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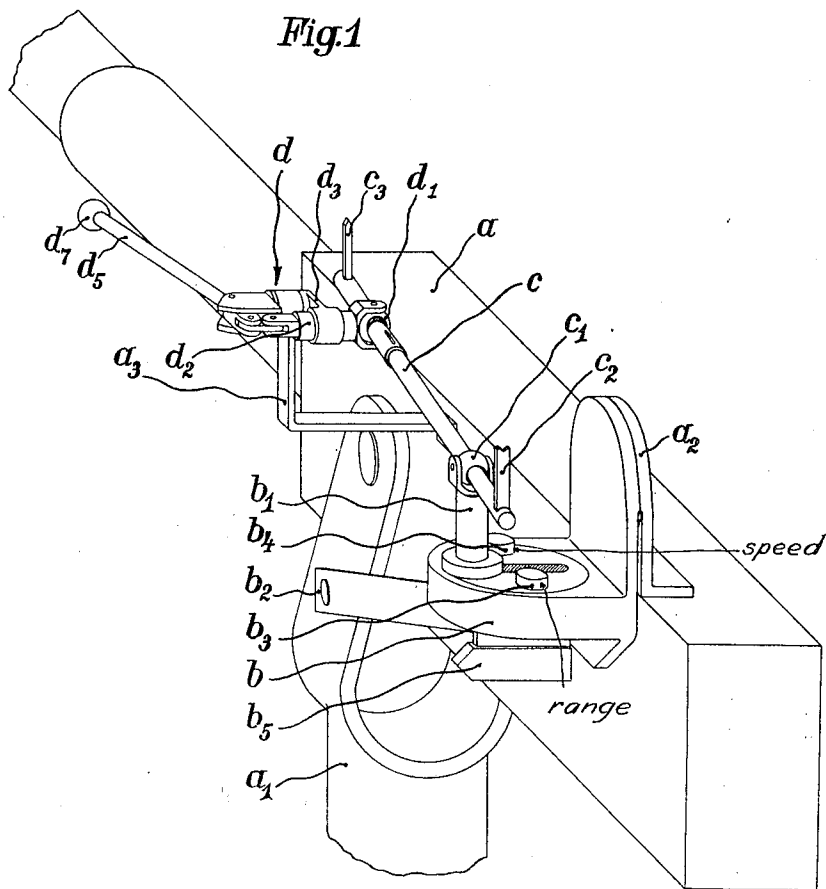
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SIGHTING DEVICE FOR ANTI-AIRCRAFT GUNS

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SIGHTING DEVICE FOR ANTI-AIRCRAFT GUNS

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In the case of sighting devices for anti-aircraft guns having a direction indicator or sight carrier adapted to be adjusted to make the necessary corrections for direction of flight, distance, height and speed of the target, the rear end is, in the known arrangements, adapted to be adjusted to the correction values obtained from a calculating apparatus. In these constructions, the direction indicator is carried at the front in a universal joint guide which permits the swinging and longitudinal correcting movements of the direction indicator to take place. This front guide is, when desired, adapted to be adjusted separately in order to make corrections dictated by conditions which vary from day to day and particularly for correcting for the direction of the wind.

When shooting with the aid of such sighting devices, the continuous alterations of the corrections necessary to allow for the constantly changing range of the target, in some cases also the direction of flight and the altitude of the target, is difficult, as it is generally impossible for the man operating the calculating apparatus to follow sufficiently quickly the constantly necessary alterations of the corrections.

According to the invention, in order to simplify the process of shooting it is proposed to make the front universal joint guide for the direction indicator adjustable by a control handle in all directions and the handle, with this object in view, is mounted rotatably and pivotally on the gun, and, according to its position in space, determines the direction of the indicator. With such an arrangement, all variations of the initially determined corrections can be transferred, by movement of the single control column, to the direction indicator. In an extreme case it is even conceivable to keep the corrections which may be effected by the control column within the maximum value necessary so that the entire adjustment of the sighting device relatively to the barrel can be effected by means of the control column, which renders it possible for the sighting adjustment to be corrected for instance according to the position of the line of flight of the tracer shells to the target. The direction indicator will, however, initially be given a basic correction as determined in the usual manner by the calculating apparatus, and then only the correction of this value still shown to be necessary by the course of the projectiles to the target, is supplied additionally by means of the control member. Besides the more rapid continuous alteration of the correction made possible, the inven-

tion renders it possible to handle the gun with a smaller crew.

An example of construction of a sighting device in accordance with the invention is shown in the accompanying drawings in which—

Fig. 1 shows a perspective view of the gun with the sighting device.

Fig. 2 shows the sighting device separately on an enlarged scale.

Fig. 3 shows a plan, partially in section, of the front part of the sighting device.

