July 10, 1951 J. J. BELOUNGY 2,559,927

SIGHT FOR ARCHER'S BOWS

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FIG. 1

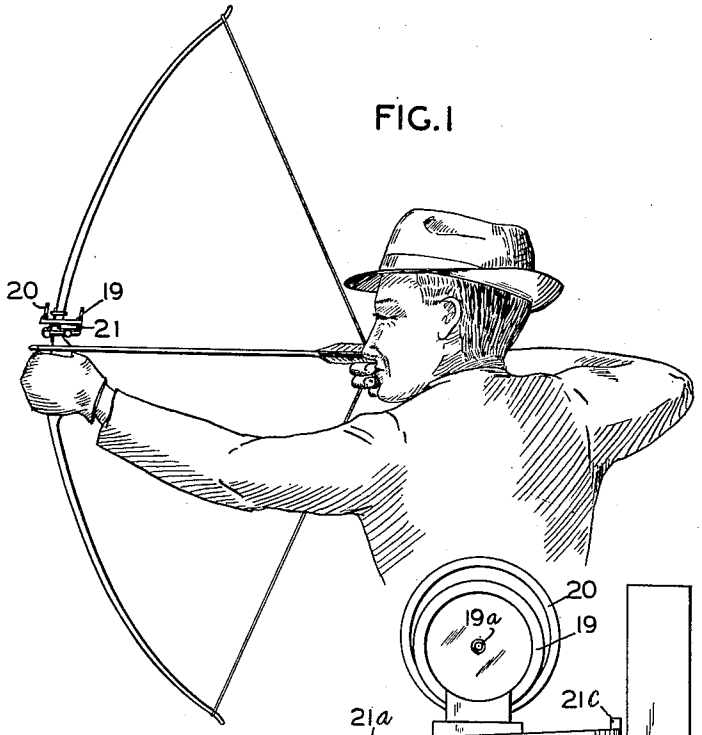

FIG. 2

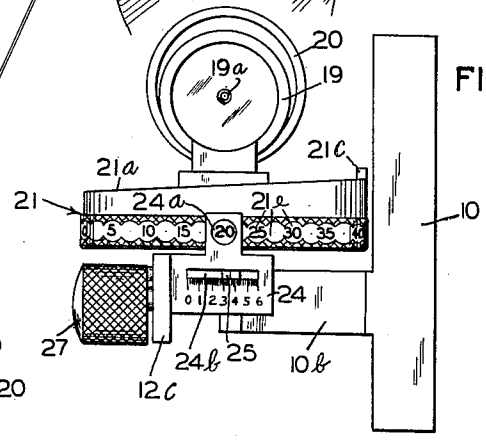

FIG. 3

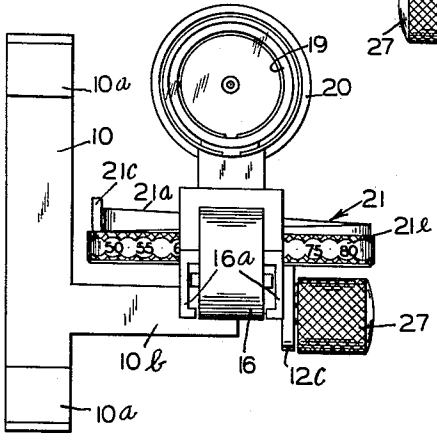

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FIG. 4

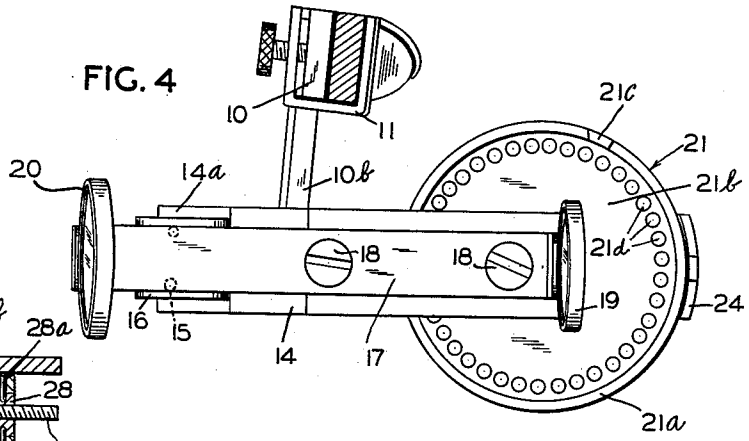


FIG. 7

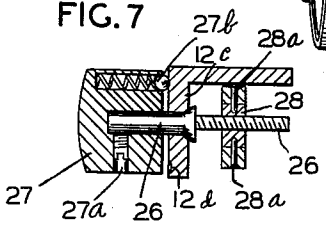


FIG. 5

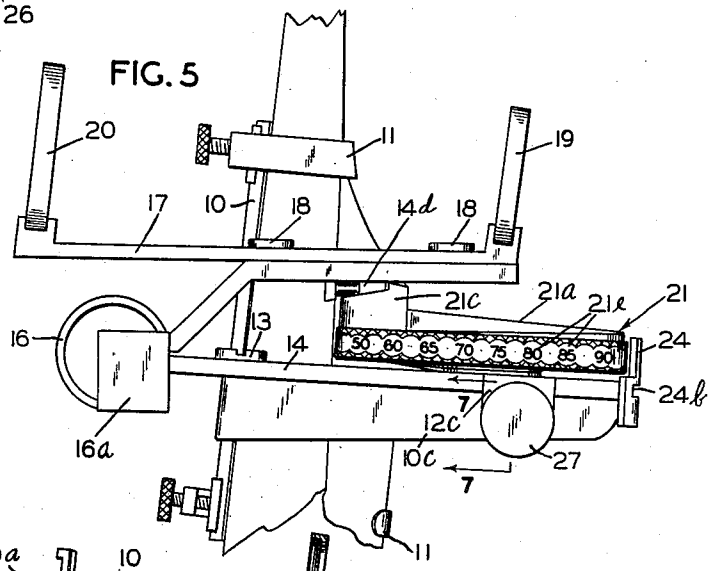
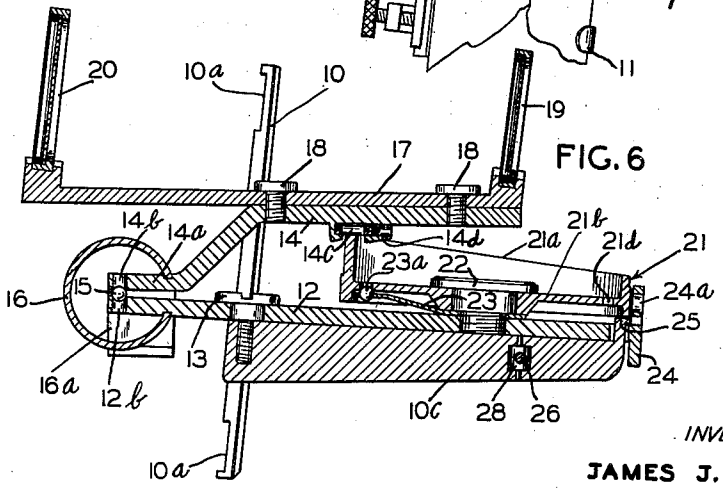


FIG. 6



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SIGHT FOR ARCHERS' BOWS

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5 Claims. (Cl. 33—46)

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This invention relates to an accurate and instantly adjustable sight for archer's bows.

Because of the many problems encountered and the numerous variable factors inherent in the act of propelling an arrow from the bow to the desired point of impact, consistent accuracy, especially at varying ranges, has been very nearly impossible of attainment. Prior art sights for bows, to applicant's knowledge, have been for the most part, crude and inaccurate and incapable of instant adjustment.

The accurate propelling of an arrow to its mark through the reactive forces released from the drawn bow string, presents a number of more serious problems than those encountered in accurately propelling rifle bullets although both are of course, governed by the same ballistic laws. The trajectory of a rifle bullet because of small missile weight and great gaseous driving force, is relatively flat compared to the extremely high trajectory of the arrow which has a much greater comparative weight with reference to the propelling energy available from a bow.

Three of the most important problems encountered in obtaining accuracy of marksmanship with bow and arrow as ordinarily used without an accurate sight, are as follows:

(1) Because of the angle at which the bow must be held when shooting at the longer ranges in order to propel the arrow at a high trajectory, the line of sight and the line of flight do not coincide within the same field of view of the archer. This is a seriously undesirable condition.

