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CONSIDERATIONS ON A NEW FORM OF IRONCLAD PROPOSED

By Captain JOHN WHEATLEY, R.N.

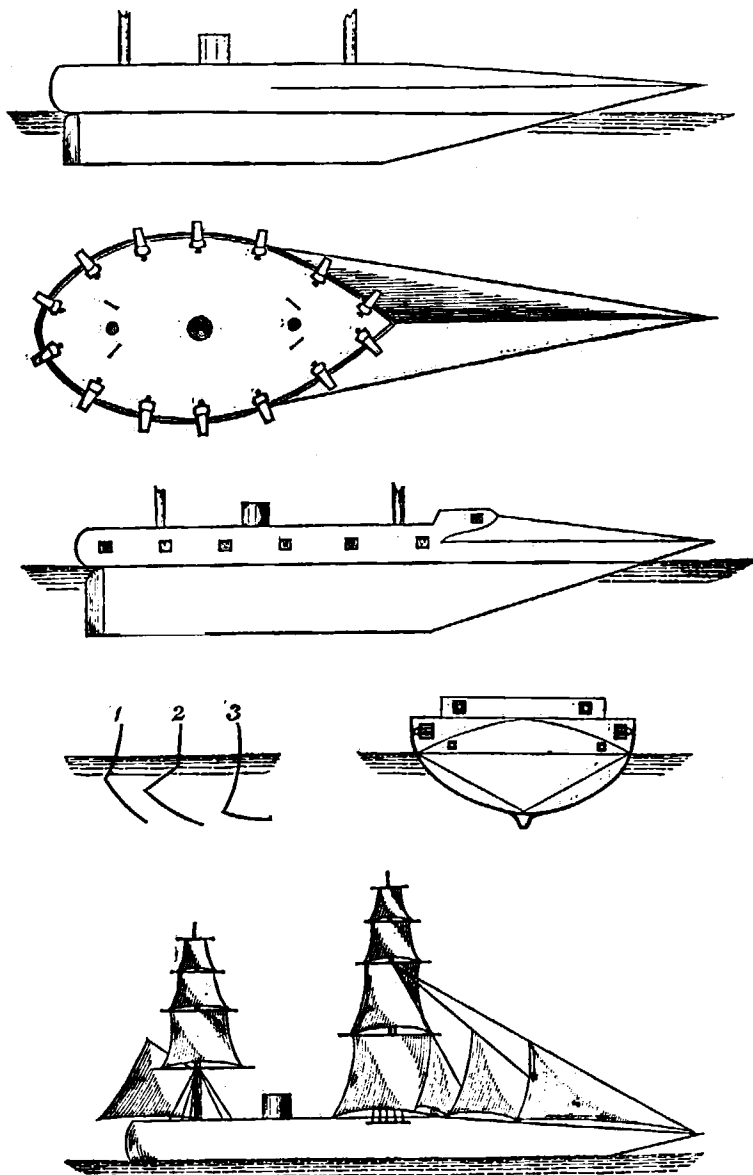
THE competition which has long been going on between guns and armour plates, is conclusively settled in favour of the gun over any plates that a sea-going ship could carry by the successful completion of the Woolwich 35-ton gun, with power to construct larger guns still in reserve. Under these circumstances, and accepting these conditions, it must be evident that the gun, that is, the power of the gun of other countries, and the size, weight, and power of our own gun, must be the chief consideration in the design of the ships; and that the best form for a sea-going ironclad must be that which exposes the smallest surface to shot striking at right angles, and possessing at the same time unquestionable stability, high speed, capability of carrying the full proportion of sail of former wooden ships, with full steam power, easy steering, and rapid turning.

