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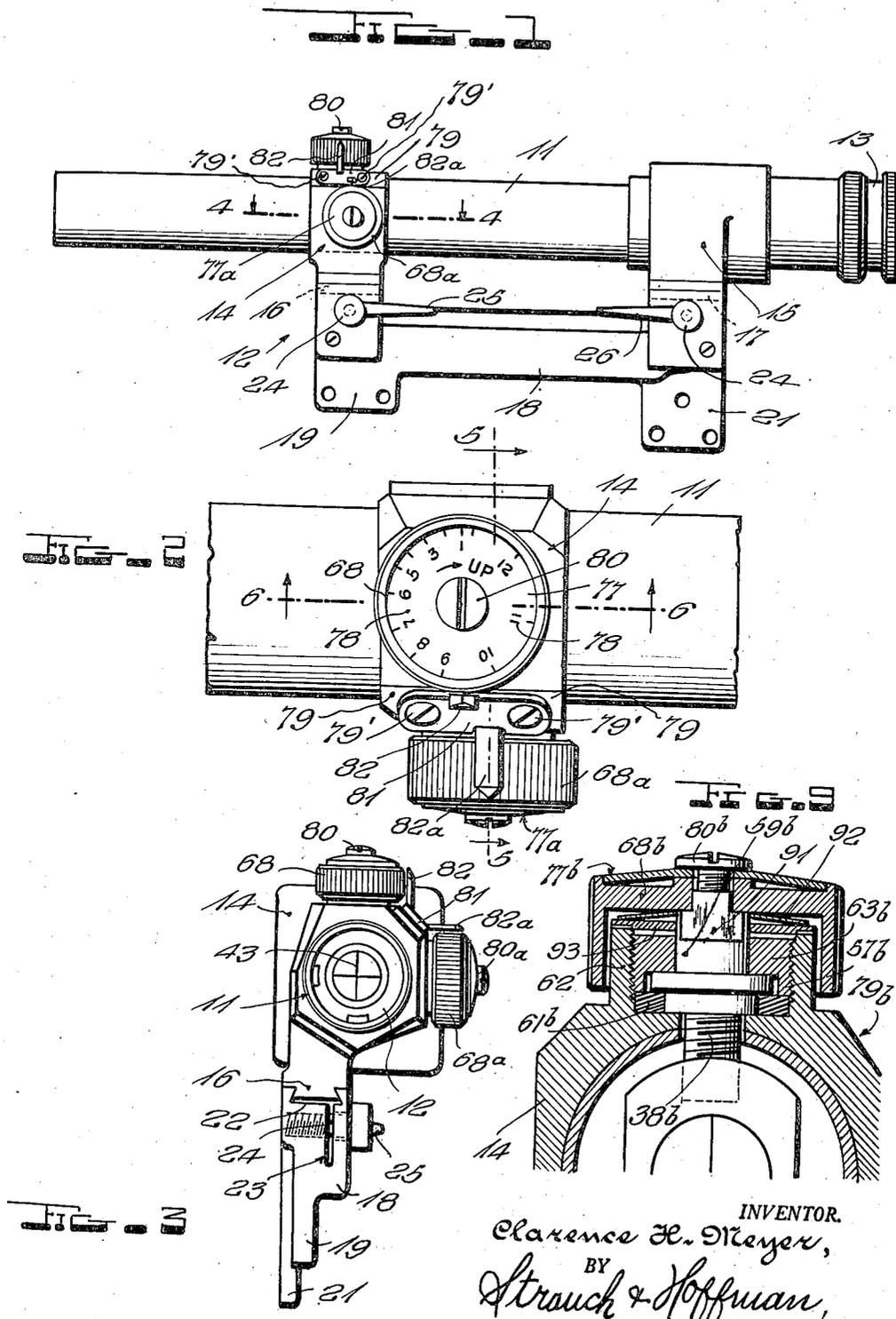
C. H. MEYER

