Adjourned Discussion. Thursday Evening, May 2, 1867

Captain R. N. Fishbourne in the Chair

To cite this article: Captain R. N. Fishbourne in the Chair (1867) Adjourned Discussion. Thursday Evening, May 2, 1867, Royal United Services Institution. Journal, 11:46, 462-484, DOI: [10.1080/03071846709417313](https://doi.org/10.1080/03071846709417313)

To link to this article: <http://dx.doi.org/10.1080/03071846709417313>

Published online: 11 Sep 2009.

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out our faults are, after all, our best friends. I have always been and always shall be most anxious to co-operate with Captain Coles; and I think I am not an insubordinate officer of the Admiralty. I shall be only too proud to act under authority in endeavouring to bring this question to a proper bearing. I will only further say that Captain Coles very early in his paper used a remark which I object to. He spoke about the persons in office who resist the speedy adoption of his principles as the "anti-turret party." Now do pray remember that the late Admiralty did not invent broadside ships. Broadside ships have existed for ages. Captain Coles is the innovator, and it is the duty of the innovator to show that the old system is bad. He comes forward with a new invention, and because those in office have not so much confidence in it as he has himself, he calls them a "party." This, I think, is absurd. It is the too ardent advocates of turrets who form a "party," and they, not we, are partizans.

The discussion was then adjourned till the following evening at eight o'clock.

ADJOURNED DISCUSSION.

Thursday Evening, May 2, 1867.

CAPTAIN FISHBOURNE, R.N., in the Chair.

THE CHAIRMAN: I have no doubt you will think it desirable to confine the discussion as much as possible to the points raised in the paper, and I therefore propose that Captain Coles should read us the conclusions that he has come to.

Captain COLES read the following conclusions:—

"In conclusion, it is obvious, I believe, that by lowering the freeboard to the minimum, the following advantages are obtained, viz.:—

"1st. A steadier gun platform, and incidentally less risk of being struck below plating whilst rolling in a seaway, as well as the power of fighting these heavy guns in a seaway.

"2nd. Diminution of area to be plated makes smaller vessels and thicker plates practically available.

"3rd. Diminution of target and increased thickness of plates, both incident to lowering the free board, seem the only effectual means of resisting the advances of modern guns and projectiles.

"4th. Less expense in the first outlay to produce these costly ships, since less tonnage is required, and fewer men, making it practicable to man more ships in time of war.

"The disadvantages often alleged to be incidental to a low free board, viz., discomfort to the ship's company, is obviated in vessels of every class by means of a hurricane deck, such as I have described in figs. 6, 7, 8, and 9. I would also observe that the recent improvements in guns and projectiles have increased the risk, previously very great to vessels with high free board and central casemated batteries, from the entering of the shell, either through their large ports, or through their weak sides, and this is a risk which there is no means of obviating in broadside ships.

"Disregarding for the moment all other considerations than the comfort of the ship's company, it still seems questionable whether any increased comfort in time of peace from a high free board, is not more than counter-balanced by their greatly increased weakness from the cause I have mentioned, in time of war."

Captain SCOTT, R.N.: Mr. Chairman and Gentlemen, the lecture we have had is so important, that I think it necessary to follow the principal points *seriatim*, being as brief as possible on each; and, with that view, I will first remark that we all of course speak of what we are full of: "Out of the fulness of the heart the mouth speaketh." So Captain Coles speaks of his proposed turret-ships, and exhibits, as you see, eight

