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Savora

[11] **3,915,455**

[45] **Oct. 28, 1975**

[54] **BROADHEAD ARROWTIP HAVING A SINGLE UNIT SOLID BODY RECEIVING REMOVABLE VERY SHARP QUALITY CUTTING BLADES EXTENDING FROM VERY NEARBY THE TIP TO THE ARROW SHAFT**

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[52] **U.S. Cl.** ..... **273/106.5 B**

[51] **Int. Cl.²** **F41B 5/02**

[58] **Field of Search** ..... 273/106.5 B

[56] **References Cited**

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2,940,758	6/1960	Richter	273/106.5 B
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3,756,600	9/1973	Maleski	273/106.5 B

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Attorney, Agent, or Firm—Roy E. Mattern, Jr.

[57] **ABSTRACT**

Broadhead arrowtips or arrowheads, referred to as broadheads, are used in the bow and arrow hunting of game animals. Each broadhead has a unique single unit solid body, i.e., a solid one piece ferrule having no moving parts. Each broadhead is not permanently attached to an arowshaft, but instead is quickly and simply installed or removed by threaded attachment to an available threaded insert or a threaded sleeve, secured in turn to the leading end of an arrowshaft. Each broadhead has one or more removable very sharp quality cutting blades which are quickly and simply replaced in longitudinal grooves on the single unit solid ferrule by using a unique locking projection on each cutting blade. Each locking projection interfits with a blade locking or blocking device, often a lock ring, in turn surrounding the ferrule in a circumferential groove. Each cutting blade is long, commencing very nearby the tip and continuing until its final locking contact is made with the arrow shaft through its threaded insert on an aluminum or fiberglass shaft or its threaded sleeve on a wood shaft.

12 Claims, 7 Drawing Figures

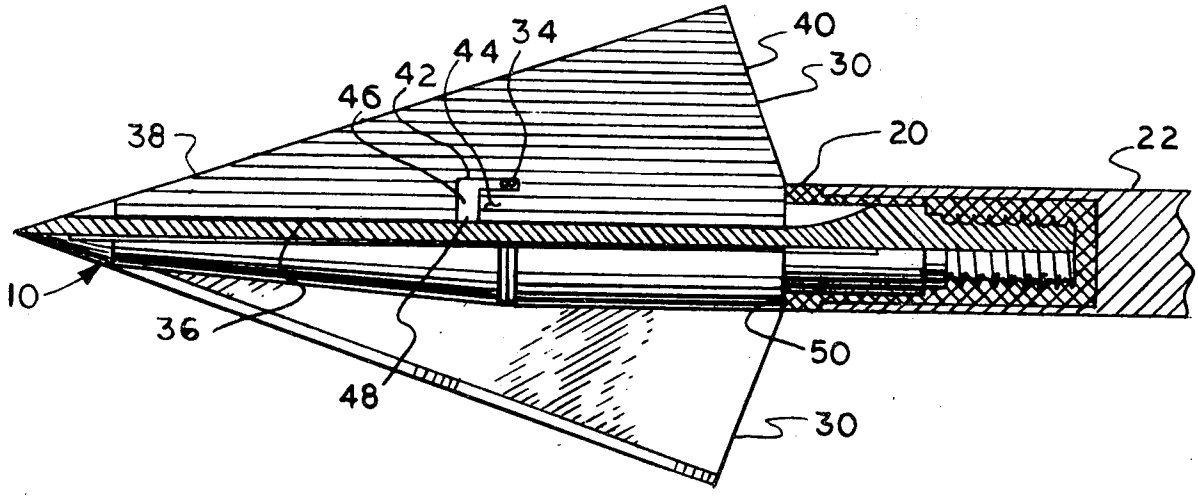
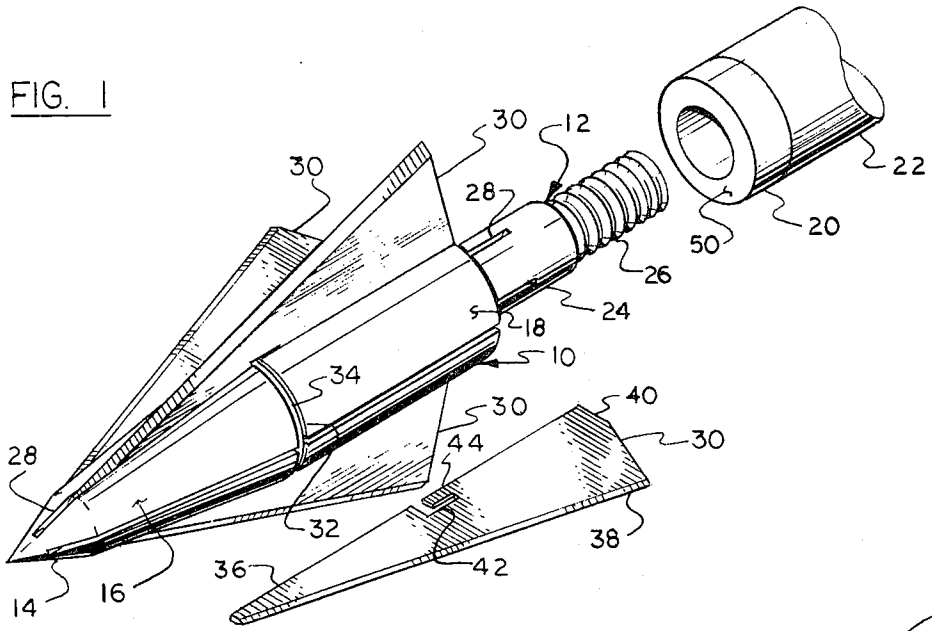


