June 9, 1953 P. H. ECCLESTON 2,641,056

APPARATUS FOR TESTING AND ADJUSTING GUN SIGHTS

Filed Sept. 12, 1951 3 Sheets-Sheet 1

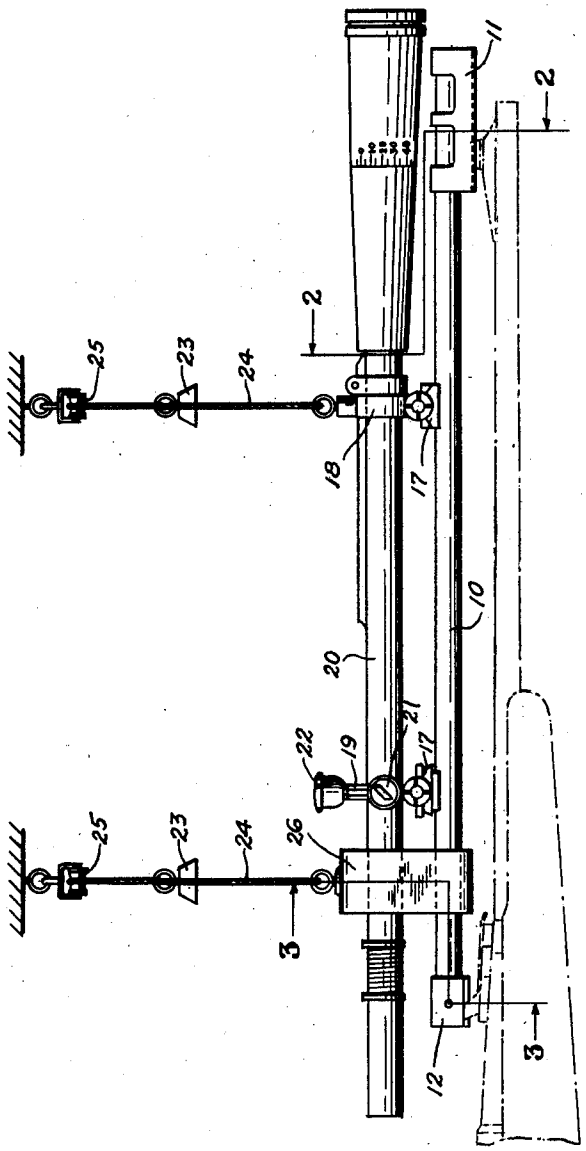


Fig. 1

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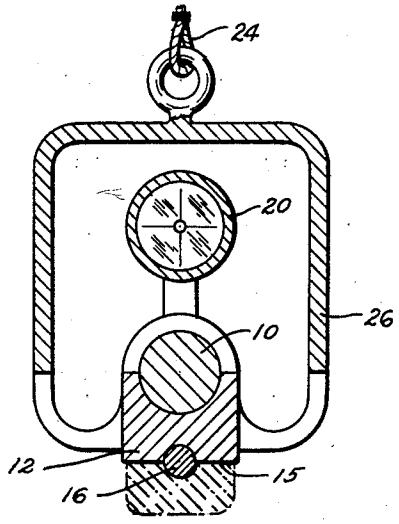