or nine specimens. There is the "Captain," now building. But we must remember that the rapidity of improvement is very great indeed, and therefore the comparison between ships building with those not only built, but also in commission, is manifestly unfair. For a fair comparison we must compare each idea of the turret ship at a particular time with the broadside ship of the same time, or else we do not get the true comparison. The broadside ships are being developed day by day quite as much as the turret-ships are being developed. I think I shall be able to show that the whole principle of the broadside ships has been considerably improved. We must not be tied down to that comparison which, if Captain Coles will allow me to say so, he has so constantly made with broadside ships, and now makes of the "Achilles," a vessel built years since, and armed with 68-pounders, against turret ships armed with the heavy guns that are now carried. When these broadside vessels were designed, there was no such gun, therefore they could not be designed for what did not exist. In order to have a fair judgment on the subject, it is necessary to bear all these points clearly in mind. Now, of the Channel squadron the reports are seemingly unfavourable. You heard them read last night; the most unfavourable parts of them were read, but why were they unfavourable? because the guns were mounted on the obsolete plans of 1864 and 1865. We had gone into a new system of artillery, but we had stuck to our old carriages, tinkered up, it being probably thought they would be cheap, which they were, and very bad at the same time. Now, to show that this view is fully borne out, I have to revert to the opinions of the different Officers, and without saying that they are *verbalim*, I, as one of those who commanded a vessel during this time, and knowing well what passed in the vessels, hearing the opinion of each Captain, can give a tolerably clear idea—at any rate, I ought to be able to give you a clear idea—of their opinions. Now I find that the Captain of the "Hector" reports that the compressors were not to be depended upon, and that the train whips carried away, the compressor should hold the gun on recoil, and the train whip should run the gun in; so that the two principal things for working the guns were not to be depended on. The Captain of the "Achilles" also says the compressors were unreliable. The Captain of the "Lord Clyde" says that the running in and out gear is bad; there was no control over the guns. The Captain of the "Pallas" wishes pauls fitted to prevent the guns getting adrift. And as to the "Research," I have no hesitation in stating that her guns did get adrift, and I showed the reason. Can it be surprising that with the fittings I have just mentioned, those old fittings, and with such a tremendous swell as there was running at the time of the special trial, that the guns could not be fought satisfactorily? When has it ever been attempted to fire guns under similar circumstances? It must be remembered that the Admiral expressly states in his report that none of our wooden frigates would have thought of opening their ports in such weather; and here were those vessels laid purposely broadside to the swell, and attempts made to fire the guns with the old fittings, and therefore the result was not satisfactory. The explanation is as simple as possible. But to compare this weather, when the men could scarcely stand, with the weather in which the "Royal Sovereign" guns were tested, is absurd. She was merely tested in the Channel; and here were those broadside vessels rolling about in the very worst swell that could be found in the Atlantic. Now as to the "Bellerophon's" firing only two rounds, which have been very much dwelt upon, the "Bellerophon" went to sea before her gun carriages were ready. She had two guns on board; one of them was mounted on Armstrong's competitive carriage, which had competed with mine, and fired some sixty rounds; and the other was mounted on a wooden carriage, so weak that, after one or two rounds before the ship went out, they decided that it was unsafe to fire it any more; so that gun could not be fired. In the other case of the gun, its carriage had been taken out and restored, and then no person could adjust Armstrong's compressor. At the first round fired, the gun came in flying. The compressor was screwed up again, and the same thing happened. Nobody could adjust it, or perhaps from the effects of the competition its holding powers were gone. Whatever was the reason, the second time of its acting in that violent way, there being no power to control it, the Captain wisely determined not to fire again, but he says expressly he could have very easily fought his guns even at that time. I am sorry the Captain's

reports are not printed, because he so decidedly says this. Now when, as I have shown, the Admiral speaks of guns badly mounted, it was what *was*, not what *is* at the present time. What *was* is simply this, that the ports were obliged to be opened to load the guns; what *is*, that we can lower our ports down in a sea-way, and load through the scuttles, and, with the training gear that is to be applied, this will be effected very easily, and these guns will be fired with great rapidity, far quicker than any firing in the turret, as I shall presently show. So that you see what Captain Coles so much insists upon, as to the powder being kept dry, is actually being carried out. The port is closed, there is simply a scuttle. Then, with the new fittings, the guns are run out rapidly. There will be no difficulty in training the guns, and elevating as they go out, and thus the guns can be kept bearing upon the object. The captain of the gun has plenty of space, and is enabled to see, and he fires when the gun is upon the object. Now, with reference to the size of ports: in the "Minotaur" the port was filled up, so that it was only 2 feet 9 inches deep, and 2 feet wide, and the gun then trained 30 degrees each way. There was no difficulty at all found in pointing, and the practice was exceedingly satisfactory. With the "Bellerophon" the lower part of the port was closed up, and narrowed to 2 feet 1 inch, and the gun trained 3½ degrees each way. This carriage is on board at the present time. Some Officers probably have seen it; at any rate they will be enabled to see it, if they wish. There is another reason why, as I said before, the ports can be closed up, as all that you want is sufficient height of gun to fire over the lower port eill you can use an elevating and depressing carriage. I shall presently show the advantage that it would give the broadside-ship, and then the gun goes closer out in the broadside than in the turret. There you see a diagram of the turret. I am not able to bring it in front, but you will at once see that in the turret the gun would be further out. Therefore for the same sized port, you would get less elevation and depression in the turret than you do with the broadside; and the turret's port will be found a very little smaller than the port was in the "Minotaur" when it was closed up in the manner I speak of. As to the gun's recoil, which Captain Coles thought to be limited to coming in six inches, I may inform him.

Captain COLES: I did not say coming in six inches. I said six inches inside the port.