(2) In the customary method of sighting there has been only one sighting point attached or relative to the bow. The eye becomes the pivot point of the sighting arc or what would normally be considered the "rear sight." Because of this factor, it has been extremely important that the anchor point (the point on the shooter's face to which the bow string is drawn at each shot before release) be exactly the same for each shot. When it is realized that a few thousandths of an inch variation in this anchor point can cause a deviation from the desired point of impact of several feet, it can easily be seen that perfection can never be consistently realized. It is closely approached only by a few masters of form who are the champion archers. To the vast majority of archers, substantial perfection can never even be hoped for.

(3) To applicant's knowledge, in all customary sighting procedure with the bow prior to this time, there has been no way to return instantly

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and exactly to the same sight adjustment, for any given range that had been previously determined as proper for that range. Nearly all succeeding shots to some extent where more or less at variance with preceding shots.

It is an object of my invention to provide a highly and consistently accurate and instantly adjustable sight for archer's bows which successfully overcomes and solves the problems previously enumerated.

A further object is the provision of a simple, compact and highly accurate adjustable sighting mechanism for an archer's bow which through instantly controlled adjustments, provides for horizontal deflection or windage control and range or trajectory adjustment for various ranges.

Another object is the provision of an adjustable bow sight which when initially calibrated for a contemplated series of ranges and horizontal deflection to the specific requirements of the individual archer, is set for future use with an exceedingly high degree of accuracy and may be readily utilized to consistently hit the mark at the various ranges.

Still another object is the provision of a bow sight of the class described which may be readily applied as an attachment to the various types of standard archer's bows now extensively utilized.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to similar parts throughout the several views and in which:

Fig. 1 is a side elevational view showing an archer with drawn bow, utilizing my improved mechanism for sighting his target;

Fig. 2 is a rear elevation of my sighting mechanism detached, as it appears to the archer when utilized;

Fig. 3 is a front elevation of the same;

Fig. 4 is a cross section through the medial portion of an archer's bow showing my sight operatively attached thereto, mostly in plan view;

Fig. 5 is a side elevation on a larger scale showing an embodiment of the invention attached to a bow;

Fig. 6 is a vertical section taken substantially through the center longitudinal line of my sight; and

Fig. 7 is a detail section showing the micrometer screw adjustment for obtaining correction for horizontal deflection or "windage."

The form of my invention disclosed includes a generally upright mounting bracket 10 adapted

to be firmly secured at appropriate location to the medial portion of an archer's bow. Suitable means such as set screw clamps 11 may be utilized to encircle the bow and ends of bracket 10, engaging transverse channels 10a in the bracket ends and rigidly affixing the bracket to the bow. Bracket 10 has rigidly connected therewith, a supporting arm 10b which for right handed archers, projects laterally and to the left of the bow (when shooting) and which in turn, is fixed or integrally connected with an elongated support bar 10c upon which my sighting mechanism is mounted. Support bar 10c extends substantially horizontally and at approximate right angles to the center line of bracket 10 and in the general direction of and approximately parallel to the position of an arrow in the bow drawn for shooting.

I provide a sighting table mounted for adjustment on supporting bar 10b and comprising a lower section 12, as illustrated, in the form of a rigid elongated plate, pivotally connected adjacent its forward end to bar 10c as by means of a pivot headed screw 13, the lower and threaded end portion of which is engaged in a tapped socket provided at the forward end of bar 10c. The sighting table also includes an upper vertically adjustable section 14, as shown in the form of an elongated rigid plate having its forward portion offset downwardly and terminating forwardly in an attachment end 14a which is hinged to the forward end of lower section 12 in an efficient manner to provide for smooth uniform swinging adjustment of the upper section with spring pressure applied to normally urge the sections together.

The hinge and spring mechanism utilized in the form illustrated, includes for fulcruming of the upper section of the sighting table, a pair of small fulcrum balls 15 spaced apart transversely at the outer ends of sections 12 and 14 and seated in aligned, vertical, cylindrical apertures 12b and 14b to provide for freedom of angular adjustment between said sections. The balls 15 are of slightly larger diameter than the diameter of apertures 12b and 14b. A split annular spring 16 retains the upper and lower sections 12 and 14 in operative relation and urges the upper section downwardly towards lower section 12. The ends of spring 16 fit and are retained in small transverse grooves formed in the forward portions of the sections 12 and 14 adjacent the outer extremities thereof. Spring-confining cheeks in the form of vertical plates 16a are rigidly affixed to the upper sighting table section 14 and prevent displacement of spring 16 laterally of the sighting table sections.

