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UNITARY MOUNTING APPARATUS FOR FIREARM OPTICAL SIGHTS

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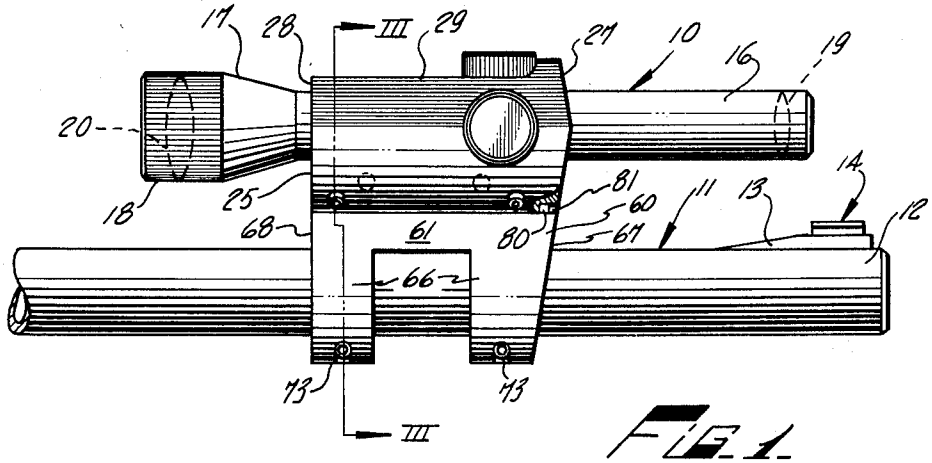


FIG. 1

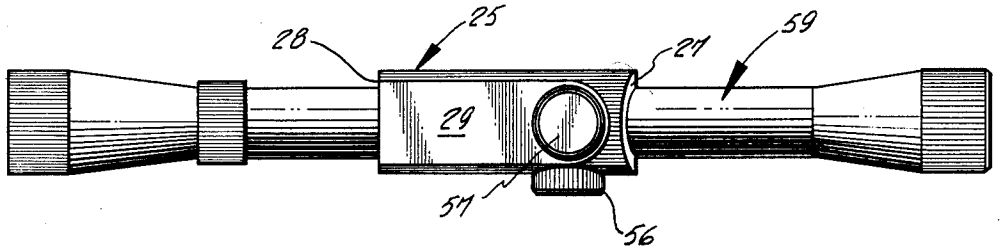


FIG. 2

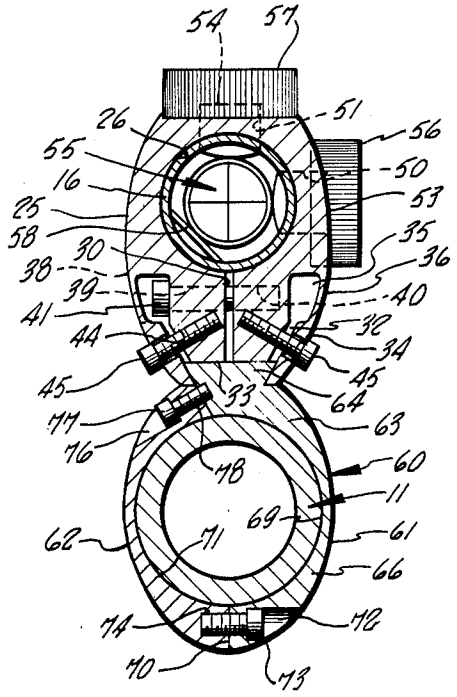


FIG. 3

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UNITARY MOUNTING APPARATUS FOR FIREARM OPTICAL SIGHTS

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This invention relates to apparatus for mounting optical sights to firearms. More particularly, this invention relates to a mounting apparatus for optical sights which combines the adjustment turret with the mounting brackets in a unitary member.

