Dec. 14, 1971 G. A. LA CAS ET AL 3,626,592

BLADE HOLDER AND BLADE

Filed Nov. 13, 1969

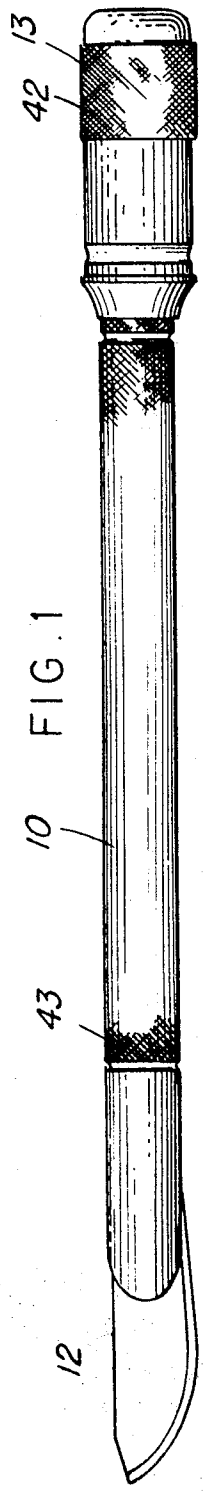


FIG. 1

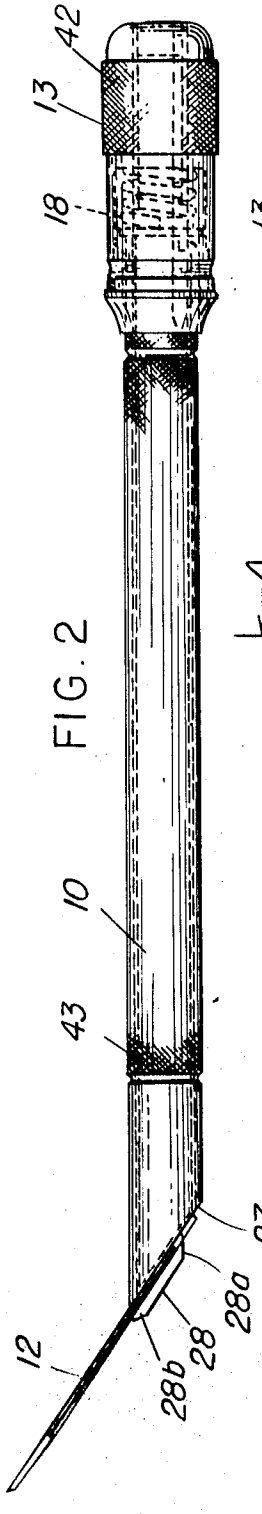


FIG. 2

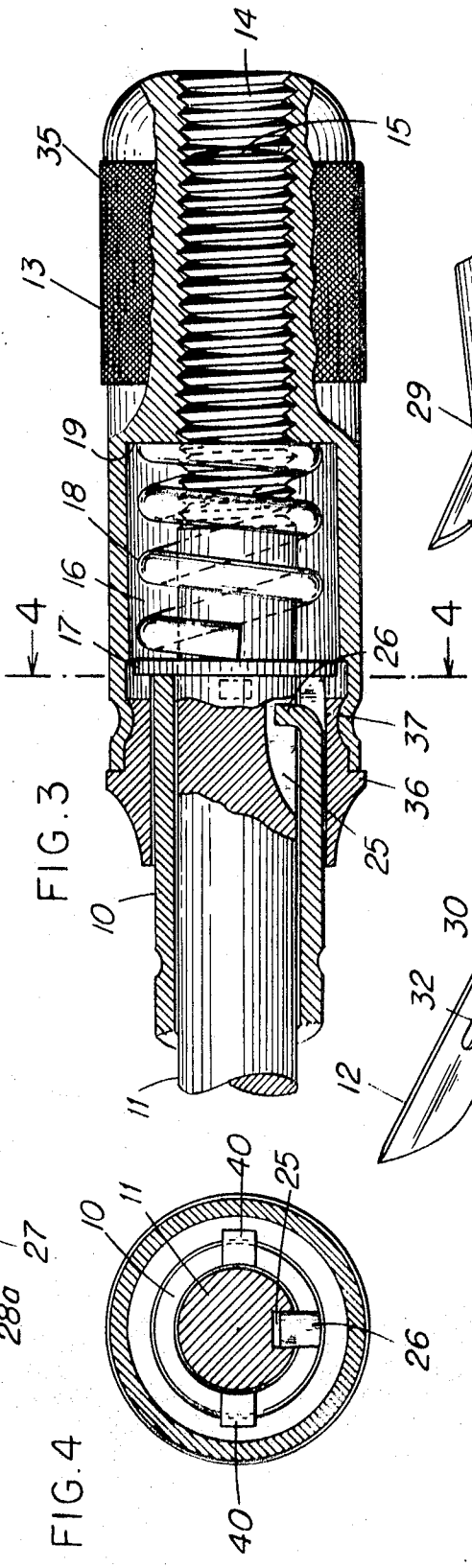


FIG. 3

FIG. 4

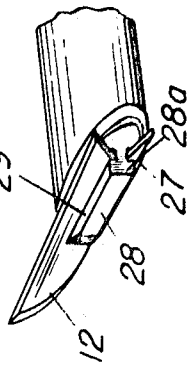


FIG. 5

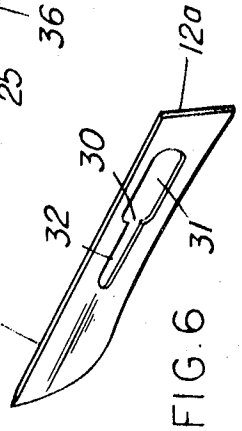


FIG. 6

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BLADE HOLDER AND BLADE

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Int. Cl. B26b 5/00
U.S. Cl. 30—339 8 Claims

ABSTRACT OF THE DISCLOSURE

A tubular blade holder particularly adapted for mounting a surgical blade at an angle to the axis of the holder embodying an elongated sleeve, a shaft extending axially therethrough having a head for clamping the blade against one end of the sleeve, a knob at the opposite end having a screw threaded engagement with the shaft permanently but rotatively secured to the sleeve, the knob being engageable against a compression spring adapted to be compressed into a solid non-elastic condition for positive locking of the blade.

THE PRIOR ART IN GENERAL

Blades of the general type concerned in combination with holders therefor have been in common use for many years and are disclosed in various United States patents of which the patents to Maltz 2,215,125 and Waugh 2,257,141 may be regarded as illustrative. Each of these shows a surgical blade having a keyhole slot engaged over some sort of locking means. In the instruments of the above-noted patents the mounting and locking means for the blade includes an arrangement in which an element is adapted to be engaged in the slot and applying the blade requires sliding the blade longitudinally while it is in a flexed condition until it falls or snaps into position. Removal of the blade normally involves similar flexing and endwise manipulation. Because of the extreme sharpness of the blades and their relatively small size the operation of applying and removing a blade has presented serious hazards. Furthermore, with that type of locking means a looseness may occur which is a dangerous condition where the instrument is employed in delicate surgical operations. The recent patent application of Fischl Ser. No. 659,412 filed Aug. 9, 1967 which became Pat. No. 3,486,229 on Dec. 30, 1969 discloses a blade holder which obviates the disadvantages just described comprising a tubular member having a clamping surface at one end with a clamping shaft provided with a T-shaped clamping head for engaging the blade at said one end of the tubular member and screw threaded means at the opposite end for adjusting the shaft longitudinally to effect the clamping of the blade.

