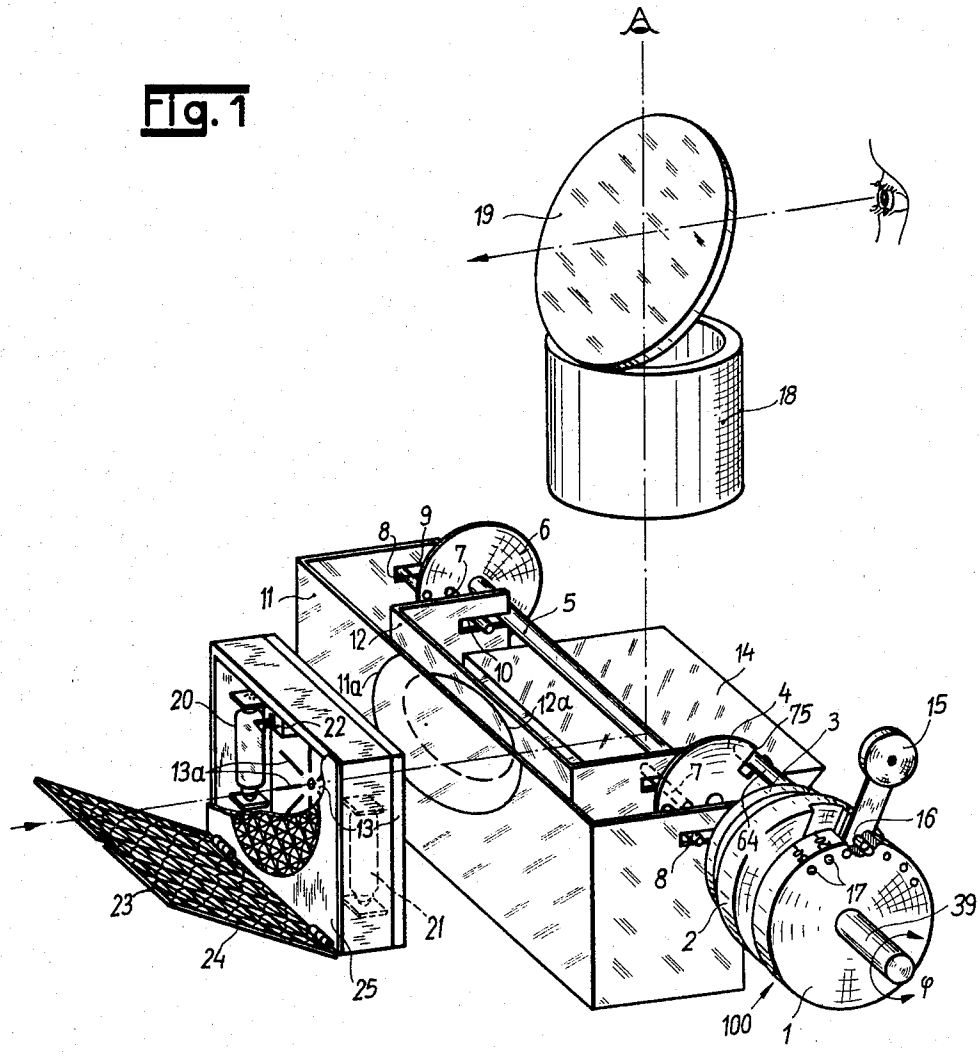
Aug. 2, 1966 H. EGLIN ETAL 3,263,566
GUN SIGHTS PARTICULARLY FOR LIGHT DEFENSIVE WEAPONS
FOR USE AGAINST MOVING AERIAL TARGETS
Filed Oct. 1, 1964 4 Sheets-Sheet 1

Fig. 1



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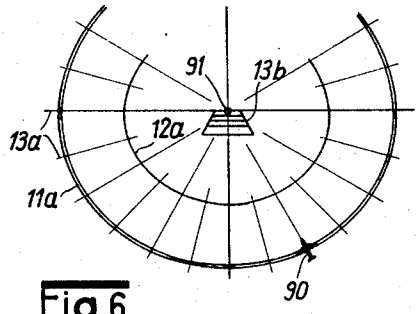
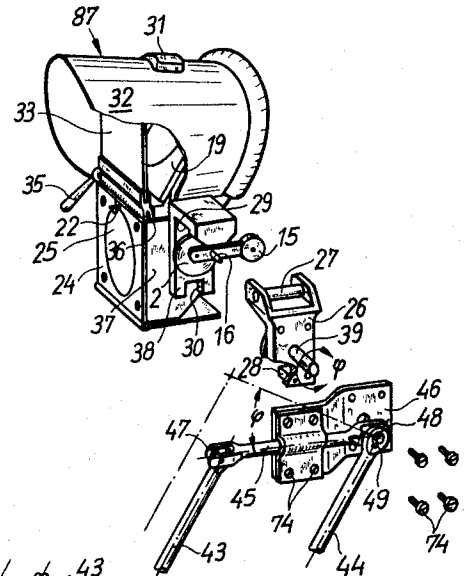