2,452,592

TELESCOPIC SIGHT

Filed Feb. 3, 1944

3 Sheets-Sheet 1



INVENTOR.
Clarence H. Meyer,
BY
Strauch & Hoffman,
ATTORNEYS

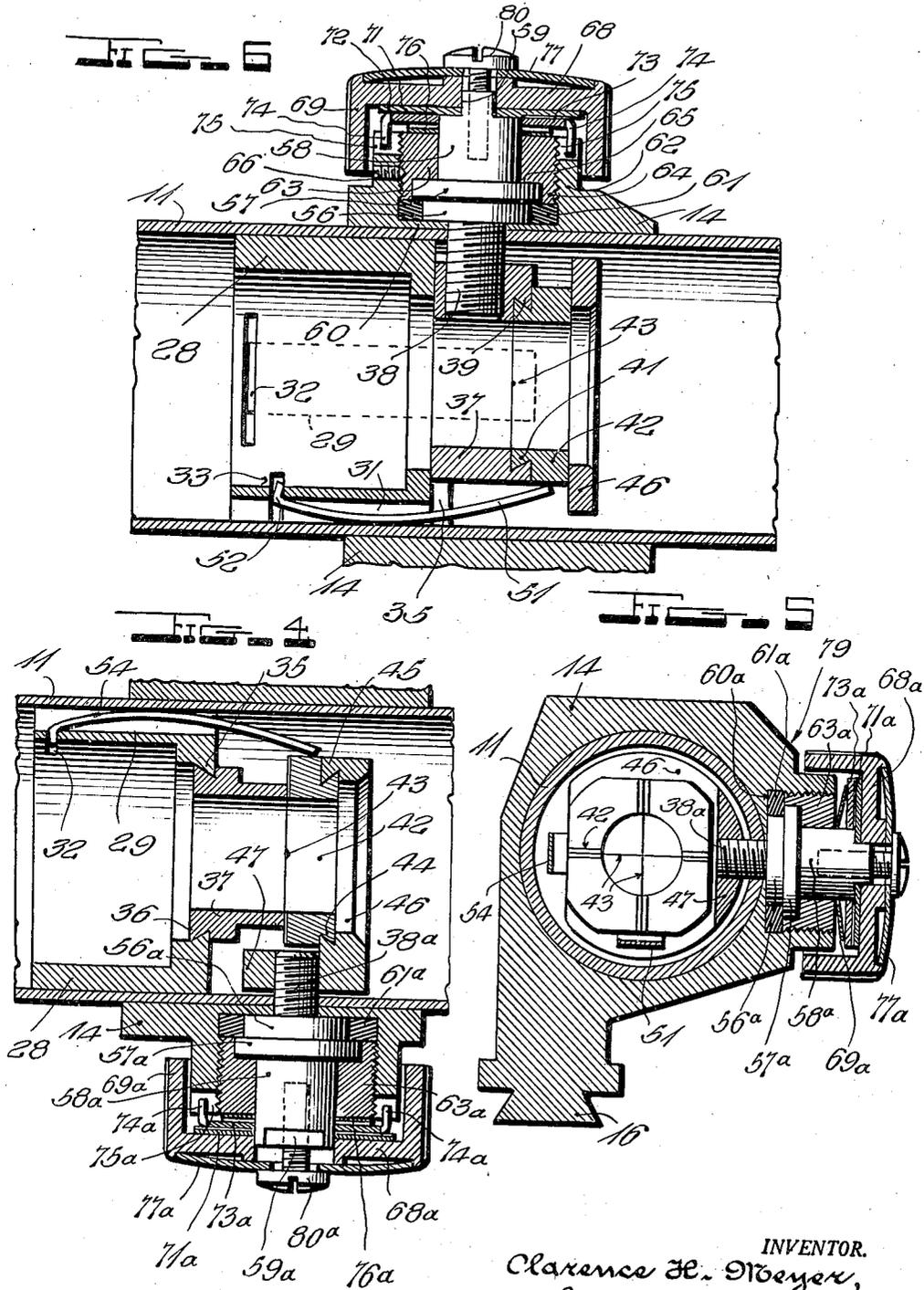
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ATTORNEYS

