United States Patent [19]

Dalton et al.

[11] **3,831,276**

[45] **Aug. 27, 1974**

[54] **CONVERTIBLE SWIVEL KNIFE WHICH ILLUMINATES WORK AREA**

[76] Inventors: **William S. Dalton,** Box 27, Chesterfield, Md. 01012; **Franklyn G. Umholtz,** Locks Pond Rd., Shutesbury, Mass. 01072

[22] Filed: **July 31, 1973**

[21] Appl. No.: **384,191**

[52] **U.S. Cl.** ..... **30/123 R,** 30/317, 145/50 R

[51] **Int. Cl.** **B26b 1/04**

[58] **Field of Search** ..... 30/123 R, 164.9, 317; 145/50 R

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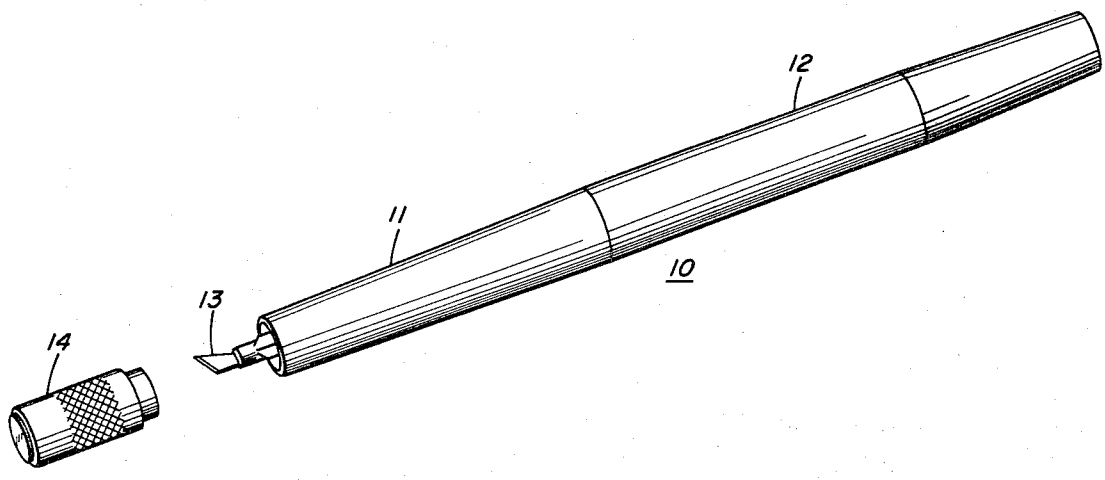
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Primary Examiner—Al Lawrence Smith
Assistant Examiner—J. C. Peters
Attorney, Agent, or Firm—William S. Dalton

[57] **ABSTRACT**

A convertible swivel knife which includes first and second sub-assemblies. The first sub-assembly comprises a first tubular housing having front and rear ends. A light-transmissive tube is rigidly fitted within the first housing, the tube having exposed edges at both the front and rear ends of the first housing. An elongated generally cylindrical stem is mounted within the tube, the stem being normally rotatable with respect to the tube. The stem has a blade-holding end which protrudes from the front end of the first housing. An adjustable means is provided for rigidly coupling the stem to the inner surface of the tube. The second tubular housing has front and rear ends, the front end of the second housing being removably mounted to the rear end of the second housing being removably mounted to the rear end of the first housing. Light generating means are mounted within the second housing and oriented to project light through the front end of the second housing. In operation, the generated light is transmitted by the light tube to the front end of the first housing to illuminate the areas surrounding the blade-holding end of the stem. Using the adjustable means, the craftsman can lock the stem so that it does not swivel with respect to the housing during applications where a rigid blade is desirable.

