

Sept. 16, 1969

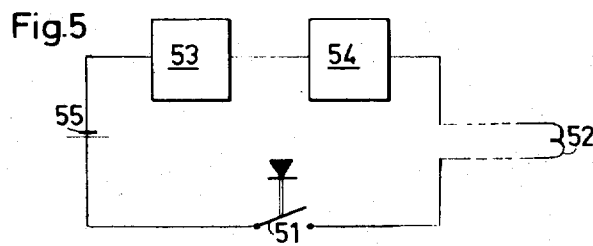
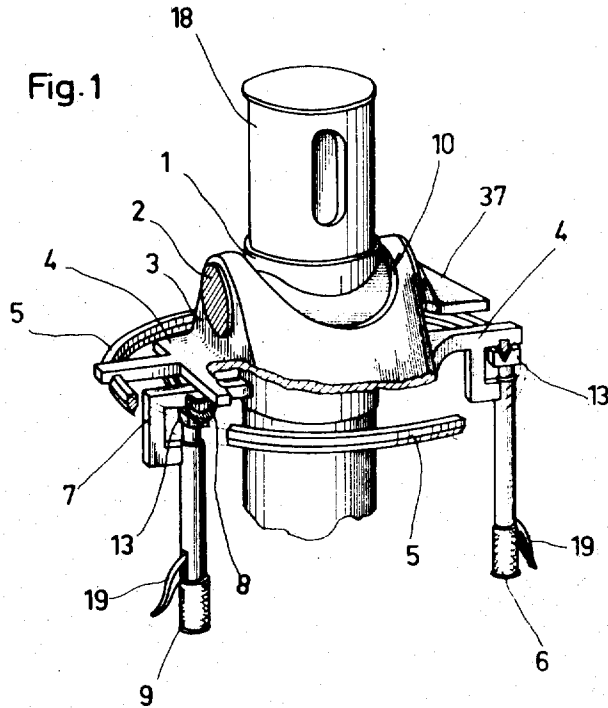
A. STANGL ET AL

3,466,968

AIMING AND TRACKING DEVICE FOR GUIDED JET-PROPELLED MISSILES

Filed May 13, 1968

3 Sheets-Sheet 1



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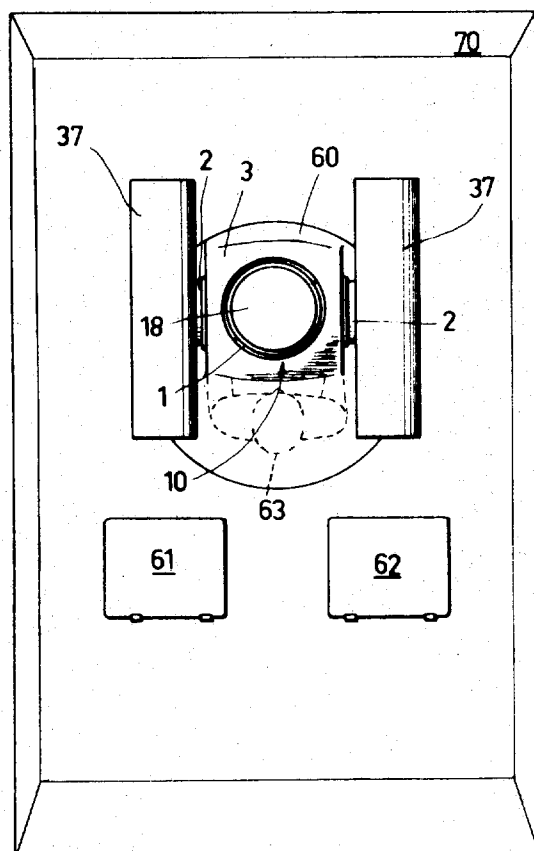
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Fig. 2