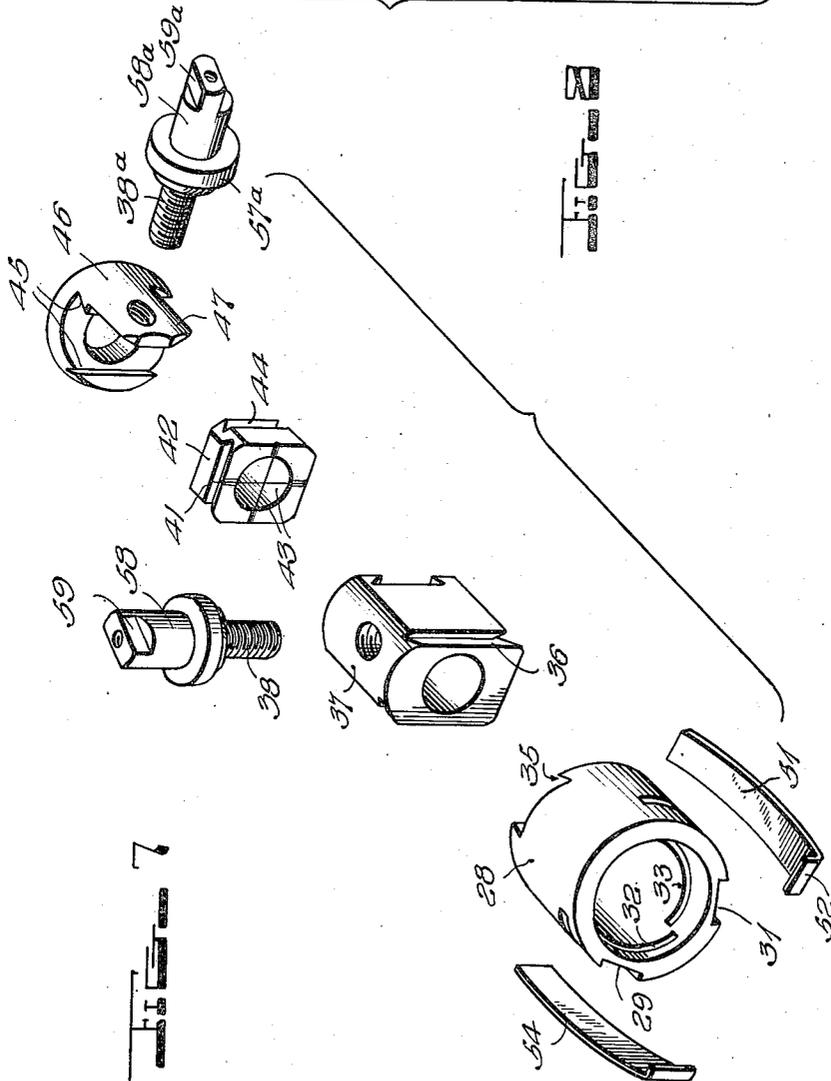
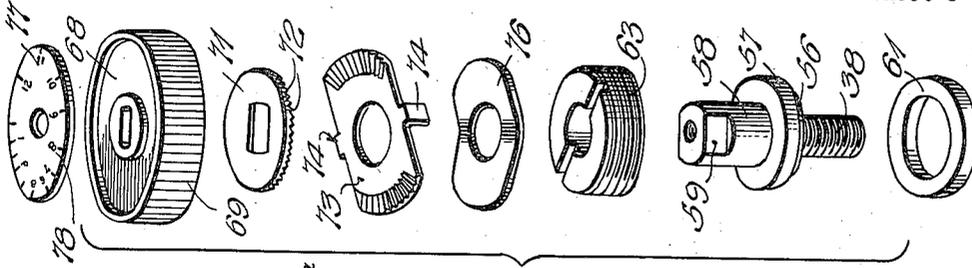
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ATTORNEYS