The gun *a* is mounted in the mounting *a*₁ so as to be capable of being elevated. The sighting device includes the calculating apparatus *b* of any known construction such as for instance shown in British Patent No. 367,402 in which Fig. 3 for instance the casing *l* thereof is the equivalent of the apparatus *b* of applicant's drawing, Fig. 1, and the arm *l* corresponds to the bar *b'* of applicant's structure, the telescopic direction indicator *c* and the correction device *d*. The calculating apparatus *b* is, by means of a bearing bracket *a*₂, pivotally carried on the gun *a*, and so that the bar *b*₁ is maintained constantly vertical, is guided in the usual manner by a parallel motion *b*₂. The calculating apparatus has two adjusting knobs, one *b*₃, for range and the other *b*₄ for speed, as well as a flight direction arrow *b*₅. The bar *b*₁ carries at the top a universal joint *c*₁ for supporting the rear end of the direction indicator or sight bar *c*, which in its turn carries a back-sight *c*₂ and a foresight *c*₃. Towards its front end the direction indicator is received by a universal joint guide *d*₁. This latter is mounted at the end of a pin *d*₂ which is mounted in an eye of a lever *d*₃ so as to be displaceable transversely (Fig. 3). The lever *d*₃ is pivotally mounted by means of a bolt *d*₄ in a mounting *a*₃ which is fixed on the gun. In the outer forked end *d*₅ of the bolt *d*₄ there is pivoted the control bar or handle *d*₅ which is adapted to pivot about a pin *d*₆, so that the pivot *d*₆ and the pivot *d*₄ function as a universal joint, and permit adjustment of the control bar *d*₅ in all directions. The control bar *d*₅ has a longer arm which terminates in a ball handle or knob *d*₇, and a shorter arm which is coupled by means of a strap *d*₈ with the pin *d*₂ which carries the universal joint guide *d*₁. For compensating for the weight of the sighting bar *c* and the control members *d*₁—*d*₇ there is provided a torsion spring *d*₉ which suitably supports the bolt *d*₄ relatively to the fixed mounting *a*₃ in all pivotal positions. One end of the torsion spring *d*₉ is secured to bolt *d*₄ and the other end to the mounting *a*₃.

The mode of operation of the apparatus is as follows:

The gun leader observes the approaching target and adjusts for its direction of flight, speed and range on the calculating apparatus *b*. Then he seizes the ball handle *d₇* of the control bar or handle *d₅*, while the man who aims and fires the gun aligns the back-sight and fore-sight on the target. After fire has been opened, the gun leader observes, preferably with the aid of an observation apparatus, the position of the luminous track of the shell. If the luminous track is too low, he moves the control bar *d₅* upward, so that the gun layer must elevate in order to align the sights on the target; if the luminous track is too high, the gun leader presses the control bar *d₅* downwards. If the lateral correction is too great in one direction the control bar is moved in the opposite direction and vice-versa. Thus correction is made in accordance with the conditions of firing without making further adjustments of the calculating apparatus *b*. In this manner correction is made, by means of a single spatially adjustable control handle, for alteration in range, altitude, speed and direction of flight of the target including corrections for such conditions as vary from day to day; in other words all necessary corrections are made.

The initial adjustment on the calculating apparatus *b* thus serves to give the initial basic adjustment, so that the correction necessary during the engagement of the aerial target by the control bar *b* remains within narrow easily controlled limits. Only in cases of ranges in which the actual aiming direction has changed from that determined as a result of adjustment by the calculating apparatus to such an extent that correction merely by the bar *d₅* renders it difficult for the direction indicator to be kept in the correct aiming position owing to control deflection having become too great, is the calculating apparatus *b* preferably adjusted in accordance with the new conditions. This can easily be done in the case of machine guns while a magazine is being charged.

It will be seen that, in an extreme case, one can manage merely with the adjustment of the front universal joint guide *d* of the direction indicator *c* by the control bar *d₅*. Naturally, a sight adjuster may also be provided which follows the alterations in range and distance of the target by adjusting a calculating device, so that the corrections given by the gun leader serve merely for correcting these values and for introducing other corrections, for example as may be dictated by weather influences.

The middle position, neutral position, of the control bar *d₅* in respect of its vertical and lateral paths, is preferably indicated to the gunner by spring-pressed catches and if desired the control bar may be deflected against spring pressures

which increase as the deflections from the mid-position increase, in order that the magnitude of the adjustment of the bar and therefore of the corrections effected may be noticeable, and therefore when the horizontal or vertical direction of the gun is changed quickly, to give an indication of the amount of correction which is being made.

I claim:

1. In anti-aircraft guns, a sighting device having a sight bar movable with the gun but adapted to be independently angularly shifted relatively thereto in accordance with the direction of flight, range, altitude and speed of the target, a universal joint support for the rear end of the sight bar, a calculating apparatus connected to shift the universal joint and bar relatively to the gun, a universal joint guide in which the front end of the sight bar is slidably mounted, a rotatable universally swingable control handle and means connecting said guide and handle so that angular movement of the handles may correspondingly adjust the sight bar in all directions about the rear joint as a center.

2. In a device according to claim 1, a mounting fixed on the gun and including a lever having an eye, a strap, a pin which is slidably mounted in the eye of said lever, and carries at one end the universal joint guide, at the other end is coupled by means of the strap with the shorter arm of the control handle universally swingably attached to the mounting.

3. In a device according to claim 1, a mounting fixed on the gun and including a lever having an eye, a strap, a bolt, a pin which is slidably mounted in the eye of said lever, and carries at one end the universal joint guide, at the other end is coupled by means of the strap with the shorter arm of the control handle universally swingably attached to the mounting and in which the lever is pivotally mounted by means of the bolt rotatably mounted in a bearing of said mounting and terminating in a forked end which supports the control handle.

4. In a device according to claim 1, a mounting fixed on the gun and including a lever having an eye, a strap, a bolt, a pin which is slidably mounted in the eye of said lever, and carries at one end the universal joint guide, at the other end is coupled by means of the strap with the shorter arm of the control handle universally swingably attached to the mounting and in which the lever is pivotally mounted by means of the bolt rotatably mounted in a bearing of said mounting and terminating in a forked end which supports the control handle, and a torsion spring with one end secured to the bolt and the other end to the mounting so as to compensate for the weight of the sight bar and the control handle attachment.

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