7 Claims, 4 Drawing Figures



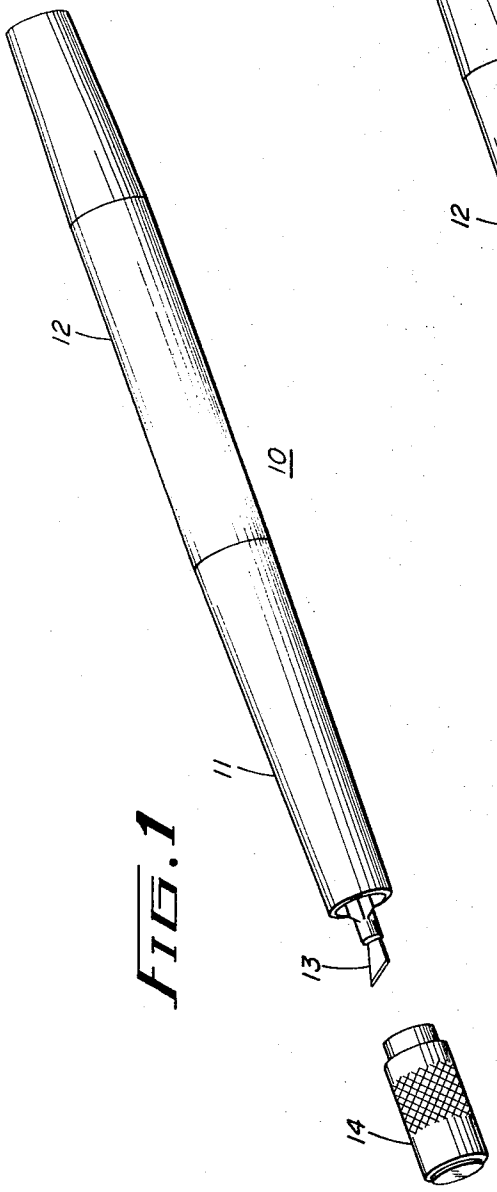
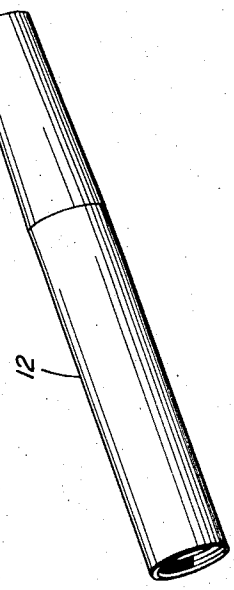