UNITED STATES PATENT OFFICE

2,452,592

TELESCOPIC SIGHT

Clarence H. Meyer, Ann Arbor, Mich., assignor to Argus, Incorporated, a corporation of Michigan

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12 Claims. (Cl. 33—50)

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The present invention relates to optical apparatus and more particularly to telescopes and other instruments embodying reticules which are adjustable both vertically and horizontally in a plane transverse to the line of sight, the two adjustments being carried out independently of the other, but it is not limited to such use.

Although reticule adjusting mechanisms of this general character have been heretofore proposed, and several of them have gone into use in gun scopes, they are open to several disadvantages. In some of the prior art scopes, the adjusting screws are threaded directly into the reticule holder, which makes it necessary to provide enlarged openings in the telescope barrel or other casing to provide for substantial transverse motion of one screw when the other screw is being adjusted, which makes it impossible to seal the openings, while in other devices the adjusting screws are mounted for rotation about fixed axes at all times but the screws merely slidingly engage the reticule holder or other assembly, which is backed up by springs aligned with the respective screws, with the result that the reticule is not given adequate support to stand the recoil of firing nor do they provide the accuracy of adjustment desired, especially in gun scopes and the like in which a relatively small movement of the reticule is reflected as a relatively serious change in the angle of sight. Other reticule adjusting mechanisms of the prior art are of such complicated costly construction as to render them impractical for commercial adoption.

It, accordingly, is the major object of this invention to provide a novel adjusting mechanism for the reticule or other sighting device of telescopes and the like, which positively guides the reticule for movement transversely of the sighting axis both vertically and horizontally, and is associated with guiding devices which perform both the guiding function and the additional function of adjusting the sighting device along its two paths of guided movements.

Another important object is to provide an adjusting mechanism for a reticule or other sighting device in which the reticule is disposed between, and is slidably connected to, a pair of guiding devices, and the latter are mounted for movement along paths which are mutually perpendicular to each other and to their slidable connection with the reticule, obviating the necessity of engaging the reticule holder with the adjusting screws.

Another object is to provide a novel reticule adjusting mechanism embodying a reticule holder

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disposed between two guide members and a pair of screws for positively adjusting the guide members in both directions of movement and spring means for taking up any backlash that may be present in the screws and the sliding connection between the reticule holder and its guide members.

A further object is to provide novel indent or ratchet assemblies for the adjusting screws of a reticule adjusting mechanism.

Another object is to provide a novel sealing assembly for the screws of a reticule adjusting mechanism, embodying means for establishing and maintaining a predetermined sealing action between the parts and also setting up a yielding resistance of predetermined magnitude to rotation of the adjusting screws, to prevent the inadvertent rotation thereof.

A further object is to provide an adjusting mechanism for reticules or the like embodying a collar structure which is operable to support the reticule adjusting screws and which also may be used as a mount for one end of the telescope or other apparatus in which the mechanism is installed.

Further objects will become apparent as the specification proceeds in conjunction with the annexed drawings, and from the appended claims.

In the drawings:

Figure 1 is a side elevational view of a scope embodying the reticule adjusting mechanism of the present invention;

Figure 2 is a top plan view, showing the forward end of the scope shown in Figure 1;

Figure 3 is a front elevational view of the scope shown in Figure 1;

Figure 4 is a fragmental horizontal sectional view on an enlarged scale, taken substantially on the line 4—4 of Figure 1, looking in the direction of the arrows;

Figure 5 is a transverse vertical sectional view on an enlarged scale, taken substantially on the line 5—5 of Figure 2;

Figure 6 is a vertical sectional view on an enlarged scale, taken substantially on the line 6—6 of Figure 2;

Figure 7 is a disassembled or exploded view of the parts making up the reticule guiding and adjusting assembly;

Figure 8 is a perspective exploded view showing the parts of the elevational adjusting screw assembly, with the parts in disassembled condition; and,

Figure 9 is a fragmental sectional view showing

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an alternative form of adjusting screw ratchet assembly also forming part of the invention.

