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SIGHTING DEVICE FOR GUNS.
APPLICATION FILED NOV. 3, 1913.

1,095,048.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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Fig. 9.

Fig. 10.

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SIGHTING DEVICE FOR GUNS.

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To all whom it may concern:

Be it known that I, KARL VÖLLE, engineer, a subject of the German Emperor, residing at 12 Scharnhorststrasse, Dusseldorf, Germany, have invented certain new and useful Improvements in Sighting Devices for Guns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Sighting devices for firing at elevated targets are usually constructed so that when they are used the range must first be determined. In aiming at elevated targets the sight angle of elevation for the given range is then corrected for the altitude of the target by means of a curved adjusting device connected with the sighting apparatus. The range is first determined because in the usual sighting apparatus only the setting for range is necessary and for a long time only this type of apparatus has been used for firing at elevated targets. In sighting apparatus for firing at elevated targets, however, the setting for the range alone is not sufficient. The elevated targets which mainly come into question are air craft which change their position in such a manner that the distance is always varying, while the elevation remains substantially constant.

The present invention relates to a construction adapted for these conditions, in which the sighting apparatus is first set for a given altitude of the target and then, by sighting the target, the angle between the line of sight and the horizontal plane (the angle of site) and the variable angle of elevation, depending on the range and angle of site, are automatically set. For all targets moving in a plane at constant height only a single adjustment by hand is necessary; on sighting the target the correct sight angle of elevation is then automatically set.

The sighting apparatus is so constructed that for targets lying in the same horizontal plane as the barrel no automatic adjustment is required, but in this case the angle of elevation is set in the usual manner by a tangent sight or its equivalent. When firing at elevated targets the tangent sight is not adjusted, but the altitude of the target is allowed for by changing the position of the curved device which acts on the natural line of sight. This curved device consists of a circular arc in which a link engages; the latter is connected with a carrier provided with the sighting apparatus consisting of rear and fore sight or of a sighting telescope. The length of the link and its point of attachment to the sight are so selected that the sight angle of elevation is adjusted as accurately as possible for all altitudes and ranges by means of the circular arc. When the arc is set for the same horizontal plane as the barrel, it comes into such a position that the line of sight is not affected when the barrel is adjusted to the required angle of elevation.

In the accompanying drawings Figures 1 to 5 are diagrams illustrating the mode of operation of the sighting apparatus; Figs. 6 and 7 are elevations of a sighting apparatus in different positions, and Fig. 8 is a cross section thereof; Figs. 9 and 10 are elevations of another form of sighting device in different positions.

Referring to Figs. 1 to 5, a is the sight carrier having a front sight b. On the rear end of the carrier the tangent sight rod c with its rear sight d is adjustably mounted; the link e is guided in the circular guide f; the latter is suspended at a point g from a part that does not share in the elevating movement of the gun barrel h, the suspension being such that the guide can turn about this point. It is by means of this pivoting movement that the adjustment is made for the altitude of the target. A bar i is rigidly connected with one of the trunnions so that it shares the elevating movements of the gun, and carries the link e with it.

Fig. 1 shows the sighting apparatus in the zero position of the rear sight.

In Fig. 2 the rear sight has been adjusted by displacing it through a sight angle of elevation a suitable for a target lying in the horizontal plane of the barrel. The barrel of the gun is then adjusted for the angle of elevation in the usual manner (Fig. 3). No
adjustment of the line of sight occurs in this case when the gun barrel is set on the target, since the circular guide is concentric with the axis of the trunnions.

5 Fig. 4 shows the setting of the sighting apparatus for an elevated target; the circular guide $f$ has been turned about the point $g$ to an extent depending on the altitude of the target, and the sight has thereby undergone a certain angular displacement $\beta$, relatively to the gun barrel by means of the link after the tangent sight has been adjusted to the zero position for firing at a target lying in the horizontal plane of the barrel. When the gun is set to the required angle of altitude the parts are moved from the position shown in chain dotted lines to those shown in full lines. If the target is now sighted the sight angle of elevation $\beta$

between the barrel and the sighting line is reduced to $\beta$, (Fig. 5) by the link being guided in the circular guide by the bar $z$. Should the target move until it is vertically above the gun, the angle of elevation becomes zero and the angle between the axis of the barrel and the horizontal plane is $90^\circ$. This is the case because the curve is a circular arc and is suspended from a point which lies at a distance from the trunnions equal to the radius of the arc.

