

Jan. 31, 1950

T. L. FORD

2,496,045

TELESCOPIC SIGHT

Filed Dec. 6, 1946

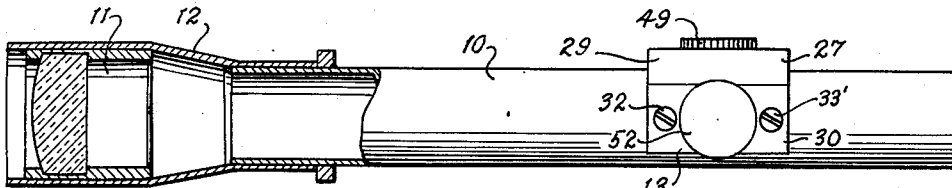


Fig. 1

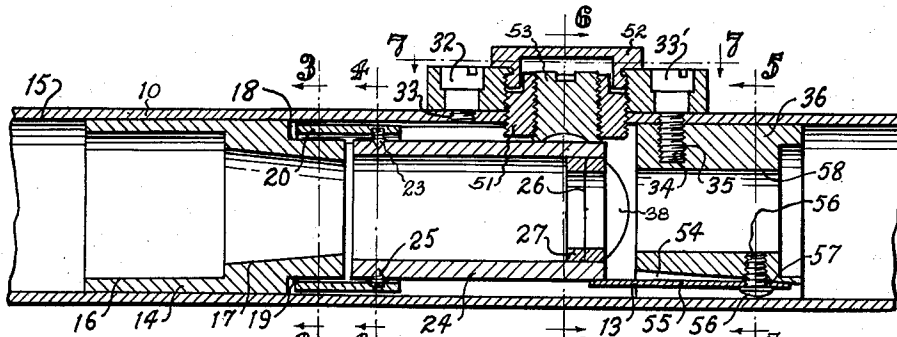


Fig. 2

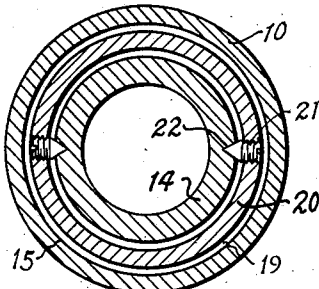


Fig. 3

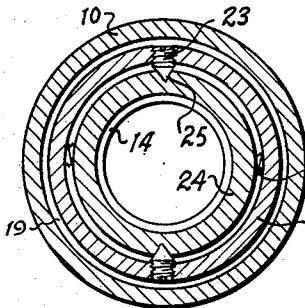


Fig. 4

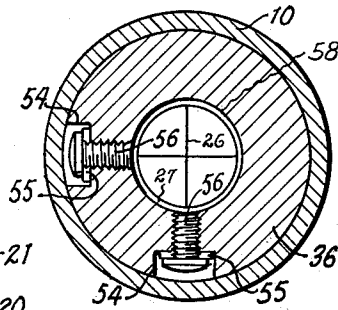


Fig. 5

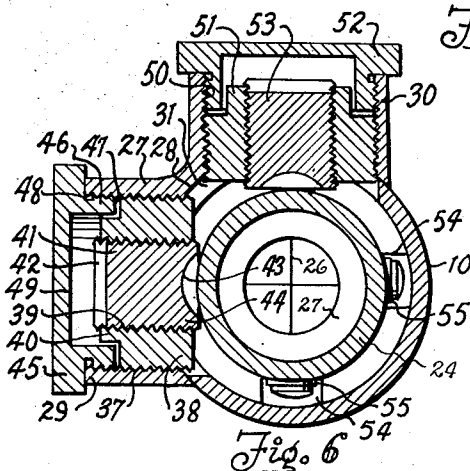


Fig. 6

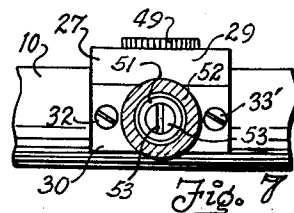


Fig. 7

Thomas L. Ford
INVENTOR.

BY *Shley & Shley*

ATTORNEYS

UNITED STATES PATENT OFFICE

2,496,045

TELESCOPIC SIGHT

Thomas L. Ford, Tyler, Tex.

Application December 6, 1946, Serial No. 714,411

6 Claims. (Cl. 33—50)

1

This invention relates to new and useful improvements in telescopic sights, and especially those sights utilized on rifles and similar small-arms.