Fig.6



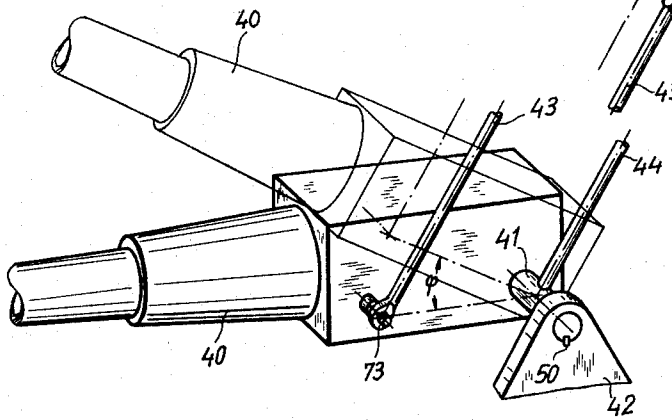


Fig.2

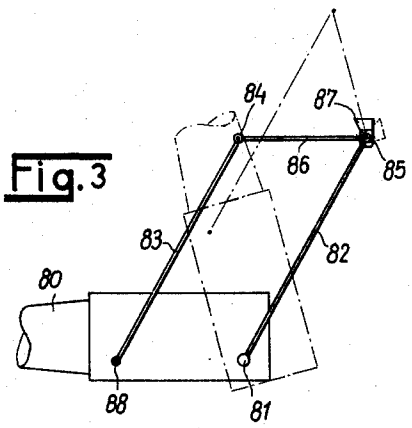


Fig.3

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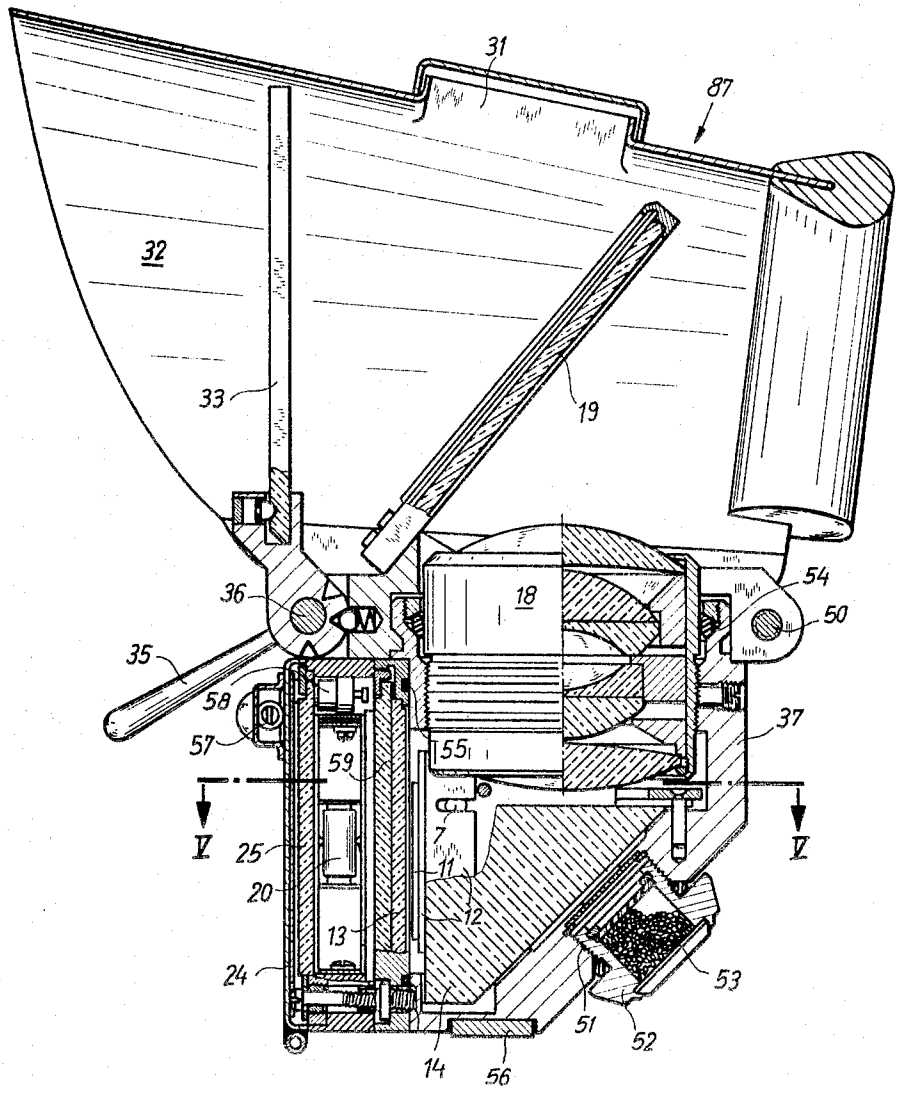
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GUN SIGHTS PARTICULARLY FOR LIGHT DEFENSIVE WEAPONS FOR USE AGAINST MOVING AERIAL TARGETS

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Fig.4

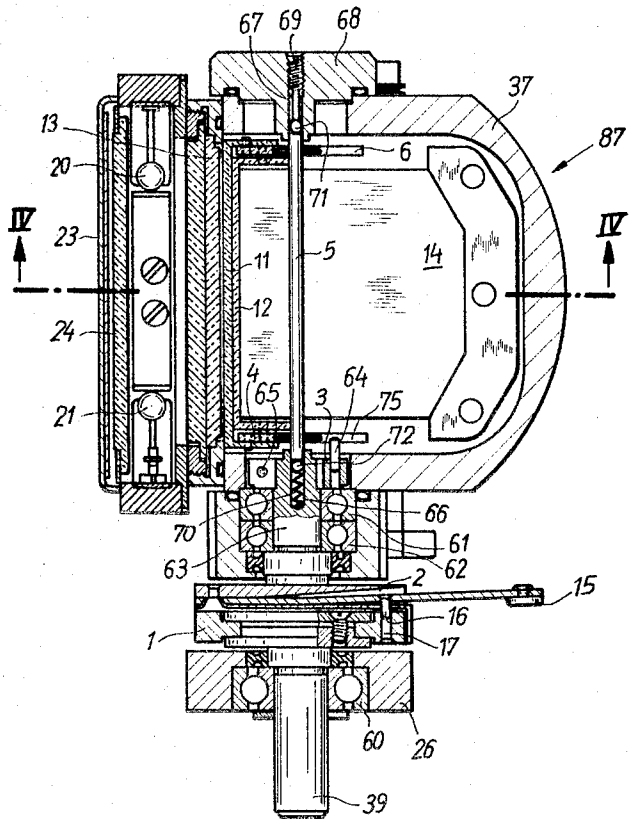


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Fig.5



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United States Patent Office 3,263,566
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3,263,566

GUN SIGHTS PARTICULARLY FOR LIGHT DEFENSIVE WEAPONS FOR USE AGAINST MOVING AERIAL TARGETS

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Filed Oct. 1, 1964, Ser. No. 400,640
Claims priority, application Germany, Dec. 28, 1959, M 43,831
13 Claims. (Cl. 89—41)

This application is a continuation-in-part of application Serial No. 77,178, filed December 20, 1960, and now abandoned.

