

March 17, 1942.

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2,276,270

GUN SIGHT

Filed March 27, 1939

2 Sheets-Sheet 1

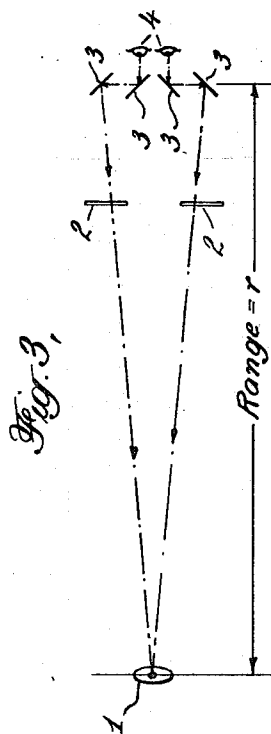
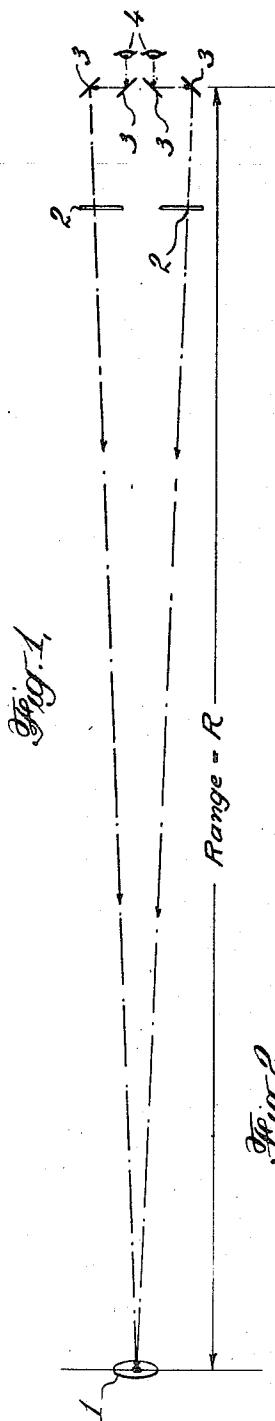


Fig. 2,

2 2 5

Fig. 4,

5 2 2

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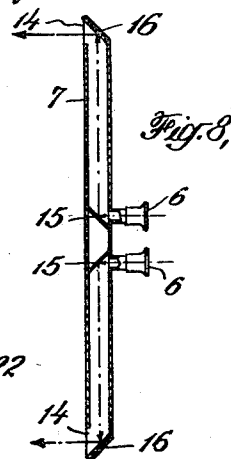
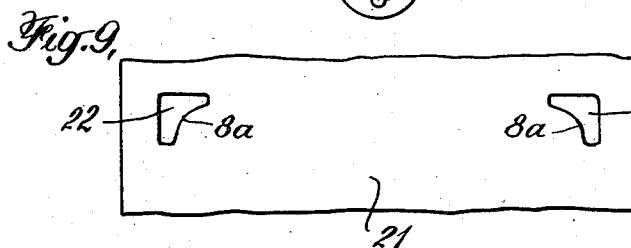
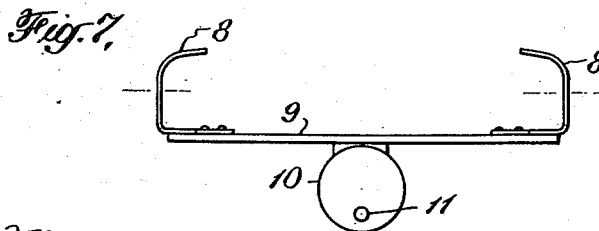
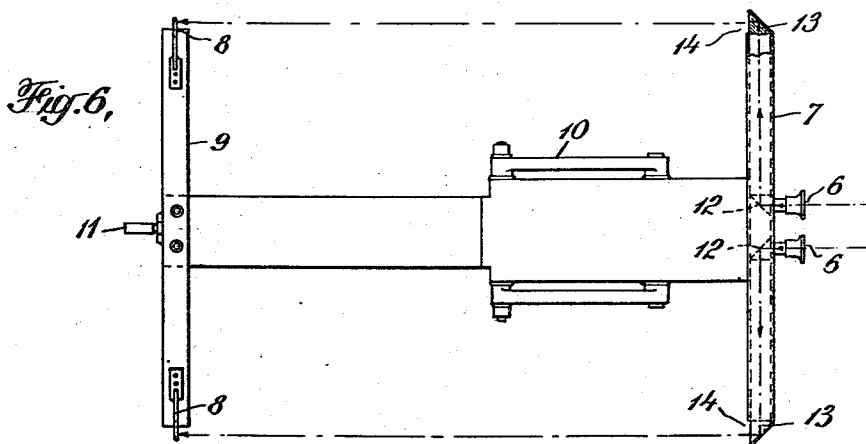
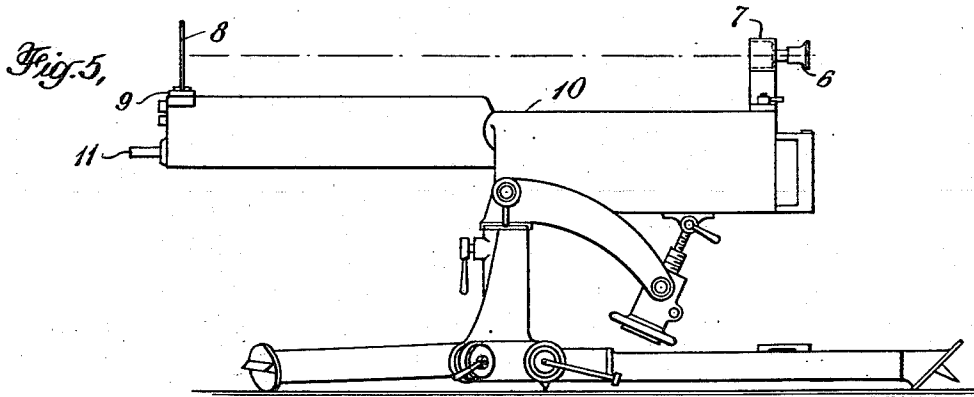
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GUN SIGHT