Now that by the addition of 350 tons of ballast, the stability of our present ironclads is so far re-established as to admit of their being sent to sea without risk, in position of attack, that is, broadside-on, they

expose a very large surface for shot to strike at right angles, probably not less than 280 feet by 20 feet of penetrable armour, which armour when penetrated is the very reverse of a defence. Turret ships with high freeboard—rather an anomaly when with penetrable sides—expose about one-third less, but their hurricane-deck may be cut through and come down on the turrets. A writer in *Blackwood's Magazine* for March, states that the “ ‘Audacious,’ when broadside-on, presents an “ area of 6,670 superficial feet; and of these only 3,207, or less than “ half, are plated at all. There is a patch of 100 feet by 3 at the “ water-line of 8-inch armour, which tapers down to 4½ inches at the “ bow and stern; and the rest of the ship has nowhere any thicker “ armour than 6 inches, the ends of the main-deck battery having “ only 4 and 5-inch armour, while the ends of the upper deck battery “ are unprotected against a raking fire, and more than half the ship’s “ side is in the same unprotected state. A roll of ¼° would lift the “ 8-inch belt well out of the water, and a roll of 10° would show the “ unarmoured hull, and we hear that on the trials outside Plymouth “ harbour, the ship, without a sail set, heeled over 16°, and the Ad- “ miralty have been compelled to have the rig of the ship altogether “ altered, and her sails and masts largely reduced. Yet these are the “ ships which are supposed to constitute our second-class of broadside “ ironclads!”

It has been said several times, and it was repeated by Sir George Sartorius, at the close of the discussion on Admiral Fishbourne’s lecture “On the Causes of the Insufficient Stability of Her Majesty’s late Turret-ship ‘Captain,’ and of other Ironclads,” that it was for the sailor to describe the sort of ship that he required, and then it was for the naval architect to construct her according to the principles of his science. Therefore in the diagrams before you no more lines are given than are necessary to show the sort of vessel proposed. All our present ironclads, and, excepting circular or star-shaped forms for coast defence, all vessels which I find proposed in the Journal of this Institution, are based on the model of the Deal, or rather Dover galley as a type, the former being formed for beaching, while the latter lies afloat, a very good form for packets or passenger boats going straight on end, but whose unhandiness for general purposes, and specially for ships of war, is shown, even when manned by those most accustomed to them in the indispensable “duck hunt” at all regattas; and this unhandiness has been further increased by the plough bow. It has been stated in this place that the “Monarch” took three hours to veer! I leave you to imagine the consequence if a ram was bearing down on her broadside.

The vessel, a diagram of which is before you, is taken from the Bombay fishing boat as a type, whose large spread of canvas is a sufficient guarantee of stability. It is the ruling principle in the form of most of the craft between Egypt and Japan inclusive. In the account of Commodore Perry’s first visit to Japan, it is stated that a Japanese boat took off some American Officers to their ship quite dry in weather which quite wet through the Officers who went in their own ship’s boat. The Chinese fast boats, the Thames wherries, and that noble wherry,



1. "Rupert."

2. "Devastation."

3. "Hercules."

the beautifully-formed Lord Mayor's barge, are all examples of this principle, though the barge, of course, is adapted only for shallow water. Taking these diagrams to represent a vessel whose extreme length is 300 feet, her beam one-fourth of her length, 75 feet, enabling her to carry 14 35-ton guns, weighing, with 23-ton carriages, 790 tons, that is little more than double the extra weight of ballast put into our present ironclads to make them seaworthy. She will have an all-round fire without any impediment; bringing, on Captain Scott's system of mounting, from 3 to 4 guns to bear, and 8 ahead and astern, and 7 broadside on Captain Moncrieff's on every point of the compass; on Moncrieff's never less than 5, without altering her position; while in proportion to the weight of metal carried, she exposes less than half the surface to shot striking at right angles than any other sea-going form, obtaining, by the oval, part of the advantage of the turret, though not quite to the same extent as the circle for defence, but, on the other hand, superior to the revolving turret for attack by the guns being placed on a curve, thus having a gun always bearing on the attacking vessel.