With continued reference to the drawings, in which like reference characters have been employed to designate similar parts throughout the several views, the invention has been illustrated as applied to a gun scope, but it is to be understood that while it is particularly advantageous when embodied in gun scopes, it is not limited thereto and may be advantageously employed in theodolites, transits, or in any other optical equipment in which it is desired to impart exact adjusting movements to a reticule or the like.

The gun scope shown comprises a cylindrical barrel or tube 11 carrying an objective assembly 12 at its forward end, and an eye piece 13 at its rear end, it being understood that no novelty is claimed for the telescope per se which may be of any desired construction, and may embody a prism or the like to offset the eye piece from the axis of the barrel, if desired. The scope is provided with front and rear collar or sleeve elements 14 and 15 having dove-tails, bases 16 and 17, respectively, provided thereon, which are snugly received in correspondingly shaped recesses in the front and rear arms of a mounting plate 18, the latter having pad portions 19 and 21 which are adapted to be secured to suitably faced surfaces on the gun (not shown) by means of screws or the like. Referring to Figure 3, dove-tail 16 seats in a dove-tail shaped socket 22 in mounting plate 18, and the latter is provided with a slot 23 opening into recess 22. A screw 24 threaded into the mounting plate and having an operating handle 25 may be rotated into the position shown in Figures 1 and 3 to cause the walls of socket 22 to firmly grip dove-tail 16. An identically similar assembly is associated with the rear end of the mounting plate for clamping dove-tail portion 17 of collar 15, and the adjusting screw is provided with a handle 26 for tightening the parts in place. Preferably the front and rear screws are left- and right-handed, respectively, so that when the parts are in operative clamped position handles 25 and 26 assume the out-of-the-way position shown in Figure 1. Mounting plate 18 is illustrative of but one form of assembly which may be used to support the scope operatively upon a gun or the like, and it is to be understood that various forms of mounting assemblies may be used, depending upon the service to which the scope is to be put.

However, collar 14 is preferably constructed in accordance with the disclosure when the reticule adjusting mechanism is used on a gun scope or the like, because collar 14 constitutes a combined support for the front end of the scope and also supports the adjusting knobs and pointers of the reticule adjusting mechanism which will now be described. While I prefer to employ a scope supporting collar which also is operative to carry the reticule adjusting knobs and pointers, because it provides a simple unitary, inexpensive construction, it is to be understood that the novel reticule adjusting mechanism of the invention is not limited to such use.

I have found that, by providing a horizontal reticule guide mounted for vertical transverse movement, and mounting the reticule holder for transverse sliding movement in a horizontal direction with respect thereto, and connecting the reticule holder to a further vertical reticule guide mounted for vertical movement with respect thereto, and providing screws or other means for shifting the horizontal reticule guide vertically

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and for shifting the vertical reticule guide horizontally, any desired transverse adjusting movement of the reticule may be readily carried out without the necessity of slidably or threadedly connecting either of the screws to the reticule holder. Such a reticule mounting structure is superior to those heretofore proposed since the axes of the adjusting screws remain in fixed position with respect to each other and to the barrel, whereby they may be effectively sealed against the entrance of dirt and other extraneous material. This novel structure will now be described in detail.

Mounted for snug sliding introduction into barrel 11 is a reticule guide support 28 having longitudinal recesses 29 and 31 in its periphery which are intersected by transverse slots 32 and 33, respectively. The recesses and slots receive reticule springs, as will be later described. It is to be understood that tube 11 may be of square, octagonal or elliptical cross-section and support 28 given a similar shape.