It is one object of this invention to provide an improved telescopic sight which is readily adjustable for elevation and windage; and wherein means are provided for protecting the adjusting means against accidental or inadvertent displacement of the sight after adjustment.

Another object of the invention is to provide an improved telescopic sight having the reticule mounted on gimbals for free and unimpeded adjustment in two perpendicular planes, normally vertical and horizontal.

Yet another object of the invention is to provide an improved telescopic sight in which the reticule is pivoted in two planes at a point remote therefrom whereby the effect of parallax is minimized.

A still further object of the invention is to provide an improved telescopic sight which is rugged and durable in construction, yet which is economical to manufacture; and which functions with a high degree of accuracy with a substantial minimum of delicate and fine-machining operations being required due to the arrangement and relation of the various parts and elements.

Another object of the invention is to provide an improved telescopic sight wherein the reticule is carried by a support pivotally mounted for universal movement, the pivot point for vertical or elevational movement being remotest from the reticule so as further to minimize parallax in elevation adjustments.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specifications and by reference to the accompanying drawing, wherein an example of the invention is shown, and wherein:

Fig. 1 is a plan view, partially broken away, of a telescopic sight constructed in accordance with this invention,

Fig. 2 is an enlarged, longitudinal, vertical sectional view of the reticule portion of the sight,

Fig. 3 is an enlarged, vertical, cross-sectional view taken on the line 3—3 of Fig. 2,

Fig. 4 is an enlarged, vertical, cross-sectional view taken on the line 4—4 of Fig. 2,

Fig. 5 is an enlarged, vertical, cross-sectional view taken on the line 5—5 of Fig. 2,

2

Fig. 6 is an enlarged, vertical, cross-sectional view taken on the line 6—6 of Fig. 2, and

Fig. 7 is a reduced, horizontal, longitudinal, sectional view taken on the line 7—7 of Fig. 2.

In the drawing, the numeral 10 designates an elongate tubular telescope barrel or housing which may be of any suitable or desirable type such as are customarily utilized for telescopic sights. An objective lens system 11 is provided in one end 12 of the barrel, said end portion 12 being enlarged in diameter so as to accommodate an objective lens of larger diameter. This invention is not primarily concerned with the telescope barrel, the lens system, or the erecting system (not shown), and any suitable or desirable arrangement or design may be utilized for any or all of these elements. The examples of the invention shown in the drawing are illustrative only and may be varied at will as desired.

The invention proper is concerned with the reticule mounting and adjusting means, along with the structure of the reticule portion of the sight.

The barrel or housing 10 is provided at its rearward medial portion with a reticule unit designated generally by the numeral 13. The unit includes a sleeve or supporting element 14 having a press fit, or otherwise being suitably secured, within the bore 15 of said housing. The sleeve is provided with an axial bore 16 extending substantially throughout its forward half, while a reduced, rearwardly tapered bore 17 extends rearwardly from the bore 16 to the rear end of the sleeve. The outside diameter of the sleeve is reduced at 18 at the rearward portion of the sleeve so as to provide an annular space 19 between the wall of the bore 15 and the extreme rearward portion of the sleeve.

A suitable, annular ring 20 carries internal, diametrically-opposed, radial pivot screws or pins 21 which engage within conical depressions 22 in the outer surface of the reduced portion of the sleeve 14, whereby the forward end of the ring is positioned within the annular space 19. The pivot screws 21 are disposed in a horizontal plane so as to allow the ring to pivot in a vertical arc, and sufficient clearance is provided between the ring and the outer wall of the reduced portion of the sleeve 14, as well as the inner wall or bore 15 of the housing 10, to allow the ring to pivot in a limited vertical arc.

The width of the ring 20 is such that substantially one-half of said ring projects rearwardly beyond the rearward end of the sleeve 14. A pair of diametrically-opposed pivot screws or

3

pins 23, similar to the pins 21, project radially inwardly of the ring near its rearward edge, the pins or screws 23 being disposed in a vertical plane. A tubular reticule support or cylinder 24 is pivotally mounted upon the ring 20 by means of conical depressions 25 in the forward outer surface of the support, said depressions being adapted to receive the inner ends of the pins or screws 23.

