

OBSERVATIONS ON COAST DEFENCE.

We are indebted to Lieutenant-Colonel von Hluddt, of the German Marine Artillery, for the following valuable ideas on this interesting subject:—

General Ideas.—Coast defence implies the aggregate of the defensive measures required to repel hostile attacks from the sea. To protect each individual point on a line of coast would entail needless expenditure and an injudicious extension of the forces available for the defence. The erection of defensive works should, therefore, be restricted to certain important points commanding the approaches to great naval establishments and the principal commercial ports. As a rule, the defensive works should be at a distance of 7000 metres (4½ English miles) from the points to be defended, but this must, of course, depend upon the circumstances of each locality. In every case, the assistance of a committee of experienced naval officers will be requisite to secure reliable information as to the number of vessels which it will be practicable to bring into action in the waters under consideration. The number and sizes of the works must be proportioned to the possible development of the attack. The greater the number of ships the enemy can deploy, the more powerful must be the defence.

Position of the Works.—I. The defensive works should be so placed that the enemy's ships can only engage them in very limited numbers at ranges under 3800 metres (two two-fifths English miles). If the enemy could bring five or six powerful ironclads into action at this range, he would find little difficulty in silencing at least the outer line of defence. He need not fear serious loss, and his ships could easily be relied out of action if disabled. If, on the contrary, at a like range, he could only command a front of 1500 to 1800 metres, at most two or three ironclads could attack in company, and then care would be required to prevent fouling in the heat of action. Heavy ironclads—despite their size—are not very formidable if they have not room enough to manoeuvre with ease and facility.

3. Coast batteries should bring a cross fire on the whole surface of the adjacent water, and also sweep the shore, so as to render a boat-attack impossible.

3. Lines of defence should be so traced that they may not be exposed to enfilade from the enemy's ships. Traverses would be of no use against the heavy ordnance now carried. Enfilade fire from any point on shore is less to be dreaded, as traverses would probably be an efficient protection against any guns which it would be practical to land.

4. Every scheme of coast-defence should include some forts or batteries at points where the enemy's fire, even with modern long ranges ordnance, cannot reach, which shall remain intact until the decisive moment of attack. There should also be some advanced batteries to prevent the enemy's ships at once engaging the main works.

5. When the coast allows of such an arrangement, the shore-batteries may be constructed on heights. The higher the site of a coast battery, the greater its superiority acquired by its artillery fire over that of opposing vessels, decreases rapidly in accuracy as the angle of elevation increases. When a battery has a sufficient command, its projectiles strike down almost vertically on the enemy's decks—a description of fire peculiarly destructive to rudders and screws, and therefore particularly detrimental to ironclads. A height of 36·4 metres

(100 German feet) above the sea-level is considered very favourable; one of 15·7 mètres (50 German feet) only is considered insufficient.

6. Batteries to cover lines of torpedoes or the important obstacles should have at least two thirds of their armament of heavy calibre.

Obstacles to bar the entrance of a channel or harbour are usually arranged in a double line—an outer or advanced line, and a main line. The outer line is to delay the enemy's vessels as long as possible under effective fire of the batteries, and so to check the rigour of the attack against the main line. It should consist of a line of torpedoes moored with chain-cable of suitable lengths. It should be 700 to 900 mètres from the main line.

The main line should be sufficiently strong to render it impossible for the enemy's ships to break through it without first silencing the fire of the works on shore. It may be formed of several lines of torpedoes or floating obstacles.

7. Many officers consider it best to have a large number of batteries with a few guns in each, so as to compel the assailants to divide their forces as much as possible. The advocates of this plan overlook an important consideration, i.e., the difficulty thus entailed in the general direction of the defence. This difficulty can only be met in one way, i.e., by increasing the number of officers of the Coast Artillery, so that there may always be a sufficient number of properly-qualified officers available to undertake the responsibility of defending individual forts and batteries.

Coast defences may be broadly defined to consist of two sorts:—1. Covered works; 2. Uncovered earth works.