Attached to the sighting table and more specifically, to the upper section 14 thereof, is a rigid sighting bar 17 having as shown, thickened upstanding portions at the ends thereof. The sighting bar may be secured to the main or upper portion of section 14 by any suitable means such as headed screws 18. Any suitable accurate sights may be mounted upon sighting bar 17 such as the upstanding rear sight 19 of opaque material provided with a central sighting aperture 19a and the forward or outer sight 20 having a transparent body provided with indicia such as a cross hair or center dot.

Means, preferably of micrometer screw nature, is provided for swingably adjusting the upper sighting table section 14 progressively in minute increments relative to the lower table section 12. To this end as shown, I provide a helical or screw camming element indicated as an entirety by the numeral 21 and having an annular rim provided with an upper helical or screw camming surface 21a which continues for 360 degrees, to the maximum elevation desired. The element 21 is interposed between the underside of the upper table section 14 and lower section 12 with camming edge 21a engaging a small roller 14c disposed in horizontal position longitudinally of section 14 and journalled in suitable depending bearings provided thereby. Adjustment element 21 has a disc body 21b which is centrally bossed and cylindrically apertured to pivotally engage and be journalled upon the cylindrical head of a headed pivot screw 22, the lower end of which is threaded into the lower sighting table section 12 at a point to the rear of the center of that section. The pitch of the single turn screw or helical cam 21a is sufficient to raise and lower the upper section 14 and its attached sighting bar, the requisite number of degrees of angle. Suitable stop means such as an upstanding lug 21c is provided for engaging a depending lug 14d on the upper sighting table section 14 to limit the maximum turning of screw element 21 in clockwise or counterclockwise direction whereby a maximum revolution of element 21 slightly short of 360 degrees, is possible. The upper surface of the disc body 21b is provided with a multiplicity of closely and circumferentially spaced ball-receiving apertures or sockets 21d for successively receiving the upper portion of a small retaining ball 23a fixed to the outer end of supporting spring 23. Spring 23 as shown, is provided with an apertured head or body adapted to surround the threaded post of the pivot screw 22 and the arm of the spring 23 is biased upwardly to urge the ball against the underside of disc 21b for registration selectively and progressively with the lower ends of the apertures or sockets 21d. With the mechanism just described, the elevation or angulation of the upper section 14 of the sighting table may be progressively obtained in minute increments and the sighting device remains completely stable after each adjustment, giving a very fine adjustment for trajectory or range, being adapted to change elevation at a point of impact at a range of 80 yards in increments as small as one inch per step of adjustment.

A scale is provided for indicating numerically any one of the many positions of adjustment and as shown, preferably comprises a series of circular indicia or defined spaces 21e circumferentially arranged in broached or closely spaced relation on the periphery of the rim of element 21b and selectively registrable with an indicating aperture 24a which is formed in a cooperating, fixed indicator plate 24 which is secured to the rear end of the lower section 12 of the sighting table. The fixed mounting bar 10c of the supporting bracket terminates near its top in a horizontally projecting indicator element or arrow 25 which works through a horizontal slot 24b formed in the medial portion of indicator plate 24.

To obtain adjustment and correction for horizontal deflection or windage, the lower section 12 of the sighting table which is pivoted for oscillation on a substantially vertical axis by the pivot screw 13, is provided with a micrometer screw adjustment as shown in Figs. 2 and 7. In the form shown, the lower sighting table section 12 is provided near its outer end with a depending screw-receiving flange 12c which is apertured horizontally to form a bearing for the smooth, cylin-

drical, intermediate portion of a micrometer screw 26 to the outer end of which is attached by set screw 27*a*, an adjustment knob 27. The inner end of screw 26 is threaded to threadedly engage a tapped socket member 28 which is mounted for swingable adjustment on a vertical axis by pins 28*a* in a corresponding portion forward a short distance of the outer end of the fixed mounting bar 10*c* of the bracket. The adjustment knob 27 as shown, carries a spring pressed retaining ball 27*b* which is adapted to progressively and selectively engage any one of a number of closely and circumferentially spaced, semispherical recesses 12*d* formed in the opposing and adjacent surface of the screw-receiving flange 12*c*, said recesses being concentrically arranged relative to screw 26.