Captain SCOTT: In the "Minotaur" the gun was allowed to come in 3 feet 6 inches. It came in 3 feet 6 inches clear of the side. That was found a great deal more than was necessary, so the gun on that carriage is now not allowed to come in more than 18 inches, clear of the port; and that gives a mean of about a foot, and there is not the slightest difficulty in loading. Now, as to seeing all round in the turret when that figure gets up and looks round, and sees a ship, it cannot be supposed, for one instant, that you are to depend on him, that is, on the captain of the gun for picking out his ship and firing at it. Why, in a general action, you would have one captain of a gun firing at a friendly vessel, and another captain firing at the enemy. It must be under the direction of the Officer of the quarters, who must be told in general terms where the vessels are, and to look out for those vessels. In fact, if a seaman exercises his individual ideas on the subject, you will have the greatest possible confusion. Therefore I think that remark as to the advantage of the captain of the turret gun, getting up and looking round, is really an imaginary advantage. I believe that the "Captain's" port, or the gun in the "Captain" is 11½ feet out of the water. Am I right?

Captain COLES: Yes.

Captain SCOTT: Very well, the gun in the "Monarch" is to be 17 feet out of the water—that vessel which is so much objected to. Now, in Admiral Yelverton's report, at page 7, he states, "The turret-system of arming a ship would have a great triumph on this occasion, for there is no doubt that a sea-going turret-ship, say 12 or 14 feet out of the water, would have fought her guns without the slightest difficulty, and have fired easily six shot to every one from our broadside-ships. I do not here allude to the 'Wyvern,' for the sea would have washed into the ports of her turrets and swamped everything inside." The Admiral here expressly points out that it is a vessel with high freeboard—a vessel whose gun would be 17 feet out of the water, which is precisely what the "Monarch's" is, that would have had an advantage over his squadron.

The CHAIRMAN: I do not think it is so stated there. It says "the gun."

Captain SCOTT: It does not say "the gun." It says, "a sea-going turret-ship, say 12 or 14 feet out of the water."

The CHAIRMAN: Read the whole of it.

Captain SCOTT: "There is no doubt that a sea-going turret-ship, say 12 or 14 feet out of the water, would have fought her guns without the slightest difficulty, and have fired easily six shot to every one from our broadside-ships. I do not here allude to the 'Wyvern,' for the sea would have washed into the ports of her turrets and swamped everything inside." But the sea in the same manner will roll over the "Captain's" deck with a low freeboard, and, to use the words of the Admiral, "swamp everything inside her turrets." The very incline of her deck will tend—will materially assist this action. Look at a breakwater, and see how the sea rolls over it; but on dropping the port, as you can in broadside-ships, and loading through the scuttle, the whole weight of the sea may come flying against the port, but it cannot sweep over the deck and swamp everything inside. I turn again to the Admiral's report—to pages 2 and 5, to see the value of the vessel with the low freeboard. "On both these occasions I was able to judge of the performance of the squadron, blowing hard with a heavy sea, and have no hesitation in saying, that under all the circumstances of bad weather in the Atlantic, I see no reason to apprehend that the ships of this squadron would make worse weather of it than any of our line-of-battle ships. I must, however, make two exceptions to this, namely, the 'Hector' and 'Wivern,' neither of which are, in my opinion, in their present condition safe in bad weather; the 'Hector,' from the difficulty (if not impossibility) of getting rid of the water she would be certain to ship, if caught in a cross sea caused by a sudden shift of wind; and the 'Wivern,' from being so low in the water, that with the everyday Atlantic swell only, she is compelled to be battened down, if not head on to it, and even then the sea breaks over her deck in a way that renders it a service of danger for the men to pass along it. On reaching the cruising-ground she was soon short of coal, and I was obliged to send her to Bantry to fill up; but the experience I had of her performance up to that time convinced me of her unfitness to keep the sea, and I ordered her to remain at Bantry until the end of the cruise, when she joined me having to put back on one occasion in the face of a strong south-easter. I was subsequently informed by Captain Burgoyne, that on the occasion of steaming down Channel, this vessel had two of her fires partly extinguished through shipping a heavy sea, which circumstance has already been reported to their Lordships. The 'Wyvern' does little under sail, and is totally unfit for the duties of a sea-going vessel, but she is well adapted for coast defence." Now, I was one of those present who saw the "Wyvern's" pitching and rolling, and certainly she did it to a very considerable extent. She had netting triced up on each side, and on one occasion a heavy sea rolled on board of her, and when it left, the men were caught in one of the nettings, like fish, safely bagged and brought back. Again the helmsmen could not pass along the deck without a wetting in ordinary weather. As to the "Wyvern," the Admiral further says, "This vessel could never have been intended as a cruising or sea-going ship, for, although she is buoyant and rises to the sea, yet from her being so very low in the water, it rushes up her sides over all, and when broadside to the sea, it is impossible to move about on her decks without the risk of being washed overboard. At sea she is almost always battened down, to the exclusion of air in the engine-room and stoke-hole. Under sail she does very little, and her stowage of coal is limited." I will make one remark with respect to her stowage of coal—when Captain Burgoyne filled up, being ordered to rejoin the squadron the last time, he did not consider it safe to take in the whole quantity of coal, and therefore took considerably short of the quantity. The report continues: "If the 'Wyvern' had to cross the Atlantic, I would suggest that she be fitted with a fore and aft bridge, like the 'Miantonomoh,' and, like that vessel, be escorted by a powerful steamer." Now, if the "Wyvern" was not built to cross the Atlantic, and operate along a stormy coast, for what on earth was she built? Next with regard to sail power, so necessary in cruising. As you see Captain Coles' imaginary vessels, because I must call them so, are to have little or none. I suppose I make no mistake, however, in saying that