In the past, devices for mounting optical sights to firearms, either to the barrel itself or to the breech or stock elements, have required at least two members. These mounting devices consisted generally of two bands, clamps, or brackets connected to the tubular barrel of the sight. The sights so supported include a reticle or cross hair mechanism within the optical system. An optical sight ordinarily includes a turret mounted to the side of the scope barrel and includes apparatus for adjusting the reticle cross hairs or the erecting lenses to compensate for misalignment of the sight relative to the barrel and also to compensate for horizontal and vertical throw of the bullet away from the axis of the barrel. This invention provides an apparatus for mounting an optical reticulated sight to a firearm which combines the adjustment turret with the mounting bracket in a unitary element. This apparatus is connectible to the firearm by engagement to means provided integrally with the firearm itself or to a secondary mounting mechanism which is engaged with the firearm.

This invention provides simpler and more economic mounting apparatus for scopes than has been available in the past. In accordance with the present invention the scope may be mounted to the firearm at substantially one location without the use of special tooling required to accurately mount as was the case with scopes known heretofore. As a result, the mounting of the scope to the firearm is considerably more flexible. The scope may be mounted at substantially any position along the barrel of the firearm. Where two points of support are required for the scope, the position of the scope on the firearm is severely limited by the physical structure of the firearm. This is particularly a problem when the scope has a high magnification. In such situations the eye-relief of the scope may be so short as to further limit the usable position of the scope for comfortable sighting. With this invention, however, the ocular lens of the scope may be positioned comfortably for the rifleman since the unitary mounting and adjustment turret element is positionable clear of the breech of the rifle. The barrel of the scope then overlies the breech and extends to the normal and comfortable sighting position of the user. Moreover, with a scope having a very long eye-relief (the eye-relief being the distance the eye can be from the ocular lens and still obtain full field of view), the mounting bracket permits a scope to be mounted at the end of a rifle barrel without requiring the removal of the conventional fixed sight provided on the rifle when purchased. The above-listed and other advantages provided by utilization of this mounting apparatus will become apparent from the detailed description and explanation of the invention.

Generally speaking, this invention provides a unitary adjustment turret and scope mounting member for an optical sight. The sight includes spaced-apart objective and ocular lenses and has particular utility when used in conjunction with firearms. The mounting member includes a longitudinal bore through one portion of the member. The bore opens at its opposite ends to the exterior of the member. Means are engageable within the longitudinal bore for securing the ocular and objective lenses relative to the member. A reticle or erector lens housing is included within the optical system within the extent of the bore. The combination mounting block and adjustment turret includes at least one aperture extending from the exterior of the block into communication with the bore. Means for adjusting the reticle or erecting lenses are engaged within this aperture. Means are associated with the firearm and define a portion of a connection mechanism. A corresponding portion of this connection mechanism is provided by another portion of the unitary turret and mounting block and is engageable directly with the firearm portion of the connection means. The invention may include means for locating the portions of the connection mechanism relative to one another.

The following detailed explanation and description of the invention is taken in conjunction with the accompanying drawings, wherein:

FIGURE 1 is a side elevation of the combination mounting block and reticle turret for a long eye-relief optical sight mounted at the muzzle end of a rifle;

FIGURE 2 is a top plan view of the combination turret and mounting block utilized in conjunction with a short eye-relief optical sight; and

FIGURE 3 is an enlarged cross-sectional view of the mounting block engaged to an auxiliary barrel engaging support and is taken along line III—III of FIGURE 1.

Referring to FIGURE 1, a long eye-relief optical scope **10** is mounted to the muzzle end **12** of the barrel **11** of a rifle. The upper muzzle end **12** is provided with a ramp **13** and longitudinally beaded sight post **14**. The corresponding sighting element provided with the rifle is not illustrated, but it is normally secured to the upper side of the barrel **11** adjacent the breech mechanism of the rifle.