This invention relates in general to weapon sighting devices and in particular to a new and useful sighting device especially for light defensive weapons for combatting a moving aerial target which is provided with lead indications which are adjustable solely in accordance with changes in elevation of the weapon.

It is already known to provide sights with an arrangement for determining the speed allowance or amount of lead and to represent the direction of the lead values as apparent direction of flight in the field of vision of a telescope or of a reflex sight superimposed on radially extending location marks. The magnitudes of the lead values are indicated by the points of intersection of the radially extending location marks with the lead curves which are indicated. The lead curves and the position of the lead curve plate in respect to the location marks are automatically determined by a suitable calculating gearing from the mathematical interrelationship of the direction readings for both elevation and traverse of the weapon.

With light weapons which are particularly usable against moving aerial targets, as a rule only the elevational movement of the weapon is effected by gearing. The traversing movement of the weapon is controlled by the gunner swinging the carriage by pushing his feet against the ground. With weapons of this nature the gunner usually sits on the upper carriage. Since no gear parts are provided for the traversing movement of the weapon, the weapon is usually referred to as one without traversing gear. Thus, with a weapon of this nature there is no gear construction which is available for transmitting to the sight the angle of traverse direction of the weapon. Consequently, if a sight were used in which the traversing movement of the weapon must be taken into consideration for calculating the lead curves, it would not be possible to avoid sitting on the weapon supplementary parts which would effect the transmission of the angle of lateral deflection movement of the weapon into the sight. These complicated technical measures are, however, very unsatisfactory and above all very complicated in all cases where a modern sight is to be fitted subsequently on already existing preferably light defensive weapons. Such technical modifications on already existing light weapons cannot be carried out in most cases.

To avoid the disadvantages above indicated not only one but several radially extending location marks are provided in accordance with the invention on a transparent stationary graduated plate located in the sight. The sight includes means for superimposing indications of lead values for different target velocities on the radial line corresponding to the actual direction of flight. In a preferred arrangement there are two or more exchangeable lead curve plates having lead curves at which the lead values of the corresponding target speed are taken into consideration and the plates are driven in accordance with the invention only in dependence on the elevational movement of the weapon.

If the sight of the invention is to be used for a weapon having a ballistic characteristic which deviates from the

assumed ballistic on which the calculations for the lead curve plates or disc has been based, then only an exchange of the lead curve plates is necessary. This change can be effected in a simpler manner after disassembly of the illumination arrangement of the sight.

Because in accordance with the inventive gun sight the traverse angle drive for the sight and its connection to the gun is dispensed with, the sight is greatly simplified and it is possible to use such a sight on a weapon which does not have any traversing gear. The lead values which are provided on the lead curve plate are calculated for horizontal flight. In doing so a fly-over flight of constant speed is assumed. The drive of the curve plate or disc is dimensioned and arranged with known mathematical relations so that the ascertained lead curve yields mathematically exact lead values at three points.

In the case of inclined flight, so-called dive flights, the geometrical conditions change so that it is necessary to adapt the lead values to such target conditions. Owing to the fact that in the case of the sight according to the invention only the single angle of elevation or sight of the weapon is used for calculating the lead curve, these calculations are only mathematically correct for "fly-over" flights. Lead curves are, however, so calculated and shaped that the lead values are sufficiently accurate to permit use with passing flights having an inclination of the trajectory plane up to about 45°. Any errors which occur can be compensated by suitably scattering the shots in the direction of the flight. Since the sights of the invention are usable principally with light weapons, the errors are of no practical importance since such light defensive weapons are principally employed as a defense against aerial targets which attack during fly-over flights. Furthermore, such aerial targets are primarily encountered during attacks at objects very close to the weapon, such as on a naval vessel. For this reason the target flights under consideration are such that the vertical sighting movement of the weapon is far more important than the traverse sighting movement. For this reason it is possible to use lead curve controls which depend solely on a change of elevation. This applies not only for horizontal flights, but also for inclined flights. If the conditions in the case of inclined flights are considered more closely and it is assumed, for example, that the aerial target will attack the gun position directly in dive flight, such target must, as is known, become battered without lead because from the gunner's point of view the attacking target carries out neither lateral nor vertical movement. It is assumed that at the moment of picking up the target, the target is at an altitude level of 20°, that is the angle of elevation of the barrel amounts to 20°. Then the angle of sight picked up must be turned back by 20° if it is desired to bring the lead indication to zero. On the other hand, if the weapon is flown over at an angle of inclination of 10°, the angle of elevation in the sight must be turned back by the same amount, i.e., 10°, to result in a lead value adapted to the actual conditions. In any case the gunner or the gun commander has first to estimate the angle of inclination of flight of the target and then adjust the sight accordingly.

Accordingly it is an object of the invention to provide a sight which is particularly adaptable for light defensive weapons and which is very simple in construction.

A further object of the invention is to provide a sight which includes means for indicating lead values superimposed on radial reticle reference lines which lead values are shiftable solely in accordance with change in elevation of the weapon barrel in which gun sight is associated.