FIG. 1



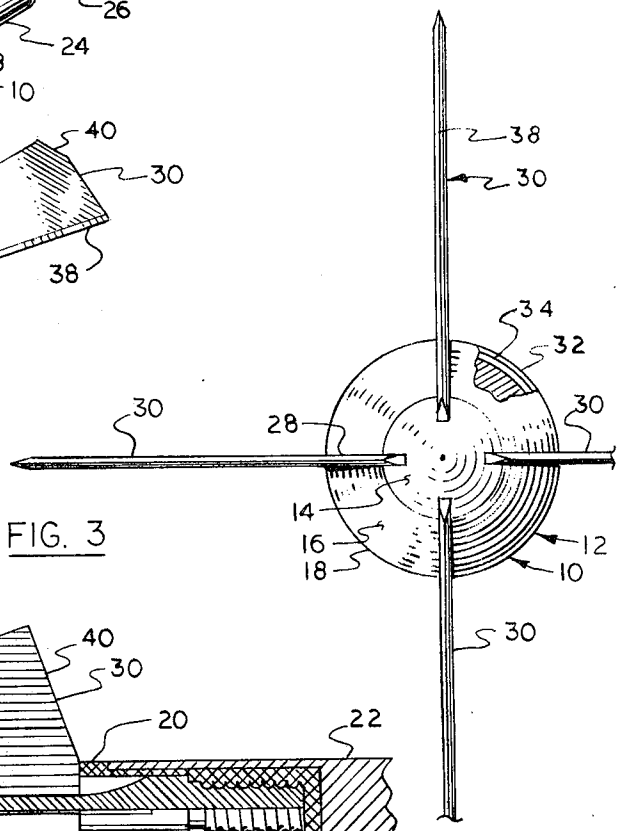
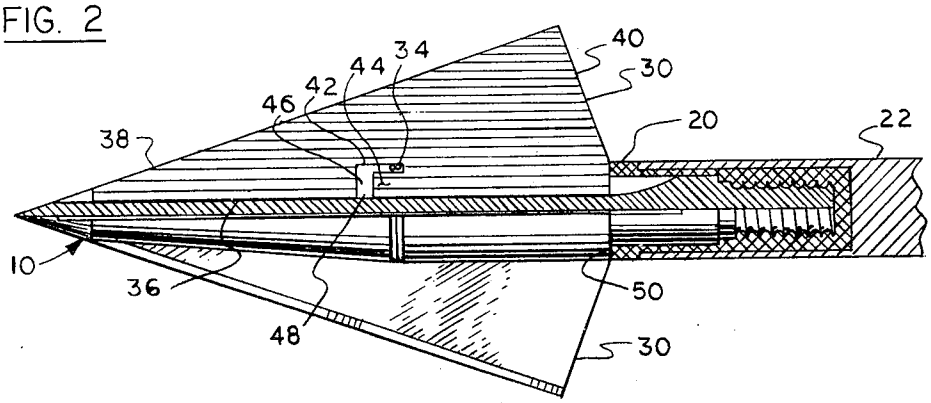