The optical sight or scope **10** generally comprises a longitudinal tubular barrel **16** belling outwardly as at **17** to an enlarged eye-piece end **18**. An objective lens **19** is mounted within the sight barrel **16** adjacent the forward end of the barrel **16**. An ocular lens **20** is mounted within the eye-piece end **17** of the scope **10**. A system of lenses called erector lenses is provided between the objective and ocular lenses to correct for the inversion of the image produced by the objective lens.

A mounting member **25**, combining the functions of an adjustment turret and mounting blocks (heretofore provided by separate elements) constitutes a major feature of this invention. A longitudinal tubular bore **26** is provided through the upper central portion of the mounting block **25** and has its ends open to the external end surfaces **27** and **28** of member **25**. As illustrated in FIGURE 3, the cross-section of the mounting block shows a substantially elliptical outline. The longitudinal bore **26** is nearer the upper exterior side **29** of the mounting block **25** than to the midpoint of the major diameter of the ellipse. A longitudinal slot **30** is formed along the major axis of the ellipse between the bore **26** and the bottom exterior surface **33** of the mounting block and opens downwardly to the exterior of the member **25**.

A pair of longitudinal grooves **32** are formed within the mounting member **25** and are angled upwardly and outwardly from the bottom exterior surface **33** of the mounting member **25**. The portions of the mounting member **25** between each of the grooves **32** and the adjacent external sides of the mounting member **25** define tongue portions **34**. Each of the grooves **32** has an enlarged cavity at its base or upper end within the mounting

member 25. In this respect, each tongue 34 has a thin walled portion 36 just adjacent the point where the tongue 34 is connected to the mounting block 25. The lower surface 33 of the mounting block 25 is divided into two portions in view of grooves 32 and the slot 30. Each of the portions 33 is coplanar with the other. The legs 34 project inwardly and downwardly toward each other below the coplanar surfaces 33 to define the female portion of a dovetail connection in conjunction with the surfaces 33.

A pair of apertures 38 are provided through the thin wall portions 36 of legs 34 on one side of the mounting block (the left side as viewed in FIGURE 3). An untapped hole 39 is drilled through the left side of the lower mounting block portion to the slot 30 coaxially with each aperture 38. Coaxially with the hole 39, a tapped hole 40 of slightly smaller diameter than hole 39 is provided in the right lower portion of the mounting block 25 and terminates short of the cavity 35 of the right groove 32. A screw 41 is inserted through aperture 38 and hole 39 to be engaged within the tapped hole 40. The head of the screw 41 bears against the interior side wall of the cavity 35.

A hole 44 is drilled and tapped through the bulbed free end of each leg 34 and into the adjacent lower portions of the mounting block 25. The holes 44 are illustrated as being perpendicular to the respective slots or grooves 32 through which they pass, although the holes may have their external ends countersunk to receive the heads of screws 45.

A pair of holes 50 and 51 are drilled from the exterior of the mounting block 25 into communication with the bore 26. As illustrated in FIGURE 3, hole 50 is drilled from the right side of the mounting block and hole 51 is drilled from the upper side 29 of mounting block 25. The axes of holes 50 and 51 and the axis of bore 26 are mutually perpendicular. A set screw-like element 53 and 54 is engaged within holes 50 and 51, respectively, and provides the means for adjusting the reticle 55 of the scope 10 against spring 58. The reticle 55 illustrated in FIGURE 3 comprises a pair of perpendicularly oriented cross hairs, but any reticle can be housed within the mounting member 25.

The optical scopes 10 provided prior to this invention utilized an adjustment turret distinct from the mounting bands or clamps, as is explained above. The adjustment turret was the casting or housing mounted at least partially around the periphery of the scope tube 16 to accommodate the adjustment mechanisms corresponding to set screws 53 and 54 in FIGURE 3. As provided by this invention, however, the adjustment turret and mounting brackets (previously there usually were two mounting brackets) are combined into the unitary element 25.