Fig. 3

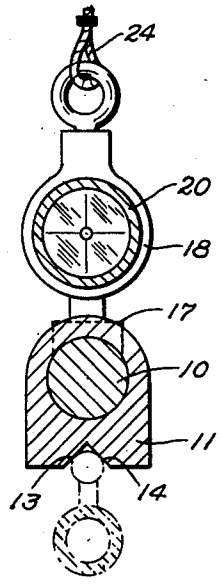


Fig. 2

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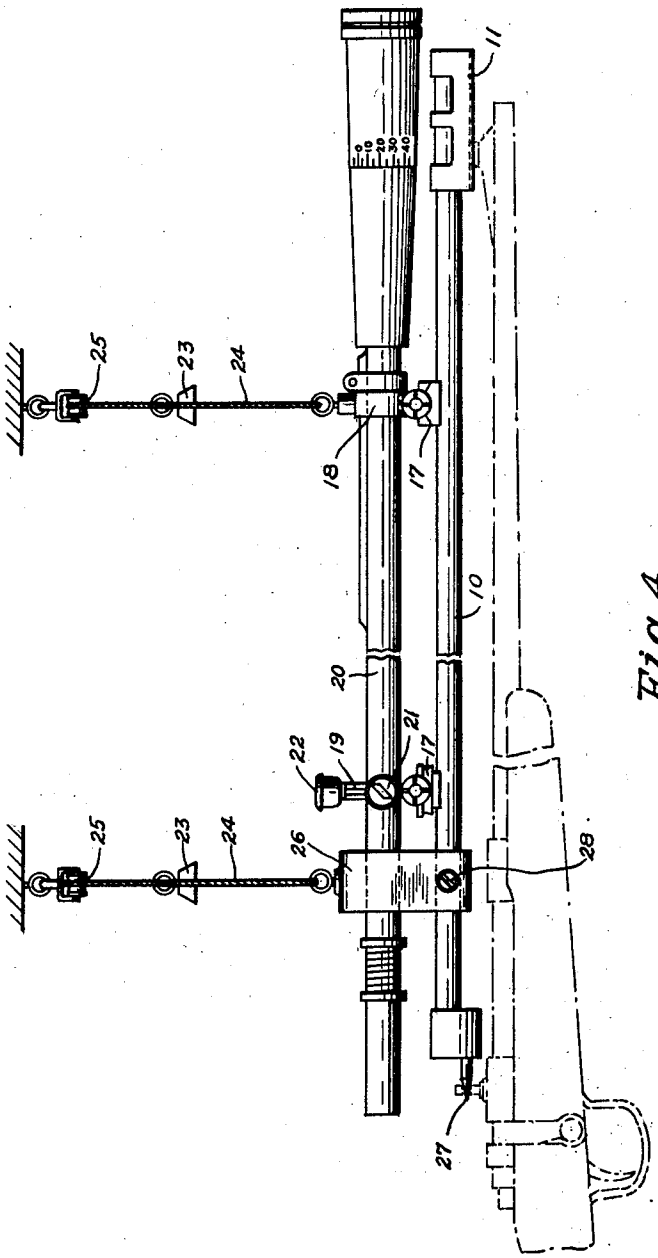


Fig. 4

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# UNITED STATES PATENT OFFICE

2,641,056

## APPARATUS FOR TESTING AND ADJUSTING GUN SIGHTS

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Application September 12, 1951, Serial No. 246,194

2 Claims. (Cl. 33—46)

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This invention relates to improved apparatus for adjusting rifle sights.

In the production of firearms it is necessary to provide for an adjustment to insure that the line of sight through the sighting devices will, at the desired range, exactly intersect the line of flight of the projectile. In the past this has usually been accomplished both in the factory and by the individual shooter, by cut and try methods. After firing a sufficient number of shots to establish a mean group, the sights are adjusted by the amount thought necessary to bring the line of sight and line of flight into coincidence and another group fired. Depending upon the skill of the targeter, this process may have to be repeated several times.

Obviously, factory adjustment by such cut and try methods is expensive in that it wastes ammunition, is slow, and requires the close concentration of a highly skilled target shooter. Further, with modern high power rifles the forces of recoil are sufficient to require that the targeter take frequent rest periods if he is to do reliable work.

Recently there has come into use a mechanical shooting rest in which a rifle may be fired with trajectory and grouping characteristics substantially identical with those obtained when fired from the human shoulder. A preferred embodiment of that rest is shown in the copending application of Wayne E. Leek, Serial Number 170,590, filed June 27, 1950, now Patent No. 2,599,265, granted June 3, 1952, entitled "Accuracy Shooting Rest." It has been possible to secure a rifle in this device and to shoot a group of five shots or more with the assurance that the rifle will retain its initial positioning in the rest both as to azimuth and elevation and will group as it would in the field. As a logical extension of the use of that device it has been contemplated that after firing to establish a group and without moving the rifle in the accuracy shooting rest, sight adjustments would be made to bring the line of sight into the center of the group. However, the clamping structure of the accuracy rest necessitated the use of a mirror for sighting and, particularly with iron sights, it is difficult to secure a critical and reproducible picture of the relationship of the line of sight to the point of aim without auxiliary magnification.

The principal object of this invention is to provide accurate optical means for determining the true position of the line of sight in order that the adjustments may be made to the sighting devices to bring the line of sight into coincidence

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with the line of bullet flight at the desired range.

I have accomplished that objective by providing a sighting telescope of power adequate to spot bullet holes at the desired range, generally 100 or 200 yards, and by the provision of means to accurately and reproducibly mount this telescope on the iron sights of a production rifle with the line of sight through the telescope in fixed relationship to the line of sight through the iron sights.

The exact nature of my invention as well as other objects and advantages thereof will become more apparent from consideration of the following specification referring to the attached drawings in which:

Fig. 1 is a side elevational view of the invention mounted on a rifle with open sights.

Fig. 2 is a cross-sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a cross-sectional view on the line 3—3 of Fig. 1.

