Nov. 15, 1966 D. B. RADE 3,284,904

ARCHERY SIGHT

Filed Dec. 9, 1963 2 Sheets-Sheet 1

Fig. 1

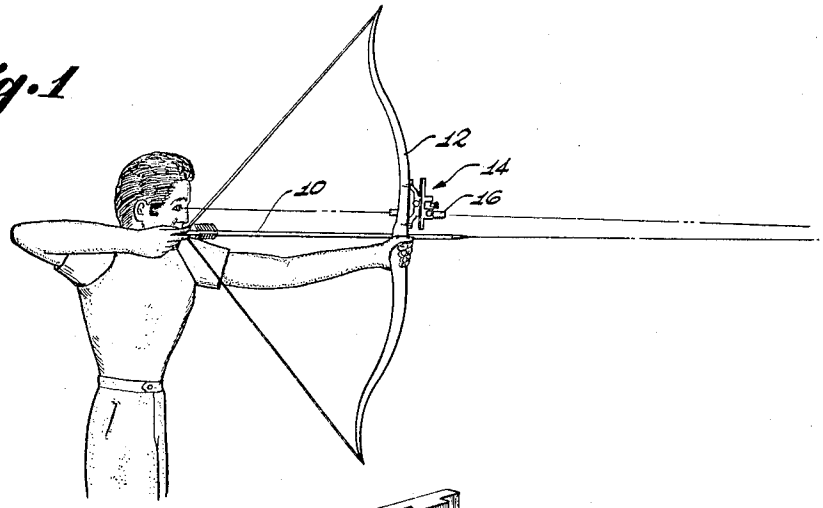


Fig. 2

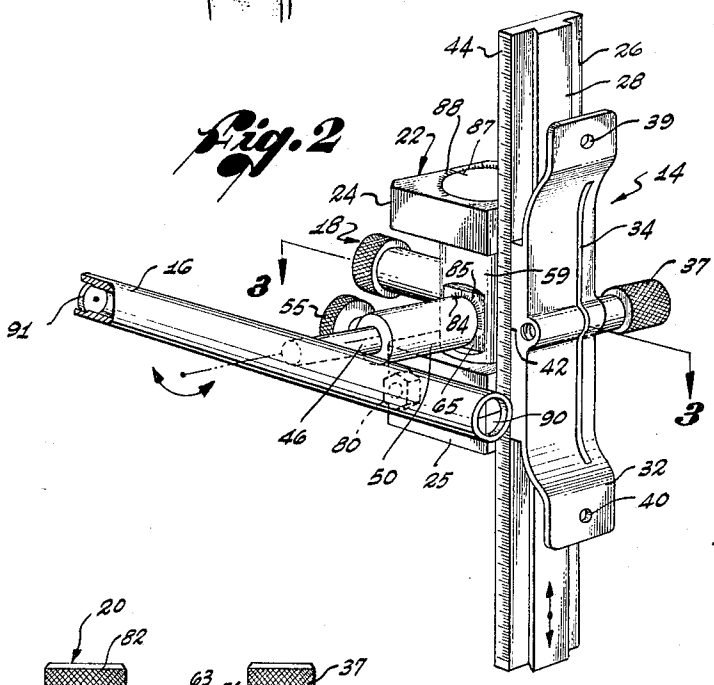
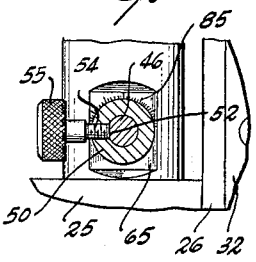