those are sails (pointing to diagrams). They cannot be the sails of a boat hoisted in the centre of the ship. I see they are the ship's sails, but on the hurricane-deck shown, would there be room to work a vessel's sails properly? I ask any one to look at the amount of room on that hurricane-deck to work a vessel under sail.

Captain COLES: 24 feet broad.

Captain SCOTT: As respects the value of sail power, I may mention that the "Research" was ordered to rejoin the squadron. Of course the "Research" had very small steam-power, and so the squadron steamed away and left me behind. I could not help myself. But being ordered to rejoin, and steaming out of Cork, just as I got abreast of Daunt's rock the vessel broke down. In the evening, the Admiral had said to me, the weather was so bad, and there was such a nasty sea on, he thought I had better not go, but if, in the morning, I was still anxious to leave, I might go, so I went. There was a very nasty sea, a tumbling sea, close to Daunt's Rock. We were making a close shave of it, for we could not afford to burn much coal. I thought it possible that the "Research's" passage would be timed, and immediately made sail. We wore at once sharp round close to the rock and stood over across to the other side and worked out under sail against the breeze and against the tide. There we were beating to windward some hours, until the Engineers repaired the valve, which had broken, and then we went on again, steaming and sailing. Now there is a case, in which, if the vessel had not had sailing power, I do not know what she could have done. We could not have anchored off Daunt's Rock. We must have gone ashore there. Next as to the accommodation of the turrets, I will turn to page 169, in the House of Commons Return on Turret-ships, and read to you what is said, because there is nothing like what is official as to matters of fact: "The space occupied by the turrets and the absence of gun decks, renders it difficult, if not impossible, to provide properly for the accommodation of officers and ship's company; while the necessary clearness of the upper deck prevents her from carrying the requisite proportion of boats, spare spars, and other gear, which must ever form a necessary part of the equipment of a man-of-war."

Captain COLES: What report is this?

Captain SCOTT: That is what Admiral Key gives as a summary, and places in the hands of Government as an official document summing up all those points.

Sir FREDERICK NICHOLSON: It is the Report of the Earl of Lauderdale's Committee.

Captain SCOTT: Yes, the Earl of Lauderdale's Committee, I have read from the paper, because I wish to go point by point through it. The turrets are deficient in offensive power, because they are too low to fire down upon torpedoes which will be largely employed, I doubt not, in future warfare. You see the deck of the turret ship is also in the way. The amount of depression the turret guns are calculated to give is only 5 degrees, and from this small amount of depression, and being so low in the water, they lose the valuable point of being able to fire down not only through a torpedo, but through any other vessel alongside of them. The decks of vessels, up to the present time, are not armoured, therefore, I think, the height of the gun is a very great advantage in enabling you to fire down on a vessel that may be alongside. Secondly, the turrets fire very slowly, because space is limited. If you look at that diagram, you will see at once what a small amount of space there is for loading. These (pointing) are two 600-pounders, I believe the turret is the size of that which is to be in the "Captain;" and the general arrangements are the same.

Captain COLES: What is the diameter of that turret—the interior diameter?

A MEMBER: It is probably 25 feet.

Captain SCOTT: It is in proportion to the size of the gun. I will tell you what it is taken from. I succeeded some time ago in getting a sketch of the turret devised by you at the end of 1865 for two 600-pounders, it was sent up to the Admiralty. This is the exact copy of it.

Captain COLES: That is not the "Captain's."

Captain SCOTT: It is very similar to it?

Captain COLES: No.

Captain SCOTT: If you say it is a foot larger or smaller, I will take it at that.

Captain COLES: It makes a difference in the diagram.

Captain SCOTT: But for all practical purposes, as to space, it is the same?

Captain COLES: That will make all the practical difference in the illustration.