To secure the mounting bracket 25 to the tube 16, the tube or barrel of the scope is inserted through the bore 26. Screw 41 is then tightened to draw together the sides of the mounting bracket about the slot 30, and to securely engage the exterior periphery of the scope barrel 16 within the bore 26. The sight barrel 16 has apertures provided therethrough adjacent the location of the reticle or erecting lens housing. The screws 53 and 54 are then engaged into the mounting block 25 and are covered by protective caps 56 and 57 which assure that no accidental unbalance of adjustment occurs.

The reticle 55 is mounted within the bore 26 so as to be optically coaxial with the objective and ocular lenses 19 and 20. By optically coaxially it is meant that the reticle 55 is aligned coaxial with the light beam passing between the lenses even though the lenses may not be geometrically coaxial. Optical coaxiality does not imply geometrical coaxiality, especially where mirrors or prisms are installed between the lenses.

The only apparatus described thus far is often sufficient to secure the scope 10 and mounting block 25 to a rifle. In recent years many rifles have been produced which incorporate a male dovetail channel or projecting rib along the upper surface of the rifle barrel extending the length of the breech mechanism. When it is desired to mount a scope to such a rifle, the female dovetail connection provided on the unitary mounting block and reticle turret 25 is engaged with this integral part of the rifle. Once the depending legs 34 of the mounting member 25 are engaged adjacent the sides of the male dovetail element, the coplanar surfaces 33 bearing against the top of the male dovetail, the screws 45 are tightened to secure the legs against the diverging sides of the male dovetail. As the screws 45 are tightened relative to the mounting member 25, the legs 34 deflect about their thin-walled portions 36 adjacent the longitudinal cavities 35. The inclusion of four such screws 45 automatically provides a windage correction means built into the mounting member 25.

The windage correction means compensates for deviations of the scope axis from true horizontal alignment with the axis of the rifle barrel 11. Also, it is often the case that a bullet shot from a rifle will not follow directly along the axis of the barrel, but instead will throw to the left or to the right. In installing the scope to the rifle this lateral projectile throw may be corrected by selective adjustment of the four screws 45 securing the female dovetail legs 34 to the male dovetail rib. If it is found that the rifle throws the bullet to the left, the right rear and left front screws 45 may be tightened initially to cock the optical axis of the scope slightly to the left. Once the proper alignment of the scope is obtained, the right front and left rear screws 45 may then be tightened to secure the unitary reticle turret and mounting block 25 to the male dovetail.

This alignability of the mounting block 25 relative to the member upon which it is supported is provided by virtue of the cavities 35 of grooves 32 (FIGURE 3). The cavities 35 (illustrated as substantially quadrilateral in configuration) are elongated more in a vertical dimension than in a lateral dimension and provide the elongated thin-walled portions 36 of the clamping legs 34. The elongated nature of the thin-walled portions 36 provides not only that the lower free ends of legs 32 may deflect relatively freely inwardly toward one another, but also provides that a warping effect may be imparted to the legs 34 between the forward and rear surfaces 27 and 28, respectively, of the mounting block 25. The cavities provided by this invention serve to distribute and minimize the stresses imparted to the roots of legs 34 while providing the inherent warpable characteristic of the legs 34.

Two separate types of optical scopes are illustrated in FIGURES 1 and 2. The scope 10 illustrated in FIGURE 1 and described in conjunction with the unitary mounting block 25 is a long eye-relief optical scope. The scope 59 of FIGURE 2 is a short eye-relief device. As explained in the introduction to this description, the eye-relief of an optical device is the distance which the eye of the viewer may be from the ocular lens and still obtain the maximum field of view provided by the scope. Necessarily, a long eye-relief is consonant with low power magnification. In cases where a scope is used on a rifle for hunting small game, a long eye-relief scope is extremely practical, especially when it can be mounted to the muzzle end of the barrel of the rifle or shotgun.