A further object of the invention is to provide a sight for a weapon such as a gun which includes lead values which may be superimposed on radial reticle reference lines for indicating the lead approach of a target which

lead indications are connected to the gun barrel and displaceable on change in elevation of the gun barrel.

A further object of the invention is to provide a sight which may be operated with a gun having only driving gear for changing the elevation of the gun and which may be connected to such driving gear for shifting the indications of lead of a target solely in accordance with changes of elevation of the gun, which lead values are calculated solely for elevational changes.

A further object of the invention is to provide a sighting device which includes a fixed reticle in the form of radial lines and one or more movable reticles having lead curve indications arranged in an optical system for viewing along with a moving target with a coupling connected to the movable reticles having the lead curves and to a weapon barrel for shifting the lead curves in accordance with change of elevation of the weapon barrel.

A further object of the invention is to provide a gun sight which is simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

In the drawings:

FIG. 1 is a somewhat schematic simplified perspective representation of the most essential portions of a sight constructed in accordance with the invention;

FIG. 2 is a partial exploded perspective view indicating the mounting of the sight in conjunction with a weapon such as a gun barrel;

FIG. 3 is a schematic representation of the interconnection between the barrel and the gun sight coupling;

FIG. 4 is an enlarged longitudinal section of the gun sight of FIG. 1;

FIG. 5 is a section taken on the line **5—5** of FIG. 4; and

FIG. 6 indicates a portion of the image which appears on the sight during the citing of a moving target.

Referring to the drawings in particular the invention embodied therein comprises a gun sight for light defensive weapons which includes target lead curve indications which are moved solely in accordance with the changes of elevation of a gun barrel. The change in the angle of elevation φ of a gun barrel is transmitted from the gun barrel to the sight through coupling elements **1** and **2** of a coupling assembly generally designated **100**. The coupling is connected to the weapon through a shaft **39**. The coupling **100** includes a driving part **1** and a driven part **2**, the latter having an entrainer or follower **3** which is connected for transmitting the angle of elevation φ to the axle **5** via the disc **4**. In the embodiment illustrated the axle **5** is rotatably supported on a portion of the frame for the housing of the sight in alignment with the axis of the shaft **39**. The ends of the axle **5** carry a disc **4** and **6**, respectively. The disc **4** is notched at **75** to receive a projecting pin **64** which transmits rotary movement to the shaft **5** in the manner of a crank. Each of the discs **4** and **6** carry pins **7** and **8**, respectively, which engage in slots **9** and **10**, respectively, of movable lead curve plates or elements **11** and **12**, respectively. Thus rotation of the discs **4** and **6** causes raising and lowering of the lead curve plates **11** and **12**, in accordance with the direction and amount of rotation of the shaft **5**. The lead curve plates **11** and **12** are transparent and are provided with lead curves **11***a* and **12***a* and movement of the plates **11** and **12** by rotation of the shaft **5** causes the upward and downward movement of the curves which in the relationship indicated is proportional to the sine of the angle φ. The transparent

plates **11** and **12** are advantageously made of an unbreakable synthetic glass or plastic.

A stationary or fixed plate or reticle member **13** having graduated radial location marks **13***a* is arranged in parallel spaced relationship with the plates **11** and **12** and in respect to a prism **14**. Light enters the optical system through the transparent graduated plate **13**. Illumination devices **20** and **21** are arranged within a rectangular housing formed in front of the plate **13** and the plates **11** and **12** in the event of insufficient daylight, for example. Two lamps **20** and **21** are connected by switch **22** to a current source (not shown). The switch **22** closes the circuit when a lid **24** of the illumination device is closed. The lid **24** is provided with a diffusely reflecting coating **23**. A scattering disc or plate **25** is arranged in front of the illumination device and serves the purpose of scattering in a diffused manner the entering daylight in the event that the lid **24** is opened and to also scatter the reflecting light if the lid **24** is closed. In accordance with the invention the lead curve plates **11** and **12** each correspond to a different target speed. A different curve or ellipse **11***a* and **12***a* is calculated for each individual basic speed. By a displacement of the pins **7** and **8**, as indicated in FIG. 1, a change in the drive ratios of the lead curve plates **11** and **12** is effected. The distance of the pins **7** and **8** from the axle **5** is chosen so that with known mathematical relationships three points can be ascertained which are widely spaced from each other and which will supply mathematically exact lead values. Due to these three points and also under employment of additional mathematical relations a curve can be drawn which in its entire path or course supplies lead values in dependence on the angle of elevation of the weapon along with insignificant errors. The curves **11***a* and **12***a* on the lead curve plates **11** and **12** are formed as average values of a curve bundle represented with Cartesian coordinates. The curve bundles are calculated for the function of $\Delta=f(\varphi)$ for different flights where Δ is the lead angle and the apparent flying direction.

The sight includes a tube arranged concentrically to the axis of the optical system with a semi-reflecting mirror **19** which permits the viewing of the target lead angles and the reticle indications **13***a* simultaneously.

The inclination of a flight is taken into consideration by setting the estimated inclination of the flight by means of a lever **15** which is pivoted on the axis or shaft **39** and which includes a pin **16** which may be engaged in one of a plurality of angularly spaced cylindrical openings **17** formed on the driving coupling part **1**. The lever **15** is resiliently connected with the driven coupling part **2** and positively connected with the driving coupling part **1** when the pin **16** is engaged in a selected opening **17**. The lever **17** is shifted to align the pin with an opening in the driving part **1** which corresponds with the angle of elevation of the target. The driving coupling part **1** has a scale for the inclination of flight adjustable from 10° to 30° in the embodiment indicated. A displacement of the lever **15** causes simultaneously an alteration of the angle of elevation φ between the gun barrel and the sight.

The prism **14** can be swung by a suitable drive (not shown) from the angle of elevation to the angle of sight.