Captain SCOTT: I shall be happy to allow you the benefit of a foot or two either way, if you will point out where it is wrong; but, as you can see, the space is exceedingly limited, owing to the roundness of the turret. This platform is very nearly 4 feet high. The man has to get on it in order to load, so that passing up the shot and powder, especially when the ship is rolling, with the sea coming in, would be a service of no slight difficulty. The man cannot stand upon the deck, as in the broadside, and he has not room to load; therefore, you will find invariably, the firing of the turret gun exceedingly slow. Actual turret warfare confirms this; and the firing of the "Royal Sovereign" has shown exactly the same result. Now, as to Captain Coles' Report on the quickness of firing, in the Trusty's Turret, there is a very simple solution to that. The gun was only a 40-pounder, and in the turret, was mounted on an inclined plane, so that when fired it ran out again, and as it was a breech-loader, it could be loaded at once; whereas the gun mounted on the broadside had to be run out by the crew. That made the difference, and in that lies the difference in the times of firing. Whether Captain Powell made the mistake I cannot tell, but that is the real reason of the difference in the quickness of firing in the Trusty. We will turn to page 168. Here are all the experiments with the "Royal Sovereign's" firing. It is only necessary to give them generally.

Captain COLES: Will you state the year it took place?

Captain SCOTT: The 3rd of October, 1865, is the date of this report.

Captain COLES: This is 1867.

Captain SCOTT: I will give you also the firing of broadside guns in 1865, and then put the two side by side, year by year. With the one-gun turret, (we went go to the two,) there was an interval of one minute and twenty-three seconds between the firing the rounds, and this was the quickest number of rounds that were fired. What Admiral Key says is this:—"In the 'Royal Sovereign' a gun's crew of 30 men who had been carefully trained in a turret for nearly a year, and who had fired about 100 rounds with shot, beside much practise without firing, completed ten rounds as follows, the quickest ten consecutive rounds being selected, vide "Report B." And these are the quickest ten consecutive rounds that were fired. They occupied 13 minutes and 51 seconds. The gun carriage that was put on the "Minotaur" was completed in 1865; but the experiments did not take place until January, 1866, as there were no competitors ready. Sir William Armstrong was to have come forward as a competitor, but did not. One of the Arsenal carriages did however turn up. That gun carriage had only four men at it, who had been at the "Research's" iron gun-carriage before, the others were taken from volunteers. The whole crew of the ship volunteered to go. The gun's crew was 14 men, not 30, as in the turret. The first time they fell in, the gun was fired ten rounds in eight minutes and fifty-four seconds.

Sir FREDERICK NICHOLSON: At a target?

Captain SCOTT: No; under just the same circumstances as the others. We are taking the quickest ten rounds. The crew pointed every time and turned the gun.

Captain COLES: In this case, with those two guns a small target was fired at 1,000 yards distance, and good practice made. That is very different to firing at nothing. That is child's play. Any one can fire a gun off.

Captain SCOTT: But as to the very quickest interval between the rounds—there has been no shorter interval on board the "Royal Sovereign" than one minute in all the firing there. In the "Minotaur" following up this first quick firing, the later rounds were only with half-minute intervals. Ten rounds were fired in four minutes and forty-eight seconds. Another ten rounds in five minutes and one second. Now you will see what it really comes to, as to quickness of firing. In the "Bellerophon" the other day with elongated shot which are exceedingly difficult to load, not the round shot, which were tried in the turret, but with elongated shot weighing 260 lb., instead of the 150 lb., round ball, five rounds were fired in three minutes and forty-one seconds. With respect to the rolling, I need not touch upon that, because the "Wyvern" rolled quite as much or more than the "Research," and

in the recorded rolling you will find that the "Wyrren" rolled as much as any vessel in the squadron. As to the favour shown; I have understood that £13,000 was spent on the "Scorpion." The outlay on the "Research," has been £11,000, including putting a deck on her, and making her in fact a very different vessel, and a very comfortable one. This is altogether from first to last, on her fittings and on her alterations, and everything that was done. She has been very considerably more than three years constantly employed backwards and forwards. The "Royal Sovereign" has been continually in hand, and I believe she has been in hand for the last six months.

But let us now examine the relative power of the Broadside and Turret vessel, and suppose the case of two enemies engaging the "Bellerophon," and two engaging the "Captain"—in one case we have a broadside in the "Bellerophon," of 1,500 lbs., and in the case of the "Captain," of about 1,200 lbs against each enemy. If you take the quickness of firing to be inversely as the size of the guns, that of the 600-pounders would be very slow, and I should say the weight of metal discharged against two enemies by the "Bellerophon" from her being able to discharge on both sides together would be treble, certainly more than double, that of the "Captain." The "Monarch" I saw a few days ago, and I am happy to state I did not see that she was being turned into a box. As the semi-turret has been spoken of, I may state that the guns are put out here, the after gun fires right a-beam and right aft, and the forward gun right a-beam, and also right forward, so that these two guns can fire right a-beam, and command a-head and a-stern. These two guns are a very great height out of the water. They are over 20 feet. I do not think that that is a semi-turret: it is a fixed thing. Of course we give Captain Coles all credit for the adoption of the turn-table which is a very great advantage, the distinctive feature being a turn-table which carries the gun upon it, enclosed in an armour casing. I may here say a word or two about one's own particular vanity, but first I wish to show that the turret has been well considered and well developed, I think Captain Coles has had great advantage in that respect. He has been working at it continuously, and his suggestions as to mounting the guns, and on almost all points, have been carried out, which has not been the case with the broadside vessels.