FIG. 1



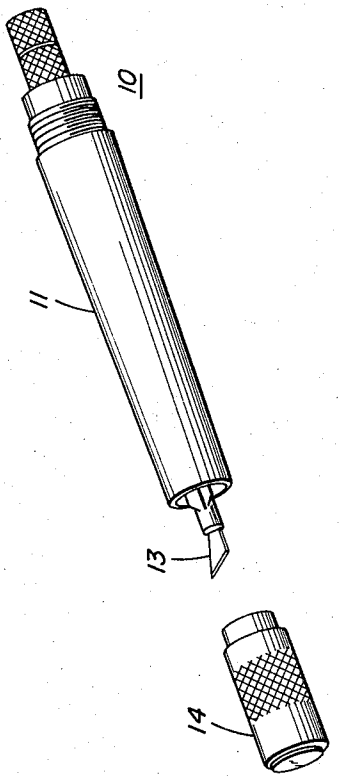


FIG. 2

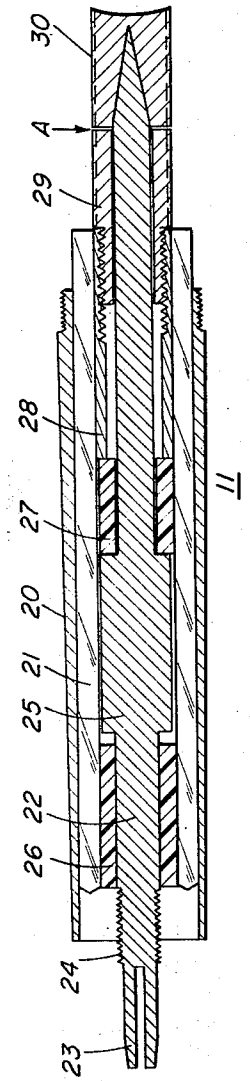


FIG. 3

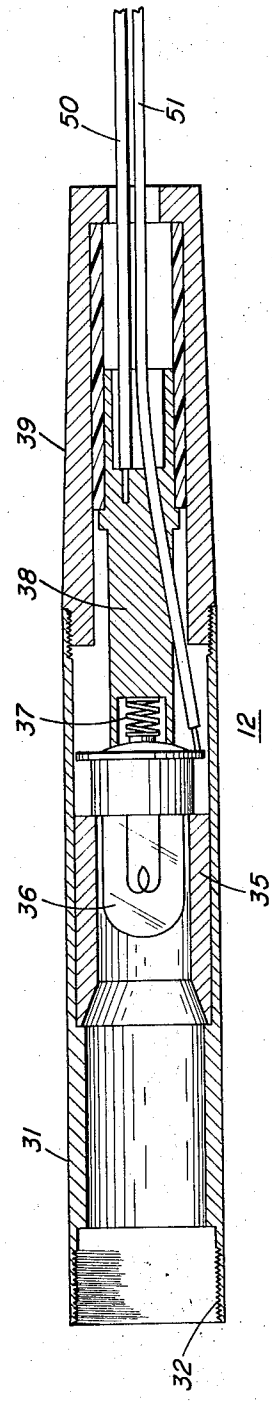


FIG. 4

CONVERTIBLE SWIVEL KNIFE WHICH ILLUMINATES WORK AREA

BACKGROUND OF THE INVENTION

This invention relates to cutting tools and, more particularly, to an improved swivel knife having internally contained means for lighting a work area around the knife blade.

There have been previously devised many types of hand-held cutting tools for use by craftsmen such as draftsmen, artists, photographers, etc. The majority of such cutting tools employ a small blade that is rigidly mounted at the end of a housing. This type of knife is satisfactory for certain applications but has been found deficient in applications where it is necessary to cut curved shapes. The disadvantage stems from the need to continually twirl the fingers or lift the hand in order to impart the required curved impetus to the cutting blade.

Responsive to the described need there have been developed a type of cutting tool known as a "swivel knife" which employs a blade that is free to rotate about the axis of the cutting tool. Thus, as the craftsman's hand is moved around the curve, the blade will orient itself in the direction required for continued motion and the amount of twirling of the fingers or lifting of the hand that was previously necessary is substantially diminished. In order to make this type of cutting tool more versatile and equally suitable for applications where a rigid blade would be more desirable, provision is often made for rendering the blade-holding mechanism of such knives stationary with respect to the knife housing; i.e., preventing rotation of the blade with respect to the housing. Generally, the blade is attached to a central shaft which is rotatable within the knife housing and the usual technique is to provide a small bore through the shaft in which a pin can be inserted. The pin typically engages a slot in the housing and thereby prevents relative rotation of the shaft. The bore is accessible by removal of a cover at the top of the cutting instrument. Therefore, when it is desired to convert the action of the knife from "swivel" to "non-swivel", or vice versa, it is necessary to remove the cap, either insert or remove the pin, and then replace the cover. This technique is somewhat inconvenient in that it requires the handling and storage of a pin element that is quite small.

Another disadvantage of present convertible swivel knife designs is the difficulty of providing additional features in the cutting tool due to the mechanics of the overall swivel mechanism. For example, it would be desirable to provide an internally contained means for lighting the work area around the blade of the cutting tool. However, it is found that commercially available swivel knives cannot be readily provided with internal lighting. This is because portions of the mechanism needed to provide for the swiveling or the locking thereof interfere with the position at which the light generating means should be placed or interfere with the light path that the generated light must follow within the cutting instrument itself. Of course, if no restrictions on size and bulkiness were observed, means could be found for employing any particular feature that was desired. However, this is not the case when dealing with a precision hand-held tool which must be necessarily

limited in length and diameter and have reasonably good weight distribution and balance.

It is accordingly an object of this invention to provide an improved convertible swivel knife which overcomes the disadvantages of presently available cutting tools.

SUMMARY OF THE INVENTION

The present invention is directed to an improved convertible swivel knife which comprises first and second sub-assemblies. The first sub-assembly includes a first tubular housing having front and rear ends. A light-transmissive tube is rigidly fitted within the first housing, the tube having exposed ends at both the front and rear ends of the first housing. An elongated generally cylindrical stem is mounted within the tube, the stem being normally rotatable with respect to the tube. The stem has a blade-holding end which protrudes from the front end of the first housing. An adjustable means is provided for rigidly coupling the stem to the inner surface of the tube. The second tubular housing has front and rear ends, the front end of the second housing being removably mounted to the rear end of the first housing. Light generating means are mounted within the second housing and oriented to project light through the front end of the second housing.