Prior to said Fischl application various patents disclosed other types of locking or clamping means for removably securing cutting elements or other implements to a handle employing in general a shaft and a cooperating nut which draws the shaft axially and clamps the blade or other implement against a stop or abutment. Representative of such types of implement holding means are the patents to Cline 2,272,649; Crocker 633,571; Fesler 2,109,108; Fletcher 2,242,700; and Heigle 2,431,-118. Heigle discloses a handle for removably mounting various blades or other implements and it embodies a spring within the barrel type handle against which the end knob engages in clamping the implement and the implement is held against stop means solely by compressive tension in the spring. In Heigle when no implement is mounted on the handle the knob normally projects outwardly from the sleeve and is free to separate completely from the handle when unscrewed sufficiently. None of

the last noted group of patents, however discloses a holder means embodying a planar clamping surface and a cooperative T-shaped clamping head adapted to secure a keyhole type blade.

THE PRESENT INVENTION

The instrument of the present invention embodies various detailed features many of which are disclosed per se in the prior art, but the instrument as a whole comprises a new combination capable of functioning in a different and advantageous manner not afforded by the prior art devices. Of importance is the arrangement of a clamping spring of a particular character and association of other elements therewith. As disclosed in the representative embodiment a coil compression spring is located within the tubular sleeve of the holder between the rotary knob and an opposed abutment means in a manner such that initial rotation progressively compresses the spring and applies an elastic or spring clamping force on the cutting blade and further rotation of the knob beyond two or three turns compresses the spring to its limit so that in effect it becomes a solid ring and the blade is positively clamped in place. Thus the securing of the blade to the handle is made easier, it being retained under the clamping head upon initial tension on the spring and finally is positively and rigidly clamped on the handle. Danger of looseness of the blade is avoided as may occur with a clamping means which depends solely on solid engagement of the elements.

In association with the foregoing features the instrument embodies a clamping means which includes a clamping knob which is firmly but rotatively secured to the handle sleeve and accordingly prevents escape of the knob and accidental loss thereof. The knob is initially formed as two elements comprising a first element into which the sleeve is threaded, the sleeve and first element having interengaging parts to prevent the first element from escape from the sleeve. Following assembly of the first element on the sleeve the second element which has the threaded portion for engagement with the concentric axially extending locking shaft is telescopically slipped over the first element and an annular area therof is rolled down into an annular groove of the first element permanently securing the two together and thereby securing the knob as a whole rotatably but permanently attached to the sleeve.

The combination is particularly adapted for securing a surgical blade having a keyhole slot therein upon the handle and arranged at an acute angle to the axis of the holder.

The construction, operation and advantages of the instrument will become more fully apparent from the description to follow considered in connection with the accompanying drawings in which:

FIG. 1 is a plan view of the completely assembled instrument;

FIG. 2 is a similar view with the instrument rotated 90° from the position shown in FIG. 1 and showing in broken lines some of the internal construction;

FIG. 3 is a fragmentary longitudinal cross-sectional view on an enlarged scale of the adjusting knob and the elements located internally thereof;

FIG. 4 is a transverse cross-sectional view taken on the plane **4—4** of FIG. 3;

FIG. 5 is a fragmentary view of the end portion of the locking shaft showing the character of the T-shaped clamping head; and

FIG. 6 is a plan view of a typical surgical blade adapted to be mounted on the handle as shown in FIGS. 1 and 2.

The general elements of the instrument include an elongated handle in the form of a hollow sleeve **10** in which is coaxially mounted a shaft **11** shown in part

particularly in FIG. 3 and in broken lines in FIG. 2. Removably clamped to the outer end of the tubular sleeve **10** is a cutting blade **12** as shown in FIGS. 1 and 2, an individual blade being shown in plan in FIG. 6. An adjusting knob **13** is permanently but rotatably secured to the sleeve **10**. The knob is internally threaded as indicated at **14** to receive the threaded end **15** of the shaft **11**. Concentrically mounted on the shaft **11** within the hollow chamber **16** of the adjusting knob is a washer **17** and a coil spring **18** engaged between the washer **17** and the inner wall **19** of the adjusting knob.