A practical construction is shown in Figs. 6 to 8. The circular guide $f$ is carried by a segment $k$ and is pivoted thereto at $g$. The plate $k$ is adjustably mounted in a guide $l$ concentric with the axis of the trunnions and fixed to the gun carriage; the adjustment is made by means of a worm gear $m$ and compensates for the slope of the ground or the settlement of the wheels or the insertion of the spade, as indicated by the spirit level $n$. The guide $f$ is provided at its free end with a toothed rack $o$ so that it can be turned about the pivot $g$ by means of the worm $p$ which is journaled in the segment $k$.

The link $a$ is connected with the guide $f$ by a block $q$ which, by its connection with the bar $z$, follows the angular movement of the gun barrel. The sight carrier $s$ comprises two arms $a^1$, $a^2$ connected with a bush $r$ which is mounted so as to turn freely on a pin $s$ which is rigidly connected with the barrel trunnions and of which the axis is coaxial with the trunnions; the bar $z$ is mounted on this pin so as to turn therewith, this movement being transferred to the carrier $a$ through the link $e$. The sight rod $t$ which carries the fore sight and its adjusting device is mounted to turn freely on the arms $a^1$, $a^2$ about an axis parallel to that of the gun barrel, in order that it may be possible to compensate the inclination of the axis of the trunnions, but this adjustment is performed by a worm gear $\nu$ inserted between the carrier and the sighting rod.

65 The curvature of the guide of the link must be adapted for different altitudes. The curve when firing at targets in the horizontal plane of the barrel must be concentric with the axis of the trunnions, in order that it may not affect the sighting apparatus. For each elevation a suitable curvature must be provided.

For targets which lie in or approximately in the horizontal plane of the barrel the sight angle of elevation can be obtained by changing the position of the curved device affecting the natural or optical line of sight. In this case the usual tangent sight is not required and the curved guide is adjusted at the range disk $x$, according to the distance of the target (Figs. 9 and 10). This arrangement has the great advantage, that the curved guide for targets lying in the horizontal plane of the barrel can also be adjusted for different distances as is usual in guns for elevated firing.

Different scales, indicated in the drawings by dotted lines, are shown on the range disk. Fig. 9 shows a sighting apparatus of this kind with an optical sighting line set for a certain range for a target lying in the horizontal plane of the barrel. Fig. 10 shows the sighting apparatus directed on the target, for the case where the required angle of elevation has been given to the gun barrel.

I claim as my invention:

1. In combination with a sighting device for guns, an arcual guide, a link connected to said sighting device and controlled by said guide, and means for positioning the guide according to the position of the target.

2. In combination with a sighting device for guns, an arcual guide capable of being concentric to the trunnions of a gun barrel, a link connected to said sighting device and to said guide, and means for setting the guide eccentrically to said trunnions when the sighting device is being set for elevated targets.

3. In combination with a sighting device for guns, an arcual guide, a link connected to said sighting device and controlled by said guide, means for positioning the guide according to the position of the target, a support for the guide, and means for adjusting the position of the support to compensate for slope of the ground.

4. In combination with a sighting device for guns having trunnions, an arcual guide pivoted at one end, means for engaging the other end of the guide for holding it eccentrically or moving it eccentrically to such trunnions, a link connecting such sighting device to said guide, and a member movable with the gun barrel for shifting said link relatively to the guide.

5. In combination with a sighting device for guns, an arcual guide, a support therefor to which said guide is pivoted at one
end, means for adjusting said support, means mounted on said support for adjusting said guide, a link movable in said guide and connected to said sighting device, and a member designed to move with a gun barrel for shifting said link in said guide.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

KARL VÖLLER.  [L. s.]
Witnesses:
HELEN NUFER,
ALBERT NUFER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."