Support 28 is of a shell- or sleeve-like form and is provided at its rear end with a dove-tail socket 35, which in the illustrated embodiment of the invention extends vertically, and guides the dove-tail portion 36 of a horizontal reticule guide 37. Threaded into guide 37 is an adjusting screw 38, which when rotated in the manner that will be later set forth, adjusts the reticule vertically in either direction.

Referring to Figure 6, the rear end of guide 37 is provided with a transverse dove-tail groove or guide 39 which extends horizontally or at right angles with respect to the dove-tail guide 35 of support 28. Snugly guided in dove-tail guide 39 is the dove-tail 41 of a reticule holder 42, which is also of generally cylindrical shell-like form. The reticule may be of any desired form and secured in the holder in any suitable way. In the present instance the reticule is being shown as made up of a pair of cross hairs 43, secured in notches in the front face of the holder. In my co-pending application Serial No. 544,092, filed July 8, 1944, for Reticule cell, I have shown a preferred manner of supporting the reticule in the holder, but as it forms no part of the present invention it will not be disclosed herein.

The rear face of the reticule holder is provided with a dove-tail guide 44, which extends substantially vertically, and snugly cooperates with a dove-tail 45 provided on a vertical reticule guide 46, which as seen in Figure 4 is of substantially ring-like form and has a lug or ear 47, into which an adjusting screw 38a is threaded. Lug 47 extends longitudinally so as to overlie the outer face of the reticule holder, and this makes it possible for the adjusting screws to be located close to each other, and to materially shorten collar 14.

In order to prevent backlash in the screw from being effected as uncontrollable movements of the reticule holder, and also to compensate for any possible lost motion in the dove-tail guides, I have provided a leaf spring 51, which seats in recess 31 and bears against a side of reticule holder 42 and reacts against the internal wall of barrel 11. The spring is retained in place by means of an inturned portion 52 seating in cross slot 33. A similar spring 54, of the same length as spring 51, but offset slightly longitudinally therefrom, seats in recess 29 and bears against a side of reticule holder 42. Springs 51 and 54 urge the reticule holder in such directions as to take up lost motion in the threads of screw 38 and 38a, respectively, and also any lost motion that may be

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present in the dove-tail slides between the reticule holder and its two guide members 37 and 46, respectively.

The preferred forms of mechanism for rotating the adjusting screws are identical in construction and therefore only the one associated with vertical adjusting screw 38 will be described in detail, similar reference characters with the sub-script "a" being applied to corresponding parts of windage adjusting screw 38a.

Referring to Figures 6 and 8, screw 38 is provided with stepped diametered portions 56 and 57, a smooth cylindrical portion 58; and a flat-sided shank portion 59. A resilient ring 61 of "Corprene," or any other suitable durable sealing material, seats on the bottom 60 of a deep cup provided by a flange 62 projecting upwardly from collar 14 and snugly engages the periphery of stepped portion 56 and lies under the shoulder provided by stepped portion 57 of the screw. A retaining nut 63, threaded inside of the recess, has a flange 64 for applying pressure to seal 61 and also a shoulder 65 which engages behind stepped portion 57, so as to cause the latter to bear tightly against the upper face of the seal. Nut 63 is adapted to be locked in adjusted position by means of a set screw 66 threaded in the wall of the cup.

Preferably nut 63 is tightened down sufficiently to exert a sealing pressure adequate to exclude moisture and other extraneous material, and the pressure exerted by the nut also functions to establish a uniform yielding resistance to turning movement of the screw, so as to prevent inadvertent turning movement thereof incident to handling the gun or scope. Cylindrical portion 58 of the screw is snugly journaled in the body of nut 63 and the screw is adapted to be rotated by the novel assembly that will now be described.