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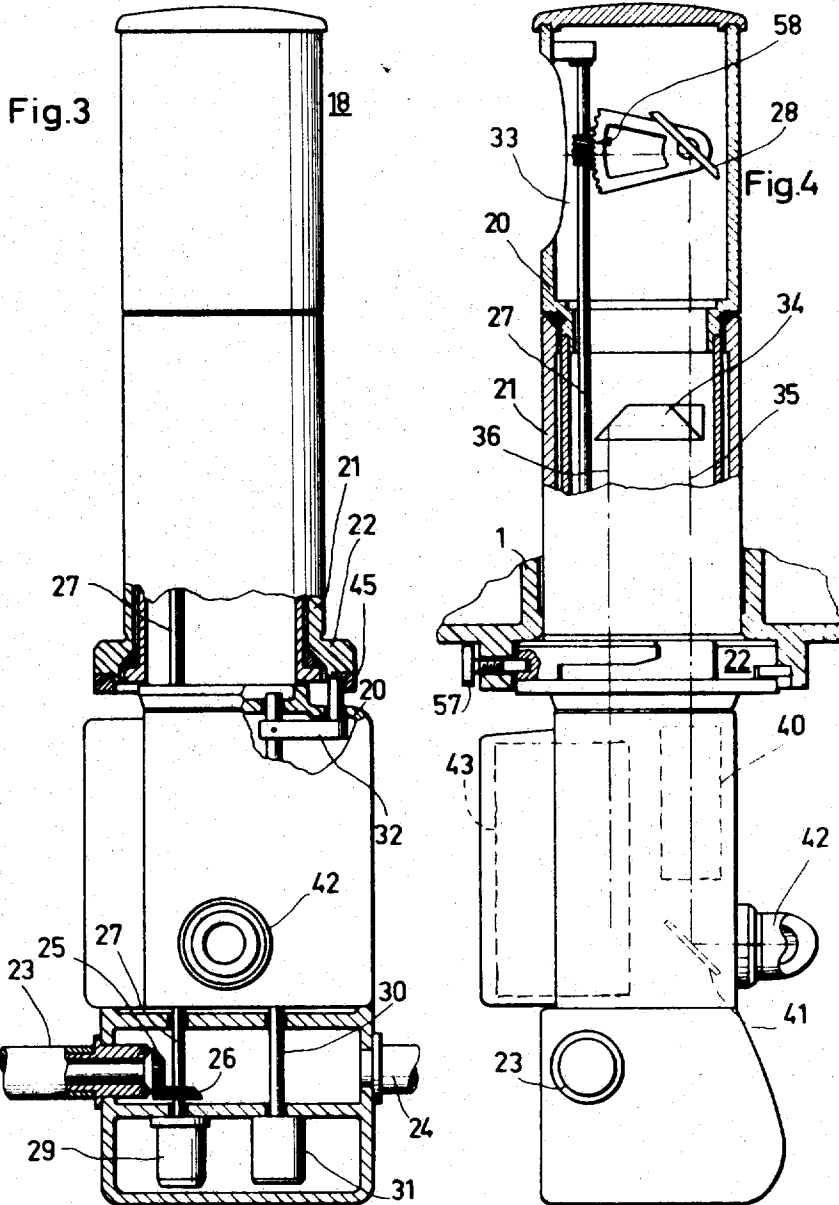
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AIMING AND TRACKING DEVICE FOR GUIDED JET-PROPELLED MISSILES

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Filed May 13, 1968, Ser. No. 728,491

Claims priority, application Germany, May 24, 1967,

B 92,690

Int. Cl. F41h 5/26, 7/08; F41g 1/40

U.S. Cl. 89—1.815

12 Claims

ABSTRACT OF THE DISCLOSURE

An aiming and tracking device for guided jet-propelled missiles includes a periscope, and both the aiming device and the periscope are mounted on a rotating ring and are operable from inside an armored enclosure. The aiming device carries the missiles, and the enclosure has a common opening through which both the aiming device and the periscope extend. The aiming device and the periscope are conjointly adjustable, in elevation and traverse, as a unit, and the periscope is also adjustable, in elevation and traverse, independently of the aiming device.

BACKGROUND OF THE INVENTION

The object of aiming and tracking devices for guided jet-propelled missiles is to pick up a target from within an armored enclosure, by means of a periscope, and to aim missiles, positioned on mounts on the aiming device, toward a target in such a manner that only a few guiding signals directing the missiles are necessary to be transmitted to the missiles after firing thereof. The missiles fired and guided by these aiming and tracking devices are preferably guided according to the "target covering" method. In this method, a sight, usually designed as a periscope, is maintained aligned with the target and, in the case of relative movement between the target and the sight, the sight must follow the movement of the target.

In tracking operation of such devices, it has been found disadvantageous to move the entire aiming device, fixedly connected with a sight, since the accuracy of sight movement, particularly in following a moving target is impaired by the large masses which must be moved.