At present no vessels are quite equal to our new breastwork monitors, but they will be enormously expensive, and we require a numerous fleet as well as a fleet of ships individually powerful. The proposed form admits of the fullest use of sail* power, without any risk of the gear interfering with the guns; and, by the adoption of the hydraulic propeller, obviates the objection brought against the use of masts and sails on account of their fouling the screw if shot away. The following account of the "Hercules," as our best present sea-going ship, is taken from *Blackwood's Magazine* for March:—

"The 'Hercules' is the only one of our first-class ironclads which has yet been tried at sea, and it is due to her constructors to say that she has proved a great success. Her armament is very powerful, and consists of 14 rifled guns, of which eight are of 10-inch, two of 9-inch, and four of 7-inch calibre. Her water-line is defended by a belt of very thick armour, perhaps impenetrable at the thickest part by any of the guns she carries, and extends for about 3 feet above and 3 feet below the water-line from stem to stern of the ship. As long, therefore, as the sea is sufficiently calm to confine her rolling to 6°, it is probably impossible for any ironclad now afloat in any foreign navy to deliver a shot which of itself can sink her. This great defensive strength is, however, confined to her belt; the battery from which her largest guns are worked is only protected with 6-inch armour, and experiment has shown that armour of that thickness, with the ordinary backing, can be penetrated at a distance of 1,000 yards, and at an inclination of impact of 30°, by the 9-inch rifled gun, and at close quarters by the 7-inch rifled gun, such as is carried by all except one of our present ironclads. But the 'Hercules' has other excellencies; she is, for an ironclad, a fair sailor, though awkward in tacking or wearing. She has a speed under steam of 14 knots, and is a very steady ship, and can, therefore, use her great offensive powers under conditions of sea in which a less steady ship

* The masts and sails are not drawn to scale, but only to show the rig.

"would be almost *hors de combat*. Of our other first-class ironclads "the 'Sultan,' which resembles the 'Hercules' in most essential "points, has been launched, but has not been tried. It is said she is "deficient in stability." So far *Blackwood*. Broadside-on, her position of attack, the "Hercules," with a length of 925 feet, exposes about 300 feet by 30 of penetrable armour. With my vessel the position of attack will be stem-on; in this position she will bring, on Scott's system, four 35-ton guns, on Moncrieff's eight 35-ton guns to fire in a line parallel to the keel behind armour quite as secure as that of the breastwork monitors, and presenting an acute spherical angle to the enemy's shot. My vessel's weakest point will be the broadside. Should she be attacked on the broadside as well as ahead, she will bring five or seven guns to bear, as repelling forces, but the defence will be weaker than stem-on, inasmuch as allowing for the great strength required for the gun-deck, she would probably not carry more than a 10-inch water-line belt of 6 feet, surmounted by 6-inch plating throughout, but the whole may be faced with 18 inches of teak (taking a leaf out of Mr. Hyde's book*) as the wood that splinters least and that suits best in contact with iron. Broadside-on, my vessel would expose about 130 feet to shot at nearly eight angles at the water-line, to about 300 feet of the "Hercules," with the same armour. On the gun-line, and above, my next ports to the beam-gun recede 10° , the next two 20° , and the next 50° ; this, with 24 feet from gun to gun, makes 96 feet, in all about 120 feet; that of the "Hercules" remaining at 300 feet penetrable armour, while the repelling force of my guns will be at least double the force of the "Hercules" guns.

I need say nothing here as to the advantage of masts and sails, over very large vessels navigated solely by steam, in point of economy, nor as to that of their being the only resource in case of damage to machinery. With vessels on a wind the greatest pressure, and of course the greatest obstruction to speed, is on the lee-bow. This pressure has been greatly reduced by the prolongation of the lines in the plough-bow, but the advantage has been more than counterbalanced by a further addition to the difficulty of steering and turning. In the diagrams before you, the entrance at the water-line very nearly coincides with Mr. Scott Russell's line of least resistance; there is an upward pressure increasing with the speed of the ship, and this upward pressure is further increased by the action of the head-sails, which all have a lifting power tending to reduce friction in passing through the water. The following is an extract from the *Globe* of March 4th, 1871:—"The Royal Commission on the construction of ships, who "visited Devonport this week to test the ironclads, have condemned "the 'Waterwitch,' worked by hydraulic apparatus, and the only ship "of her class. The performances of the 'Hotspur' as to speed, power, "and safety were satisfactory; but owing to her weight and form of "bow, which is built to allow firing straight ahead, she lies dead in "the water, and when driving at full speed against a head sea, three "tons of water were taken in at port of the turret, which was experi-

* This, however, is a naval architect's question.

"mentally opened for five minutes only. The Committee approve of her for coast defence, but will decline to pronounce her suitable for ocean voyages."