Slidably fitting over the flat sided shank portions 59 is a knob 68, having a knurled skirt 69. Also locked to shank portion 59 is a ratchet disk 71, having serrations 72 on its lower face engaging the serrations of a ratchet plate 73 journaled on portion 58 of screw 38. Plate 73 is provided with diametrically opposed lugs or ears 74 slidably received in slots 75 provided in flange 62, and is resiliently urged upwardly into engagement with ratchet disk 71 by means of a spring washer 76, which loosely fits over cylindrical portion 58 of the screw. By employing a disk and plate which both embody a multiplicity of serrations, it is possible to achieve a readily adjustable device and yet one in which a minimum amount of wear occurs, by reason of the tooth pressure being distributed among the several serrations.

From the structure so far described, it is apparent that screw 38 may be rotated by rotating knob 68, and that rotation thereof is resisted by the seal 61 and also the interengaging serrations of the disk 71 and plate 73. The serrations, as they ride over one another, provide a definite audible click, which is advantageous in determining when the parts are in properly adjusted position.

Referring to Figure 2, a dial 77 is rigidly secured to the upper face of knob 68 and the dial and knob are held in place by a screw 80. Dial 77 carries suitable indicia 78 to denote the amount of vertical movement of the reticule. For instance, the dial may denote the degree of vertical displacement in terms of minutes of angle of sight. Secured to a flat face 79 on collar 14, by screws 79' or the like, is a plate 81 carrying

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a pointer 82 coacting with dial 77, and a second pointer 82a which coacts with dial 77a. The windage dial 77a may carry suitable indicia denoting the angle of sight or other measure as may be desired depending upon the use to which the apparatus is put. Preferably each ratchet assembly is provided with seventy-two serrations, so as to yieldingly retain the screws in any one of seventy-two positions for each full revolution of the screws.

Dials 77 and 77a are preferably arcuate and made of spring metal, so that they provide spring tension for locking screws 80 and 80a against accidental loosening during rotation of the knobs. The counterbore on knobs 68 and 68a is provided chiefly to bring the top of dials 77 and 77a, respectively, flush with the knobs.

If desired, the dials may be mounted for angular adjustment on the knobs, so that screws 80 and 80a may be loosened and the device calibrated with respect to pointers 82 and 82a.

In Figure 9 there is shown a modified form of adjusting screw actuating mechanism which may be employed for adjusting screw 38 or 38a, the parts in Figure 9 being shown as being associated with the horizontal reticule guide 37. Parts which are similar to those previously described have been given the same reference character with the sub-script "b," it being observed that seal 61b is clamped under flange 57b of the screw 38b and nut 63b, in the manner previously described. In this form of the invention flats 91 are provided on cylindrical portion 58b of the screw and extend down approximately to the level of the upper side of nut 63b, and keyed thereon is operating knob 68b. Its associated dial 77b is secured to reduced shank portion 59b by means of a screw 80b in a manner similar to those previously described.

Mounted for synchronous rotation with the screw, by means of elongated slots engaging flats 91 of the screw, is a leaf spring 92 and a ratchet plate 93, the latter having serrations on its under face. Plate 93 is constantly urged downwardly by spring 92, and the serrations on its under face cooperate with serrations provided on the rim of cup 60b, it being understood that serrations are suitably spaced to provide the desired indent action.

From the foregoing detailed disclosure, it is apparent that by mounting the reticule holder between a pair of guide members, and guiding it for movement relatively to the guide members in mutually perpendicular directions, and mounting the guide members for movement in directions perpendicular to their guiding connections with the reticule holder, a construction is achieved in which it is possible to accurately adjust the reticule holder in both directions of movement by rotating the knobs in the proper direction, without threadedly connecting either of the screws to the holder, with the result that the adjustment screws may be mounted for rotation about fixed axes in the barrel of the scope or other optical instrument and effectively sealed by the novel sealing means, which is operable to both seal the reticule chamber against ingress of moisture or other extraneous material, and that novel indent devices have been provided for yieldingly resisting rotation of the adjusting screws.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered

in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description.