With this last described mechanism, the position of the under section 12 of the sighting table may be horizontally adjusted for deflection or windage control in minute increments, remaining stable after each adjustment.

The mechanism further provides a vernier scale through the cooperation of pointer or indicator 25, which extends through the medial portion of the indicator plate 24 in cooperation with a graduated scale formed on the rear or outer face of the indicator plate 24, just below the slot 24*b*. As shown, indicia reads numerically from zero at the left to graduated numbers at the right.

Method of initial adjustment and calibration

After attaching my sighting mechanism to the bow through the medium of the mounting bracket 10, the windage adjustment effected by the positioning of the lower sighting table section 12 on the vertical axis of the pivot element 13 is centered by releasing several arrows at the target at close or point-blank range. For this initial adjustment, the elevation element or helix 21 is set a few "clicks" or points above the lowest screw pitch. The construction of the mounting bracket and sighting table is such that the sighting bar passes through positive elevation into negative elevation within one "click" or progression of the permanent point-blank range to allow for a zero calibration point along the control portion or periphery of the elevation screw 21. Each progressive point or "click" of adjustment made to center the windage point of impact should be accompanied by a corresponding change in the elevation adjustment to obtain an initial reference, elevation setting for point-blank range.

Having attained centering on the target at close range, it is then only necessary to step back or increase the range in uniform integrals (for example, merely noting which point on the elevation index scale, viewed through aperture 24*a* of the index plate), is indicated for the particular range. This point or number on the periphery of adjustment element 21 provides a permanent calibration or initial point for all future requirements and can be returned to instantly at any time thereafter.

It, of course, must be understood that the trajectory of the arrow depends on at least three variable factors, to wit, the power or "pull" of the bow, the arrow length and the arrow weight. Therefore, the elevation calibration will hold true when succeeding use of the sight continues to employ the same bow power, arrow length and arrow weight. Changing any of the three will of course require recalibration which, however, is common and accepted procedure in archery. There is also the accepted practice of marking

the bow string usually with a narrow wrapping at the point at which the arrow is always nocked and providing a definite "shelf" point above the hand on the bow, at which point, the arrow always rests. This insures that the arrow is always at right angles to the bow itself and forms the base point of all calibrating adjustments.

The horizontal or windage control involving the vertical pivoting of the lower section 12 of the sighting table with relation of the adjustment screw 26, fixed supporting bar 10*c* and flange 24*c*, can be used as a true windage adjustment to compensate for wind deflection while on the target range, but more commonly, is used to compensate for conditions of attachment of the sight to the bow in relation to any particular archer's equipment or manner of use. Once initially adjusted, it should require but little further attention except when additional adjustment is needed for windage effect.

Because of the very small increments of change possible with the horizontal adjustment control, my mechanism is capable of varying the point of impact of the arrow in steps of less than a minute of angle providing extremely accurate control. During extensive trials of this sighting device under actual operating conditions, it has been possible at a twenty yard range, free-stance shooting, to "walk" a group of arrows across the face of a target spacing them at regular intervals of one half inch per step or "click" of adjustment. The elevation adjustment as well as horizontal deflection adjustment may be instantly made with the fingers of the archer's hand grasping the bow and determined conveniently by observation of the archer on the scales associated with the indicator plate 24 at the rear of the sighting table. Extensive use has shown my sight highly accurate for elevation and horizontal deflection adjustments. The unique hinging of the sighting table at one end assures both sections 12 and 14 of the table to be always in alignment without possibility of side play.

Sighting bar 17, it will be noted, is quickly removable from the upper section 14 of the table, thereby providing for a wide choice of specific sights to suit individual preferences.