FIG. 3

FIG. 2



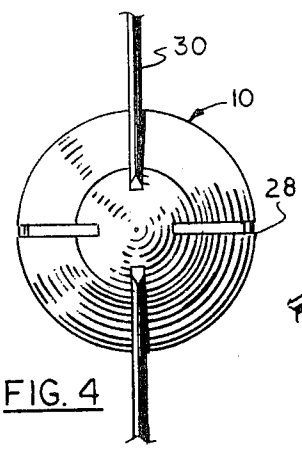


FIG. 4

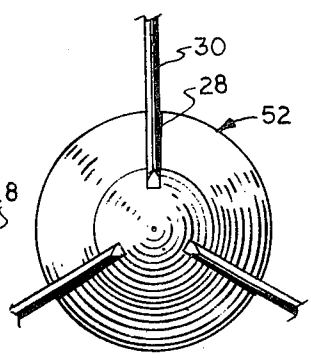


FIG. 5

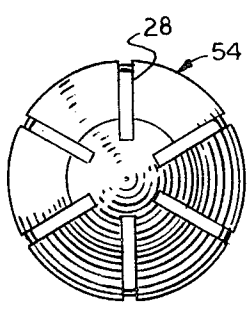


FIG. 6

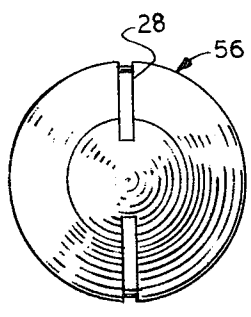


FIG. 7

BROADHEAD ARROWTIP HAVING A SINGLE UNIT SOLID BODY RECEIVING REMOVABLE VERY SHARP QUALITY CUTTING BLADES EXTENDING FROM VERY NEARBY THE TIP TO THE ARROW SHAFT

BACKGROUND OF THE INVENTION

The effectiveness of using arrows having broadhead arrowheads or arrowtips during the bow and arrow hunting of small and large game animals is dependent, over and above the skill of the archer, upon the razor sharpness of the broadhead blades and the overall strength, weight, shape and accuracy of construction and installation of each broadhead arrowhead or arrowtip. The blades must be razor sharp and be positioned to be protected at their tips, and yet be able to start cutting as soon as possible, to cause the almost immediate demise of a game animal struck in a fatal area of its body. Yet if the game animal is not struck in a fatal area, the blades must only produce a superficial clean incision, which will heal quickly without causing any serious after effects. The weight and shape of the broadhead arrowhead or arrowtip and the securement and alignment of its ferrule to the insert or sleeve on the arrowshaft must result in a precisely assembled and well balanced arrow which is stable and accurate in flight. The broadhead arrowhead or arrowtip must be strong to maintain its shape and sharpness when enduring abuse, as it is carried, and as it strikes the bone and muscle of a game animal.

In reference to prior patents, Burton D. Smith in his U.S. Pat. **3,021,138** illustrates and describes a broadhead arrowhead structure which has an unprotected blade tip. Richard C. Maleski in his U.S. Pat. No. **3,756,600** and Adrian P. Mckinzie in his U.S. Pat. No. **3,138,383** both use razor blades or razor blade stock to obtain high quality cutting edges. Karbo in his U.S. Pat. No. **3,741,542** and Mr. John A. Richter in his U.S. Pat. No. **2,940,758** both use a multiple part body or ferrule to retain replaceable blades in a broadhead arrowhead. However, none of these prior designs individually meets all the following objectives:

Objectives in reference to the body or ferrule of the broadhead by making it in one piece:

Strength – using a one piece body or ferrule to avoid multiple component parts which upon impact may weaken and be damaged, and using the one piece ferrule to support the cutting blades for their full length until reaching the arrow shaft, thereby transferring their impact forces to the ferrule and arrow shaft thereby and also rendering the ultimate performance in the strength of the broadhead, in total.

