SPECIFICATION

Naval gun

The invention relates to a naval gun, having a first setting axis which does not point to the zenith, a second setting axis which is perpendicular to the first setting axis, and a carrier mounted for rotation about the first setting axis, the gun being mounted on the carrier for rotation about the second setting axis.

When naval guns of this type are used for fighting targets in the air and on the water, that is to say on the horizon, various problems arise.

a) The rolling and pitching of the ship makes aiming more difficult. Special measures are therefore necessary to eliminate the influence of these motions of the ship on the gun.

b) In the case of guns, one setting axis of which points to the zenith, it is necessary, when fighting targets which are in the zenith, to apply high acceleration forces when following with the gun.

In a known gun of this type (see German Patent Specification 329,461), a device is provided for eliminating the influence of motions of the ship, wherein the gun barrel is mounted, so that it can rotate, in two axes which are mutually at right angles and which can be swivelled about a vertical axis.

In this known device, the horizontal axis which is at right angles to the trunnion axis lies in the plane of elevation of the gun barrel; the plane of elevation can therefore be rotated about this axis in any position of the gun and can be adjusted vertically in order to balance the motions of the ship. With this known weapon, howver, aiming of the gun is effected about the vertical swivelling axis which points exactly to the zenith.

This known arrangement has the disadvantage that aiming in the zenith and in the vicinity thereof is made extraordinarily difficult. Large variations in the lateral setting angle are necessary for following a target moving through the zenith. As long as the barrel of the weapon is approximately parallel to the vertical lateral setting axis, accurate aiming is virtually impossible. This has a particularly troublesome effect in the case of naval guns, since the vertical lateral setting axis also moves with the motions of the ship and aiming in the zenith zone is thus made even more difficult.

In addition, the large variations, which have been mentioned, of the lateral setting angle in the case of small movements of the target in the zone of the zenith, require high acceleration forces and thus high drive powers for following with the gun.

The object which is to be achieved by the present invention is the provision of a naval gun which, on the one hand, on aiming is able to take into account the motions of the ship, is particularly suitable for fighting targets in the zenith and does not require high drive powers on following.

According to the invention there is provided a naval gun arranged to be directable at any point in a target area which includes the zenith and whose centre is at a predetermined angle from the zenith, the gun being mounted on a carrier rotatable about a first setting axis which is inclined relaive to the horizon and which does not extend into the target area, and the gun being rotatable relative to the carrier about a second setting axis perpendicular to the first setting axis.

Admittedly, naval guns are already known (US Patent Specification 2 978 961) in which one swivelling axis does not point to the zenith, the second swivelling axis is arranged at right angles to the first axis and both swivelling axes form the setting axes.

This known gun, however, has the disadvantage that the first swivelling axis is horizontally arranged, as a result of which, when fighting targets on the horizon in the direction of this swivelling axis, the same difficulties arise as in the case of fighting targets in the zenith when the first swivelling axis is arranged vertically as mentioned.

To avoid this disadvantage, the first swivelling axis is arranged according to the invention in such a way that it does not point into the target area.

Two illustrative embodiments of the gun according to the invention are described in the following text in detail by reference to the attached drawing in which:

Figure 1 shows a diagrammatic representation of the gun according to a first illustrative embodiment;

Figures 2 and *4* show the forecastle of the ship with a gun; and

Figure 3 shows the gun according to a second illustrative embodiment in plan.

According to Figure 1, two supports 2 are positioned on a surface 1 which is inclined relative to the horizon. Between these supports 2, a carrier 6 is located so that it can be swivelled about a stationary setting axis Y. The two ends of the carrier 6 each have an axle journal 3, which protrude into the supports 2 and are coaxial with the setting axis Y. The two ends of the carrier 6 also each have a tooth sector 4, which each mesh with a pinion 5. Each pinion 5 is driven by a motor 5*a* fixed to the supports in order to swivel the carrier 6 about the setting axis Y.

In the carrier 6, a wheel 27 is mounted so that it can rotate and this wheel meshes with a pinion 29. The pinion 29 is driven by a motor which is not shown in more detail in the drawing, in order to rotate the wheel 27 about a second setting axis X. One cradle 11 each is fixed on both sides of the wheel 27. One recoil weapon 12 is mounted on each cradle 11. The two setting axes X and Y intersect at right angles. The tooth sectors 4 have incisions 13 which determine the swivelling range of the weapon 12 fixed on the cradle 11 about the setting axis X. Moreover, an ammunition drum 14 for each weapon 12 is fixed on the cradle 11, which drums are likewise mounted so that they can rotate about the setting axis. It is also possible to use other ammunition magazines in place of these ammunition drums. Such ammunition magazines are described and shown, for example, in Swiss Patent Specification No. 379,969.