Captain COLES: May I ask how you know that?

Captain SCOTT: As far as I see, and as far as what you have done, I believe it is pretty nearly the fact. For fast cruisers I have been inclined to give up armour altogether, and to get great height of free-board out of the water, trusting to the power of the guns to keep down in a great measure the attack of any rival vessel. I consider that we could not go far wrong in building fast unarmoured vessels; and therefore as one development of the broadside, I have taken a small turn-table, and having 12-ton guns upon each side, have used it so as to gain the power of firing a-head or a-stern; (all those three guns will fire within 13 degrees of the line of the keel forward or aft). My idea is to fire with great rapidity, which you can do on the broadside, and within 13 degrees of the line of the keel. You may discharge your three guns, you may shear your vessel only through 26 degrees, and then you may discharge your other guns; and you get a great height out of the water. This sea here is shown exceedingly small, (pointing) but the Atlantic wave is about 12 feet in height, and would continually interpose between the turret gun and the broadside vessel.

Captain COLES: The turret gun is 12 feet in height, the same height as the broadside. My principle is the same height in ships of the same class.

Captain SCOTT: I am alluding to the "Captain." The gun is low: it certainly is not high. If the gun is high it does not represent the "Captain." That seems to be a high freeboard and a high gun, and it does not carry out the principle of the low freeboard.

Captain COLES: Oh yes, it does.

Captain SCOTT: Certainly it does not illustrate the "Captain." I have made a few remarks on this subject. It is one that needs very great consideration, and I believe that these discussions have a very good effect, for we are shown our weak points, which we cannot see before. We are all too fond of our own plans; and in laying them before you of course we get them fully discussed; and in fact, the wheat

is sifted from the chaff, which I hope will be the case at the present time, and that all of us, working together as we are doing, may assist—because that must be the ultimate object of us all—in placing our country in such a position that she shall remain the unrivalled mistress of the seas.

Vice-Admiral R. S. ROBINSON, Controller of the Navy: Mr. Chairman: It is with extreme diffidence that I venture to address the audience that I now see before me, for several reasons. I know that the subject on which I am about to speak is one with which most people here are not only thoroughly acquainted but on which they would deliver their opinions in far better language, and in a far clearer style than I can possibly attempt to do. In the next place I have not had the advantage of hearing the commencement of this lecture, or hearing what the gallant officer Captain Coles has, I have no doubt, so well and so ably put before the meeting, and I am therefore rather in the dark as to the points on which I wish to direct my observations. But this to me is perfectly clear: we are discussing a question of the very greatest moment, a question on which all personalities should entirely disappear. However amusing it may be, and however advantageous for the moment it may be, in discussing such questions as these, to make use of a personal argument, or to give a home-thrust to an opponent, the cause of truth—that cause which we know is at the bottom of every man's desire in this assembly—the cause of truth suffers in the end from the temporary triumph anybody may obtain by a good hit and a smart thrust. Now I wish as much as I possibly can, in discussing the question which I wish to discuss, to avoid personalities. If in advocating the views I have to advocate, I am unfortunately led to mention anybody's name, I trust that I shall mention it in such a way as to give no cause of offence to that person, and should I by any accident make use of an expression in the fearless and free discussion which I court for my own opinions, and which I think that others will be equally willing to accord to me the liberty of using—I say, if by any accident, any word or phrase of mine shall hurt any such person's feelings, I apologise beforehand, and request him to attribute it only to my unskilful use of the weapons I wish to use, and not to any desire to be disagreeable to him. I should also apologise, before going much further into this subject, for one point which you will very soon find out. My occupations and my avocations day by day are so laborious, that I stand before you not a strong man, not a person capable of making much exertion, and in general, at this time of the day, so completely overwhelmed by the labours that I have to undergo, as to be little fit to address an audience. Now, Sir, the subject which we have to discuss, which I wish to do with as much philosophy and knowledge as I am able to bring upon it, is “the turret system *versus* the broadside system,” and I wish to discuss that subject rationally and logically. To do so, we must have a clear understanding of what is meant by a turret-ship, and what is meant by a broadside-ship. Now I stand before you—and perhaps some of you who have found out that I am the Controller of the Navy may be surprised when I say that I stand before you the oldest, the most consistent, and the most persistent advocate of the turret system—yes, of the turret system, for that which it is capable of doing; not of a system which is incapable of performing the work we want it to perform; but the advocate of that system which can perform it, and which can perform it better than any other. Quite in the early days when Captain Coles commenced his most meritorious labours—labours for which I give him all possible credit,—I met my friend Captain Coles—if at this day I may call him my friend—I met with my friend Captain Coles in a state of extreme difficulty, having got his system, the excellence of which was evident to me, before a certain department of State which I will not name, and having got himself into extreme trouble and difficulty with that department. He was kind enough to take me into his model shop, and to show me the inventions, which with so much skill and talent he had prepared for that department, and he also showed me some correspondence, which proved that they were very great difficulties in his way. I am happy to say I was the means of removing those difficulties. I am also happy to say some time after that, I became Controller of the Navy, and was able to forward the views then entertained by Captain Coles, of the turret system. I only state this much to show why I say that I was one of the oldest advocates of the turret system. I may say, without speaking too much of myself, that I assisted Captain Coles extremely