Weight – a one piece body or ferrule to achieve the full utilization of its length in receiving and holding removable blades to thereby achieve a better weight and strength distribution between the body or ferrule and the blades;

Installation – a one piece body or ferrule to achieve the more convenient installation and removal of the blades without using special tools and without requiring special skills;

Accuracy in Flight – a one piece body or ferrule to provide a proper weight relationship between the body or ferrule and the blades to insure accuracy of the arrow in flight; and

Accuracy in Mounting – a one piece body or ferrule having its attachment end formed with a load transfer portion and a threaded portion to be accurately fitted and threaded into and aligned with a threaded insert or sleeve previously secured and aligned with the arrow shaft, and placing the ends of the cutting blades so their impact loads will be transferred to the arrow shaft.

Objectives in reference to the razor sharp removable blades to be installed on a one piece body or ferrule:

Sharpness – the removable quality blades will be honed to be razor sharp; i.e., they will be precision ground to function as a broadhead blade;

Strength – the removable blades will be made of high quality tempered alloy steel of scalpel quality, stronger than razor stock;

Cutting Edges – the removable blades will be designed to obtain the longest possible cutting edge starting just to the rear of the point, and yet not terminate in a barb trailing edge;

Replacement – the removable blades will be quickly installed and locked into place on the one piece body or ferrule, and also may be quickly unlocked and removed, handling a minimum of individual parts;

Locking of Blades – the locking of the removable blades on the one piece body or ferrule, will initially be a function of the blade design, eventaully leading to a solid locking of the blades so there is no movement of the components to interact with the blades upon impact. If they were to move, they might otherwise weaken the overall assembly of the broadhead arrowtip, threaded insert or threaded sleeve, and shaft, so maximum performance of the arrow, would not be realized.

Transfer of Cutting Blade Loads – the cutting blades are firmly secured for their full length in the solid ferrule until reaching the arrow shaft, and therefore are positioned to transfer their impact loads to the ferrule and arrow shaft.

SUMMARY OF INVENTION

This broadhead arrowhead or arrowtip, referred to as a broadhead, meets all these objectives set forth in reference to both a one piece body or ferrule and also the one or more radially spaced removable quality blades having razor sharp edges. It is now available to be removably secured to arrow shafts which are equipped with internally threaded leading end inserts on aluminum or fiberglass shafts and sleeves on wood shafts. The one piece ferrule or body following the best available machining techniques, now has a short point portion, a longer gradually tapering enlarging portion, a slightly shorter cylindrical portion, and, then to fit a threaded insert or sleeve on an arrow shaft, it has both a shorter reduced diameter cylindrical portion, and a trailing end portion also of like reduced diameter, which is externally threaded. At spaced radial locations the body or ferrule has longitudinal grooves or slots which extend from adjacent the short point portion, throughout the tapering portion, throughout the larger cylindrical portion, throughout the smaller cylindrical portion, and terminating just forward of the externally threaded portion. These slots or grooves are arranged to receive the longest possible blades, while still protecting their immediate tip edges, yet allowing the cutting to commence as soon as possible. Also located at about the midlength of the one piece body or ferrule is a circumferential groove which controls the axial positioning of a cutting blade locking or blocking device which is often a locking or retaining ring. The razor

sharp removable cutting blades are made of high quality tempered alloy steel of scalpel quality. They have an elongated base edge designed to slidably and snugly fit into the longitudinal grooves. The base edge of the blade is interrupted by the presence of an integral locking recess forming a locking projection. During installation, upon the creation of a drop-in and slide forward motion for each cutting blade entering into a longitudinal groove, each locking projection moves under the locking or blocking device, which is often a retaining ring. Then when one or more of the removable cutting blades are initially secured against forward, dropping, and radial movement by the locking or retaining ring, they are thereafter prevented from moving backward, when this broadhead is threaded into the threaded insert or threaded sleeve installed on the arrow shaft. This final locking occurs, as end portions of either an insert or a sleeve abut the trailing edge of each cutting blade completing its snugly locked installation on the ferrule body. Each blade has a long inclined leading cutting edge starting very near the point and terminating at the commencement of a rearwardly abruptly declining integral cutting edge, concluding the contour of the overall blade without forming any barb like blade contour, and presenting a long cutting edge without radially extending the blade very far from the body, thereby helping to insure the maximum depth of penetration into the game animal. As so assembled and threadably installed on the leading end of an insert or sleeve all arranged in alignment with a true arrow shaft, this broadhead arrowhead or arrowtip meets all the highest standards of: razor edge sharpness of blades of high quality steel, strength of all components, minimum well distributed weight, limited overall profile, and excellent flight accuracy of the completed arrow.