Fig. 4



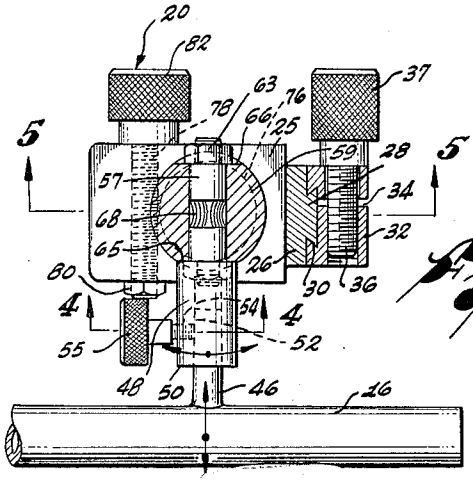


Fig. 3

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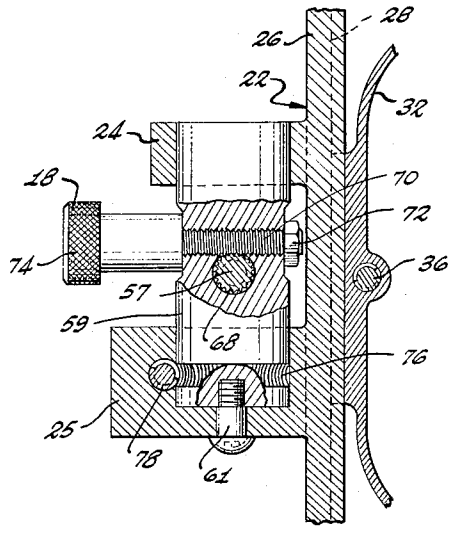


Fig. 5

Fig. 6

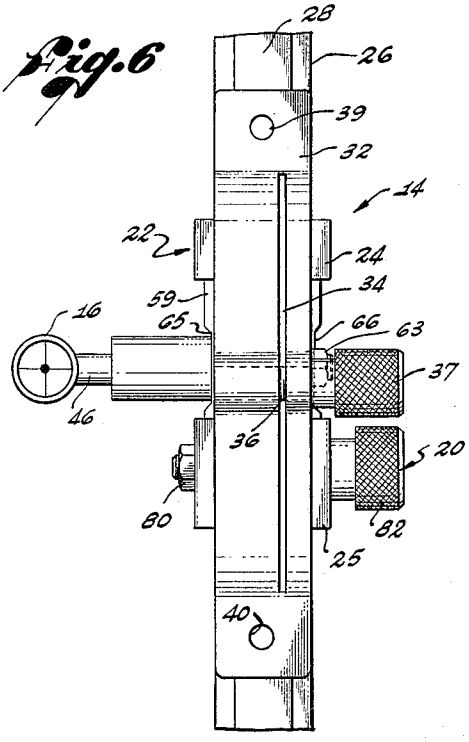
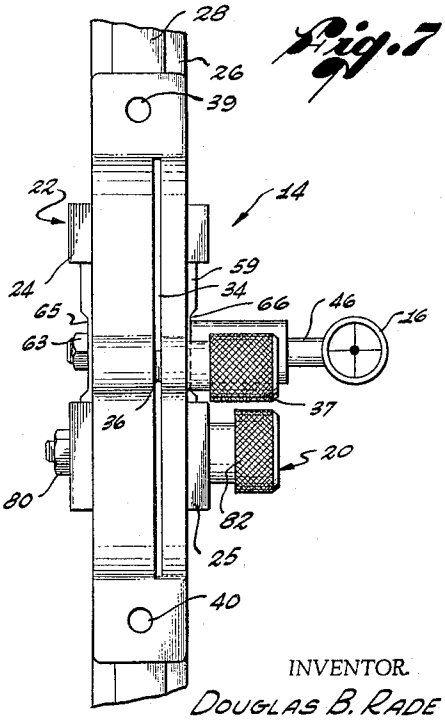


Fig. 7



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ARCHERY SIGHT

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3 Claims. (Cl. 33—46)

This invention relates generally to improvements in archery sights, and more particularly to new and improved means for first aligning a sight tube between the eye of the archer and a target, for either right of left-handed archers and for either the left or right eye of the archer, and for then universally adjusting the position of the archer's bow relative to the properly aligned sight tube to accurately compensate for varying range and windage.

In the sport of archery, it has been the general practice for archers to shoot with the unaided eye except where extemely high accuracy is required, as in competition shooting. In the latter instance, archers prefer to use sight tubes for improved aim, and such sight tubes are generally permitted by the rules of competitive shooting if they are of the type producing no optical magnification. However, the sight tubes heretofore available have generally been rather crude and unreliable devices, and archers have had to depend upon previous experience and pure guesswork for the adjustment of such aiming aids. Moreover, archery has become increasingly popular in recent years, and the average novice is usually ill equipped, by virtue of poor form and lack of experience, to handle a bow embodying one of the aforedescribed aiming devices.