Covered Works.—The destructive powers of the enormous projectiles used with modern naval ordnance are so great that armour is indispensable for all works near the sea-level, particularly for those in the exterior line of defence. In such cases, the guns are placed in ranges of shot proof iron-turrets, or behind armour-plated breast-works. Recourse is had to turrets when it is necessary to occupy sandbanks or low-lying islands, or any important point sufficiently low-placed to be commanded by the fire of the enemy's vessels. As a rule, works having their *terre pleins* 10 to 15 metres or more above high water mark do not need turrets; it is sufficient to plate the battery and its traverses with iron. The thickness of the armour-plates should be such that they may not be penetrated by projectiles of large calibre. There should be no backing or filling-in with earth. Earthen merlons and traverses are very unsatisfactory defences in such cases. The bursting of a shell of large size in the vicinity of a gun will place it, for a while, as completely *hors de combat* as though it had struck it direct. The bursting of an elongated projectile in the earth between armour-plates will place guns temporarily *hors de combat*, even at distances of 75 mètres (82 yards). The bores of the pieces, the brakes of the hydraulic lifts, the slides, and the platforms themselves get so much clogged with the loose earth scattered about in all directions that it becomes absolutely necessary to cease firing. We may instance a case at Gruson's works, of a 28 centm. spherical chilled iron shell, which lodged in an earthen mound, and bursting, scattered the earth over other guns, at distances varying from 35 to 75 metres, in such quantity that a considerable time elapsed before they could be cleared again ready for action. We can imagine

what would be the effect of an elongated projectile of equal calibre. The men of the gun detachments, too, in this way often received contusions incapacitating for the performance of their duties for some time. By putting the guns in shot proof turrets we secure the advantage of both guns and men being completely under cover. Traverses are not needed; and so spare and labour are saved also. But, turrets are enormously expensive; financial considerations therefore require that they should be employed only where they are absolutely essential.

When works are simply protected by cast-iron armour plating the cost is, of course, less. Taking into account the penetration powers of modern naval ordnance, these plates should have a thickness of 12 (German) inches (0 m. 314). It is useless to exceed this limit, as the artillery contest will rarely be carried on at ranges under 1500 metres, and even at this distance a 23 centm shot will not go through a 12 inch iron plate.

To cover the men and guns efficiently, the armour should be carried up to a height of at least 5½ (German) feet (1 m. 68). B-rhettes and traverses on a sea-front should have their reverse slopes plated as well. Heretofore it has been usual to place traverses on either side of each gun and to carry them up above the level of the adjacent merlons. In this way they give an embrasure like appearance to the crest of the work when raised in front which plainly indicates the positions of the gun and affords a convenient mark at long ranges. The advantages gained in respect of defilade, by high traverses have therefore been abandoned, and they are not now carried higher than 1 m. 78 above the *terreplein*,

Earthen Works.—Earthen works on elevated sites have no need of a shot-proof mask of the above description. The guns, in point of fact, are only exposed to the fire of the enemy's ships at considerable distances, at which the chances of hitting are greatly diminished. A bombardment would have little effect on works at a distance of 150 to 225 metres from the water, and separated from it by a smooth, sloping glacis. In such a case, the majority of the enemy's shells would burst in front or in rear of the mark. The nearer the vessels might approach, the less effective their fire would become. Forts, like Korugen and Oberjagersburg, or Kiel roadstead, are so well placed that it appears very questionable whether they could be silenced even by a considerable force of ironclads. The thickness of the parapet should be at least forty German feet, so that it may withstand the shock of the heaviest projectiles.

Precaution against Sudden Attacks.—After a declaration of war, within a very few days at farthest, coasts will be liable to attack. Now at this time the augmentation-men will probably not yet have come in, and the coast-garrisons will still be very weak. Should the enemy succeed in effecting a landing the works might soon be carried. An hour would suffice to put the heaviest calibre *hors de combat*. But, even under the conditions just supposed, this could not be accomplished if the works had been properly finished beforehand. An escarp of masonry, and a few flanking caponnières, well supplied with mitrailleuses, ought to enable a very small number of men to hold out against the attacks of a far superior force until the arrival of reinforcements from the neighbouring garrisons. If palisades are considered requisite, they should be put up in peace-time; at any rate, in the case of the more advanced works.