DESCRIPTION OF DRAWINGS

Preferred embodiments are illustrated in the drawings, wherein:

FIG. **1** is a perspective view of the boradhead arrowhead or arrowtip, with one blade yet to be installed, when four are to be used, and the broadhead is positioned to be threaded into an internally threaded insert, which in turn is secured to the leading end of a shaft of an overall arrow;

FIG. **2** is a side view of the broadhead and a portion of the internally threaded insert, both with portions cut away and sectioned, to illustrate how the removable cutting blades are held in place;

FIG. **3** is a front view of the broadhead illustrating the radial spacing of four cutting blades, one being shown only in part, and their limited radial projection beyond the body, and, through the use of the illustrative break away of body portions, showing the position of the blade locking or blocking device, such as the locking or retaining ring in removably securing the high quality blades; and

FIGS. **4, 5, 6** and **7** are similar to FIG. **3,** illustrating in various front views different embodiments, with cutting blades shown only partially: in FIG. **4,** two blades installed opposite one another and no installation of the other two blades, thereby completing the arrow in this way; in FIG. **5,** three blades are installed in equally spaced three longitudinal grooves; in FIG. **6** the ferrule has longitudinal grooves to receive selectively up to six cutting blades; in FIG. **7,** the ferrule has only two longitudinal grooves to receive cutting blades.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A One Piece Body of the Broadhead Arrowhead or Arrowtip

The broadhead arrowhead or arrowtip **10,** hereinafter referred to as the broadhead **10,** using the best machining techniques available today, has a one piece body or ferrule **12,** integrally having a short point portion **14,** a long gradually tapering enlarging portion **16,** a slightly shorter cylindrical portion **18.** Then to fit a conventional internal threaded insert **20,** or sleeve not shown, on an arrow shaft **22,** the ferrule **12** has both a shorter reduced diameter cylindrical load transfer portion **24** and also a reduced diameter portion **26** which is externally threaded to match the internal threads of the insert **20,** as illustrated in FIGS. **1** and **2.**

Also the one piece body or ferrule **12** has longitudinal grooves **28,** radially spaced to receive blades **30.** The grooves **28** extend from the short point portion **14** back to the load transfer portion **24.** A circumferential groove **32** near the mid length of the body or ferrule **12** receives a blade locking and blocking device **34,** which is often a locking or retaining ring **34.**

Razor Sharp Single or Multiple Removable Blades Made of High Quality Steel

Razor sharp single or multiple removable blades **30** made of high quality steel, such as scalpel quality steel, as used in the preferred embodiment, are shaped as a right angle triangle, as shown in FIG. **2,** with their hypotenuse sides **36** formed to fit the longitudinal grooves **28** on the one piece body or ferrule **12,** their longest right angle side **38** presenting a long cutting edge **38,** and their shortest side **40** presenting a trailing edge, which is not barbed. Near the midpoint of the hypotenuse blade side **36,** each blade **30** has a cut out or slotted structure **42,** including a projection **44** to be fitted within the blade locking or blocking device **34,** which is often a retaining or locking ring **34,** as illustrated in FIGS. **2** and **3.**

Cutting Blade Locking or Blocking Device, i.e., a Retaining Ring or Locking Ring

The one piece body or ferrule **12** has the circumferential groove **32** to receive a blade locking or blocking device **34,** which is often a retaining, restraining or locking ring **34.** Then each blade **30** has a slotted structure **42** including a projecting portion **44,** the latter to be fitted within the retaining ring **34.** This retaining, restraining, or locking ring **34** serving as the blade locking or blocking device **34** is made for example, as a ring and also in two turns of resilient metal wire, as shown in FIG. **2.**

The Initial and Final Locking of the Cutting Blades to the One Piece Body or Ferrule