Fig. 4 is a view corresponding to Fig. 1, showing a modified form adapted for use with peep sights.

Referring to the drawings by characters of reference, it may be seen that my invention comprises a mounting bar 10 provided at the front end with a locating pad 11 and at the rear end with a locating pad 12. The locating pad 11 is formed to define in its lower surface, between two inclined surfaces 13 and 14, a V groove which will be self-centering on the bead of the conventional front sight. The locating pad 11 should be of sufficient length to accommodate the variety of barrel lengths to be encountered and the V groove should be throughout its length parallel to the axis of the bar 10. The locating pad 12 for flat top, open iron sights is formed to provide a flat lower face 15 also parallel to the axis of the bar 10, which will rest on the flat top of the conventional open rear sight to support the mounting bar against canting to either side. Preferably, I mill in the lower face 15 of the bar a half round groove in which I may secure a cylindrical key 16 of such size as to be exactly received in the notch of a standard flat top, open rear sight. The rear locating pad should be so dimensioned that the axial projection of the key 16 will be in exact alignment with a front sight bead resting in the V notch in the front locating pad.

Secured on the upper surface of the bar 10 are the base blocks 17 for the mounts 18 and 19 of a conventional high power combination target sighting and spotting telescope 20. For con-

venience, the telescope may have a prismatic eyepiece to permit observation from one side. The front mount 18 is arranged to support the telescope with limited freedom for tilting movement of the axis of the telescope but without any significant capacity for radial movement of the axis of the telescope. The rear mount 19 is, as usual, provided with micrometer adjustment knobs 21 and 22, serving to accurately position the axis of the telescope with relation to the axis of the mounting bar 10.

There are several procedures for using this apparatus in the adjustment of the sights of newly manufactured rifles. One of the simplest of these methods is to first take a rifle having the standard sights and known to be in perfect condition and have this rifle fired and its sights adjusted by several skilled targeters. When a sight adjustment has been obtained, such that the average point of impact of groups fired by these shooters corresponds with their point of aim, this rifle may be considered to have its sights adjusted in the optimum manner. This rifle may then be placed in the accuracy shooting rest previously referred to and a group of shots fired without sighting. My invention may then be positioned on the sights and the adjustment knobs 21 and 22 turned to bring the crosshair of the telescope into the center of the group. This establishes a standard setting for my invention which may thereafter be used in setting the sights of new arms of identical construction for the same range.

The standard setting for my device may also be arrived at by having a group of skilled targeters all fire the rifle at a common aiming point but without reference to the setting of the sights. In this way, an average point of impact may be found which it will be usually found is offset both as to windage and elevation from the actual point of aim. This standard rifle may then be secured in the accuracy shooting rest and a group formed on the target, the relationship of the center of that group to the point of aim being accurately spotted. Since the divergence of the line of sight through these sights and the line of fire as the result of imperfect sight adjustment has been established by the difference between group center and point of aim in the targeter's test noted above, my device may now be placed on the sights and the micrometer adjustment knobs set to bring the intersection of the cross-hairs to a fictitious point which is offset in windage and elevation from the group center by amounts of equal magnitude and opposite sign to the amounts of the offsets noted by the targeters. In this way, I can readily set into my device the amount of the corrections for range, drift, etc., necessary to bring the point of impact of a standard rifle with correctly adjusted sights into coincidence with the point of sight.

Having by either of these methods established a standard setting for my device, I may utilize the device to set the sights of any number of similarly constructed rifles for the same range by proceeding as described below.

Each new rifle may be secured in the accuracy shooting rest and a group of five or more shots fired at the target without regard to sight adjustment. This group on the target may then be inspected either with a conventional spotting telescope or with the telescope on my invention and, if the group is small enough to equal or better the accuracy specifications for the particular rifle, the sights may be properly adjusted. If the size of the group exceeds specified limits, the rifle may be rejected at this point and sent back to the plant for correction of the defect.



With the usual type of sporting open sights, lateral adjustments may be made by bodily shifting front or rear sights, or both, in their dovetail mountings on the barrel, but are more commonly made by the use of a special wrench which engages the rear sight and permits it to be bent appropriately to the right or left.

Within limits, elevation adjustments may also be made by the expedient of bending the rear sight but are more commonly made by the selection of an elevator wedge of the appropriate dimensions to fit between barrel and rear sight. In extreme cases it may be necessary to change front sights to secure one with a different height bead. It may also be noted that sporting open rear sights are frequently formed with the sight notch defined in a plate which is movable with respect to the rest of the sight to permit a limited amount of elevation adjustment.