As Admiral Elliot, who was a strong advocate for the hydraulic propeller, was one of the Committee, there must have been good reason for the condemnation of the "Waterwitch;" but the principle has more than once so nearly reached success that we may still look forward to it as our best motive principle. The immense quantity of water shipped by the "Hotspur" is probably owing to the concave shape of the plough-bow just below the surface of the water, the pressure being downward and therefore destructive to speed, and carrying the water upwards.

In a question of national existence,—for, deriving so much of our subsistence from abroad, were our fleet defeated, we might be starved into submission on the most humiliating terms without an enemy landing on our shores,—it would be a very great mistake not to avail ourselves of the advantage to be gained by the use of the most powerful projectiles; the difference between an 18 or 25-ton gun and a 35-ton gun might render a doubtful contest certain, with fewer damages to repair and with less or very likely no time lost by absence of the ship from her station.

With this view I propose three classes of vessels, all having the same scantling, this class before you being the first-rates; the second-rates, of 260 feet length with 65 feet beam, to carry eight 35-ton guns, weighing, with carriages, 440 tons; third-rates, 220 feet in length with 55 beam, carrying four 35-ton guns, weighing, with carriages, 220 tons; the first and second-rates bring four or eight,—according to the system adopted,—guns to bear right ahead behind impenetrable armour, and the third will bring two or three under the same conditions. I do not allude in any way to gunboats carrying one gun. It must be borne in mind that the smaller the vessel in a sea-way, the greater the disturbance to correct aim, and that in case of a miss, it is of great advantage to have another gun ready, as these guns cannot be reloaded very rapidly; and though the large ship may cost more, she will also be worth a great deal more. In the next naval war we shall have to seek special precautions against that most destructive weapon, Harvey's sea torpedo. In the trial between the "Royal Sovereign" turret ship and the "Camel" with these torpedoes, the "Royal Sovereign" at anchor was supposed to defend herself against ten different attacks, the turret ship being armed with five guns. The torpedo was successful eight times out of the ten, each touch representing total destruction, the "Royal Sovereign" firing during the first attack seven times; second attack four times; third, fourth, fifth, sixth, and seventh attack twice; eighth and ninth attack only once. On the following day, with the "Royal Sovereign" under weigh, the torpedo vessel made six attacks, failing only once, the "Royal Sovereign" firing ten, twelve, seven, two, five, eight rounds during the successive attacks; and it was remarked at the time that had these guns been shotted very few of the shot would have struck the "Camel," this in smooth water, at an extreme distance of sixty

fathoms, thus showing the necessity of having guns laid for an attack in any direction.

In the article in *Blackwood*, from which I have received so much information, it is stated, that "Every break in the armour-plated side of a ship is a necessary element of weakness, especially in the present day, when breechloading rifles from the enemies' marines may be expected to pour a volley through every open port-hole." Every ship of war of whatever form must be a compromise between difficulties. The intention of the rifled gun is to enable you to destroy your enemy at distances of from one to two thousand yards; thus I cannot imagine where any body of riflemen could find a near-enough platform whence to discharge a volley into any ports in case of the adoption of the Scott system instead of the Moncreiff.

Extracts from Mr. E. J. Reed's "Our Ironclad Ships."

Chapter vii, p. 140. "Rolling."

In fact, the heavier a ship is, the greater is the resistance she offers to being set rolling, a statement which it is scarcely necessary to illustrate, as we are all familiar with the fact. It is true that great weight tends to sustain motion when it has begun, but even then it does not increase rolling. In fact, as far as the mathematical theory of rolling goes, a ship's behaviour is entirely independent of her weight, although the heavier ship requires a greater effort to set her rolling than a lighter vessel.

Chapter vii, p. 178. "Dimensions, Turning."