The blade locking or blocking device **34,** often a retaining ring **34,** is fitted into the circumferential groove **32** of the one piece body or ferrule **12,** having the longitudinal grooves **28.** Everywhere this circumferential groove **32** crosses the longitudinal grooves **28,** access to a respective clearance volume **46** is opened below the locking, restraining or retaining ring **34,** as shown in FIG. **2.** Into this clearnace volume **46,** i.e., a portion of a longitudinal groove **28,** the projecting portion **44** of the slotted edge structure **42** is guided. In doing so,

each high quality blade **30**, i.e., each scalpel like blade **30**, is first lowered into its restrictive longitudinal groove **28**, with its open entry **48** of its slotted structure **42** directed down over the retaining ring **34**. After the blade **26** is in the respective longitudinal groove **28**, it is moved forward and the projecting portion **44** moves into the clearance volume **46** and within the diameter of the blade locking or blocking device **34**, such as the retaining or locking ring **34**. The forward motion of each installed blade **30** is thereafter restricted, and also its radial or drop out motion is thereafter restricted upon this initial locking, until it is again purposely drawn to the rear of the body or ferrule **12**. To complete the final locking of the cutting blades **30**, the broadhead **10** is threaded into the internal threaded insert **20**, until the rear abutting edge **40** of each blade **30** makes firm blocking and locking contact with leading edge **50** of the insert **20**, as illustrated in FIGS. **1** and **2**. Rearward movement of the blades **30** is thereby prevented until the broadhead **10** is removed from the internally threaded insert **20**, which is in turn secured to the arrow shaft **22**.

Modifications Indicated by the Embodiments of FIGS. **5**, **6** and **7**

As indicated in FIGS. **1** through **4**, the preferred embodiment of the broadhead **10** has a body or ferrule **12** in which four equally spaced longitudinal grooves **28** are formed to receive the long cutting blades **30**. For target practice, and arrow may be shot without installing any blade **30**. During hunting only one blade **30** may be installed, or two blades **30** may be installed, as shown in FIG. **4**. Preferably, four blades will be installed as shown in FIGS. **1**, **2** and **3**. Yet the general specifications of the design of these broadheads **10** are applicable: to the design of the broadhead **52**, shown in FIG. **5**, having longitudinal grooves **28** for receiving one to three blades **30**; to the design of broadhead **54**, shown in FIG. **6**, having longitudinal grooves **28** for receiving one to six blades **30**; and to the design of broadhead **56**, shown in FIG. **7**, having longitudinal grooves **28** for receiving one to two blades **30**.

As indicated in FIGS. **1** and **2**, the blades **30** in the longitudinal grooves **28**, extend the full length of the exposed body or ferrule **12**, after its installation on the arrow shaft **22**, by using the conventional internally threaded insert **20**, or the internally threaded sleeve, not shown, the former used with aluminum and fiberglass shafts and the latter used with wood shafts. The portions of the ferrule **12**, not seen after installation, which are the load transfer portion **24** and the externally threaded portion **26**, are designed to match these conventional inserts **20**, or sleeves. If the conventional attachment ways, reflected by the insert and sleeve designs, were to change, then the ferrule **12**, by necessity, would also be changed. However, the objectives would remain to keep the length of the blades **30** almost equal to the full length of the exposed ferrule portions, leaving only a small ferrule pointed end portion **14** to protect the tips of the blades **30**.

Moreover, the blades **30** must be initially locked to permit the installation and removal of two or more blades **30** so they will not drop out as the arrow shaft **22** is rolled around during installation of the blades. Then the final locking upon tightening the threads results in all blades **30** to bear directly against the leading edge **50** of the insert **20**, or sleeve thereby in effect, upon impact of the arrow with the game animal, transferring the porportional impact loads occurring on the blades **30** directly to the arrow shaft **22**. Beyond, the initial locking, no loads, thereafter, are carried by the blade locking or blocking device **34**, i.e., generally the locking, retaining or restraining ring **34**.

Changes are anticipated, if plastic molded parts prove satisfactory. Recesses will be created for the projection **44** on the blade **30** to enter, and then a blade locking or blocking device **34** will not be used as a separate component. Instead the functional structural recess, like the clearance volume **46**, will be molded into the ferrule or body **12**. Moreover, as metal machining techniques are improved, or as molded plastic techniques are improved, the body or ferrule **12**, will be formed, so a constant increasing taper is used throughout its exposed length.