For the purpose of obviating these disadvantages, aiming and tracking devices are known, for example, from U.S. Patent No. 3,293,985, wherein either the aiming device can be moved fixedly with the sight, or the sight can be separated from the aiming device. This known aiming and tracking device comprises a mount carrying a guided missile, and comprises a sight mounted for rotation about separate vertical and horizontal axes with respect to this mount. The device includes means providing for rigid coupling of the sight with the mount in such a position that the optical axis of the sight coincides with the firing direction of the guided missile, in elevation and traverse. After the missile has been fired, this coupling means can be disengaged so that, during tracking movement of the sight necessary for guiding the missile, the sight can be adjusted, in elevation and traverse, independently of the mount.

A disadvantage of the arrangement disclosed in U.S. Patent No. 3,293,985 is that it cannot be operated and reloaded from an armored enclosure, such as an anti-tank cover. In order to be able to move the tracking device from the armored enclosure independently of the aiming device, an arrangement has been disclosed in German Auslegeschrift 1,152,330. In this latter arrangement, a periscope is used as a tracking device and mounts, used

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as an aiming device, extend through the armor plate of an armored car, for firing the missile. The periscope extends through a special opening in the armor plate of the armored car, and can be layed in elevation and traverse separately, both to pick up the target and to track it. The respective traversing position of this periscope is determined by contact switches distributed around the circumference of the periscope, and signals from these contact switches are transmitted to follower switches which are distributed around the circumference of the traversing mount of the missile aiming means. These signals cause the latter mount to follow the respective traversing position as assumed by the periscope.

However, the foregoing arrangement has the disadvantage that the aiming device and the tracking device extend through separate openings in the armored enclosure, thus weakening the armor plate of the enclosure unnecessarily and making it difficult to take measures against ABC weapons. Additionally, the contact switches distributed around their circumference permit only determination of the respective traversing position and adjustment of the mount thereto, the power of resolution of the traversing movement suffering from the finite number of contact switches. Since the pickup range of an infrared position finder contained in the periscope, which forms guiding signals according to the location of the launched missile, is very small and of the order of about $\pm 2^\circ$, the missile must be fired very accurately at the start into this narrow pickup range of the position finder in order that the conditions for a guided flight can be met at all. By using such contact switches and the additional electrical devices connected therewith, the entire installation becomes more complicated and more susceptible to trouble.

SUMMARY OF THE INVENTION

This invention relates to aiming and tracking devices for guided jet-propelled missiles and, more particularly, to a new and improved aiming and tracking device in which both the aiming device and the tracking device extend through a common opening in an armored enclosure, with the tracking device being adjustable conjointly with the aiming device or independently of the latter.

Thus, the invention provides an aiming and tracking device that can be operated from within an armored enclosure, and wherein a periscope, serving to pick up the target, can be adjusted automatically, in elevation and traverse, along with the aiming device during aiming of the missiles. Also, the periscope can be automatically separated from the aiming device during the tracking necessary for guiding the missiles, so that the periscope can track a target automatically, in elevation and traverse, independently of the aiming device.

Based upon an aiming and tracking device for guided jet-propelled missiles and including a periscope arranged in a rotating ring and which can be operated from within an armored enclosure, the problem confronting the present invention is solved in that the periscope, together with the aiming device carrying the missiles, extends through the enclosure in a common opening, and can be adjusted, in elevation and traverse, in a known manner positively together with the aiming device or independently of the aiming device and relative thereto. Since the aiming device and the tracking device extend through the armored enclosure in a common opening, the effectiveness of the armor plate is impaired only to an absolutely necessary extent. At the same time, it is possible to couple the aiming device with the tracking device during the aiming operation, with both devices being commonly or conjointly adjusted, during the aiming operation, by simple mechanical devices which can be uncou-

pled for the tracking operation to provide for independent adjustment of the elevation and traverse of the tracking device.

In accordance with the invention, the aiming and tracking device is so designed that a tubular support, containing the periscope and adjustable in elevation and traverse, as well as extending through the armored enclosure, is fixedly connected with mounts for receiving missiles. Preferably, the tubular support containing the periscope extends through a preferably circular cover plate which is rotatably mounted on a rotating ring serving as a support for performing a traversing movement. The tubular support extends through the cover plate eccentrically to the axis of traverse, and can move, with respect to the cover plate, only about a horizontal axis, which is the axis of elevation.

The tubular support has roller-shaped bearing bodies which are mounted, for rotation about the elevation axis, in bearing blocks fixedly arranged with the cover plate outside the armored enclosure. The mounts carrying the missiles are fixedly connected with these bearing blocks at the outer ends thereof extending through and beyond the bearing blocks.