The shaft **11** is provided with an axially extending groove **25** and the sleeve **10** has an inwardly bent finger **26** engaged in the groove **25** whereby the shaft is maintained non-rotatable with respect to the sleeve **10**. The end of the tubular holder member **10** is provided with a generally plane clamping surface against which the blade **12** is adapted to be clamped. The relation of the blade to the holder may be varied dependent upon the circumstances but in the specific embodiment the clamping surface **27** and correspondingly the blade **12** are arranged at an acute angle to the axis of the holder as shown particularly in FIG. 2. Likewise the character of the clamping means may vary but a particularly convenient and effective type for a blade of the character shown in FIG. 6 comprises a T-shaped clamping head **28** having laterally extending flanges **29** the flanges being generally parallel to the blade seat **27** as dictated by the relation of finger **26** to the shaft groove **25**.

As previously noted the blade may vary in character but desirably may be of a well known type having a keyhole opening **30**. In assembling the parts the wider portion **31** of the opening **30** is adapted to be slipped over the head **28** of the shaft clamping means and the blade then slid longitudinally whereby the narrower portion opening **32** occupies a position under the lateral flanges **29** and clamping is effected by drawing the shaft toward the clamping surface **27** by means of the screw threaded means **14, 15**.

Initially the knob **13** is formed as two separate elements including a rear portion **35** having the hollow chamber **16** and a forward coupling member **36**. The construction and functional relationship and advantages of the knob arrangement may be particularly pointed out by describing the manner of assembly of the knob with respect to the sleeve **10**. First the spring **18** is inserted within the hollow chamber **16** of knob portion **35** followed by the washer **17** and then the end of the long sleeve **10** is inserted and finally the coupling or bushing member **36** is slid over the tube and telescoped within the inner open end of the knob portion **35**. The coupling member **36** is provided with an annular groove **37** and after the elements **36** and **35** are brought into engagement in the position shown in FIG. 3 the outer surface of the rear member **35** is rolled down into the groove **37** permanently and rigidly securing together the elements **35** and **36**. It will be noted that the sleeve **10** is provided with two lateral fingers **40** (FIG. 4) extending radially from the inner end of the sleeve **10** whereby when the knob parts **35** and **36** have been secured together the knob **13** as a whole is prevented from being removed outwardly to the right in FIG. 3 from the sleeve **10**.

Spring **18** is a rather stiff coil spring which may vary in number of turns and length dependent upon the proportions of the other elements but as a specific example in the case of a handle in which the tubular member has a diameter of about ¼ in. the spring **18** has a free length of about .290 in. and a solid compressed length of about .200 in. When the shaft **11** is inserted and the knob **13** rotated the screw threaded connection draws the shaft **11** to the right and assuming that a blade has been applied over the clamping head **28**, as rotation of the knob **13** continues, it initially acts through the spring **18**, washer **17** and sleeve **10** to apply an impositive or an elastic force drawing the blade against the clamping surface **27** and immediately holds the blade in place sufficiently so that it does not drop off and as further rotation is applied to the knob **13** the spring **18** gradually compresses and reaches its limit of compression and finally becomes in effect a solid sleeve member and the blade is firmly and rigidly clamped. Normally about two turns of the knob after initial engagement against the spring force effect a complete rigid clamping of the blade in place, and the knob can be backed off about one full turn before any substantial loosening of the blade occurs.

As previously noted the knob is permanently attached to the holder but freely rotatable. Preferably the knob **13** is provided with gripping means such as the knurling **42**. Also the barrel or sleeve **10** may have roughened formations **43** for better gripping and decorative purposes.