According to Figure 2, the gun described is located, for example, on the forecastle 21 of a ship 20. A base 22 of the gun is fixed to the forecastle 21. This base 22 has a surface 1. This surface 1 is

inclined in the longitudinal direction of the ship 20 towards the bow 24 thereof and carries the supports 2 of the gun. As a result of this inclination of the surface 1, the setting axis Y is also inclined relative to the deck 21 of the ship. According to the illustrative embodiment, the angle of inclination can amount to 20°.

The barrels 19 of the firearms 12 can be swivelled about the setting axis X by an angle of about 160°. The limit of this swivelling angle is given, as stated, by the incisions 13 of the two tooth sectors 4. This means that the minimum angle between the barrel axis and the setting axis Y amounts to about 10° in one direction and in the other direction. The carrier 6 can be swivelled about the setting axis Y by an angle of about 270°.

When the barrels 19 of the weapons are swivelled about the setting axis X into one or the other of their end positions and are then swivelled about the setting axis Y by the stated angle of 270°, the barrels 19 describe the lateral areas of two cones, the apexes of which lie on the setting axis Y and surround the latter. A target cannot be reached within these cones. As can be seen from Figure 2, however, superstructures 23 of the ship and the bow 24 of the ship are in this zone so that it is anyway not permissible to shoot within these cones.

On the other hand, the weapon described is particularly suitable for fighting targets which are in the zenith since, in this zone, it is possible for the weapon to follow a target moving in the zenith with substantially smaller swivelling movements than is possible in the case of conventional weapons, the lateral setting axis of which points to the zenith.

The illustrative embodiment shown in Figure 3 differs from the first illustrative embodiment, which has been described, essentially by the special design of the carrier 6. Between the two supports 2, the frame-type carrier 6 is mounted so that it can be swivelled about the stationary setting axis Y. This carrier has two crossbeams 7 which are mutually connected by sidebeams 9. Two tooth sectors 4 are fixed to the crossbeams 7 by means of bolts 8. These tooth sectors serve, in the manner described, for rotating the carrier 6 about the setting axis Y. Bearing journals 3 which protrude into the supports 2 and are rotatably mounted in the latter, are fixed to the crossbeams 7. Trunnions 10 which are fixed on both sides of the cradle 11, are rotatably mounted in the sidebeams. Moreover, one tooth sector 17 each is mounted on both sides of the cradle 11, and these tooth sectors serve in the manner described for swivelling the cradle 11 about the setting axis X.

The base 22 having the surface 1 can be mounted so that it can rotate about a vertical axis.

According to Figure 4, the two supports 2 are fixed on the horizontal platform of the deck 21 of the ship, the two supports 2 having different lengths.

CLAIMS

1. A naval gun arranged to be directable at any point in a target area which includes the zenith and whose centre is at a predetermined angle from the zenith, the gun being mounted on a carrier rotatable about a first setting axis which is inclined relative to the horizon and which does not extend into the target area, and the gun being rotatable relative to the carrier about a second setting axis perpendicular to the first setting axis.

2. A naval gun according to Claim 1, wherein the carrier is rotatably mounted between two supports.

3. A naval gun according to Claim 2, wherein the two supports are located on a platform which is inclined relative to the horizon.

4. A naval gun according to Claim 2, wherein the two supports have different lengths and are located on a horizontal platform.

5. A naval gun according to Claim 1, wherein the first setting axis is inclined in such a way that, at least in one direction, it points towards the contour of the ship.

6. A naval gun according to Claim 1, wherein the first setting axis is inclined in such a way that, at least in one direction, it points to the immediate surroundings of the ship.

7. A naval gun, substantially as described with reference to any Figure of the drawings.

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When the barrels 19 of the weapons are swivelled about the setting axis X into one or the other of their end positions and are then swivelled about the setting axis Y by the stated angle of 270°, the barrels 19 describe the lateral areas of two cones, the apexes of which lie on the setting axis Y and surround the latter. A target cannot be reached within these cones. As can be seen from Figure 2, however, superstructures 23 of the ship and the bow 24 of the ship are in this zone so that it is anyway not permissible to shoot within these cones.

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