	Length.	Breadth.	Prop.	No. of men steering.	Circle.	
					Yds.	Time.
Bellerophon, balanced rudder.....	300	56.1	5.3	8	401	4' 47"
Minotaur	400	59.4½	6.7	78	939	7' 38"
Lord Clyde.....	280	58.11	4.7	12	379	4' 54"
Achilles	380	58.4	6.5	—	618	6' 40"
Warrior					760	7' 46"
Hercules, jointed balanced rudder.....	325	59	5.5	16	562	4'

P. 181.

Our experience with long and short ironclads may be fairly stated as follows—that the short ships may be driven as fast as long ships by a moderate addition to their engine power; that in turning power and general handiness under steam and sail, the short ships are much superior, and that the great reduction in prime cost of short ships much more than makes amends for the addition to the steam power.

Chapter ix, p. 196. "Forms and Proportions."

In armoured ships, as the extent and thickness of the armour are increased, the proportion of length to breadth should be diminished and the fulness of the water

lines increased; the shorter fuller ship can be propelled at as great speed as the longer finer ship, with about the same or only a little greater horse power.

In longer ironclads the proportion of frictional resistance becomes considerably increased.

Extracts from Mr. J. M. Hyde's Lecture on Deflecting Armour Plated Ships for Coast Defence.

Journal of the Royal United Service Institution, No. liii, pp. 133, 134, 139.

Mr. Hyde's experiments were made with a gun representing a 25-ton 12-inch 600 pounder, at a range of about 17 feet, representing 70 yards, and the results bore the same proportion to those of the service gun.

With a target representing the angular side of his ship (20° from horizon) one half faced with wood and the other bare, the wood made the shot ricochet; the metal showed a small indentation only.

Since writing the above we have had letters from Sir Spencer Robinson in the newspapers, stating that other powers are building on the models of "Hercules" and "Devastation." It is clear that Russia is putting efficiency before economy, and that part of her new loan will go to pay for the heavy breechloading guns of which we read in the *Standard* of the 8th instant. Prussia in her last two wars has acquired ample means of proceeding on the same scale. There can be no question as to the object of these armaments, and unless we are prepared to meet them our prospects are not very gratifying. I therefore propose to increase the scale of my ship to 340 feet length, 85 feet beam, and to guns of 60 tons, throwing 1,200 or 1,500 lb. shot; and that no time should be lost in testing Captain Moncrieff's system, which either increases one-third or double the force of the ship. In one of our present sea-going ships,—perhaps as she is without ports the "Monarch" would be the best,—three guns of the same calibre should be substituted for the turrets, there would still be space for two more, and thus her attacking force would be doubled. As it is one of the inevitable consequences of the progress in ships and guns that the ship of to-day becomes obsolete to-morrow, it is perhaps wisest, and in the end cheapest, to go to work at once on the largest scale possible. Captain Colomb's most important and suggestive lecture on "The Attack and Defence of Fleets," shows the advantage of the ram over the gun as a weapon of attack, and also that the proportionate power of the gun has receded as its size has increased. Since the war of the first Napoleon, we have had two actions of fleet-to-fleet—Navarino and Lissa; but we have had Algiers, Acre, and Sebastopol; Cronstadt was considered unassailable with the means we had then at our disposal. In the American civil war, ships were successful over forts at New Orleans, Mobile, Fort Fisher, and failed only at Charleston. In all these cases the gun was the only possible weapon.

In addition to the other advantages of the form I propose, I submit that the proposed vessel possesses very superior advantages as a ram, the weight of head and stem assisting. It has been found with projectiles that the sharper the point, the deeper the penetration; should this be so with a ship, as is most probable, this vessel would simply split any other in two and pass through her, while as a defence, pre-

sending her stem, the approaching ram would either spit herself on the point or pass along side without doing harm.

Torpedoes.

As all ships can use torpedoes, I look forward to the time when ships will no more be sent to sea without a store of Harvey and other torpedoes, than without boats or anchors.

According to Captain Dawson's lecture, the force of torpedoes does not extend in water beyond 20 yards, so that ships of the proposed form may easily sweep a channel clear of stationary torpedoes by proceeding in pairs with the stream or kedge chain extending across the channel from outriggers on the off bow of each ship, stiffening the chain with spars if the bottom is steep; an operation which could not be carried out by ships of the present form.

With the supremacy at sea, blockades may be secured by a torpedo cordon moored across a harbour's mouth, excluding access or egress of any kind.