In addition to the aforementioned difficulties, the sight tubes of the prior art have always had to be custom mounted to satisfy left-handed, right-handed, left or right eye requirements of the particular archer who was to use the bow upon which the sight tube was mounted. In the event of use of such a customized bow by another archer having different physical requirements than the first archer for whom the aiming device was originally set up, the entire aiming device would normally have to be removed from the bow and be reoriented or replaced to satisfy the particular hand and eye requirements of the new archer.

Hence, those concerned with the development of archery equipment have long recognized the need for an improved archery sight capable of reliable and accurate adjustment, capable of use as an instructional aid, and further capable of universal mounting for right-handed or left-handed archers and either the right or left eye. The present invention clearly fulfills these needs.

Accordingly, it is an object of the present invention to provide a new and improved archery sight which overcomes the above and other disadvantages of the prior art.

Another object is to provide a new and improved archery sight which is accurate, relatively simple to adjust and economical to produce.

A further object of the invention is the provision of a new and improved archery sight capable of more accurately aligning the archer's eye and the bow relative to a target.

Still another object is to provide an improved archery sight capable of use as an instructional aid to teach and correct archery form.

Yet another object of the present invention is the provision of a calibrated archery sight which enables the

archery sight which enables universal orientation of the bow to subsequently be aligned relative to the archer's line of sight to the target.

A still further object is to provide a new and improved archery sight which enables universal orientation of the bow to adjust for any range and windage relative to an accurately aligned line of sight from the archer's eye to the target.

Still another object is the provision of a novel archery sight wherein a sight tube is provided with two degrees of translational freedom and two degrees of rotational freedom.

Yet another object of this invention is to provide a novel archery sight wherein a sighting tube is aligned relative to an archer's eye and a target by means of both translational and rotational adjustments and the archer's bow is subsequently aligned relative to the properly aligned sighting tube solely by translational adjustment to compensate for both range and windage variations.

Another object is to provide a relatively simple archery sight capable of being mounted upon a bow in a single position from which it is universally adjustable to accommodate either right or left-handed archers and either the right or left eye of the archer.

The above and other objects and advantages of this invention will become apparent from the following detailed description, when considered in connection with the accompanying drawings of an illustrative embodiment thereof, and wherein:

FIGURE 1 is a right profile view of an archer preparing to shoot an arrow from a bow equipped with the new and improved archery sight of the present invention;

FIGURE 2 is a perspective view of a presently preferred embodiment of an archery sight in accordance with the invention, a portion of the sight tube being broken away;

FIGURE 3 is a sectional view, taken along the line 3—3 in FIGURE 2, and illustrates the details of the range, windage and sight tube train controls;

FIGURE 4 is a fragmentary sectional view, taken along the line 4—4 in FIGURE 3, and illustrating the sight tube lateral adjustment lock and the sight tube elevation scale;

FIGURE 5 is a fragmentary sectional view, taken along the line 5—5 in FIGURE 3, and illustrates the internal structure of the sight tube train and elevation adjustments;

FIGURE 6 is a right side elevational view of the archery sight of FIGURE 2 adjusted for an archer who grips the bow with the left hand; and

FIGURE 7 is an elevational view similar to FIGURE 6, but with the sight set up for an archer who grips the bow with the right hand.

Referring now to the drawings, and particularly to FIGURE 1 thereof, an archer is shown preparing to shoot an arrow **10** from a bow **12** equipped with an archery sight **14** in accordance with the present invention. The sight **14** is normally mounted above the bow handle upon the surface of the bow directed towards the target. However, it is to be understood that this by way of example only, and the archery sight **14** can just as readily be mounted upon the inner face of the bow directed towards the archer. As shown in FIGURE 1, the archery sight **14** is set up for an archer using his right eye for sighting and his left hand for gripping the bow. However, as

will hereinafter be described, the archery sight **14** can easily be adjusted, without removing the sight from its mounted position shown in FIGURE 1, to accommodate either right or left-handed archers using either eye.

In using the archery sight **14** of the present invention, the archer first adjusts the position of a sight tube **16**, which can be either a telescope or a nonmagnifying device, so that the archer's eye and the target are in accurate alignment for the specific target range involved. Once the sight tube **16** has been thus positioned to provide such eye-target alignment for the specified range, the sight tube adjustment controls will normally not be readjusted unless the range is changed. The remaining portion of the archery sight mechanism and the bow **12** upon which it is mounted are then shifted, by appropriate translational controls, relative to the sight tube **16**. In this connection, the sight tube **16** always remains fixed in space relative to the archer's eye and the target throughout the latter adjustment process.