The apparatus preferably has a special reflex optical system with a 62 mm. focal length which projects into infinity several polar lines as apparent direction of flight. The above mentioned lead curve plates **11** and **12** are located in the optical path of the light rays and they supply the lead values as interruptions of the polar lines **13***a* for two different target speeds. The plates **11** and **12** are exchangeable and are calculated or designed for the respective ballistic. If the sight is to be changed to a different ballistic which may be the result for example when it is used on a weapon of different caliber or due to the use of a different type of ammunition, it is a simple

matter to change the curve discs **11** and **12** to compensate for such change. This exchange can be effected after the disassembly of the electrical illumination device **22** and **23** and of the graduated disc or plate **13**.

In FIG. 2 the sight generally designated **87** is indicated in a position connected with a gun barrel **40**. The portions of the sight **87** which correspond to those indicated in FIG. 1 are similarly designated. The sight **87** includes a casing or housing **87** onto one side of which an angle member or piece **38** is secured. The angle piece has a groove **29** adjacent the upper portion thereof and includes a recess **30** cut into the bottom end. The leg portions on each side of the recess **30** are provided with a bearing for receiving a bolt **27** of a mounting bracket **26** having a guide piece **28** which is secured on a gun barrel or an extension thereof. The shaft **39** which is connected with the driving part **1** of the coupling **100** is rotatable in the mounting **26** as best indicated in FIG. 5. The driven part **2** of the coupling **100** together with the lever **15** which is connected to the coupling driven part **2** is mounted at the angle member **38** which is secured to the sight **87**. A blocking device (not shown) is provided for locking the holding means **38** and **26** which are secured on the sight and on the gun respectively. The bracket **26** is secured to the gun by means of screws **74** carried by the lock member **46** and supported on the rod **45**. The two ends of the rod **45** are pivotally connected to parallel extending rods **43** and **44** at pivot points **47** and **48** respectively. The rod **44** at its opposite end is connected with a bearing pin **41** which is held against rotation on a mounting bracket **42** by a key **50**. The gun barrel **40** is pivotally mounted on the pin **41**. The rod **44** is keyed to the shaft **39** by means of a key **49**. The lower end of the rod **43** is pivotally connected to the gun barrel **40** at a spacing from the pin **41** which corresponds the length of the rod **45**. The gun **40** may be moved from a solid line position to the dotted line position indicated in FIG. 2 through the angle φ as indicated and this same angle of rotation will be imparted to the shaft **39** relative to the casing **37** of the gunsight **87** by the corresponding movement of the connecting rod **45** which causes the shifting of the housing **37** while rod **44** holds shaft **39** against rotation.

The relative rotation of the shaft **39** will be imparted through the coupling parts **1** and **2** into the sight **87**. The relative rotary movement effected on the shaft **39** is equal to the vertical sighting movement which is performed by the gun barrel **40** about its gun barrel **41**.

In FIG. 3 the drive of the sight is indicated schematically for a gun barrel **80** which is rotatable about a bearing pin **81**. A rod **82** is secured at the bearing pin **81** and an additional parallel rod is pivoted at a pivot pin **88** spaced from the bearing pin **81** by the distance equivalent to the rod **86** connecting the other end of the rod **80** at a pivot **84**. The sight **87** is secured at the rod **86** and thus it will be pivoted by an amount equivalent to the change of elevation of the gun barrel **80**. The joint **85** of the parallelogram is situated at the level of the neck of a gunner (not shown). If the barrel of the gun **80** is pivoted upwardly then the parallelogram rod system will assume the dotted line position indicated in FIG. 3. This movement can be followed by the gunner through a corresponding inclination of his head. The gunner will sit on a seat (not shown) which does not perform the vertical sighting movement of the gun.

FIGS. 4 and 5 show the details of the sight corresponding to FIG. 1 with parts similarly designated. Sight **87** is provided with a protecting hood **32** which has an additional closable viewing opening at the top at **31** for viewing by a supervisor who trains the gunner. In front of the semi-transparent mirror or reflex plate **19** there is arranged an exchangeable color disc or plate **33** in the field of vision of the sight. This disc **33** is pivotal about an axis **36** by means of a lever **35** permitting the sight to be adapted to the prevailing sight conditions. In some

instances instead of a color disc **33** there is provided a polarization filter of known construction.

A protective hood **32** is pivotal about a pivot point **50** at the casing **37** of the sight **87**. The hood **32** is pivoted backwardly about the pivot **50** for access to the optical parts of the sight for cleaning purposes. The hood **32** in this manner will be lifted completely off the color disc **33** and the mirror **19**. In this manner each of these elements may also be cleaned.

A cylindrical capsule or plug **52** is threaded into a threaded bore **51** of the casing and contains a medium or agent **53** which absorbs moisture. In this manner any moisture which penetrates the sealings or washers **55** may be effectively absorbed. At the bottom of the casing **37** there is a magnet **56** which holds the open lid **24** of the illumination device in its position. Contrary to the showing indicated in FIGS. 1 and 2 there is arranged at the lid **24** a safety device **57** which holds the closed lid **24** against the force of the pressure contact switch **58**. The pressure contact switch **58** is built into the device instead of the switch **22** of FIGS. 1 and 2 and it is provided with a holding hook. An additional strain or scattering disc **59** is arranged in front of the graduated disc or plate **13**.