In the First Lord's speech on the naval estimates he stated, that "It seemed to him to be an impossible problem to combine a first-rate fighting ship with a first-rate sea-going ship." It has been my endeavour to combine a first-rate seaboard with a first-rate steamer, and first-rate sailing ship with a first-rate fighting ship, armed at all points, whether for gun, ram, or torpedo warfare.*

The CHAIRMAN: Does any gentleman wish to ask any question or to make any observations upon the paper just read? I should like to lead off by asking two questions. What is the freeboard of your largest vessel? Also what is the height of the hawse-holes above the water?

Captain DAWSON, R.N.: The only questions I should like to ask are whether these are a series of guesses, or whether there have been any calculations made to justify the supposition that a vessel of those dimensions would carry the weights that are there stated? And how are we to guard against the guns on the Moncrieff system firing into one another? I would also say that you misquoted me. I never said that torpedoes could strike a vessel 20 yards from the place of explosion; it was 10 or 15 feet.

Captain WHEATLEY: That is the better for my vessel.

Admiral of the Fleet Sir GEORGE SARTORIUS: I wish to ask you, in attacking as a ram, what would be your mode of attack? I do not mean end-on, because no ram of that kind would attack end-on. But in attacking, how do you calculate upon attacking as a ram a ship on her broadside? Also what is the power of penetration?

Mr. HYDE, C.E.: I should like to make a few remarks. It appears from the design that Captain Wheatley has produced, that all his guns would be placed in one huge battery. Now, unless the sides of his ship would be invulnerable, the effect of shells

* Captain Wheatley has requested that the following propositions may be added to his paper.—ED. :—

1st. Neither light draught of water nor reliable stability under sail are attainable with narrow beam.

2nd. High speed is only attainable by considerable length in proportion to beam.

3rd. Abundant proof exists that there is no absolute necessity for this length to be in the form of an elongated vertical parallelogram.

4th. Abundant proof exists that according to the elongation of the above-named form the efficiency of ironclad ships of war is diminished.

getting into that battery would, I think, be rather serious for the crew who were fighting the guns. It has been argued that the great point in all future warfare should be to keep the shells out of a ship, because they seem to do more mischief than any other projectile. So that unless the sides of the ships were practically invulnerable, shells would necessarily get through; and you can well imagine the effect they would produce among a crew so confined even in so huge a battery. The forward end of the ship, of course from its construction and from the angular sides it presents, would be practically invulnerable. Now, if it be necessary to make the end of the ship angular, and hence invulnerable, why not carry out the angular side all round the ship and place your battery in the turret gun-carriage? Turrets are really invulnerable gun-carriages; and if the turrets were armed with these modern 35-ton guns, the power of which is hardly yet known, the turrets being practically invulnerable, the shells then would not get in among the crew. The remark I wish to make is simply this, that if it has been shown that the sides of our ships are penetrable to our modern shells, then these vertical sides would still be practically useless for the protection of the gunners and those who serve the guns. Also if it be necessary to make the bows of the ship angular to keep shot and projectiles out, why not carry the angular sides all round the ship?

THE CHAIRMAN: Perhaps, Captain Wheatley, you will now reply. You did not mention the speed or the coal carried.

Captain WHEATLEY: Your first question was with regard to the height of the freeboard. The lower sills of the port are 7 feet 6 inches above the water-line, and of the hawse-holes 7 feet. That is about the height of those of our frigates in the last war. Of course they may be made a little higher if it is necessary. With the 35-ton guns, on Captain Scott's system, it is necessary to have the 'twelve decks rather higher than on Captain Moncrieff's system, the greatest diameter of the gun being 4 feet 8 inches, to allow for the gun-carriage and for the necessity of elevating and depressing the gun. Captain Dawson wants to know on what data the vessel is designed. I can only say that it is designed from the models which we have before us, just as others are designed, from the Deal galley, or rather the Dover galley. It is the same design increased to the size and necessity of a man-of-war. I am very much obliged to him for putting me right about the torpedo. I gave the torpedo credit for more power. It is more easily got rid of by a ship of that form, that is to say, the engineer's torpedo fixed upon the ground. Sir George Sartorius wished to know about the attack. The attack would be made by the ram stem-on. I know of no other way in which that ram could be used. The point of the ram is 7 feet 6 inches above the water-line. The projection of the stem of the "Rupert" is I suppose about 4 feet below water-line, that of the "Devastation" still lower, and that of the "Hercules" about 10 feet below the water-line. If you brought the plough-bows of these vessels against my ship they would not touch any part of her; and again, if they missed the point they would slide along the side and could not do any harm.