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2 Sheets-Sheet 2



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2,276,270

GUN SIGHT

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4 Claims. (Cl. 88—33)

This invention relates to gun sights, and in particular to certain new and useful improvements in range-finding binocular gun sights.

An object of this invention is to increase the useful range-finding effect of binocular gun sights of the type disclosed in my Letters Patent No. 1,350,153 and No. 1,476,884. A further object of this invention is to provide an effective range-finding sight, automatic in operation, and simple and rugged in construction, by which a machine gunner, for example, without any adjustment of his sights, can instantly train his weapon on a target appearing suddenly at an unknown range.

For a consideration of what I believe to be novel in my invention, attention is directed to the accompanying description and the claims appended hereto. The invention is illustrated, by way of example, in the accompanying drawings in which—

Fig. 1 is a schematic diagram of the operation of my invention at the comparatively long range R;

Fig. 2 shows the "optical cross" formed by the use of my invention at range R;

Fig. 3 is a schematic diagram of the operation of my invention at the shorter range r;

Fig. 4 shows the "optical cross" formed by the use of my invention at range r;

Fig. 5 is a side elevation of a machine gun provided with my invention;

Fig. 6 is a plan view of the machine gun provided with my invention;

Fig. 7 is a front elevation of a machine gun provided with my invention;

Fig. 8 is a horizontal section of the rear sighting member only disclosing an alternative construction; and

Fig. 9 is a front elevation of a portion of a gun shield embodying a modified form of the front sighting element of my invention.

The operation of my invention will be understood from a study of the schematic drawings, Figs. 1 through 4. In Fig. 1 we see a target 1 at a range R from the observer 4. The dot-and-dash lines show lines of sight from the eyes of the observer 4 passing by means of a train of fixed mirrors 3 past the sighting wires 2 to the target 1 and forming an apparent "optical cross" near the base of the sighting wires 2. The appearance of these wires, when the eyes of the observer 4 are focused on the target 1, is shown in Fig. 2. Each wire 2 is seen by one eye only of the observer and, therefore, an "optical cross" 5 consisting of an opaque spot is formed where the

separate images of wires 2 apparently cross. At the range R the lines of sight from the mirror train 3 to the target 1 pass through the sighting wires 2 near their base.

Fig. 3 shows the target 1 at a shorter range r from the observer 4. The lines of sight from the observer 4 to the target 1 pass by way of the train of fixed mirrors 3 past the sighting wires 2 as they did when the target was at the longer range R, except that sighting wires 2 now appear to intersect near their tops. The appearance of the sighting wires 2 to the observer 4 when sighting at the range r is shown in Fig. 4. An "optical cross" 5 is formed by the apparent intersection of wires 2 as it was when the sight was employed at the range R, except that opaque spot 5 is near the top of said wires 2.

The purpose of the interposition of the mirror train 3 in the lines of vision from the eyes 4 of the user past the sighting wires 2 to the target 1 is to increase the apparent vertical shift of the opaque spot 5 for a given change in range. I have found that by increasing the distance apart of the sighting wires 2 and by use of a device to increase proportionately the effective inter-pupillary distance of the eyes 4 of the user, such as the mirror train 3, the effectiveness of the wires 2 as a means of forming an "optical cross" is greatly increased. That is, the sensitivity of the automatic rangefinding effect of this device to changes in range is greater, particularly at larger ranges, and a fixed rear sighting element is provided, which has hitherto been lacking in "optical cross" sights.