The standard rifle is normally provided with a pair of fixed sights mounted adjacent the breech and muzzle ends of the rifle barrel; shotguns conventionally use a rib or rail sight extending along the length of the barrel. To use the conventional sight apparatus of a rifle, it is necessary first that the rifleman spot the game. Then the rifle is sighted by aligning the fore and aft sight elements with the game. In doing so, the focus of the eye is forced to jump back and forth between the game, the forward sight and the rear sight. Because of the distances involved between these three elements, when the game is

in focus the forward sight is out of focus, and conversely. The repeated change focusing of the eye between the game and the forward sight element is a contributing factor of the common wavering motion of the forward end of the rifle.

Optical sights or scopes have been considered as primarily useful to increase the size of the image of the game. But the use of an optical sight collaterally eliminates the eye movement described above since the eye focuses only at one point. The image of the game and of the reticle are provided at the same plane by the optical system.

The utilization of high power scopes, however, has certain disadvantages, particularly when they are used in game hunting. Since a high poweerd scope has a short eye-relief, it must be mounted to the rear end of the rifle adjacent the breech. In this location the scope and its mount occupy a large portion of the normal field of view of the unaided eye of the rifleman. On the other hand, if the scope could be mounted to the forward end of the rifle it would occupy a smaller portion of the field of view and scanning of the field could be had much more conveniently. The scope **10** illustrated in FIGURE 1 has an eye-relief of approximately twenty-one (21) inches, but has a magnification of only approximately 1.3. Mounting such a scope to the muzzle end of the rifle is extremely practical. In such a case the rifleman may freely scan the field to locate game since the scope occupies a small portion of the field of view. Once game is sighted, the rifle can be preliminarily aimed by pointing the barrel in the direction of the game. Once the rifle barrel is aligned substantially in the direction of the game, the rifleman may then refer to the optical sight or scope to pick up and accurately sight the game. Sighting with a muzzle mounted long eye-relief scope is much more rapid and convenient than with a short eye-relief high powered scope. Moreover, since even the low-power high eye-relief scope **10** provides the image of the game apparently coplanar with the reticle, eye strain and wavering of the rifle is substantially reduced.

A further advantage of a long eye-relief scope is that it can be used in conjunction with a pistol. A pistol is normally fired by holding the arm outright from the body. A high power scope having a short eye-relief cannot be so used since the field of vision is materially restricted when used at arm's length. The high eye-relief scope, however, illustrated in FIGURE 1, having an eye-relief distance of twenty-one (21) inches, can conveniently be used at arm's length. When utilized with a pistol, and also with many rifles not providing an integral male dovetail, the successful practice of this invention requires an auxiliary mounting apparatus.

FIGURES 1 and 3 illustrate an auxiliary mounting means or barrel block assembly **60** having essentially a main portion **61** and two secondary parts **62**. The barrel block **61** has a longitudinal upper portion **63** (FIGURE 3) having a male dovetail element **64** formed integrally therewith along its upper edge. A pair of legs **66** depend downwardly from the upper portion **63** adjacent the forward **67** and rear **68** edges or surfaces of block **61**. The legs **61** are curved outwardly and downwardly to provide a circular internal surface **69** engageable around a portion of the barrel **11** of the rifle or pistol upon which the scope **10** or **59** is mounted. The pair of members **62**, when engaged with the block **61**, extend from the vertical surface **70** at the lower end of leg **66** upwardly around the barrel **11** to adjacent the upper end **63** of the member **61**. The members **62** have internal concave surfaces **71** which continue the circular presentation of surface **69** and engage the barrel **11** (see FIGURE 3).

The lower end of each leg **66** has a transverse recess **72**. A screw **73** is engaged from the recess **72** through the bottom portion of leg **66** into a tapped hole **74** in the lower end of each member **62**. The upper end of each member **62** is provided with a recess **76** in which a screw **77** is engaged. Screws **77** project through the upper end of the clamp **62** to be engaged within tapped holes **78** in the upper portion **63** of the barrel block **61**. The barrel block assembly **60** is secured to the barrel **11** of the firearm by connection of the C-shaped clamp members **62** with the main block **61** through engagement of screws **73** and **77**.