Referring now more particularly to FIGURES 2–7 of the drawings, the structural and operational details of the archery sight **14** will become apparent. The sight tube **16** is rotatably adjustable about two mutually perpendicular axes by means of an elevation control **18**, and a train control **20**. This rotational adjustment of the sight tube **16** is made relative to an archery sight main supporting body **22** best observed in FIGURES 2 and 5. The main body **22** consists of an upper housing block **24**, a lower housing block **25** and an elongated substantially planar plate member **26** coupling the blocks **24**, **25** together and integral therewith. The plate **26** extends a considerable distance above and below the upper and lower blocks **24**, **25**, respectively.

The surface of the plate **26** opposite that in contact with the blocks **24**, **25** is provided with a central projection **28** of dovetail cross section along the entire length of the plate. This dovetail projection **28** is adapted to mate in sliding engagement with a grooved seat **30**, of complementary configuration, in an elongated bracket member **32**.

The bracket **32** is longitudinally slotted at **34** along a portion of its length to render the bracket more readily compressible in the lateral direction. In this connection, a bolt **36** is in threaded engagement with portions of the bracket **32** on opposite sides of the slot **34**, and is thus adapted to selectively compress or expand the bracket **32**. To this end, the bolt **36** is integral with a range control knob **37**, rotation of which selectively locks or releases the bracket **32** with respect to the plate **26**, for accomplishing proper translational orientation of the bracket and plate relative to each other.

The bracket **32** is also provided with a pair of holes **39**, **40** at its upper and lower remote ends so that the bracket can be mounted by any appropriate means, such as by screws, rivets or the like, upon the selected face of the bow **12** in FIGURE 1.

As best observed in FIGURE 2, at least one side face of the bracket **32** is provided with an index mark **42** perpendicular to the bracket face in sliding engagement with the plate **26** of the archery sight main body **22**. The corresponding side face of the plate **26** is provided with a calibrated scale **44** along its length, so that the relative positions of the plate and bracket **32** can always be accurately determined by reading the scale adjacent the index mark **42**. With the archery sight **14** mounted upon the bow **12** in FIGURE 1, the bow can be raised or lowered with respect to the main body **22** and sight tube **16** by merely turning the knob **37** to unlock the bracket **32** from the plate **26** and moving the bow and bracket up or down along the plate until the desired position is reached. The range control knob **37** is then rotated to lock the bracket **32** to the plate **26** and thereby positively establish the height of the bow.

For any given archer, the setting of the scale **44** for any specific range will always be the same for that range.

Hence, the archer need merely record his experimentally determined settings for the scale **44** for all of the ranges of interest, and he can thereafter use these predetermined settings of the range scale **44** without any further experimentation. In general, the latter is true for all of the scales used in conjunction with the sight tube and bow position adjustment controls of the archery sight **14**. It will be apparent, therefore, that all of the controls can be preset to approximate values for a given archer and target range, so that a novice sighting through the sight tube **16** is forced to assume proper shooting form when he grips the bow **12**. If the novice does not use proper form, he will not be able to see the target through the sight tube **16**.

The sight tube **16** is fixedly secured to a shaft **46** which is slidably received within the central bore **48** of a sleeve **50**. As best observed in FIGURES 3 and 4, the shaft **46** is provided with a flat face **52** as a bearing surface for the leading end of a bolt **54**. The opposite end of the bolt **54** is provided with a knob **55**, and the bolt **54** is in threaded engagement with the sleeve **50** for selective movement into and out of abutment with the shaft **46**. Hence, it will be apparent that the lateral position of the sight tube **16** can be adjusted merely by sliding the shaft **46** into or out of the sleeve **50**. When the sight tube **16** has been thus shifted horizontally to its desired position, the knob **55** is rotated to bring the bolt **54** into engagement with the flat face **52** of the shaft **46**. This simultaneously locks the shaft **46** and sight tube **16** against further lateral movement and also keys the shaft and sight tube against rotation within the sleeve **50**. Lateral shifting of the sight tube **16** in the aforedescribed manner is used to orient the sight tube in proper alignment with either eye of the archer and also to compensate for windage.