In Figs. 5 through 7 I show in detail a preferable construction of a device embodying my invention. I show a machine gun 10 on which is mounted rigidly, at right angles to the axis of the barrel 11, and at the rear of the weapon 10, a sighting element consisting of a sight tube 7 in which are affixed two parallel eye-pieces 6 with their axes separated by the average inter-pupillary distance of the human eyes and equidistant from the center of said sight tube 7. Eye-pieces 6 may be made adjustable for individual differences and consist simply of tubes opening into sight tube 7 and affixed thereto preferably by light-tight connections. The axes of eye-pieces 6 are parallel to the axis of barrel 11, and perpendicular to the axis of sight tube 7.

At the front of weapon 10 is mounted a support 9, parallel to sight tube 7 holding in its ends two sighting wires 8 in such a manner that the plane of the axes of eye-pieces 6 intersects said sighting wires 8 approximately midway

from top to bottom thereof. Said sighting wires 8 are of the shape and function of the wires 2 in Figs. 2 and 4.

In Fig. 6 the rear sighting element is shown partly in cross-section, revealing its internal construction. It consists of (a) a tube 7, preferably light-tight, having two openings 14 located at the extreme opposite ends of tube 7 and on the front side thereof, and having two eye-pieces 6 mounted as hereinbefore described; (b) two fixed prismatic mirrors 12 mounted within tube 7 with their respective reflecting surfaces mutually perpendicular, and arranged in such a manner as to reflect, along paths parallel to the axis of said tube 7 and with the right and left lines separated by 180° directionally, the lines of vision entering the two eye-pieces 6; (c) two fixed prismatic mirrors 13 mounted within tube 7 with their respective reflecting surfaces mutually perpendicular, and arranged in such a manner as to reflect, toward the front of the weapon 10 along paths perpendicular to the axis of tube 7 and in the plane of the axis of eye-pieces 6 the lines of vision coming from the mirrors 12 parallel to the axis of tube 7.

The rear sighting element consists essentially of two equally opposed optical trains, one right and one left, each consisting of an eye-piece 6, a fixed prismatic mirror 12, and another fixed prismatic mirror 13. These elements are mounted in a tube 7 substantially as described and so arranged that parallel beams of light entering the eye-pieces 6 are reflected along paths parallel to the entering path but separated by the distance from right mirror 13 to left mirror 13. Further, the rear sighting element is preferably constructed to permit light to enter only by the openings 14 and the eye-pieces 6. Thus, when an observer looks into the eye-pieces 6, he views the scene before him as if his eyes were separated by the distance from the left mirror 13 to the right mirror 13, and the sighting wires 8 interposed in his line of vision cooperate to form an "optical cross" which shifts its "bead" with changes in range as heretofore described and illustrated in Figs. 1 through 4.

Fig. 8 shows a modified construction of the rear sighting element employing plane mirrors 15 instead of prismatic mirrors 12 and plane mirrors 16 in place of prismatic mirrors 13.

Fig. 9 shows a modified construction of the front sighting element in which the "optical cross" forming devices 8a constitute a part of a protective shield 21. This shield 21 may be of any desired form or pattern, the operative part thereof for the purposes of this invention being the front sighting shapes 8a which, by means of the rear sighting element heretofore disclosed form the "optical cross" constituting the "bead" to be placed on the target. In the portion of the protective shield shown in Fig. 9, the lines of vision from the user to the target pass the devices 8a through the apertures 22. This is the preferred construction of a gun shield embodying my invention, but the devices 8a may be shaped on the upper left and right corners of the shield if desired.

The shape of the devices 8a, and of the sighting wires 8 employed in the form of front sighting element shown in Figs. 5 through 7, is to be determined by calculation from the trajectory of the projectile discharged by the particular weapon on which my invention is used. The operation of and purposes served by this predetermined shape is similar to the operation and pur-

poses of the sights disclosed in my letters patent previously mentioned, namely: These wires or shapes interposed in the line of vision from openings 14 to the target form when the eyes of the shooter are focused on the target an "optical cross" as described heretofore and illustrated in Figs. 1 through 4. It is preferable that the distance between the sighting shapes at their bases be slightly greater than the distance between the effective reflecting surfaces of the mirrors.