The reticule support is in the form of an elongate tube or cylinder having each end open, and being of relatively thin-wall construction. The inside diameter of the support is slightly greater than the diameter of the tapered bore 17 at its rearward end. A reticule 26 is carried by an annular reticule ring 27 which has a press fit in the extreme rearward end of the support 24. The reticule is thus positioned remotely from the pivot screws or pins 21 and 23 so that, as the reticule support is swung vertically and horizontally to adjust the sight for elevation and windage respectively, the reticule moves a minimum distance longitudinally of the barrel 10, said movement being the horizontal component of the swinging movement of the reticule support, so that the reticule proper remains substantially at or near the focus point of the lens system being utilized. Thus, as the sight is adjusted for windage and elevation, the reticule remains in relatively sharp focus against the field of sight of the lens system whereby a sharp and distinct reticule image is provided at substantially all times. It is to be noted, that the reticule support 24 pivots about the pins 21 for elevation adjustments. Since these latter adjustments are the most often used, the pins 21 are located remotest from the reticule 26 so that a maximum swinging radius is provided for this particular adjustment, thereby further minimizing loss of focus of the reticule during or as a result of adjustment. Since the radii of swinging, either vertically or horizontally, are both relatively large, the effect of parallax is also minimized. Due to this long radius of swinging, the reticule 26 remains at all times in a substantially vertical plane so that all portions of the reticule are in substantially uniform focus.

The reticule adjusting mechanism is carried by a suitable block 27 mounted upon the barrel or housing of the sight. The underside 28 of the block is arcuate in cross-section so as to conform to the outside contour of the barrel 10, the block comprising a pair of rectangular bosses 29 and 30 which project horizontally and vertically, respectively, of the telescope barrel. The bosses are arranged so as to have their longitudinal axes extending parallel to the longitudinal axis of the telescope barrel, as is shown in Figs. 1 and 7. The barrel is formed with a suitable opening 31 underlying the central portion of the block 27 to permit the adjusting screws to be described hereinafter, to project inwardly to the interior of said barrel. A modified cap screw 32 extends horizontally through the forward portion of the boss 29 and engages within a screw-threaded opening 33 formed in the wall of the barrel 10, to anchor the block 27 in place. A similar screw 33', having a somewhat longer screw-threaded portion 34, extends horizontally through the rearward portion of the boss 29 as well as the wall of the barrel 10. The lower screw-threaded portion 34 of the screw 33' engages within a screw-threaded opening 35 formed in a tubular spring collar 36 disposed within the bore 15 of the telescope barrel. The collar 36 is positioned rearwardly of the rearward end of

4

the reticule support 24 so as to provide ample clearance for the swinging of said support. The screw-threaded opening 35 is formed in the upper and forward portion of the collar so as to place the major portion of the latter rearwardly of the screw 33' and the block 27. The screw 33' thus serves to secure both the block 27 and the collar 36 in position by clamping the two elements together with the wall of the barrel 10 therebetween. A pair of screws 32' and 33' (not shown) similar to the screws 32 and 33, also project horizontally through the boss 30 to anchor the block 27 and collar 36 more securely in position with respect to the telescope barrel. If desired, the block may be brazed to the telescope barrel as well as being bolted thereto, or the brazing or welding may replace the securing action of one or several of the mounting bolts or screws just described.

The boss 29 is formed with a horizontal screw-threaded bore 37, said bore being located centrally of the boss and having a diameter somewhat less than the diameter of the bore 15 of the barrel 10. A screw-threaded bushing 38 having an axial screw-threaded bore 39, engages within the bore 37 and extends from a point slightly within the inner end thereof to a point spaced beyond the outer end thereof. The bushing 38 is formed with a short upstanding annular collar 40 surrounding the outer portion of the bore 39. A screw-threaded adjusting screw 41 engages within the bore 39 of the bushing, and is slightly greater in length than said bushing, including the collar 40, so as to project beyond and within the bushing. The screw 41 carries a relatively wide, diametric groove 42 in its outer end, and has a concentric concave recess 43 in its inner end, the diameter of the recess 43 being less than the diameter of the screw 41 so as to form a marginal bearing surface 44 on the inner extremity of said screw. This bearing surface is adapted to engage the side of the reticule support 24 so that the support may be swung in a horizontal arc by horizontal adjustment of said screw. The concave recess 43 causes the inner end of the screw to bear against the reticule support at two diametrically-opposed points, as shown in Fig. 2, thereby serving to steady the reticule support and provide a more secure and trouble free adjustment for said support.