Such a tubular support, which is mounted for rotation, relative to the cover plate, to perform the elevation movement, and which is fixedly connected with the holder on the periscope, ensures that the periscope must follow the elevation movement performed by the tubular support. Since the tubular support can be moved, relative to the cover plate, only about the elevation axis, while the entire cover plate, which covers the opening in the armored enclosure, is turned about the axis of traverse to perform the traversing movement, the periscope necessarily must also follow the traversing movement performed by the cover plate and the tubular support. Since the mounts for receiving the missiles are fixedly connected with the tubular support, and preferably with the roller-shaped bearing bodies extending through the bearing blocks, the firing direction of the missiles and the optical axis of the periscope are thus in a certain desired correlation, and this correlation is maintained, during the entire aiming operation, by the fixed connection of the periscope with the tubular support.

As the tubular support, and thus the periscope, extend through the cover plate eccentrically thereof, a space-saving installation of the aiming and tracking device is possible, for example, in armored cars. A gunner operating the aiming and tracking device therefore can be placed in a very confined space without being hindered by the periscope, and he is positioned substantially symmetrical with respect to the axis of rotation of the cover plate, that is, the axis of traverse. At the same time, such an eccentric arrangement of the entire aiming and tracking device with respect to the cover plate provides, in connection with armored cars, an arrangement for simpler reloading of the aiming device, involving mounting of new missiles on the mounts. Loading hatches, extending through the armor plate, and which are necessary for reloading, can be made smaller, since the mounts of the aiming device can be inclined to a sharper angle in the reloading position than would be possible with a non-eccentric arrangement of the aiming device on the cover plate.

In a preferred embodiment of the invention, the aiming device comprises the tubular support and the cover plate, each provided with a handle, one handle being for elevation and the other for traverse. The handles have locking means fixing the associated aiming direction, with the handle associated with the elevating movement being arranged opposite the handle associated with the traversing movement, and with both handles being arranged symmetrically with respect to the traversing axis. Traversing movement is effected using both handles with the elevation movement blocked.

In order to be able to track a moving target with the periscope and independently of the aiming device, after a missile has been fired, means are provided in the periscope per se to permit turning the optical axis of the periscope in elevation and traverse independently of the periscope holder which is fixedly connected with the tubular support. In accordance with a preferred embodiment of the invention, such elevation movement is effected by turning the optical axis of the periscope objective, and the traversing movement is effected by rotating the periscope relative to its holder which is fixedly connected with the tubular support. The periscope has a position finder, operating in the infrared range, to pick up a guided missile, and the path of rays entering through the objective is divided into a partial path leading to the eyepiece of the periscope and a partial path leading to the position finder.

In accordance with a further feature of the invention, the periscope is so designed that manually operable or automatically operating devices are provided for the automatic unlocking, return, and/or locking of the periscope in a position in which the aiming directions of the periscope and of the aiming device coincide exactly. These arrangements have the effect that the periscope is unlocked from its holder preferably upon firing of the missile, so that tracking of the target using the periscope, and by turning the optical axis of the periscope objective, is possible by manual operation of handles provided on the periscope.

In accordance with a further feature of the invention, an electric motor is provided for automatic return of the optical axis of the periscope objective to its neutral position. This electric motor is energized either automatically or manually at the end of the missile guiding operation for the last-fired missile, and thereby effects automatic return of the optical axis of the objective to the neutral position so that the optical axis of the objective is perpendicular to the longitudinal axis of the periscope.

In accordance with a further feature of the invention, an electromagnetically operated locking mechanism is provided for automatic locking of the periscope to its holder which is fixedly connected with the aiming device. This locking mechanism is effective when the periscope reaches a traversing position in which the elevation axis of the periscope and that of the aiming device coincide exactly. The electromagnetically actuated locking mechanism is likewise released after completion of the guiding operation, and locks automatically, for example, into a groove provided in the periscope holder when the periscope has been so turned about its traversing axis, relative to its holder, that the locking mechanism is directly aligned with the groove. This rotation of the periscope relative to its holder, and thus relative to the aiming device, must be performed by the gunner operating the aiming and the tracking device, for example, by imparting a torque to the latter through the periscope handles.

In accordance with yet another feature of the invention, the automatic electromagnetic devices for unlocking the periscope can be made effective by switching means included in the starting circuit of a missile. These switching means insure that the periscope is released automatically from the aiming device upon pressing of the missile starting key, so that an easy observation of the trajectory and easy guidance of the missile are possible using the tracking device comprising the periscope.

An object of the invention is to provide an improved aiming and tracking device for guided jet-propelled missiles.