As best indicated in FIG. 5 the sight **87** is provided with ball bearings **60** which rotatably mount the shaft **39** in the mounting brackets **26**. The driven coupling part **2** is provided with a stub shaft extension **63** which is rotatably mounted in ball bearings **61** and **62** in the casing **37** of the sight. On the stub shaft **63** there is secured the follower disc **3** by means of a clamping screw **65**. A follower pin **64** is secured in the disc **3** and engages in a slot **75**. At the other end of the shaft **5** there is secured the disc **6** and the shaft **5** is rotatable in bores **66** of the stub shaft **63** and **67** of a bearing shield **68** which is secured at the opposite side of the casing **37**. The axle **5** is longitudinally slidably mounted in these bores and may be adjusted in a selected position by means of a set screw **69** acting against the force of a spring **70** which is arranged between the ends of the shaft **5** and the interior of the bore **66**. In order to reduce the friction against the ends of the axle **5** balls **71** and **72** are provided.

The rotary movement of the axle **5** is equivalent to the rotary angle φ indicated in FIG. 2 which is comparable to the change in elevation of the gun barrel about its bearing pin **41**. This rotary movement is transformed in the sight by means of the crank drive into a transitory movement of the lead curve plates **11** and **12** corresponding to the sine of the elevation angle φ. The plates **11** and **12** are driven by the pins **7** and **8** which are secured to the respective discs **4** and **6** and which engage in the respective slots **9** and **10** as described previously in respect to FIG. 1.

In FIG. 6 there is indicated the image or picture which is seen in the sight. The stationary graduated disc **13** in the sight supplies the radially extending line markings **13***a* for the aerial target and in addition lead markings **13***b* for movable ground targets for broadening the utilization field of the sight. The lead curve discs which are driven in dependence on the vertical or elevational sighting movement of the weapon yield the lead curves **11***a* and **12***a*.

A target **90** is located in the sight so that the current flying direction extends radially to the center point **90** of the sight. The polarrays **13***a* of the sight marking facilitate the recognition of the apparent flying direction. As soon as the target **90**, thus sighted, comes into the field of a lead curve or crosses a lead curve **11***a* or **12***a* which corresponds to the assumed target speed the gunner will open fire. The lever **15** indicated in FIG. 1 will during horizontal flight be always in the zero position and will be changed in correspondence to any change in elevation of the target flying elevation. The change in elevation of the target in respect to the horizontal is estimated and the changes set by the lever **15** in the sight. The

consideration in the change of elevation angle of the weapon is accomplished by the coupling **100** which imparts a positive or negative inclination relative to the axis of the barrel or gun.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A gun sight particularly for a light defensive weapon and for use against moving aerial targets, comprising a stationary transparent plate carrying a plurality of radially extending visual lines, at least one movable transparent plate having a visible lead curve defined thereon corresponding to target speed, said movable plate being located in spaced relationship to said fixed plate in a position to permit the lead curve of said movable plate to be superimposed on the image of the visual lines of said fixed plate, optical means associated with said fixed and movable plates and having an optical axis arranged at the center of the radial lines of said fixed plate and including means for viewing a moving target superimposed on the images of said lead curve and said radial lines, a coupling for transmitting changes of angle of elevation from a weapon barrel including a driving part adapted to be connected to the weapon barrel and to be rotated in proportion to the change of elevation of the weapon barrel and a driven part, said driven part being shiftable angularly in respect to said driving part for changing the orientation of said driven part in respect to said driving part for the purpose of allowing for different angles of flight of a target, said driven part being connected to said movable transparent plate, said driven part and said movable plate with the lead curve being movable upon rotation of said driving part.

2. A sight for use in association with a weapon barrel and adjustable solely by vertical movement of the weapon barrel particularly for use against moving aerial targets, comprising a transparent stationary plate carrying a plurality of radially extending visual lines, at least one movable transparent plate having a visible lead curve defined thereon corresponding to the target speed, said movable plate being located in spaced relationship to said fixed plate in a position to permit the lead curve of said movable plate to be superimposed on the image of the visual lines of said fixed plate, a coupling for transmitting changes of angle of elevation from the weapon barrel including a driving part adapted to be connected to a gun barrel and to be rotated in proportion to the change of elevation of the gun barrel and a driven part, said driven part being shiftable angularly in respect to said driving part for changing the orientation of said driven part in respect to said driving part for the purpose of allowing for the different angles of flight of a target, said driven part being connected to said movable transparent plate and being effective upon movement to change the position of said movable transparent plate and the location of the image of the lead curve thereon which is viewed in conjunction with the radial lines on said fixed plate and with said target.

3. A sight for use in association with a weapon barrel and having a visible target lead indications which are movable solely by vertical movement of the weapon barrel and particularly adaptable for use against a moving aerial target, comprising a stationary transparent plate carrying a plurality of radially extending visual lines, a first moving plate having a first visible lead curve defined thereon corresponding to a first preselected target speed characteristic, a second movable plate having a second visible lead curve defined thereon corresponding to a second preselected target speed characteristics, said first and second movable plates and said fixed plate being located in spaced parallel relationship, said first and second movable plates and said fixed plate being transparent to permit the first and second lead curves and the radial lines to be superimposed in a viewed image, optical means associated with said first and second movable plates and said fixed plate and having an optical axis arranged at the center of the radial lines of said fixed plate and including means for viewing a moving target superimposed on the images of said first and second lead curves and said radial lines, a coupling for transmitting changes of angle of elevation from a weapon barrel including a driving part adapted to be connected to a gun barrel and to be rotated in proportion to the change of elevation of said gun barrel and a driven part, said driven part being connected to said first and second movable transparent plates and being effective upon movement to change the position of said first and second movable transparent plates and the location of the first and second images of the lead curves thereon.

