

AUXILIARY AIMING DEVICE

The present invention concerns an auxiliary aiming device.

In particular, the present invention concerns an
5 auxiliary aiming device intended for installation on
mobile or fixed naval or land air platforms, for
turrets of gun groups of various calibre, water
cannons, cannons for other fluids or optical or
electromagnetic devices or sensors such as optronic or
10 radar systems. In particular, it is known that on
ships, be they warships, merchant ships, or ships
intended for fishing or scientific expeditions,
emplacements are installed that, according to the use
of the ship, carry gun groups like guns, cannons or
15 machine guns in the case of warships or in any case in
naval services, or else fire hydrants, and/or optical
detection or display devices.

The aforementioned devices require manual or automated
aiming to aim, according to the case the shot, the
20 optics or the detector, towards a target.

With reference purely as an example to a turret
carrying a gun group, the electronics applied to
ballistics has made it possible to improve and optimise
the control of shooting in terms of automation of the
25 preparation of the piece and its loading or in the
acquisition of the target and in its continuous

tracking.

Turrets are also made equipped with sophisticated movements and provided with mechanisms that allow the gun group to have even negative elevation, usually of a few degrees from the horizontal, so as to allow the trajectory of the projectile to be lowered during firing, in order to strike nearby targets.

Therefore, in the state of the art, systems for protecting the area close to the ship arms are known, based upon particularly wide traversing and elevation commands, however such systems do not allow the area directly alongside to be swept, meaning that the protection from sudden attacks through small fast boats must always be left to armed motor boats.

It can be understood how the reaction and preparation times of a motor boat in the case of attack, but the same goes for a fire that suddenly damages the outer hull, do not allow safe operation nor effective prevention of the damaging event.

Despite the aforementioned improvements it is not therefore possible to protect the area alongside extending for a few tens of metres from the hull of the ship with turrets that are currently known.

Such a requirement with regard to the military ships in service has arisen to protect the ship and its company from possible terrorist attacks aimed at the hull by

fast crafts.

More generally, there is a need to be able to directly intervene on the hull or in its immediate vicinity with means located on board.

- 5 Also worth noting is the possibility of detecting events in the immediate vicinity of the hull or of spraying water on the side of the ship through fire hydrant cannons in the case of accidents, just to quote a few examples.
- 10 The Applicant has set itself the problem of how to effectively protect the area alongside a ship through turrets or emplacements installed on board the ship itself, in particular the Applicant has set itself the problem of how to strike possible threats, even
- 15 alongside the ship, with conventional gun groups, or that of allowing the alongside area to be sprayed with water, when a hydrant is installed.

The Applicant has been able to solve such a problem through an auxiliary aiming device capable of modifying

20 the aiming elevation of a turret carrying a gun group or a hydrant or a detection device intended to be aimed.

These and other purposes according to the present invention are accomplished by an auxiliary aiming

25 device according to what has been outlined in claim 1.

Further characteristics of the invention form the

object of the dependent claims.

The object of the patent therefore consists of an auxiliary device suitable for modifying the aiming elevation of the turret, to allow the gun group, or the
5 hydrant or the cannon, or the sensor(s), or in general the firing or detection means arranged on the turret, to be aligned with a reference or target to be dealt with alongside the ship, the device being made through a platform that can be articulated able to be commanded
10 to recline by a predetermined angle.

Such a reclining platform, depending upon the requirements of application, can also be equipped with an axial lifting system that lifts its active part so as to pass over possible obstacles or structures that
15 might lie between it and the object being aimed at or detected.

The characteristics and advantages of the device according to the present invention shall become clearer from the following description, given as a non-limiting
20 example, of an embodiment of the invention with reference to the attached figures in which:

Figure 1 is a partial perspective view of a ship carrying a turret equipped with the device according to the invention;

25 Figure 2 illustrates the turret of figure 1 enlarged;

figure 3a is a perspective view of the turret equipped with the device according to the invention;

Figures 3b and 3c illustrate the turret of figure 3a in side elevation view and front view respectively;

5 Figures 4 and 5 illustrate the turret with the device according to the invention in extended position in side elevation and in perspective view, respectively;

10 Figures 6 and 7 schematically illustrate the turret mounted on a ship with the device according to the invention in extended position from behind in elevation and in perspective view, respectively;

Figure 8 is a perspective view of the device according to the invention in retracted position.

15 Figure 9 is a side section view of the device of figure 8.

Figure 10 is a plan view from above of the device of figure 8.

20 Figure 11 is a perspective view of the device according to the invention in extended position.

Figure 12 is a side elevation view of the device of figure 11.