SUMMARY OF SOME OF THE ADVANTAGES

This broadhead arrowhead or arrowtip, embodies the best aspects of the sought after five factors of utmost importance: razor sharpness, adequate strength, lower well distributed weight, compact configuration for adequate penetration, and excellent balance and alignment for accuracy in flight. More specifically, this broadhead securely holds multiple blades having no barbs, the leading edges of which are protected by the tip of the one piece body, yet they start cutting quickly upon impact utilizing extended razor sharp cutting edges, which extend substantially the full length of the exposed ferrule. The blades are easily installed and removed without using special tools or employing special skills, so effective sharpening may be readily undertaken or, as necessary, a replacement blade may be installed. The blades, being removable, from the one piece body, are made of high quality alloy steel as the basis for forming very sharp and durable cutting edges, which are continuous in length from adjacent the very entry tip back to the arrow shaft. The blade shapes, although alike on any particular broadhead, as a group may be changed in some aspects. Yet all blades are fitted to the one piece body or ferrule, which is essentially solid with no moving parts to be damaged or lost, or to damage the blades. The minimum number of component parts in each broadhead and the initial locking of the blades make it very convenient to change blades. The transverse overall cross sectional area of the broadhead is comparatively small. Moreover, the broadhead is always accurately fitted to standard designed arrow shafts equipped with threaded inserts or sleeves, to insure the overall accurate alignment of a well balanced arrow which will follow the intended flight path to the game animal.

I claim:

1. A broadhead used as an arrowtip for an arrow used in hunting game animals, comprising:

a. a ferrule in a single piece, therefore with no moving parts, having at least one longitudinal groove to receive a cutting blade commencing very near the pointed commencement of the ferrule and extending at least throughout the exposed length of the ferrule, a circumferential groove not as deep as the longitudinal groove about the ferrule to receive a locking and blocking means, and a non exposed threaded connection structure of the ferrule beyond the exposed length of the ferrule to transfer loads as it is threaded to an arrow shaft via an

arrow shaft's self contained threaded insert or sleeve;

b. a locking and blocking means, surrounding the ferrule and positioned in the circumferential groove creating at each longitudinal groove a restrictive opening below the locking and blocking means; and

c. at least one cutting blade precision ground to function as a broadhead blade formed substantially as a right angle triangle, having a hypotenuse side sized to slidably and snugly fit a longitudinal groove of the ferrule and extending from very near the pointed end of the ferrule to the end of the exposed length of the ferrule, and also having a cutout structure inclusive of a radial entry and a horizontal projection formed at and near this hypotenuse side edge, this cutout structure allowing the cutting blade to radially enter the longitudinal groove without interference with the locking and blocking means; and upon the subsequent forward sliding of the cutting blade, the horizontal projection of the cutout structure enters the restrictive opening formed below by the locking and blocking means at the longitudinal groove, to thereby initially lock the cutting blade against forward and radial motion, the final locking of the cutting blade occuring as the ferrule of the broadhead is threaded upon the arrow shaft using its non exposed threaded connection structure and the arrow shaft's self-contained threaded insert or sleeve, and having the longest right angle side serving as the cutting edge, and the shortest right angle side serving as the non barbed trailing edge of the cutting blade.

2. A broadhead, as claimed in claim **1,** wherein the ferrule in its single piece configuration has respective contoured portions commencing in a short point exposed portion, then a longer gradually enlarging tapered exposed portion, followed by a slightly shorter cylindrical exposed portion, and concluding with an overall non exposed connection portion, which has a non threaded snugly fitting load transfer portion thereof and also an externally threaded portion thereof, the sizes of which meet the standard receiving sizes of internally threaded inserts or sleeves conventionally previously secured to the leading ends of arrow shafts.