With the type of blade illustrated in FIG. 6, upon assembly to the holder it leaves a tail portion **12***a* extending beyond the sleeve opposite to the cutting end which commonly would present a hazard or at least an inconvenience in the use of the knife. It will be noted that the tail end **28***a* of the clamping head **28** is well within the projected outline of sleeve **10**. Accordingly after the blade is clamped in place the tail end **12***a* thereof may be snapped off and the remaining broken end is within the area of the clamping surface as shown in FIG. 5. The opposite end **28***b* of the clamping head may extend to at least the periphery of the sleeve **10** as appears in FIG. 2 thereby assuring adequate area for rigid clamping of the blade.

Various changes may be made in the article described and disclosed in the drawings and accordingly different embodiments of the invention may be made without departing from the scope thereof and it is intended that all matter contained herein shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A cutting instrument embodying a cutting blade and a holder for detachably clamping the blade thereon, said holder comprising a main tubular sleeve having a blade clamping surface at one end, a shaft extending longitudinally through said holder including said clamping surface, said shaft having a clamping head adapted to engage the blade and clamp it against said clamping surface upon retraction of the shaft, a clamping knob having a hollow sleeve portion telescoped over the outer end of said main tubular sleeve opposite to said one end and permanently but rotatably secured to said main tubular sleeve at the said outer end, said knob having a screw threaded connection with said shaft for retraction thereof, a coiled compression spring within said hollow sleeve portion engageable at one end by said knob and engageable at its opposite end against abutment means within said hollow sleeve portion.

2. An instrument in accordance with claim **1** in which rotation of the knob in the shaft retraction direction initially effects an elastic clamping effect on the blade by progressive compression of the spring and continued rotation compresses the spring to its limit and effects a solid positive final clamping of the blade.

3. An instrument in accordance with claim **1** in which interengaging parts of the main sleeve and knob limit the outer movement of the knob while permitting rotation thereof.

4. An instrument in accordance with claim **3** in which the knob is comprised of two elements, the first element being telescoped over the outer end of the main sleeve and having the interengaging parts to limit the said outward movement, and the second element having the screw threaded connection with the shaft and being telescoped over the first element and permanently secured thereto.

5. An instrument in accordance with claim **4** in which the means for securing the second element to the first element comprises an annular rib rolled in situ into an annular groove in the first element.

6. An instrument in accordance with claim **1** in which said main sleeve has radially extending fingers at its

outer end and said knob has an inner annular shoulder engageable with said fingers to limit the outward movement of said knob relative to said main sleeve.

7. A surgical instrument embodying a cutting body and a holder for detachably clamping the blade thereon, said holder comprising a main tubular sleeve having a blade clamping surface at one end, a shaft extending longitudinally through said holder including said clamping surface, said shaft having a T-shaped clamping head with outer lateral flanges extending substantially parallel to said clamping surface adapted to engage the blade and clamp it against said clamping surface upon retraction of the shaft, a clamping knob permanently but rotatably secured to said sleeve at an outer end opposite to said one end having a screw threaded connection with said shaft for retraction thereof, a blade adapted to be engaged over said head said blade having a longitudinal slot therein with a wide portion and a relatively narrower portion, the wide portion being proportioned to receive therethrough the said clamping head, and the narrower portion being smaller than said head but adapted to receive said undercut portion whereby with the blade longitudinally shifted to bring the narrower portion in registration with said head retraction of said shaft by said screw threaded

means draws the blade into firm engagement with said blade clamping surface, said knob having a hollow sleeve portion telescoped over the end of said main tubular sleeve opposite to said blade clamping end, and a compression spring within said hollow sleeve portion engageable at one end by said knob and engageable at its opposite end against abutment means within said main tubular sleeve.

8. A surgical instrument in accordance with claim 7 in which rotation of the knob in the shaft retraction direction initially effects an elastic clamping effect on the blade by progressive compression of the spring and continued rotation compresses the spring to its limit and effects a solid positive final clamping of the blade.

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J. C. PETERS, Assistant Examiner