25 Figure 13 is a side elevation view of a different embodiment of the device according to the invention in partially extended position;

Figure 14 is a side elevation view of a further

different embodiment of the device according to the invention in partially extended position.

With reference to the figures, an emplacement 10 is installed near to a side of the hull, generically indicated with 2 or the stern or bow of a ship 1.

In particular, figure 1 illustrates the device, arranged in a housing suitable for protecting it when it is not operating, which is arranged close to the outer edge of the ship so as to be able to be orientated downwards with an angle such as to cover the spaces below.

Figure 2 illustrates the turret of figure 1 enlarged, in which the device can be seen in open position in the housing and the turret is orientated downwards.

The emplacement 10 is shown as an example as a gun group emplacement, however its function can be of whatever type where it is necessary to aim in the direction of a target.

In particular but not exclusively, the emplacement comprises a turret carrying gun groups like guns, cannons or machine guns in the case of warships or in any case naval services, or else fire hydrants, and/or optical detection or display devices.

In the present description reference shall be made to an emplacement 10 carrying a turret 11 for a gun group 12 housed in a chamber 16 that can be closed to protect

the mechanisms of the turret from exposure to weather conditions.

The turret is equipped with spaces 13 that can be closed through hatches 14 for housing devices and
5 munitions 15.

The turret can also be accessed in the chamber 16 by service personnel for loading and maintenance.

The turret is therefore autonomously equipped with and/or connected to electromagnetic and hydraulic
10 mechanical devices that allow it to operate automatically, the gun group mounted on the turret being arranged to simultaneously perform traversing and elevation for aiming.

In particular, the primary elevation of the gun group
15 can provide a few tens of degrees above the horizontal, and a few degrees, about 10-15 degrees, below the horizontal for firing nearby.

In order to allow the gun group or in general the apparatus mounted in the emplacement 10 to be aimed,
20 the turret is foreseen mounted on a platform 20 making the auxiliary aiming device.

The platform 20 comprises a base plate 21 directly fixed, or slidably connected through rails, to the deck of the ship.

25 A support plate 22, carrying the turret 11 mounted through cooperation with cross members 32 firmly

attached to the support plate, is articulated on said base in a first hinge 23.

The platform 20 is articulated and able to be commanded to recline by a predetermined angle thanks to the fact
5 that between said plates 11,12 elevation means are foreseen suitable for reclining the support plate 22 about said first hinge 23 by a predetermined angle of between 0° and 110° and preferably between 0° and 90° .

The elevation mechanism of the support plate 22
10 foresees a first arm 24 articulated to the base plate through a second hinge 26 arranged substantially at the end of the base plate opposite the first hinge 23.

A second arm 25 is in turn articulated to the support plate 22 substantially at the end of the support plate
15 opposite the first hinge 23, the two arms 24,25 being articulated together in a fourth hinge 30.

Between the first hinge 23 and the fourth hinge 30 commandable thrusting means 28,29 are arranged exemplified in the present embodiment with cylinder 28
20 connected to the hinge 23, or as an alternative to the base plate 21, and stem 29 connected to the fourth hinge 30.

With particular reference to figures 4 and 5 the turret with the device according to the invention in extended
25 position are respectively illustrated in side elevation and in a perspective view, in this case the system

being in the rotated position, i.e. the device is in open position with the two moving arms (details 24 and 25 of figures 4 and 5) in practically aligned position; this open position, with the turret thus rotated is
5 achieved through the thrusting cylinder 28 and the piston 29 that moves the two moving arms from closed position to open position.

The aforementioned commandable means are connected to a processing unit that, as well as the various steps for
10 preparing to fire, takes charge of commanding and synchronising both the elevation and the traversing to allow continuous tracking of the target acquiring data from possible detectors present on the turret so as to obtain the correction of aim through feedback.

15 In particular with reference to figures 6 and 7 the firing line T when the auxiliary aiming device is operative must continually be corrected by the primary elevation and/or traversing of the gun group to be able to be kept on the target.

20 With reference to figures 6 and 7 the turret mounted on a ship with the device according to the invention in extended position are schematically shown from behind in elevation and in a perspective view, respectively. From this extended position of the device, i.e. with
25 the plane of the turret rotated, it is possible to aim at a position close to the side of the ship so as to

cover such an area.

With reference to figures 8 to 10 it can be seen how the auxiliary aiming device, with stem 29 retracted in the cylinder 28, allows the platform 20 to be closed
5 with the two plates 21 and 22 pulled into contact by the arms 24 and 25.