Another object of the invention is to provide such a device including an aiming device and a tracking device extending through a common opening in an armored enclosure and operable from within the enclosure.

A further object of the invention is to provide such a device including an aiming device and a tracking device and in which the tracking device is locked for conjoint

adjustment with the aiming device during an aiming operation and released for adjustment independently of the aiming device for a tracking operation following firing of a missile.

Yet, another object of the invention is to provide such a device including a preferably circular cover plate mounted for rotation on a rotating ring and having a tubular support extending eccentrically therethrough and adjustable, relative thereto, about an axis of elevation only.

A further object of the invention is to provide a device of the type just-mentioned in which the tubular support has roller-shaped bearing bodies coaxial with the axis of elevation and extending through bearing blocks fixedly connected with the cover plate, the projecting ends of these bodies having fixed thereto mounts for carrying the missiles.

Still another object of the invention is to provide a device of the type mentioned in which elevation movements of the tracking device, during the tracking operation, are performed by adjustment of the optical axis of a periscope forming the tracking device.

A further object of the invention is to provide such a device in which, upon firing of the missile, a periscope, acting as the tracking device, is automatically released for independent adjustment, in elevation and traverse, relative to the aiming device.

Another object of the invention is to provide such a device in which, subsequent to a tracking operation, the tracking periscope is automatically returned to a predetermined position with respect to the aiming device and locked in such predetermined position.

BRIEF DESCRIPTION OF THE DRAWINGS

For an understanding of the principles of the invention, reference is made to the following description of a typical embodiment thereof as illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a partial perspective view, partly broken away and partly in section, of an aiming and tracking device for guided jet-propelled missiles embodying the invention;

FIG. 2 is a plan view of the aiming and tracking device as mounted in an armored car, with the latter being indicated only schematically;

FIG. 3 is a front elevation view, partly in section, of a periscope constituting the tracking device;

FIG. 4 is a side elevation view, partly in section, corresponding to FIG. 3; and

FIG. 5 is a schematic wiring diagram of a starter circuit for releasing a guided missile.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The aiming and tracking device of the invention, represented in simplified form in FIG. 1, comprises a tubular support 1 to which are rigidly connected coaxial and oppositely projecting roller-shaped bearing bodies 2. These roller-shaped bearing bodies 2 rest in bearing blocks 3, so that the entire tubular support 1 can be turned about a horizontal axis which is the axis of elevation. Bodies 2 extend through bearing blocks 3 and project outwardly therebeyond, and the projecting portions of bodies 2 have fixedly connected thereto mounts 37 which are provided to receive guided missiles, which latter have not been illustrated. Bearing blocks 3 are worked out of a preferably circular cover plate 60, shown in FIG. 2 and not shown in FIG. 1 except for a part thereof which is a frame 4 designed as a support. Frame 4, and thus cover plate 60, can be rotated on a rotating ring 5 through 360° about the vertical axis, which is the axis of traverse. Tubular support 1 is constrained to move with plate 60 about the axis of traverse due to the fact that its bearing bodies 2 are engaged in the bearing blocks 3 rigidly connected with frame 4.

A handle 6 is fixedly connected to frame 4 to effect traversing movement of cover plate 60 and tubular support 1. In order to perform a traverse, a brake shoe 13, cooperable with rotating ring 5, must be released by means of a lever 19 on handle 6, brake shoe 13 returning automatically to its motion-arresting position upon release of lever 19 so that frame 4 is locked at a particular angular position. Another handle 9 is connected with tubular support 1 for moving the tubular support in elevation. Such elevational movement of the tubular support is about the horizontal axis of the bearing bodies 2 mounted in bearing blocks 3.

Cover plate 60 is formed, between bearing blocks 3, with a generally oval opening 10 which permits tubular support 1, passing through opening 10, to perform a free angular displacement, through a certain angular range, about the horizontal axis of bearing bodies 2. The handle 9, provided to perform this elevational movement of tubular support 1, is also provided with a brake shoe 13 cooperable with a circularly arcuate ring 8 fixed to frame 4, brake shoe 13 associated with handle 9 being releasable by a second lever 19 on handle 9. This second brake shoe 13 must be released by the second lever 19 in order for tubular support 1 to be moved in elevation, and the brake shoe is returned automatically to the motion-arresting position when the desired elevational position of tubular support 1 has been attained through swinging thereof by handle 9.