4. A sight for use in association with a weapon barrel and having visible target lead indications which are movable solely by vertical movement of the weapon barrel and particularly adaptable for use against a moving aerial target, comprising a stationary transparent plate carrying a plurality of radially extending visual lines, a first moving transparent plate having a first visible lead curve defined thereon corresponding to a first preselected target speed characteristic, a second movable transparent plate having a second visible lead curve defined thereon corresponding to a second preselected target speed characteristic, said first and second movable plates and said fixed plate being located in spaced parallel relationship, optical means associated with said first and second movable plates and said fixed plate including means for viewing a moving target superimposed on the images of said first and second lead curve and said radial lines, a coupling for transmitting changes of angle of elevation from a weapon barrel including a driving part adapted to be connected to a weapon barrel and to be rotated in proportion to the change of elevation of the gun barrel and a driven part, said driven part being connected to said first and second movable transparent plates and being effective upon movement to change the position of said first and second movable transparent plates and the location of the first and second images of the lead curves thereon in said viewing means, said driven part being shiftable angularly in respect to the said driving part for changing the orientation of said driven part in respect to said driving part for the purpose of allowing for the different angles of flight of a target.

5. A sight for use in association with a weapon barrel and having visible target lead indications which are movable solely by vertical movement of the weapon barrel and particularly adaptable for use against a moving aerial target, comprising a stationary transparent plate carrying a plurality of radially extending visual lines, a first movable transparent plate having a first visible lead curve defined thereon corresponding to a first preselected target speed characteristic, a second movable transparent plate having a second visible lead curve defined thereon corresponding to a second preselected target speed characteristic, said first and second movable plates and said fixed plate being located in spaced parallel relationship, optical means associated with said first and second movable plates and said fixed plate for viewing a moving target superimposed on the images of said first and second lead curve and said radial lines, a coupling for transmitting changes of angle of elevation from a weapon barrel including a driving part adapted to be connected to a gun barrel and to be rotated in proportion to the change of elevation of said gun barrel and a driven part, said driven part being connected to said first and second movable transparent plates and being effective upon movement to change the position of said first and second movable transparent plates and the locations of the respective first and second images of the lead curves thereon, a disc member connected to said driven part and rotatable therewith, first and second pins projecting outwardly from said disc member

at spaced locations from the center of rotation thereof and engageable with said first and second movable plate members respectively for shifting said first and second plate member upon rotation of said driven part and said disc.

6. A sight for use in association with a weapon barrel and having visible target lead indications which are movable solely by vertical movement of the weapon barrel and particularly adaptable for use against a moving aerial target, comprising a stationary transparent plate carrying a plurality of radially extending visual lines, a first moving plate having a first visible lead curve defined thereon corresponding to a first preselected target speed characteristic, a second movable plate having a second visible lead curve defined thereon corresponding to a second preselected target speed characteristic, said first and second movable plates and said fixed plate being located in spaced parallel relationship, said first and second movable plates and fixed plate being transparent to permit the first and second lead curves and the radial lines to be superimposed in a viewed image, optical means associated with said first and second movable plates and said fixed plate for viewing a moving target superimposed on the images of said first and second lead curve and said radial lines, a coupling for transmitting changes of angle of elevation from a weapon barrel including a driving part adapted to be connected to a gun barrel and to be rotated in proportion to the change of elevation of said gun barrel and a driven part, said driven part being connected to said first and second movable transparent plates and being effective upon movement to change the position of said first and second movable transparent plates and the location of the first and second images of the lead curves in said optical means, a disc member connected to said driven part and rotatable therewith, first and second pins projecting outwardly from said disc member at spaced locations from the center of rotation thereof and engageable with said first and second movable plate members respectively for shifting said first and second movable plates upon rotation of said driven part and said disc, a second disc member connected to said driven member, said first disc member and said second disc member being arranged adjacent the respective ends of said first and second movable plates, each of said disc members including first and second pins projecting outwardly therefrom and engageable with said respective ones of said first and second movable plates whereby each end of said movable plates is shifted correspondingly upon rotation of said first and second disc members with said driven member.

7. A gun sight particularly for light defensive weapons and for use against moving aerial targets, comprising a casing, a stationary transparent plate mounted in said casing adjacent the front thereof and carrying a plurality of radially extending visual lines, at least one movable transparent plate arranged in spaced parallel relationship to said stationary transparent plate within said casing, said movable plate having a visible lead curve defined thereon corresponding to target speed, means on said casing for viewing a target, the visual radial lines of said fixed plate and the lead curves of said movable plate in superimposition, a shaft rotatably mounted in said casing and having crank means thereon connected to said movable plate for displacing said plate upwardly and downwardly in said casing in accordance with the amount and direction of rotation of said shaft clockwise and counterclockwise, and means for connecting said shaft and said casing to a weapon barrel for rotating said shaft relatively to said casing in accordance with a change in elevation of a weapon barrel to cause a corresponding change in position of the movable transparent plate and the lead curve thereon.

8. A gun sight particularly for light defensive weapons and for use against moving aerial targets, comprising a casing, a stationary transparent plate mounted in said casing adjacent the front thereof and carrying a plurality of radially extending visual lines, at least one movable transparent plate arranged in spaced parallel relationship to said stationary transparent plate within said casing and to the rear of said stationary transparent plate, said movable plate having a visible lead curve defined thereon corresponding to target speed, means for viewing a target, the visual radial lines of said fixed plate and the lead curves of said movable plate in superimposition from the rear of said casing, a shaft rotatably mounted in said casing and having crank means thereon connected to said movable plate for displacing said plate upwardly and downwardly in said casing in accordance with rotation of said shaft clockwise and counterclockwise and means for connecting said shaft and said casing to a weapon barrel for rotating said shaft and said casing relatively in accordance with a change in elevation of a weapon barrel to cause a corresponding change in position of the movable transparent plate and the lead curve thereon, said crank means connecting said shaft with said movable transparent plate comprising a disc at each end of said shaft rotatable therewith, a pin projecting outwardly from each of said discs in a direction substantially parallel to said shaft, said movable plate having a portion at each end extending parallel to said disc with slots in which said pins are confined.