In operation, the generated light is transmitted by the light tube to the front end of the first housing to illuminate the areas surrounding the blade-holding end of the stem. Using the adjustable means, the craftsman can lock the stem so that it does not swivel with respect to the housing during applications where a rigid blade is desirable.

Further features and advantages of the invention will become more readily apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an elevational perspective view of an embodiment of a convertible swivel knife in accordance with the invention;

FIG. **2** shows the convertible swivel knife of FIG. **1** with its first and second sub-assemblies disconnected and its protective cap removed;

FIG. **3** is a cross-sectional view of the frontmost sub-assembly of the convertible swivel knife shown in FIG. **2**; and

FIG. **4** is a cross-sectional view of the rearmost sub-assembly of the convertible swivel knife shown in FIG. **2**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. **1** and **2** there is shown an embodiment of a swivel knife **10** in accordance with the invention. The knife **10** consists of a first sub-assembly **11** and a second sub-assembly **12** which is removably mountable to the first sub-assembly. These sub-assemblies are shown in disconnected fashion in FIG. **2**. The knife **10** has a removable blade **13** that is protected during idle periods by a cap **14** which can be considered as part of the first sub-assembly **11**.

Referring to FIG. **3**, there is shown a longitudinal cross-section of the first sub-assembly **11** as seen without the blade **13** in place. A cylindrical housing **20**, preferably formed of aluminum, has a clear acrylic

light-transmissive pipe **21** fitted to its inner surface. The pipe **21** has exposed edges at both the front and rear ends of the housing **20.** A central shaft or stem **22** is mounted within the light pipe **21** and adapted for rotation on its axis with respect to the stationary housing **20** and pipe **21.** The stem **22** is longer than the housing **20** and extends substantially beyond both ends thereof. The front end of the stem is provided with a forked receptical **23** which can receive a blade (not shown) that is rigidly attached to the stem with a collet (not shown). The collet engages the threaded portion **24** of stem **22** in conventional fashion. The opposite end of the stem **22** is referred to as the "free" end thereof.

The stem **22** is provided with a widened collar portion **25** and a pair of teflon bearings **26** and **27** are on opposite sides of the collar. The front bearing **26** is attached to the light pipe in stationary manner, such as by cementing. The bearing **27** is a free-floating inter-load bearing which acts as a thrust bearing in a manner to be described.

A lock nut **28** is secured to the inside of the light pipe **21,** such as by cementing. The nut **28** has inner threading which receives a hollow screw **29** which may be formed of brass. The inner surface of the screw **29** is proportioned large enough to allow free rotation of the stem **22** therein. Rigidly attached to the free end of the stem **22** is a locking nut **30,** preferably formed of aluminum. The nut **30** may be fastened to the stem by any suitable technique such as peening.

Referring to FIG. **4** there is shown a longitudinal cross-section of a second sub-assembly **12.** A cylindrical housing **31** is provided at its front end with inner threading **32** that is adapted for mating with the outer threading **50** at the rear end of the housing **20** (FIG. **3**). The front end of housing **31** is hollow to receive the protruding free end of stem **22** during connection to the sub-assembly **11.** Located approximately centrally in the housing **31** is a light bulb holder and reflector **35** which receives and holds a small light bulb **36.** The light bulb is removably mounted, in the manner of a conventional flashlight arrangement, using a small coil spring **37.** The spring **37** is mounted in a recess in a connector **38** which is, in turn, rigidly mounted in a removable aluminum end-piece **39.** The end-piece **39** is provided with threading at its forward end for connection to housing **31** and to allow easy removal for replacement of the bulb when necessary.

In the present embodiment the bulb **36** is energized by an external voltage source carried on the conductors **50** and **51.** Typically, these conductors will be coupled to the output of a small transformer (not shown) which receives conventionally available home or office voltages. Alternatively, the end-piece could be adapted to house a small battery which would supply the necessary power.