3. A broadhead serving as an arrowtip for arrows used in hunting game animals, comprising:

a. a ferrule which is a solid one piece body having at least one longitudinal groove of a depth approximately one quarter the diameter of the ferrule, commencing near the start of the ferrule and extending at least to the finally exposed portions of the ferrule, to receive a cutting blade, having a circumferential groove formed in the ferrule of sufficient depth to receive a circumferential coiled spring;

b. a circumferential coiled spring serving as a blocking and locking means fitted into the circumferential groove formed in the ferrule and passing through part of the depth of the longitudinal groove which receives a cutting blade to remain there during the installation and removal of a cutting blade; and

c. a cutting blade, removably secured to the ferrule, of a length commencing very near the commencement of the ferrule and extending to the termination of the finally exposed portions of the ferrule, when it is fitted into place on an arrow shaft, whereby the cutting blade bears against an arrow shaft, having a cut out structure in the blade to first radially clear the circumferential coiled spring and thereafter upon longitudinal forward movement of the blade to cause some of the cut out structure to pass under the coiled spring to thereafter prevent any radial movement of the cutting blade out of the longitudinal groove as long as the cutting blade is not thereafter allowed to be longitudinally moved back, as it is so restricted when the broadhead is serving as the arrowtip mounted on an arrow shaft.

4. A broadhead serving as an arrowtip for arrows used in hunting game animals, as claimed in claim **3,** wherein the ferrule solid one piece body has a non threaded cylindrical portion in which the longitudinal groove terminates and which is of the same inside diameter of a receiving interior of an arrow shaft, which if made of wood may have an insert which is unthreaded first and thereafter threaded, to thereby snugly fit therein and transfer impact loads, and has a threaded cylindrical portion, beyond the non threaded cylindrical portion, to be threadably secured to the interior of an arrow shaft, which if made of wood, may have an insert which is unthreaded first and thereafter threaded, the final securement of the ferrule and its installed cutting blade placing a trailing edge of the cutting blade adjacent an arrow shaft to thereafter transmit impact forces from the blade to the shaft and also to keep the cutting blade in position to remain locked by the coiled spring serving as a blocking and locking means.

5. A broadhead arrowhead for mounting on an arrow shaft, for use in hunting game animals, comprising:

a. a solid ferrule having a forward part culminating in a point, and a cylindrical rearward part which has a sufficiently small diameter to fit within an arrow shaft and which also has a structure for fastening the arrowhead to the arrow shaft, said ferrule having at least one longitudinal groove commencing near the pointed end of the forward part and extending into the rearward part, and also having a circumferential groove about the forward part;

b. a retaining structure extending around the ferrule, positioned within the circumferential groove at least partly below the outer surface of the ferrule; and

c. at least one blade shaped substantially as a right angle triangle, having a hypotenuse side sized to slidably yet snugly fit within one of the longitudinal grooves, a leading right angle side precision ground to function as a cutting edge, and a trailing right angle side, said hypotenuse side having a slot cut into it to receive the retaining structure when the blade is positioned in the longitudinal groove, said slot extending inwardly from the hypotenuse side and rearwardly toward the trailing right angle side and terminating at a point a distance from the trailing end of the hypotenuse side roughly equal to the distance between the circumferential groove and the trailing end of the forward part of the ferrule, whereby the retaining structure, when positioned in said slot, prevents forward and radial movements of the blade relative to the ferrule, and whereby the blade is locked in place against rearward motion relative to the ferrule by the arrow shaft when the arrowhead is fastened to an arrow shaft.

6. An arrowhead, as claimed in claim 5, wherein the forward part of the ferrule commences in a short sharply tapered point portion, is followed by a longer more gradually tapered portion, and ends in a cylindrical portion of a length approximately equal to that of the gradually tapered portion.

7. An arrowhead, as claimed in claim 6, wherein the slot in the blade first extends inwards substantially normal to the hypotenuse side and then extends rearwards substantially parallel to the hypotenuse side.

8. An arrowhead, as claimed in claim 7, wherein the ferrule is of a single piece construction.

9. An arrowhead, as claimed in claim 6, wherein the ferrule is of a single piece construction.

10. An arrowhead as claimed in claim 5, wherein the slot in the blade first extends inwards substantially normal to the hypotenuse side and then extends rearwards substantially parallel to the hypotenuse side.

11. An arrowhead, as claimed in claim 10, wherein the ferrule is of a single piece construction.

12. An arrowhead, as claimed in claim 5, wherein the ferrule is of a single piece construction.

* * * * *