A post **80** extends upwardly from the central forward portion of the upper planar surface of the male dovetail **64** and is engageable within a slot **81** formed in the lower forward portion of the unitary mounting block **25**. When the mounting block **25** is engaged on the barrel block assembly **60**, the pin **80** abuts against the end of the slot **81** and serves to position the mounting block relative to the barrel block assembly **60**. A second function of the post **80** and slot **81** combination is to serve as a creep preventer when the firearm is discharged. Particularly in pistols, when the firearm is discharged, the muzzle end **12** of the barrel **11** kicks sharply upward. If there is any looseness in the connection between the male and female dovetail connection means, there is a tendency for the mounting block **25** to creep forward along the barrel block assembly **60**. The engagement of pin **80** in slot **81** prevents this creeping phenomenon.

From the foregoing description it should be apparent that the combination reticle turret and scope mounting block **25** provided by this invention results in many features and advantages not attainable with devices known previously. The dual purpose mounting block **25** permits an optical scope to be mounted conveniently and securely to the muzzle end of a firearm.

Also, as explained above, the mounting block **25** of this invention inherently provides a windage adjustment to compensate for misalignment of the scope and rifle barrel and also to compensate for the lateral throw of the rifle bullet.

While the invention has been described in conjunction with specific apparatus and having particular configurations, these descriptions have been by way of example only and are not to be considered as limitations to the scope of this invention.

What is claimed is:

1. Apparatus for mounting an elongated tubular optical sighting device having a reticle and an optical axis to the barrel of a firearm comprising a mounting block having a longitudinal tubular bore extending from end to end of the block in one portion thereof, the block in combination with the longitudinal bore being adapted for peripheral engagement with the sighting device, the block having a lower longitudinal exterior surface below and parallel to the longitudinal bore, a pair of downwardly depending tongue portions integral with the block extending from the block on opposite sides of the lower exterior surface of the block, each tongue portion extending from end to end of the block and being disposed parallel to the tubular bore, each tongue portion having a thin walled portion adjacent the block, each tongue portion having a longitudinal end spaced from the block, the tongue portions converging as they extend from the block to the longitudinal ends thereof, the longitudinal ends of the tongue portions being enlarged transversely with respect to the thin walled portions thereof and defining the female portion of a dovetail connection means, the mounting block having a pair of holes therein from the exterior surfaces of the mounting block into communication with the longitudinal bore, reticle adjustment means engaged within the pair of holes for adjusting the image of the reticle relative to the optical axis, means including a male portion of the dovetail connection means associated with the firearm barrel for receiving the mounting block, and means for securing the mounting block to the male dovetail when the dovetail portions are engaged.

2. Apparatus according to claim **1** including means for selectively moving the integral tongue portions of the mounting block relative to the lower exterior surface of

the mounting block for adjusting the axial alignment of the optical sighting device relative to the firearm barrel.

3. Apparatus for mounting an elongated tubular optical sighting device having a reticle and an optical axis to the barrel of a firearm comprising a mounting block having a longitudinal tubular bore extending from end to end of the block in one portion thereof, the block in combination with the longitudinal bore being adapted for peripheral engagement with the sighting device, the block having a lower longitudinal exterior surface below and parallel to the longitudinal bore, a pair of downwardly depending tongue portions integral with the block extending from the block on opposite sides of the lower exterior surface of the block, each tongue portion extending from end to end of the block and being disposed parallel to the tubular bore, each tongue portion having a thin walled portion adjacent the block, each tongue portion having a longitudinal end spaced from the block, the tongue portions converging as they extend from the block to the longitudinal ends thereof, the longitudinal ends of the tongue portions being enlarged transversely with respect to the thin walled portions thereof and defining the female portion of a dovetail connection means, means including a male portion of the dovetail connection means associated with the firearm barrel for receiving the mounting block, and means for securing the mounting block to the male dovetail when the dovetail portions are engaged.

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