In normal operation of the swivel knife, the hollow screw **29** is fully inserted to the limit of its threading within the nut **28.** The screw **29** is proportioned such that, in this condition, there is a clearance (indicated by arrow A in FIG. **3**) between its outer end and the blocking nut **30.** In such condition the stem **22** is free to rotate within the housing **20.** As the draftman applies the blade to a work surface the stem **22** will experience an axial force opposite the direction of application; i.e., toward the rear of the knife. The rear edge of the collar portion will be pushed against the inter-load bearing **27** which prevents the stem **22** from moving back in its housing. As the blade is turned during use, the stem **22** will rotate and the bearing **27** acts as a thrust bearing during such rotation.

When it is necessary to render the blade stationary with respect to the knife body, sub-assembly **12** is removed and the hollow screw **29** is unscrewed by an amount that is sufficient to cause its outer end to bind against the locking nut **30.** The screw **29** is preferably knurled on its exposed area to facilitate turning with the fingers. The spacing between the screw **29** and locking nut **30** is preferably small so that a portion of the single turn achieves the desired binding. It is readily seen that binding the nut **30** against the screw **29** prevents rotation of the stem **22** within housing **20.** This means that the blade will remain stationary within the knife body as is desired. Thus, the conversion of the knife as between its swivel and stationary operating states is a simple operation which can be achieved in a few seconds without the need for inserting and/or removing a pin. At the same time, the mechanism for achieving conversion does not interfere with operation of the lighting system which effectively illuminates the work area.

We claim:

1. An illuminating convertible swivel knife comprising:

A. a first sub-assembly including

a. a first tubular housing having front and rear ends;

b. a light-transmissive pipe rigidly fitted within said first housing, said light pipe having exposed edges at both the front and rear ends of said first housing;

c. an elongated generally cylindrical stem mounted within said light pipe, said stem being normally rotatable with respect to said light pipe, said stem having a blade-holding end at the front end of said first housing; and

d. adjustable means for rigidly coupling said stem to the inner surface of said light pipe; and

B. a second sub-assembly including

e. a second tubular housing having front and rear ends, the front end of said second housing being removably mounted to the rear end of said first housing; and

f. light generating means mounted within said second housing and oriented to project light through the front end of said second housing;

whereby the generated light is transmitted by said light-transmissive tube to the front end of said first housing to illuminate the area surrounding the blade-holding end of said stem.

2. The swivel knife in accordance with claim **1** wherein said adjustable means comprises:

a lock nut fitted within said light pipe toward the rear end of said housing, said lock nut rotatably receiving the portion of said stem at the rear end of said housing;

a hollow screw having outer threading which is received by the inner threading of said lock nut, said screw being proportioned to rotatably receive said stem with a free end of said stem protruding therefrom; and

locking means rigidly connected to the free end of said stem, said locking means being operative to bind against the exposed edge of said hollow screw when the latter is unscrewed by a predetermined

amount, whereby said stem is rendered rigid with respect to said housing.

3. The swivel knife in accordance with claim 2 wherein said stem has a widened collar portion within said housing; and further comprising first and second bearings on opposite sides of said collar portion.

4. The swivel knife in accordance with claim 3 wherein one of said bearings is housed between said collar portion and said lock nut.

5. A swivel knife that is convertible for use as a conventional knife wherein the blade is rigidly mounted, comprising:

a tubular housing having front and rear ends, the rear end of said housing having inner threading;

an elongated cylindrical stem mounted within said housing, said stem being normally rotatable with respect to said housing, said stem having a blade-holding end at the front end of said housing and a free end which protrudes from the rear end of said housing;

a hollow screw having outer threading which is received by the inner threading of said housing, said screw being proportioned to rotatably receive said stem so that the free end of said stem protrudes therefrom; and

locking means rigidly connected to the free end of said stem, said locking means being operative to bind against the exposed edge of said hollow screw when the latter is unscrewed by a predetermined amount, whereby said stem is rendered rigid with respect to said housing.

6. The swivel knife in accordance with claim 5 wherein said stem has a widened collar portion within said housing; and further comprising first and second bearings on opposite sides of said collar portion.

7. The swivel knife in accordance with claim 6 further comprising removable means for covering the exposed protruding end of said stem.

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