The foregoing is a description of my invention for the purpose of disclosing the spirit, scope, and operation thereof, but not intended as a limitation thereof. While I have described my invention as applied to a machine gun it is to be understood that it may be applied to any object to be aimed, as, for example, an airplane carrying fixed guns. Moreover, although I have described my invention as embodied in a sight of portable size, useful on small arms, it is no departure from the invention herein disclosed to construct a sight employing any practicable dimensions, for example, mounting the prismatic mirrors 13 and the sighting wires 8 in the disclosed relationship to each other and to the eye-pieces 6 and prismatic mirrors 12 on the left and right wing tips of an airplane. It will be understood that these and other changes may be made within the scope of my invention as set forth in the appended claims.

I claim:

1. A binocular sight for an instrument to be aimed comprising a pair of eye-pieces, reflecting means aligned with each of said eye-pieces, a second reflecting means positioned transversely and outwardly of the line of vision through each of said eye-pieces, said second reflecting means being spaced apart a distance substantially greater than said eye-pieces, said first mentioned and said second mentioned reflecting means being so positioned with respect to one another and to said eye-pieces that said second mentioned reflecting means is adapted to reflect images onto said first mentioned reflecting means and said first mentioned reflecting means is adapted to reflect such images impinging thereon through said eye-pieces, and a sighting element positioned in alignment with each of said second reflecting means, and at the opposite side of said reflecting means from said eye-pieces, said sighting elements being spaced apart a distance substantially equal to the spacing of said second reflecting means and converging upwardly, said sighting elements, when an object beyond said sighting elements aimed at is viewed by a person with both eyes, producing the optical effect of crossing one another at varying points, depending on the distance of said object from the person doing the aiming.

2. A binocular gun sight comprising a pair of eye-pieces, reflecting means aligned with each of said eye-pieces, a second reflecting means positioned transversely and outwardly of the line of vision through each of said eye-pieces, said second reflecting means being spaced apart a distance substantially greater than said eye-pieces, said first mentioned and said second mentioned reflecting means being so positioned with respect to one another and to said eye-pieces that said second mentioned reflecting means is adapted to reflect images onto said first mentioned reflecting means and said first mentioned reflecting means is adapted to reflect such images impinging thereon through said eye-pieces,

and a sighting element positioned in alignment with each of said second reflecting means, and at the opposite side of said reflecting means from said eye-pieces, said sighting elements being spaced apart a distance substantially equal to the spacing of said second reflecting means and converging upwardly, but not intersecting within the area visible through said eye-pieces by means of said reflecting means, said sighting elements, when an object beyond said sighting elements aimed at is viewed by a person with both eyes, producing the optical effect of crossing one another at varying vertical points, depending on the distance of said object from the person doing the aiming.

3. A binocular gun sight comprising a pair of eye-pieces, reflecting means aligned with each of said eye-pieces, a second reflecting means positioned transversely and outwardly of the line of vision through each of said eye-pieces, said second reflecting means being spaced apart a distance substantially greater than said eye-pieces, said first mentioned and said second mentioned reflecting means being so positioned with respect to one another and to said eye-pieces that said second mentioned reflecting means is adapted to reflect images onto said first mentioned reflecting means and said first mentioned reflecting means is adapted to reflect such images impinging thereon through said eye-pieces, and a sighting wire positioned in alignment with each of said second reflecting means and at the opposite side of said reflecting means from said eye-pieces, said sighting wires being spaced apart a distance substantially equal to the spacing of said second reflecting means and converging upwardly, but not intersecting within the area visible through said eye-pieces by means of said re-

5 reflecting means, said sighting wires, when an object beyond said sighting wires aimed at is viewed by a person with both eyes, producing the optical effect of crossing one another at varying vertical points, depending on the distance of said object from the person doing the aiming.

10 4. A binocular gun sight comprising a pair of eye-pieces, reflecting means aligned with each of said eye-pieces, a second reflecting means positioned transversely and outwardly of the line of vision through each of said eye-pieces, said second reflecting means being spaced apart a distance substantially greater than said eye-pieces, said first mentioned and said second mentioned reflecting means being so positioned with respect to one another and to said eye-pieces that said second mentioned reflecting means is adapted to reflect images onto said first mentioned reflecting means and said first mentioned reflecting means is adapted to reflect such images impinging thereon through said eye-pieces, and a sighting wire positioned in alignment with each of said second reflecting means and at the opposite side of said reflecting means from said eye-pieces, said sighting wires being spaced apart a distance substantially equal to the spacing of said second reflecting means and each curving upwardly and inwardly, but not intersecting within the area visible through said eye-pieces by means of said reflecting means, said sighting wires, when an object beyond said sighting wires aimed at is viewed by a person with both eyes, producing the optical effect of crossing one another at varying vertical points, depending on the distance of said object from the person doing the aiming.

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