The sleeve **50** is integral with a coaxial shaft **57**, of reduced diameter, which extends in a sliding fit through a cylindrical body or rotor **59** having its upper and lower ends journaled for rotation in the upper and lower blocks **24**, **25**, respectively. To prevent translational displacement of the rotor **59** relative to the main body **22**, a bolt **61** extends through a clearance opening in the lower block **25** and into threaded engagement with the lower end of the rotor **59** (FIGURE 5).

The longitudinal axis of rotation of the shaft **57** extends perpendicular to the longitudinal axis of rotation of the rotor **59**. The end of the shaft **57** remote from the sleeve **50** is threaded to receive a nut **63** which holds the entire shaft and sleeve sight tube assembly in rotatable engagement with the rotor **59**. Portions of the surface of the rotor **59**, at opposite sides thereof, are removed at **65**, **66** to provide flat faces for abutment with the nut **63** and end face of the sleeve **50**.

As illustrated in FIGURES 2, 3, and 6, the sight tube **16** of the archery sight **14** is set up for an archer who holds the bow with the left hand. If the bow is subsequently used by an archer who wishes to hold the bow with the right hand, the sight tube must be transferred to the opposite side of the main body **22** as shown in FIGURE 7. This is very simply accomplished with the archery sight of the present invention by merely removing the nut **63**, pulling out the sleeve **50** and integral shaft **57** from the rotor **59**, and transferring the sleeve and shaft to the opposite side of the rotor **59**. There the shaft **57** is again passed through the rotor **59** in the opposite direction and is held therein by reinstallation of the nut **63**. In this manner, the sight tube **16** can be shifted from one side of the main body **22** to the other, to rapidly accommodate right-handed or left-handed archers, without requiring removal of the entire archery sight **14** and remounting upon the bow **12**.

Rotation of the shaft **57**, sleeve **50**, shaft **46**, and hence of the sight tube **16**, in the vertical plane to selectively elevate the sight tube is accomplished by a worm gear arrangement. As best observed in FIGURES 3 and 5, the shaft **57** is provided about its circumference with a

360° gear sector **68** which provides a worm wheel in driving engagement with a worm **70**. The worm **70** extends through the rotor **59** along an axis of rotation which is mutually perpendicular to the axes of rotation of both the shaft **57** and the rotor **59**. The worm **70** is held against translational movement relative to the rotor **59** by a nut **72** at one end and the shoulder of a knob **74** at the other end. The knob **74** provides the means for operating the sight tube elevation control **18**. It will be apparent that rotation of the knob **74** causes like rotation of the shaft **57** and sight tube **16** in the vertical plane.

Adjustment of the sight tube **16** in the train or horizontal plane is accomplished by a similar worm gear arrangement. To this end, the circumference of the rotor **59**, adjacent its lower end in the block **25**, is provided with a 360° gear sector **76** (FIGURE 5) in engagement with a worm **78**. The worm **78** extends through the lower block **25** along an axis of rotation perpendicular to the axis of rotation of the rotor **59**. As in the case of the elevation control **18**, the worm **78** carries a nut **80** and control knob **82** at opposite ends thereof to hold the worm **78** against translational displacement relative to the block **25** (FIGURES 3, 6 and 7).

As best observed in FIGURES 2 and 4, calibration means are provided for both the train and elevation controls. The calibration means for the elevation control includes an index mark **84** along the circumference of the sleeve **50** adjacent a circular scale **85** upon the surface of each of the rotor flats **65**, **66**. The purpose of providing two scales **85** is to allow sight tube elevation to be read regardless of whether the sight tube **16** is set up for a right-handed or a left-handed archer.

The calibration means for the train control comprises an index mark **87** in the upper end face of the rotor **59** adjacent a circular scale **88** upon the top face of the upper block **24**.

Preferably, the archery sight **14** is made of the lightest materials consistent with durability and quality. For example, fabrication of the archery sight **14** with nylon gears and all other parts of a light metal has been found to be a practical arrangement. However, the archery sight **14** may be fabricated of any suitable structural materials, e.g., entirely of plastic or metal without in any way departing from the spirit and scope of the invention.

The operation and adjustment of the archery sight **14**, once installed upon a bow **12** as in FIGURE 1, is next described. The archer comfortably holds the bow in the estimated proper position for shooting arrows at the specific range involved. The archer then turns the knob **55** to unlock the shaft **46** from the sleeve **50**, and shifts the sight tube **16** laterally until he can see through the sight tube with the particular eye which the archer uses for aiming. The knob **55** is then rotated to lock the sight tube **16** in this position.

