figure 3, it is possible to feel the rear edge 21a of the actuating member 21 engage the shoulder 33. Since thus mechanical latching occurs between the extended knife blade or actuating member and the handle or the insert, it is now necessary only to exert sufficient thumb pressure, substantially transversely of the direction of pull of the spring 26, on the actuating part for the actuating member 21 to remain in the engaged position with the shoulder 33. The manual force to be applied need not in this position be any longer greater than the restoring force of the tension spring.

Upon removal of the actuating pressure, the restoring force of the tension spring 26 is instantly fully regained. By causing a tilting moment to be effected between the point of support of the member 21 on the insert 16 and the point of anchorage 28 of the spring on the actuating member, the spring 26 lifts the actuating member 21 out of engagement with the shoulder 33 so that the blade retainer 17 and the knife blade 13 can move back rapidly and jointly in the direction of the end abutment shoulder 30 until they come to a standstill thereagainst. As this occurs, the knife blade 13 automatically disappears into the interior of the handle.

CLAIMS

1. A retractable blade knife comprising a blade retainer longitudinally movable against the action of a tension spring in a hollow handle and retained in its retracted inoperative position by said tension spring, an actuating member extending outwardly from the blade retainer through the handle, a locking step in the path of movement of the actuating member on which said member can be locked with the blade protruding from the handle by the application of a transverse pressure thereto but from which it is released when said transverse pressure is



coupling lug 19 which engages a coupling aperture 20 on the knife blade 13 (see Figures 1 and 3). By means of a blade actuating member 21 which is constructionally, particularly integrally associated with the blade retainer 17, the blade retainer 17 is longitudinally displaceable in the handle 10. The blade retainer 17 has its actuating member 21 protruding through a longitudinal slot 22 provided on the wide side of the handle so that by a sliding movement this blade retainer 17 can move the blade 13.

The blade retainer 17 is combined with the insert 16 to form one common component. This insert 16 is substantially constructed as a slider which can be pushed into the handle 10 in the direction of the arrow 'C' in Figure 4, from the rear end of the handle 10 which is remote from the working end of the knife, and which in the assembled condition, Figures 1 to 3, supplements the construction of the handle. Formed in the end portion 16a of the insert 16 is an eyelet 23. Furthermore, the end portion 16a, viewed in end elevation, has contours corresponding to those of the handle 10.

Provided opposite the end portion 16a is a rectangular-shaped projection 16b which in the assembled condition of the knife fills in parts of the length of the slot 22 in the handle 10. The projection 16b has at oppositely disposed narrow sides guide ribs 24 which co-operate positively with the extended guide portion 12a in the handle 10. Frictional engagement maintains the insert 16 in the handle 10.

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Upon removal of the actuating pressure, the restoring force of the tension spring 26 is instantly fully regained. By causing a tilting moment to be effected between the point of support of the member 21 on the insert 16 and the point of anchorage 28 of the spring on the actuating member, the spring 26 lifts the actuating member 21 out of engagement with the shoulder 33 so that the blade retainer 17 and the knife blade 13 can move back rapidly and jointly in the direction of the end abutment shoulder 30 until they come to a standstill thereagainst. As this occurs, the knife blade 13 automatically disappears into the interior of the handle.

CLAIMS

1. A retractable blade knife comprising a blade retainer longitudinally movable against the action of a tension spring in a hollow handle and retained in its retracted inoperative position by said tension spring, an actuating member extending outwardly from the blade retainer through the handle, a locking step in the path of movement of the actuating member on which said member can be locked with the blade protruding from the handle by the application of a transverse pressure thereto but from which it is released when said transverse pressure is



released whereby the blade is automatically retracted to its inoperative position within the handle.

2. A knife as claimed in claim 1 wherein the depth of the locking step is substantially less than the depth of the actuating member.

3. A knife as claimed in claim 1 or claim 2 wherein the face of the actuating member which engages the locking step is longitudinally curved, an attachment for the tension spring being provided centrally of the actuating member on which one end of the tension spring is anchored.

4. A knife as claimed in any one of the preceding claims, wherein the actuating member and the tension spring are mounted in an insert providing at least part of the handle itself and supplementing the shape thereof, said insert having an elongated recess to house the tension spring, a guide for the actuating member, an end abutment shoulder against which the actuating member abuts when it is in its retracted inoperative position, an abutment shoulder to provide the locking step to retain the actuating member in its extended working position and means for connecting the insert to the handle.

5. A knife as claimed in claim 4 wherein the handle is provided with a blade guide extending over the whole length thereof, the insert being constructed as a slider and the means for connecting the slider to the handle comprising guide means thereon which fit into the blade guide in the handle and are retained therein due to at least frictional engagement therewith.

6. A knife as claimed in claim 4 or claim 5, wherein the insert is provided on and adapted to be pushed into the end of the handle which is remote from the working end of the knife.

7. A knife as claimed in any of claims 4 to 6, wherein the insert has at its free end an eyelet which extends completely through the cross-sectional thickness thereof.

8. A knife as claimed in any of the preceding claims, wherein the blade retainer extends longitudinally parallel but laterally offset with respect to the actuating member and comprises a strip-like portion provided with a blade housing and an anchoring lug protruding in the direction of the knife blade for cooperation with an opening therein.

9. A knife as claimed in any of the preceding claims wherein more than one locking step is provided.

10. A knife, substantially as herein described with reference to and as shown in the accompanying drawings.