The outer end of the bore 37 is closed by a suitable cap 45. The cap is generally disk shaped and has a diameter slightly greater than the width of the boss 29, whereby the cap projects slightly beyond said boss in a vertical direction on either side thereof, as is shown in Fig. 6. This allows the cap to be gripped and rotated for disengaging or removal. If desired, the periphery of the cap may be milled or knurled to facilitate its gripping and the rotation thereof.

The cap is provided with a depending annular flange 46, spaced radially inwardly from the peripheral edges thereof, said flange being formed with external screw-threads 47 for engaging within the screw-threaded bore 37. An external clearance groove 48 may be provided at the base of the flange 46 to permit the cap to seat snugly on the outer surface of the boss 29. A cylindrical recess 49 is formed concentrically of the cap and on the underside thereof, the wall of the recess coinciding with the inner wall of the depending flange 46. This recess receives the collar 40 carried by the bushing 38 as well as the outer end of the adjusting screw 41.

When the cap 45 is tightened into closing po-

2,496,045

5

sition, it is to be noted that it does not contact either the bushing or the adjusting screw. The adjusting means is thus not effected by the cap, but is completely enclosed and protected by the latter. When it is desired to rotate the adjusting screw to alter the position of the reticule support, the cap may be removed by rotation, and one peripheral edge thereof engaged in the groove 42 for rotating said screw. Thus, the cap may be utilized as a screw driver for adjusting the position of the screw 41 and thereby the position of the reticule support 24 and the reticule 26. In this manner, the sight may be adjusted as desired without the utilization of any special or particular tool, and means is provided for protecting the adjusting screw against inadvertent displacement, as well as protecting the entire adjusting mechanism from dirt and water and other harmful elements.

The vertical or upstanding boss 30 is formed with a vertical screw-threaded opening 50 similar to the opening 37. The bore 50 receives a bushing 51 and a cap 52, similar in all respects to the bushing 47 and the cap 45, and a vertical adjusting screw 53 is carried within the bushing 51, the screw 53 being substantially identical to the screw 41, and being adapted to be adjusted by means of the cap 52. The lower end of the screw 53 engages the upper side of the reticule support 24 for swinging the support in a vertical arc about the pivot screws or pins 21. The two adjusting mechanisms are substantially identical throughout and function in the same manner with the same advantages and results described hereinbefore. The screw 53, of course, adjusts the reticule 26 vertically so as to permit vertical adjustment of the sighting point for the fire arm on which the sight is mounted, to compensate for range or distance. The lateral adjustment provides horizontal as well as windage adjustment.

Since the reticule support 24 is universally mounted upon the pins 21 and 25, it is free to be moved into any position or point within a circle defined by the structural dimensions of the sight. By proper positioning of the adjusting screws 41 and 53, it is obviously possible to so position the reticule in any desired point since the screws have only sliding engagement with said support, whereby it is possible to adjust one screw and move the reticule support in one plane without changing the position of the other screw.

The collar 36 is provided to carry resilient elements or springs for opposing the movement of the reticule support 24 caused by the adjustment of the screws 41 and 53, and for holding the support in snug engagement with the inner ends of said screws. The collar is formed with a pair of longitudinal grooves 54, said grooves being situated on sides of the collar diametrically-opposed to those points on the outer surface of the collar which are in longitudinal alinement with the centers of the screws 41 and 53. The grooves 54 are greater in depth at their forward ends than at their rearward ends so as to provide for the deflection of springs 55 which are mounted therein. The springs 55 are of the leaf type, and are secured to the collar 36 by means of screws 56 extending through openings 57 provided near the rearward end of said springs. The forward ends of the springs project beyond the collar 36 and engage the rearward end of the reticule support 24, thus urging the support upwardly and to the left, as viewed in Fig. 6, against the adjusting screws 41 and 53. Obviously, the

6

springs remain in engagement with the reticule support at all times to oppose the movement of the adjusting screws and to hold the reticule support in snug engagement therewith. The collar 36 is provided with an axial bore 58 through which the image of the field of sight of the telescope along with the image of the reticule 26 may be projected to the eyepiece (not shown).