A periscope 18, which serves as a tracking device, is so suspended in tubular support 1 that it necessarily follows all rotary and pivotal movements of support 1. As can be readily seen from FIG. 1, tubular support 1, and thus mounts 37 carrying the guided missiles as well as periscope 18 perform the elevating movement when handle 9 is actuated, by turning of bearing bodies 2 in bearing blocks 3 about a horizontal axis. The traversing movement of the entire arrangement, however, is effected by handle 6 turning frame 4 on ring 5. Since the elevating movement is usually effected simultaneously with the traversing movement, frame 4 can be moved using both handles 6 and 9, which latter preferably are arranged symmetrically with respect to the traversing or vertical axis of rotation, when performing the traversing movement. Such a design of the aiming and tracking device thus positively ensures that periscope 18, serving as the tracking device, follows tubular support 1, due to its rigid connection with the latter, in any adjusting movement for elevation and traversing of the aiming device comprising substantially tubular support 1 and mounts 37.

As can be best seen from FIG. 2, opening 10 through which extend tubular support 1 and periscope 18 is arranged eccentrically to the axis of rotation of cover plate 60. Cover plate 60 is attached, by way of example and as indicated in FIG. 2, in an armored car 70 in an opening recessed in the armor plate or anti-tank cover thereof. Due to such eccentric positioning of tubular support 1 and periscope 18, a gunner 63, operating the aiming and tracking device, is not hindered by periscope 18 if he is accommodated in the space defined approximately by the diameter of cover plate 60. When turning the aiming and tracking device about the traversing axis, the gunner likewise turns therewith in an aiming seat, the traversing axis comprising the axis of rotation of cover plate 60.

In order for positioning new missiles on mounts 37 during reloading, the entire aiming and tracking device is turned through 180° and mounts 37 are inclined to the vertical axis so that new missiles can be positioned on mounts 37 through the loading flaps 61 and 62. If the aiming and tracking device were not arranged eccentrically on cover plate 60, the aiming device would not have to be turned through 180° for reloading, but mounts 37 could not be inclined nearly so steeply for reloading so that loading flaps or hatches 61 and 62 would have to be considerably larger.

Referring to FIGS. 3 and 4, periscope 18 comprises a housing 20 which is rotatably mounted in a periscope holder 21. Holder 21 encloses housing 20 of the periscope along that portion thereof which extends through tubular support 1, as indicated in FIG. 1. Holder 21 has a mechanical locking mechanism 22 with a safety screw 57 which corresponds with a corresponding locking portion of tubular support 1 in such a way that, after periscope 18 has been inserted into tubular support 1, holder 21 is rigidly locked with support 1.

At the lower end of periscope 18 there are arranged two handles 23 and 24 which extend radially or perpendicularly to the longitudinal axis of the periscope. These are for the purpose of turning the periscope about its longitudinal axis. Handle 23 is also designed to be a rotatable handle for rotating a friction wheel 25 engaging a second friction wheel 26 in the interior of the periscope and fixedly mounted on a shaft 27 extending parallel to the longitudinal axis of the periscope. Adjacent the upper end of the periscope, shaft 27 carries a worm engageable with a worm sector and constituting, with the latter, a worm drive 58 for adjusting a mirror 28 about a horizontal axis, as best seen in FIG. 4. An electric motor 29 is connected with shaft 27 for effecting an automatic rotation thereof independently of handle 23. A bar 30, as best seen in FIG. 3, extends parallel to shaft 27 and is operable by an electromagnet system 31. Bar 30 actuates a locking mechanism 32 provided between periscope holder 21 and periscope housing 20.

As can be best seen from FIG. 4, the beam of light rays arriving through an objective 33 in periscope 18 impinges on the mirror 28, which is displaceable about a horizontal axis, and is reflected by mirror 28 to a prism arrangement 34. Prism arrangement 34 effects a sub-division of the ray path, extending parallel to the longitudinal axis of periscope 18, into two partial ray paths 35 and 36 which also extend parallel to the longitudinal axis of periscope 18 and parallel to each other. Partial ray or ray path 35 is directed, through an optical system 40 and a deviating mirror 41, to the eyepiece 42 of the periscope. The other partial ray or ray path 36 is directed to an infrared position finder 43, which has not been shown in detail. Position finder 43 produces the signals necessary for locating and guiding a missile in flight.

FIG. 5 schematically illustrates the starter circuit for firing a guided missile. When a starter key 51 is closed, switching means 53 and 54, connected with an engine ignitor 52, with motor 29 and with magnet system 31, are also connected with a source of potential 55. Thereby periscope 18 is automatically released for movement relative to the aiming device, upon firing of the missile.