The elevation control **18** is then operated by rotating the knob **74** to bring the sight tube **16** into proper vertical alignment with the target. Similarly, the train control **20** is operated via rotation of the knob **82** to bring the sight tube **16** into proper horizontal alignment with the target. The archer's eye is then accurately aligned with the target through the sight tube **16**.

To further aid in precision sighting along the longitudinal axis of the sight tube **16**, the sight tube is provided with a pair of reticles **90**, **91** at its opposite ends (FIGURE 2). The reticle **90** nearer the eye of the archer contains a cross-hair, whereas the reticle **91** further from the archer's eye contains a central dot or bead. The archer is aware that he is sighting along the central axis of the sight tube **16** when the bead of the reticle **91** appears to coincide with the cross-hair intersection at the center of the reticle **90**. The latter tube sight design has been found to greatly improve sighting concentration.

Once the sight tube **16** has been aligned in the foregoing manner, the readings from scales **85** and **88** may be taken and recorded. For any specified range, these settings will always be the same for the same archer. Hence, after accurately aligning the sight tube empirically at a given range, the archer need never resort to such experimental adjustment again, but rather can merely set the sight tube train and elevation controls to the previously predetermined settings at that specified range.

With the sight tube **16** thus aligned relative to the archer's eye and the target, the bow **12** must be moved relative to the sight tube **16** in accordance with the range to the target and prevailing windage. To adjust for range, the knob **37** is rotated to release the bracket **32** relative to the plate **26**. The bow **12** is then selectively elevated or depressed until the arrows being shot by the archer come into vertical alignment with the target. The knob **37** is then rotated to lock the bow and bracket **32** to the plate **26** of the archery sight **14**. As in the case of the sight tube adjustments, once the archer has determined the proper setting of the scale **44** for a given range, he need only return to that setting the next time he is shooting at that range.

Windage adjustments are made by again releasing the sight tube shaft **46** via the knob **55** and shifting the remaining portion of the archery sight **14** and the bow **12** laterally relative to the sight tube **16**, until the arrows shot by the archer come into horizontal alignment with the target. Hence, the only setting which may be subject to variations for successive shootings at the same range is the adjustment to compensate for windage. All other settings, i.e, sight tube train and elevation, and bow height, remain the same every time the archer shoots at the same range for which his control settings were determined.

It will be apparent from the foregoing that, while a particular form of my invention has been illustrated and described, various modifications can be made without departing from the spirit and scope of my invention. Accordingly, I do not intend that my invention be limited, except as by the appended claims.

I claim:

1. In an archery sight, the combination comprising:
- a bow mounting bracket;
- a plate member;
- means for slidably coupling said mounting bracket to said plate member for relative vertical translation therebetween;
- first calibration means for indicating the relative position of said plate member and said mounting bracket;
- means for selectively locking said mounting bracket against movement relative to said plate member;
- a main body integral with said plate member and having upper and lower blocks and a space therebetween;
- a substantially cylindrical rotor having its ends journaled within said upper and lower blocks for rotation about a vertical axis;
- first worm gear means for selectively rotating said rotor relative to said main body about said vertical axis;
- second calibration means for indicating the degree of rotation of said rotor about said vertical axis;
- a sight tube;
- means for selectively mounting said sight tube to said rotor in either of two positions 180° apart;
- second worm gear means for selectively rotating said sight tube relative to said rotor about a substantially horizontal axis;
- third calibration means for indicating the degree of rotation of said sight tube relative to said rotor about horizontal axis;
- means for horizontally translating said sight tube relative to said rotor;
- and means for selectively locking said sight tube against horizontal translation relative to said rotor.

2. A combination as set forth in claim **1**, wherein said means for slidably coupling said mounting bracket to said

plate member includes mating dovetail surfaces on said plate member and said mounting bracket.

3. A combination as set forth in claim 1, wherein said sight tube includes a cross-hair reticle at one end and a center bead reticle at the other end.

References Cited by the Examiner

UNITED STATES PATENTS

2,094,705	10/1937	Jefferson	33—56.5
2,163,503	6/1939	Tate	33—50
2,297,507	9/1942	Schormann	33—69
2,351,103	6/1944	Brown	33—46.4
3,027,648	4/1962	Crook	33—46.4
3,063,151	11/1962	Hanson	33—46.4
3,163,938	1/1965	Reynolds	33—46.4

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