to get the first turret that ever was tried, brought not only to the notice of the Admiralty, but tried in a ship under fire. I assisted Captain Coles moreover to get the first turret-ship that ever was designed or laid down, namely the "Prince Albert." Now I do not want to say more upon my persistency or consistency in advocating the turret system, for what it is fit, and not for what it is not fit. I have persistently and consistently, and do at this moment contend that the turret system, as applied for purposes of either coast defence, inland navigation, or siege artillery, to attack an enemy's port or roadstead in inland waters and in fine weather, is the system of all others in which you can combine the greatest amount of offence and defence. I have never deviated from that opinion, publicly or privately. I advocated it eight years ago. I advocate it now; but because I advocate for a particular purpose a particular weapon, I am not, I think, bound, either logically or philosophically, to say that this weapon, which I believe and know to be the best weapon for that particular purpose, is an equally efficient weapon for all other purposes. I know well, for instance, what you can do with an axe. I know, I have seen work well done by barbarians, if I may so call the Chinese—with an axe, but no one would tell me an axe is able to do all that a saw is able to do. And so while I say, and say with a certain knowledge and clear conviction of the fact, that a turret ship for coast defence and for the purposes I have named, is the very best weapon you can use, I use my judgment, and I have within myself as clear a conviction, founded upon argument, reflection, and logic, that this may not be the best vessel for sea-going and cruising purposes; and to explain more fully what reason I have for this assertion, I would like this Meeting to consider for a moment with me what is the very best form you can give a turret-ship for the purpose of hostilities in inland waters, whether for offence or defence. In inland waters you are restrained by none of the difficulties which the ocean puts into contact with you. You have simply to know how much weight you intend to carry upon the vessel, and to proportion your carrying power to the weight that you intend to put. The lower, therefore, any such vessel can be constructed, the better; the less the draught of water such vessel can be constructed with, the better; all that you require in such a case is a vessel so strong in every part that no shot shall be able to penetrate it, except under circumstances which we must give up, because we cannot absolutely overcome the power of artillery; but under ordinary circumstances you can construct, for the purposes of coast defence, or, as I have said, for siege artillery, without the smallest difficulty in the world, a vessel low in the water, coated with armour-plating, and carrying the heaviest possible guns, and this you may do comparatively in small dimensions. Now when the idea dawned across the gallant officer, it was a great idea; the idea dawned across him to put a gun upon a turn-table, and to surround that turn-table with armour-plating; he came positively upon a very great invention—a very great and successful idea came across his brain. He has laboured in various directions with assiduity ever since, but the first thought, and the first realization of that thought, must have been to him a very considerable and great satisfaction. It is that thought, that idea, embodied in a low level armour-plated vessel like what is now known as the "Monitor" vessel, which is the most perfect conception to my mind of what you ought to have for attack and defence of ports and arsenals, and if the gallant officer had stopped there, I should have said he had done quite enough for his fame—quite enough for the benefit of his country and for the benefit of the world. He has, however, (and he is perfectly right—he views the thing in a different light to what I do—his reflections upon the subject have brought him to a different conclusion from the one I have come to)—he has conceived that there was no more difficulty in adapting this system of turret-ships—that is to say, carrying a revolving gun on a turn-table, surrounded by an armour-plated shield—there is no more difficulty in carrying that in a vessel to contend with the waves of the Atlantic or the stormy ocean, it would have to cross, in conjunction with very great speed, than in making the "Monitor," or the coast defence vessel to which I have just referred. Now it would not be difficult to show that that cannot be; it would not be difficult to show that however excellent the system which requires lowness, for instance, of freeboard, (it is a vital point in a "Monitor" that you should not