The aiming and tracking device is adjusted in elevation and traverse, for firing a guided missile on a mount 37, using handles 6 and 9 until the gunner has the target to be engaged appearing in the cross hairs of the periscope. Traversing movement of the aiming and tracking device is preferably effected using both handles 6 and 9 to turn the entire aiming device connected with frame 4. During traversing movement, only that brake shoe associated with ring 5 is released by the associated lever 19 on handle 6, while handle 9 is fixed with respect to frame 4 by its brake shoe 13 engaging the circularly arcuate partial ring 8. During the elevating movement, tubular support 1 is moved about the axis of elevation, which is the symmetry axis of bearing bodies 2, using handle 9 and with the associated brake shoe 13 released. Periscope 18 necessarily follows the elevating and traversing movement of the aiming device since its holder 21 is fixedly connected with tubular support 1 through locking mechanism 22.

When the cross hairs of periscope 18 coincide with the target, after the completion of the aiming operation, the gunner releases a missile on a mount 37 and pointing in the direction of the target. This is effected by actuating the starter key 51 of FIG. 5. Since the missile, starting

from mount 37, is fired in the direction of the line connecting objective 33 of periscope 18 with the target, it necessarily arrives in the pickup range of infrared position finder 43 in periscope 18. Thereby, the position coordinates of the missile can be picked up by position finder 43 so that the latter can transmit guiding signals through a guiding signal generator arranged in the position finder. These signals compensate any deviation of the missile from the line connecting objective 33 of periscope 18 with the target.

Simultaneously with actuation of the starter key 51 to initiate the firing of a missile, electromagnet system 31 is activated, through switching means 54 in the starter circuit, to unlock locking mechanism 32 through bar 30. Periscope 18 thus can be turned, along with its housing 20, relative to periscope holder 21 fixedly connected to tubular support 1, and about the longitudinal axis of periscope 18 which constitutes the traversing axis. Electric motor 29 is deenergized through switching means 53 so that a displacement of mirror 28 through handle 23, friction wheels 25 and 26, shaft 27 and worm drive 58 can no longer be cancelled by electric motor 29 returning mirror 28 to its neutral position. By angularly adjusting mirror 28, the optical axis of objective 33, aligned with the target, is turned in elevation and, by rotating the entire periscope 18 relative to holder 21, the optical axis is turned in traverse. Thereby, the optical axis follows constantly the target covering line connecting objective 33 with the target.

After actuation of starter key 51 and firing of the missile, the tracking phase begins, in which it is necessary to guide the missile. In this phase, periscope 18, functioning as a tracking device, can be adjusted in elevation and traverse independently of the aiming direction, that is, independently of the tubular support 1. The traversing axis about which periscope 18 can be adjusted in traverse is the longitudinal axis of periscope 18, which is radially offset but parallel to the axis of rotation of cover plate 60 due to the eccentricity of opening 10 in the cover plate. The axis of rotation of the cover plate is the axis of traverse of the aiming device about which the tracking device is adjusted conjointly with the aiming device during the aiming of phase. The elevation axis of the tracking device, however, is the horizontal axis of rotation about which mirror 28, arranged behind objective 33 of periscope 18, can be angularly adjusted. Since a relative movement between the target and the aiming and tracking device will usually take place even during flight of the guided missile, the tracking device is adjusted in elevation and traverse relative to the aiming device so that the line connecting the tracking device and the target coincides with the optical axis of the periscope objective.

When the guided flight of the missile is completed at the end of the tracking phase, motor 29 is energized, either automatically or manually, and electromagnet system 31 is also activated in such a manner that mirror 28 is angularly adjusted into its neutral position by rotation of shaft 27 and through worm drive 58. In the neutral position, the optical axis of objective 33 is perpendicular to the longitudinal axis of periscope 18 and thus to the traversing axis. Locking mechanism 32 is actuated in such a manner by electromagnet system 31 and bar 30 that it will lock into a groove 45 provided in periscope holder 22 as soon as periscope 18 has reached a predetermined angular position relative to periscope holder 22. Such locking of locking mechanism 22 can be effected by using one or both of the handles 23 or 24 to impart a torque to periscope 18 upon completion of the tracking phase. Thereby periscope 18 turns, relative to holder 22, until locking mechanism 32 and groove 45 are in opposition, so that periscope 18 is thereupon locked in its position. In this position, the elevation axis of periscope 18, which is the axis of pivoting of swivel mirror 28, and the elevation axis of tubular support 1, which is the symmetry axis of bearing bodies 2, coincide exactly.