What is claimed and desired to be secured by United States Letters Patent is:

1. In an optical sighting device having a tube providing a longitudinal sighting path, a hollow support disposed in said tube and having a first guideway at one end thereof, a first adjustment member mounted for sliding movement along said guideway and having a second guideway at right angles to said first guideway, means on said tube for positively moving said member along said first guideway, a reticule holder mounted for sliding movement at one end thereof along said second guideway and having a third guideway parallel to said first guideway at its other end, a second adjustment member having a slide connection with said third guideway, and means for positively moving said second member in a direction perpendicular to said third guideway whereby movements of said reticule holder in directions at right angles to each other may be effected solely by moving said first and second adjustment members.

2. In an optical sighting device having a hollow tube, a support member snugly mounted and non-rotatable within said tube, a first reticule adjustment member having a transverse slide guide connection with said support member, a second reticule adjustment member axially spaced from said support member, a reticule holder between said adjustment members and having transverse slide guide connections with each of them, one at right angles to the other, the slide guide connection between the second adjustment member and the reticule holder being parallel to the slide guide between the first reticule adjustment member and said support member, and spaced means on said tube connected to the respective adjustment members independently of said support and accessible externally of the tube for independently adjusting said two adjustment members at right angles to each other for displacing said reticule holder in a plane normal to the axis of said tube.

3. In an optical apparatus having a barrel providing a longitudinal sighting path, a hollow support disposed in said barrel and having a vertical guideway at one end thereof; a primary guide device mounted for sliding movement along said guideway and having a horizontal guideway; means for positively moving said guide device along said vertical guideway; a sighting device mounted for sliding movement at one end thereof along said horizontal guideway and having a vertical guideway at its other end, a secondary guiding device having a slide connection with said last-named guideway, and means for positively moving said secondary guiding device in a direction perpendicular to said last-named guideway; whereby vertical and horizontal movements of said sighting device may be effected solely by moving said primary and secondary guiding devices.

4. The optical apparatus defined in claim 3, wherein said primary and secondary guiding devices are slidably connected to said sighting device by means of dovetail shaped guideways, whereby relative axial displacement thereof is precluded.

5. The optical apparatus defined in claim 3, together with resilient means carried by said support and coacting with said sighting device to urge the latter along the guideway of said primary and secondary guiding devices.

6. The optical apparatus defined in claim 3, together with spring means carried by said support and reacting against the interior of said barrel and operable to urge said sighting device along the guideways of said primary and secondary guiding devices.

7. The optical apparatus defined in claim 3, wherein said secondary guiding device is provided with a longitudinally disposed projection offset from the sighting path and overlying the periphery of said sighting device, and said means for moving said secondary guiding device comprises a screw threaded into said projection and restrained against endwise movement.

8. In an optical apparatus having a sighting tube and a sighting device mounted within said tube for adjustment transversely of the sighting path, a screw for adjusting said sighting device projecting outwardly through an opening in said tube; means on said tube providing an outwardly facing cup having an annular bottom wall encircling the projecting end of said screw; sealing means coacting with said annular wall and said screw for preventing ingress of extraneous material into said tube; pressure means for establishing a predetermined degree of seating pressure between said screw and said sealing means; and means for rotating said screw.

9. The optical apparatus defined in claim 8, wherein said sealing means comprises a seal ring seating on said annular surface and cooperating with a flange on said screw.

10. The optical apparatus defined in claim 8, wherein a screw is provided with a flange overlying said annular wall and said sealing means comprises a seal ring frictionally clamped between said flange and said annular wall.

11. The optical apparatus defined in claim 8, wherein said screw is provided with an outwardly directed shoulder and said pressure means comprise a nut encircling said screw, engaging said shoulder and threaded into said cup.

12. The optical apparatus defined in claim 8, wherein said screw is provided with a flange having an inner small-diameter portion and an outer large-diameter portion; and said sealing means comprises a seal ring seating against said annular wall and sealingly coacting with the periphery of said small diameter portion of said flange and sealingly coacting with a side face of the large diameter portion of said flange.

CLARENCE H. MEYER.

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