My improved sighting mechanism, in addition to making possible very excellent scores and accuracy on the part of the average archer in target shooting, provides an important advantage to the field archer or hunter archer where shots are called for at constantly varying ranges. It is comparatively simple with little experience, to estimate ranges within close tolerances at the distance at which field shooting is effective. The elevation adjustment can be quickly and definitely moved to the estimated range position even while the bow is in the ready or partially drawn position. When it is considered that under former shooting conditions without the use of this sighting device, the archer was required to first estimate the range and then mentally picture and select an elevation angle of trajectory at which he believed the arrow should be projected to impact the target at the desired point, the great advantages of my sighting mechanism can be readily appreciated. Added to this former difficulty was the further handicap that the decision in field archery had to be made instantly.

Keeping in mind that with the individual archer in the use of a bow, the bow force is the same in the shooting of identical arrows for the various ranges since the arrow is set in the same place with reference to the bow and bow string

and always drawn until the arrow head touches the archer's hand or a portion of the bow; it makes no difference, for accuracy with my sighting device, whether the anchor point of the individual archer is varied during succeeding shots. In other words, the arrow at the time it is released, regardless of the point on the shooter's face (anchor point) to which the bow string is drawn, has for a certain type of arrow, always a predetermined relation with the bow and string. With my sighting mechanism, the arrow does not figure in the sighting but the archer sights through the two spaced elements or telescope upon the sighting bar and accuracy is obtained regardless of whether the anchor point is the nose or a part of the cheek or chin of the archer.

It will of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of my invention.

What I claim is:

1. An adjustable sight for archer's bows comprising a supporting bracket, adapted to be attached to the medial portion of a bow, a sighting table having a section adapted to be pivotally connected to said bracket for adjustment oscillation on a substantially vertical axis and having a second section pivotally connected with said first section for swinging adjustment relative thereto on a substantially horizontal axis, sighting means mounted on the second section of said sighting table and extending transversely of the bow, means for horizontally adjusting the first section of said sighting table relatively to said bracket and progressively applied means for adjusting the angular relation of said second section of said sighting table relative to said first section.

2. An adjustable sight for archer's bows comprising a supporting bracket, adapted to be attached to the medial portion of a bow, a sighting table having a section adapted to be pivotally connected to said bracket for adjustment oscillation on a substantially vertical axis and having a second section pivotally connected with said first section for swinging adjustment relative thereto on a substantially horizontal axis, sighting means mounted on the second section of said sighting table and extending transversely of the bow, means for horizontally adjusting the first section of said sighting table relatively to said bracket and a rotatable adjustment element interposed between said first and second sections for progressively adjusting the angular relation of said second section relative to said first section.

3. An adjustable sight for an archer's bow, having in combination a supporting bracket adapted to be attached to the medial portion of bow, a sighting table comprising a lower section pivotally connected with said bracket for oscillatory adjustment on a substantially vertical axis and an upper section swingably connected with said lower section for angular adjustment relative thereto on a substantially horizontal axis, screw adjustment means interposed between said lower

section and said bracket, rotary adjustment means interposed between said upper section and said lower section and indicating means for designating the adjusted position of said lower section relative to said bracket and the adjusted position of said upper section relative to said lower section.

4. An adjustable sight for archer's bows comprising a supporting bracket, adapted to be attached to the medial portion of a bow, a sighting table having a section adapted to be pivotally connected to said bracket for adjustment oscillation on a substantially vertical axis and having a second section pivotally connected with said first section for swinging adjustment relative thereto on a substantially horizontal axis, sighting means mounted on the second section of said sighting table and extending transversely of the bow, micrometer screw adjustment means for angularly adjusting the first section of said sighting table on said vertical axis and a rotatable adjustment element interposed between said first and second sections for progressively adjusting the angular relation of said sections and scales associated with said adjustment element and said adjustment means for indicating by graduations various predetermined adjustment positions.

5. An adjustable sight for an archer's bow comprising a supporting mounting adapted for attachment to the medial portion of a bow, a sighting table having a section pivotally connected to said mounting for oscillatory adjustment on a substantially vertical axis and having a second section pivtally connected with said first section for swinging adjustment relative thereto on a substantially horizontal axis extending substantially normal to a plane defined by the bow and its bow string, sighting means mounted on said second section of said sighting table and extending transversely of the bow, adjustment means for angularly adjusting the first section of said sighting table on said vertical axis and screw adjustment means interposed between said first and second sections for progressively adjusting the angular relation of said sections.

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