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

What is claimed is:

1. In a combined aiming device and tracking device, for guided jet-propelled missiles, operable from an armored enclosure including an armor plate wall on which the device is mounted on a rotation ring, and including a periscope: the improvement comprising, in combination, said aiming device including means operable to support missiles to be aimed and fired; said armor plate wall having a common opening through which both said aiming device and said periscope extend; means operable to adjust said aiming device and said periscope, in elevation and traverse, as a unit; and means operable to adjust said periscope, in elevation and traverse, independently of said aiming device and relative thereto.

2. In a combined aiming device and tracking device for guided jet-propelled missiles, the improvement claimed in claim 1, in which said aiming device comprises a tubular support mounting said periscope and extending through said common opening; said missile support means comprising at least one mount, for receiving a missile, fixedly connected to said tubular support.

3. In a combined aiming device and tracking device for guided jet-propelled missiles, the improvement claimed in claim 2, in which said common opening is formed through a circular cover plate rotatably mounted on said rotation ring for performing the traversing movement, said rotation ring serving as a mounting support in said armor plate wall; and means mounting said tubular support on said cover plate for displacement relative to said cover plate about only an axis of elevation.

4. In a combined aiming device and tracking device for guided jet-propelled missiles, the improvement claimed in claim 3, in which said mounting means comprises roller-shaped bearing bodies fixed to said tubular support and rotatably engaged in bearing blocks fixed to said cover plate outside said armor plate wall, for rotation about a horizontal axis of elevation; said roller-shaped bearing bodies projecting outwardly of said bearing blocks; said mounts being fixedly connected to the projecting portions of said bearing bodies.

5. In a combined aiming device and tracking device for guided jet-propelled missiles, the improvement claimed in claim 3, in which said aiming device comprises said tubular support and said cover plate; two handles secured to said aiming device, one serving for elevation movement and the other serving for traversing movement; respective locking means associated with each handle and effective to block the associated movement, whereby, during traversing movement, said aiming device may be retained at a particular elevation and, during elevational movement, said aiming device may be maintained at a particular traversing position.

6. In a combined aiming device and tracking device for guided jet-propelled missiles, the improvement claimed in claim 2, in which said tracking device comprises said periscope; and periscope having an objective; a periscope holder fixedly connected with said tubular support and movably mounting said periscope; said means operable to adjust said periscope independently of said aiming device and relatively thereto including means operatively associated with said objective and operable to adjust the optical axis of said objective during an elevational movement of said periscope, and including means connected to said peri-

scope and operable to rotate said periscope relative to said periscope holder to effect traversing adjustment of said periscope.

7. In a combined aiming device and tracking device for guided jet-propelled missiles, the improvement claimed in claim 6, in which said periscope includes an eyepiece; a position finder mounted in operative relation with said periscope; and optical means operatively associated with said objective and effective to divide the light rays along the optical axis of said objective into a first light ray path directed to said eyepiece and a second light ray path directed to said position finder.

8. In a combined aiming device and tracking device for guided jet-propelled missiles, the improvement claimed in claim 7, in which said position finder is an infrared position finder.

9. In a combined aiming device and tracking device for guided jet-propelled missiles, the improvement claimed in claim 6, including means operable to lock said periscope to said tubular support in a position in which the aiming axis of said periscope and the aiming axis of said aiming device coincide exactly; and means operable automatically to unlock said periscope from said tubular support for independent adjustment of said periscope in elevation and traverse, to return said periscope to said position, and to lock said periscope to said tubular support in said position.

10. In a combined aiming device and tracking device for guided jet-propelled missiles, the improvement claimed in claim 9, including an electric motor operatively connected to said means operatively associated with said objective, and operable automatically to adjust said last-named means to a neutral position in which the optical axis of said objective coincides exactly with the optical axis of said aiming device.

11. In a combined aiming device and tracking device for guided jet-propelled missiles, the improvement claimed in claim 9, in which said means operable automatically to unlock, return, and lock said periscope comprises an electromagnetic system connected to said locking means and operable automatically to actuate said locking means to the locking position when the elevation axis of said periscope coincides exactly with the elevation axis of said aiming device.

12. In a combined aiming device and tracking device for guided jet-propelled missiles, the improvement claimed in claim 9, including a starter circuit for initiating firing of a missile, said starter circuit including a source of potential and means selectively operable to connect said starter circuit to said source of potential; and switching means including in said starter circuit and controlling such automatic unlocking, return, and locking of said periscope relative to said tubular support.

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U.S. Cl. X.R.

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