Sir GEORGE SARTORIUS: But when you are attacking an enemy's ship as a ram, the point of your vessel would be considerably above the water-line.

Captain WHEATLEY: It would strike the ship a little above her belt.

Sir GEORGE SARTORIUS: The great object to be gained by a ram is to strike underneath and sink the ship, which yours would not do.

Captain WHEATLEY: By the ram striking above the belt and making a wide hole, not a thin hole like the cut of a knife, the weights of the ship's head and stern would immediately come into play to break her back. The fore and aft parts would part even from the force of the blow; there would be nothing to sustain the head and stern of the ship attacked. The head and stern is much heavier than the midship section; and if the midship section is cut through, she would break in two.

Sir G. SARTORIUS: If the two vessels were going fast through the water the nose of your vessel would be run off.

Captain WHEATLEY: It might be; but recollect it is not a thin plate, it is supported on each side; and if it was, breaking it off would do no great harm. But that remains to be seen. I should be very glad to see an experiment on a small scale with

a vessel of this form. Speaking about the effect of shells, does the gentleman who asked the question mean vertical or horizontal fire of shell, because that would make a difference. The ship is impenetrable to the horizontal fire of shells; you cannot protect the ship against vertical fire.

Mr. HYDE: But you can drive a shell through a 10-inch vertical plate.

Captain WHEATLEY: This is the angular form of the ship's bow; and she brings eight guns to bear on the Moncrieff system.

Mr. HYDE: But I mean on the broadside.

Captain WHEATLEY: On the Moncrieff system all these guns turn on the broadside, and there is a greater force of guns than in any vessel of any other form. The "Hercules" can only bring four guns to bear.

Captain GILMORE, R.N.: If it is merely a question of the damage done by shells after entering a battery, it is easily obviated by having a traverse between the guns.

The CHAIRMAN: With regard to the report you quoted from a west country paper about the visit of the Committee of which I am a member, the words used could not be justified at all. The words used by the person who wrote in the paper expressed no opinion at all; therefore you may set that on one side. (Captain WHEATLEY: Very well.) I am sure that I only express the sentiments of all present by returning our thanks to Captain Wheatley. All papers on these subjects are very interesting, and anybody who will contribute to our knowledge will always be welcome.

Captain Wheatley is desirous that the following notes should be added, as he did not at the time clearly understand the question put:—"With regard to Captain Dawson's question, as to previous calculations, it is answered, by the opening statement that mine is only the "sailor's vessel," its construction is for the Naval Architect. I know of no formula for calculating the tonnage or speed of such a vessel, or whether those cited for the present forms would apply; but taking the tonnage to be nearly that of the Minotaur's, it must be ample for the weights proposed.

"With respect to the further discussion on the ram, such questions can only be decided by experiment. Several vessels are sunk every year by collision, without being struck by a plough-bow. In my opinion, in the case referred to by Admiral of the Fleet, Sir George Sartorius, as to the rammed vessel going at speed, the knife-like projection of the plough-bow is more likely to be wrung off, and with greater danger to the ram, than with my vessel, a double wedge strongly supported; a wedge is also the form that most easily withdraws from the hole it has made."

ARE THE ROYAL MARINE FORCES A NECESSARY AUXILIARY TO THE ROYAL NAVY?

By Major-General SCHOMBERG, C.B., R.M.A.

In the revolution that has taken place during the last few years in warlike matters, naval and military, a question is often asked, Is there now any necessity for the maintenance of the Royal Marine Forces as an auxiliary to the Royal Navy?

The question is an important one, for the marines have been hitherto not only an auxiliary to the Navy, but its first reserve, a reserve which could be always depended on; which never failed. As an Officer of Marine Artillery, I crave permission to examine this question, and will endeavour to do so as dispassionately as possible.