The simple and rugged structure of this telescopic sight is to be stressed. It will be noted, that substantially all delicate and close-tolerance machining has been eliminated from the adjusting system with the exception of the cutting of screw-threads. Since the collar 36 has a sliding fit within the telescope barrel and is anchored in position by means of the pair of screws, it need not have an extremely close fit. The portion of the springs 55 which overlap the rearward end of the reticule support 24 is not critical. Also, since the sleeve 14 has a press fit within the barrel 10, no accurate positioning of screw holes for securing the sleeve is required, and the sleeve may be positioned as accurately as desired to locate the reticule 26 at the proper focus point of the lens system. Slight inaccuracies of the locations of the adjusting screws 41 and 53 with respect to the reticule support will have substantially no effect. In this manner, a telescopic sight is provided which may be manufactured under less severe machining tolerances than is usual in such instruments, and yet which is extremely accurate in operation while maintaining its rugged and durable construction.

The operation of the device is believed obvious. The reticule 26 is adjusted vertically and horizontally to provide the proper elevation and windage for the range at which the fire arm with which the sight is to be utilized, is to be fired.

The foregoing description of the invention is explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim and desire to secure by Letters Patent is:

1. A telescopic sight including, a barrel, a lens system in the barrel, a supporting element carried in the barrel, a tubular supporting section on the supporting element, a ring receiving the supporting section and pivotally mounted thereon, a tubular reticule support received within and pivotally mounted within the ring, and a reticule carried by the support.

2. A telescopic sight including, a barrel, a lens system in the barrel, a tubular supporting element secured within the barrel and having one end reduced to form a tubular supporting section, a tubular reticule support within the barrel substantially alined with the supporting section and having one end adjacent thereto, a ring encircling the adjacent ends of the support and the supporting section, a pair of pivots securing the ring upon the supporting section having their axis transverse to the longitudinal axis of the barrel, a pair of pivots securing the reticule support within the ring having their axis transverse to the barrel axis and the axis of the first-named pivots, and a reticule carried by the reticule support.

3. A telescopic sight including, a barrel, a lens system in the barrel, a tubular supporting element secured within the barrel and having its outside diameter reduced at one end to provide an annulus between said reduced end and the inner wall of the barrel, a ring having one end

7

received in the annulus and pivotally connected to the supporting element upon an axis transverse to the longitudinal axis of the barrel, a tubular reticule support within the barrel having one end received within the ring and pivotally connected thereto upon an axis transverse to the longitudinal axis of the barrel, and a reticule carried by the opposite end of the reticule support, the supporting element and the ring and the reticule support being substantially axially aligned whereby the line of vision through the sight extends through the interior of said elements.

4. A telescopic sight including, a barrel, a lens system in the barrel, a tubular supporting element secured within the barrel and having its outside diameter reduced at one end to provide an annulus between said reduced end and the inner wall of the barrel, a ring having one end received in the annulus and pivotally connected to the supporting element upon an axis transverse to the longitudinal axis of the barrel, a tubular reticule support within the barrel having one end received within the ring and pivotally connected thereto upon an axis transverse to the longitudinal axis of the barrel, and substantially perpendicular to the pivoting axis of the ring upon the supporting element, and a reticule carried by the opposite end of the reticule support, the supporting element and the ring and the reticule support being substantially axially aligned whereby the line of vision through the sight extends through the interior of said elements.

5. A telescopic sight as set forth in claim 3, adjusting screws carried by the barrel bearing against the reticule support, and resilient means urging the support into engagement with said screws.

6. A telescopic sight including, a barrel, a lens system in the barrel, a tubular supporting ele-

8

ment secured within the barrel and having its outside diameter reduced at one end to provide an annulus between said reduced end and the inner wall of the barrel, a ring having one end received in the annulus, a pair of pivots carried by the ring in an axis transverse to the longitudinal axis of the barrel, the projecting ends of the pivots engaging the reduced diameter end of the supporting element, a tubular reticule support having one end received within the ring, a second pair of pivots on the ring substantially at right angles to the first-named pair and engaging one end of the reticule support, and a reticule carried by the opposite end of the reticule support.

THOMAS L. FORD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
848,757	Lomb et al.	Apr. 2, 1907
1,246,960	Logan	Nov. 20, 1917
1,704,059	Packard, Jr.	Mar. 5, 1929
2,078,858	Kuhn	Apr. 27, 1937
2,094,623	Stokey	Oct. 5, 1937
2,150,629	Mossberg	Mar. 14, 1939
2,180,184	Weaver	Nov. 14, 1939
2,183,530	Alkan	Dec. 19, 1939
2,189,766	Unertl	Feb. 13, 1940
2,452,592	Myer	Nov. 2, 1948

FOREIGN PATENTS

Number	Country	Date
104,921	Great Britain	1917
547,120	Great Britain	1942
814,937	France	1936