Regardless of the implements or methods used to make the actual adjustment, the result sought is the movement of the sights so that the telescope supported thereon as previously described will have its crosshairs placed in the center of the group fired from the accuracy rest. It should be understood that both firing and sight adjustment should take place with the rifle clamped firmly in the accuracy rest previously referred to or in some other rest in which the rifle will group the same as when fired from the human shoulder but will maintain the barrel axis after firing in the identical position occupied before firing.

As described above, it will be noted that my invention was simply placed on the open sights and allowed to rest thereon, being held in place by gravity. For greatest accuracy that is the preferable mode of use, but for most efficient use in production work, it is desirable to suspend my device by a counterbalancing arrangement which simplifies handling by the targeter.

Such a suspension arrangement is shown in Fig. 1 with additional details in Figs. 2 and 3. Counter-weights 23 are suspended by cords 24 passing over pulleys 25 secured to the ceiling or other overhead structure and brought down to eyes attached to the mounting bar 10, as will be described below. The counter-weights should be heavy enough to support the weight of my invention and should be provided with stop cords or other convenient means to limit the descent of the weights and consequent lifting of my invention to a degree such that the device will be out of the way while guns are changed in the accuracy shooting rest yet instantly accessible for use when needed. The front one of the cords 24 may be conveniently secured to the scope mounting ring 18 which is fixedly attached to the mounting bar 10. The rear one of the cords 24, however, is preferably attached below the center of gravity as by means of the frame 26 which is freely rotatable on the mounting bar within the limits imposed by engagement of the sides of the frame with the telescope 20. With my device supported in this way, it may be pulled down to the sights of a rifle and held thereon by light pressure on the mounting bar while the line of sight is checked. The below-center mounting of at least the rear end of the device insures that the pendulum effect of the counterweight cords will not prevent the rear

locating pad from conforming to the top of a rear sight which is canted to one side or the other. With the exception of the need to hold down on the mounting bar during use, all operations are as previously described. Obviously, a weight could be hooked to the mounting bar during use to provide a constant pressure, or auxiliary cords could be used to temporarily lift the counter-weights. However, in actual factory use adequate accuracy and greatest efficiency has been secured by allowing the counter-weights to oppose the pressure of the targeter's hand on the mounting bar.

Fig. 4 shows an adaptation of my device for use with aperture or the so-called peep sights. In this construction the mounting bar **10**, front locating pad **11**, telescope **20**, and mounting thereof on the bar **10**, are identical with those previously described. Instead of a rear locating pad I provide a tapered point or locator **27** which is adapted to enter and center in the aperture of a peep sight. Preferably, this point is offset from the axis of the mounting bar by an amount equal to the offset of the point of the V notch in the front locating pad. In use the operator can readily apply a sufficient rearward pull to maintain the point snugly centered in the aperture, although obviously spring means engaged between the mounting bar and one of the sights can perform this function.

The peep sight provides no convenient means of supporting my device against canting as on the flat top rear sight and I have found it preferable to rely upon the counterbalanced suspension cords to maintain the vertical position of my device. The front mounting **18** and suspension cord **24** may be identical with those previously described. The rear suspension cord and the mounting frame **26** may be identical in appearance to those previously described, but the mounting frame should be rigidly fixed to the mounting bar as by means of a set screw **28**. The operation of this modification of my invention will be obvious from the description of use with open sights.

Although I have shown and specifically described herein only two modifications of my invention, other forms can readily be devised. Accordingly, I wish it to be understood that I consider my invention to extend to all equivalent forms, devices and constructions falling within the terms of the claims appended hereto.



I claim:

1. Means for testing the line of sight through standard rifle sights, comprising a mounting bar, a sighting telescope adjustably mounted on said bar, front locating means comprising a block secured to said bar and formed to define in its lower surface a V-groove having its apex parallel to the axis of the bar and adapted to be centered on the bead of a front sight, and rear locating means comprising a block secured to said bar having a flat lower surface adapted to bear on the top of an open rear sight and a key adapted to rest in the notch of a rear sight, said key being axially parallel to the axis of said bar and in substantial prolongation of the apex of said V-groove.

2. Means for testing the line of sight through standard rifle sights, comprising a mounting bar, a sighting telescope adjustably mounted on said bar, front locating means on said bar constructed and arranged to be reproducibly seated upon a front rifle sight to position the forward end of said bar with its axis in predetermined relation to said front sight, and rear locating means comprising a block secured on said bar and formed to define a flat lower surface adapted to be supported on the upper side of an open iron sight, and a key mounted on said block in axial parallelism with said bar and adapted to be engaged in the notch of an open iron sight.

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