9. A gun sight particularly for light defensive weapons and for use against moving aerial targets, comprising a casing, a stationary transparent plate mounted in said casing adjacent the front thereof and carrying a plurality of radially extending visual lines, at least one movable transparent plate arranged in spaced parallel relationship to said stationary transparent plate within said casing and to the rear of said stationary transparent plate, said movable plate having a visible lead curve defined thereon corresponding to target speed, means for viewing a target, the visual radial lines of said fixed plate and the lead curves of said movable plate in superimposition from the rear of said casing, a shaft rotatably mounted in said casing and having crank means thereon connected to said movable plate for displacing said plate upwardly and downwardly in said casing in accordance with rotation of said shaft clockwise and counterclockwise, means for connecting said shaft and said casing to a weapon barrel for rotating said shaft relatively to said casing in accordance with a change in elevation of a weapon barrel to cause a corresponding change in position of the movable transparent plate and the lead curve thereon, said crank means connecting said shaft with said movable transparent plate comprising a disc at each end of said shaft rotatable therewith, a pin projecting outwardly from each of said discs in a direction susbtantially parallel to said shaft, said movable plate having a portion at each end extending parallel to said disc with slots in which said pins are confined, and a second movable plate located in spaced parallel relationship to said first movable plate, said crank means connecting said second movable plate for moving said plate upwardly and downwardly in accordance with the rotation amount and direction of said shaft

10. A weapon sight and weapon barrel combination comprising a weapon barrel, means mounting said weapon barrel for pivotal movement about a horizontal axis for change in elevation, a sight mounted on said barrel and being movable therewith when said barrel is changed in elevation, a fixed reticle carried within said sight including radially extending visual lines, a movable reticle having a lead curve defined thereon corresponding to target speed arranged adjacent said fixed reticle, means in said sight for viewing the radial lines of said fixed reticle, the lead curve and a target simultaneously in a superimposed image, a rotatable shaft in said sight, crank means connecting said rotatable shaft with said movable reticle for displacing said reticle in an amount and direction in accordance with the amount and direction of rotation of said shaft and drive means connecting said shaft to said weapon barrel for rotating said shaft relatively to said casing in

accordance with change of elevation of said barrel about its pivotal mounting.

11. A weapon sight and weapon barrel combination comprising a weapon barrel, means mounting said weapon barrel for pivotal movement about a horizontal axis for change in elevation, a sight including a casing mounted on said barrel and being movable therewith when said barrel is changed in elevation, a fixed reticle carried within said sight including radially extending visual lines, a movable reticle having a lead curve defined thereon corresponding to target speed arranged adjacent said fixed reticle, means in said sight for viewing the radial lines of said fixed reticle, the lead curve and a target simultaneously in a superimposed image, a rotatable shaft in said sight, crank means connecting said rotatable shaft with said movable reticle for displacing said reticle in an amount and direction in accordance with the amount and direction of rotation of said shaft and drive means connecting said shaft to said weapon barrel for rotating said shaft in accordance with change of elevation of said barrel about its pivotal mounting, said drive means including a coupling with means for shifting the position of said shaft relatively to said gun sight casing for accounting for variations in elevation in target.

12. A weapon sight and weapon barrel combination comprising a weapon barrel, means mounting said weapon barrel for pivotal movement about a horizontal axis for change in elevation, a sight including a casing mounted on said barrel and being movable therewith when said barrel is changed in elevation, a fixed reticle carried within said casing including radially extending visual lines, a movable reticle having a lead curve defined thereon corresponding to target speed arranged adjacent said fixed reticle, means in said casing for viewing the radial lines of said fixed reticle, the lead curve and a target simultaneously in a superimposed image, a rotatable shaft in said casing, crank means connecting said rotatable shaft with said movable reticle for displacing said reticle in an amount and direction in accordance with the amount and direction of rotation of said shaft, drive means connecting said shaft to said weapon barrel for rotating said shaft relatively to said sight casing in accordance with the change of elevation of said barrel about its pivotal mounting, said drive means including a coupling with means for shifting the position of said shaft in said sight casing for accounting for variations in elevation of a target, said coupling including a driven part connected to said shaft, a lever resiliently carried by said driven part, a pin extending outwardly from said lever, a driving part adapted to be connected to the weapon barrel and means for shifting said lever to position a pin in engagement with said driving part for orienting said shaft in accordance with the elevation of a target to be encountered.

13. A weapon sight and weapon barrel combination comprising a weapon barrel, means mounting said weapon barrel for pivotal movement about a horizontal axis for change in elevation, a sight mounted on said barrel and being movable therewith when said barrel is changed in elevation, a fixed reticle carried within said sight including radially extended visual lines, a movable reticle having a lead curve defined thereon corresponding to target speed arranged adjacent said fixed reticle, means in said sight for viewing the radial lines of said fixed reticle, the lead curve and a target simultaneously in superimposed image, a rotatable shaft in said sight, crank means connecting said rotatable shaft with said movable reticle for displacing said reticle in an amount and direction in accordance with the amount and direction of rotation of said shaft and drive means connecting said shaft to said weapon barrel for rotating said shaft in accordance with the change of elevation of said barrel about its pivotal mounting, said drive means including a coupling with means for shifting the position of said shaft in said gun sight for accounting for variations in elevation in targets, a first rod member rotatable on said shaft, said sight being mounted on said rod member, a second rod member secured to said shaft for rotation therewith and extending downwardly therefrom, said gun barrel being pivotally mounted on a horizontal axis, said second rod member being pivotally connected to said horizontal pivotal axis, a third rod member pivotally connected to said first rod member at its upper end and pivotally connected to said weapon barrel at a spaced location from an axle by an amount of spacing equivalent to the dimensions of said first rod member, said third rod member and said first rod member being pivotal upon change in elevation of said weapon barrel to cause a corresponding rotational movement of said shaft.

No references cited.

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