It is thus possible to see the parts that make the system move, the plane 22 on which the turret or other system to be positioned can be arranged, the hinge 23
10 on which the rotation of the plane of the turret takes place, the arms 25 and 24 that, commanded by the cylinder 28 and piston 29, carry out the rotation from retracted to open.

Figure 11 is a perspective view of the device according
15 to the invention in extended position in which the main parts of the device are highlighted, which are: the base 21 suitable for supporting all of the moving parts and for interfacing the base on which the entire device must be anchored, the mobile part 22 that takes the
20 possible turret into rotation, the arms 24 and 25 suitable for taking the rotating part 22 into rotation commanded by the actuator (electrical, mechanical or manual) 28.

A different embodiment of the invention is illustrated
25 in figure 13, such a representation highlighting an actuator (mechanical manual, hydraulic or

electromechanical) directly connected to the rotating part of the device, without the intermediation of the arms (details 24 and 25) of the previous representations.

5 In order to give greater inclination to the support plate 22, elevation means are made applied directly between the two plates, for example at least one cylinder 28' articulated in a hinge 31 arranged in the base plate in a position substantially opposite the
10 articulation hinge 23 between the plates, and a stem 29' coming out from the cylinder 28' articulated to the support plate in a hinge 30' possibly able to slide.

With reference to figure 14, a different embodiment of the invention foresees a moving system directly acting
15 upon the rotation axis of the mobile platform 22, such an actuator (mechanical manual, hydraulic or electromechanical) being able to be of the irreversible type so that once positioned the rotating part 22 remains blocked in position.

20 In such an embodiment a geared motor 33 fixed to the base plate 21 is equipped with a worm screw 34 engaged with a gear wheel 35 that is mounted on the articulation hinge 23 between the plates 21,22, the gear wheel 35 being firmly attached to the support
25 plate 22.

The commanded rotation of the geared motor allows the

elevation without limitations of the support plate.

In this way angles between the plates of over 90° even up to 110° can be reached, except for technological and functional restrictions made to the rotation.

- 5 Through such a last embodiment it is possible to strike targets even in contact with the hull 2 or to spray water on the hull itself in the case in which the emplacement 10 carries a hydrant.

10 The various illustrated embodiments as stated also lend themselves to the installation of optical detection systems like diurnal systems, infrared systems, light intensification systems or laser telemetry systems.

In the case of possibility of extreme elevations like in the third presented embodiment, electronic and
15 mechanical aiming and firing limiters are also foreseen to prevent the gun group from being able to hit the hull.

CLAIMS

1. Auxiliary aiming device for a naval emplacement, characterised in that said device comprises an articulated platform (20) carrying a turret (11) and
5 able to be commanded to recline by an angle that can be predetermined.

2. Auxiliary aiming device according to claim 1, wherein said turret carries gun groups like guns, cannons, or machine guns, or else fire hydrants, and/or
10 optical detection or display devices like diurnal systems, infrared systems, light intensification systems or laser telemetry systems.

3. Auxiliary aiming device according to claim 1, wherein said platform comprises a base plate (21)
15 directly fixed, or slidably connected through rails, to the deck of a ship (1), a support plate (22) carrying the turret (11) being articulated onto said base plate (21) in a first hinge (23), elevation means being foreseen between said plates (11,12) suitable for
20 flipping back the support plate (22) about said first hinge (23) by a predetermined angle of between 0° and 110° and preferably between 0° and 90° .

4. Auxiliary aiming device according to claim 3, wherein the elevation mechanism of the support plate
25 (22) foresees a first arm (24) articulated to the base plate through a second hinge (26) arranged

substantially at the end of the base plate opposite the first hinge (23), a second arm (25) is in turn articulated to the support plate (22) substantially at the end of the support plate opposite the first hinge
5 (23), the two arms (24,25) being articulated to each other in a fourth hinge (30), commandable thrusting means (28,29) in the form of a cylinder (28) connected to the hinge (23), and a stem (29) connected to the fourth hinge (30) being arranged between the first
10 hinge (23) and the fourth hinge (30).

5. Auxiliary aiming device according to claim 3, wherein elevation means are applied directly between the two plates (11,12), through at least one cylinder (28') articulated in a hinge (31) arranged in the base
15 plate in a position substantially opposite the articulation hinge (23) between the plates, and a stem (29') coming out from the cylinder (28') articulated to the support plate in a hinge (30') possibly able to slide.

20 6. Auxiliary aiming device according to claim 3, wherein elevation means comprise a geared motor (33) fixed to the base plate (21) and equipped with a worm screw (34) engaged with a gear wheel (35) mounted firmly on the support plate (22) on the articulation
25 hinge (23) between the plates (21,22).