expose any of her;) it is not difficult, I think, to show that although that requisition may not be incompatible with a perfect coast-defence vessel, or with a perfect piece of siege artillery, yet that the requirements of a sea-going ship, are entirely different, for the moment you get into waves and into sea-way, the lowness of freeboard signifies at once, that your gun cannot be high out of the water; if your gun is not high out of the water, there come between you and your object various waves more or less high, and your artillery is paralysed. For instance, if your gun is only five feet out of the water—take that as an illustration—these figures will illustrate it better than anything else—say that your gun is only five feet out of the water, and the enemy is 500 or 600 yards from you, how many waves, twelve or thirteen feet high, will there be between you and your enemy? However little the rolling of the ship may be—(we will give the gallant officer the advantage of supposing that his low freeboard will exceedingly mitigate the roll of the ship, which I do not deny for a moment, provided it be really low)—yet he can only fire at his enemy when he is at the top of the wave, and he cannot fire at that enemy's water-line when waves thirteen feet high are between him and the enemy; therefore one great advantage of his artillery is lost to him when he takes a low freeboard as the condition of a sea-going ship. And let me put the alternative. He says, Well, I will not take a low freeboard for my sea-going ship; I will take a high one for the sea-going ship; he at once departs from the principle that he has advocated so long and so persistently, that the great advantage of a turret-ship consists in its lowness and in its smallness; for it must be evident to everybody who has ever considered these subjects for a moment, that when you begin to talk about the lowness of a ship, a very low ship alone enables you to have a small ship; but the moment you determine that your artillery shall be mounted at a considerable height above the water, all the conditions of equilibrium, sea-going, and sea-worthiness demand that you should have at once a high and, therefore, a large ship. There comes in, therefore, at once an objection to which I have never heard a satisfactory reply, to endeavouring to make small turret-ships sea-going, especially when combined with speed; the speed that you can obtain, and the weight that you carry in all ships must necessarily be antagonistic one to the other—that is to say, that you may turn with the greatest ease the weight that you carry on a ship into speed; or *vice versa*, you may turn that speed into weight by reducing the speed. Those two things are convertible. If, therefore, we are going to have a swift ship on small dimensions, we must sacrifice something; we must either sacrifice some portion of the armour-plating or some portion of the armament, in order to obtain a power to drive the ship at the rate at which she is to go. The two things, the speed and the weight to be carried, are, *ceteris paribus*, perfectly interchangeable. If, therefore, you are going to ask us to construct small turret-ships with low freeboards, you deprive us of the artillery, or rather of the power of placing that artillery in such a manner as to be really efficacious to use, and you deprive us of the power of obtaining great speed. Those difficulties are, to my mind, almost insurmountable, as to the possibility of perfecting a sea-going turret-ship with low freeboard and of small dimensions; but this does not affect the question the least in the world of a turret-ship properly designed of large dimensions and with a high freeboard. The question, then, between the turret-ship and the broadside-ship stands upon an entirely different ground. Now, I must say, as I said when I commenced, I do hope in what I say I shall not give offence, but it is my firm conviction that the great opponent of the turret-system, as applied to sea-going ships, sits in that chair. That may seem extremely odd to many—the greatest opponent to the turret-system as applied to a sea-going and a cruising ship, is Captain Coles; and for this reason, that, in my judgment, he has advocated impossibilities. He has refused to accept, as a principle of a good sea-going turret-ship that her guns should be high out of the water. He has contended that the true principle of a sea-going turret-ship is to have her guns low in the water. Now, I stand here to advocate that the true principle of a sea-going turret-ship is, that her guns should be high out of the water, and not that they should be low. I have already said that the true principle of a coast defence, the true principle of a piece of siege artillery, the true principle of a ship built to contend, as the Americans fought their actions, in inland

waters, is a low freeboard; but that the true principle of a turret-ship to contend with the waves of the sea, to be a cruising ship on the ocean, to give accommodation to her men, and to go into action with a certainty of overcoming all her opponents, is in truth a gun high out of the water, and not lowness of freeboard. It is this particular point that is most interesting to me, and that has induced me to come here, and however imperfectly (as I know it must be, however much I may have wearied everybody here) I have endeavoured to point out what I really think is the true philosophy of the turret-system, there is no question of this—that we can do this much—we can mount very heavy guns in our turrets, we can carry those guns at a considerable height out of the water, we can, under certain circumstances, that will occur to everybody, enter into action with another ship with every prospect of success provided we are not restricted by small dimensions; but I do not think that even that much proves, so entirely as I dare say some of the advocates of the turret-system think it proves, that you should build nothing but turret-ships, or that turret-ships alone are sufficient to maintain a Navy like that of England in all the conflicts and all the diversities of service that that Navy would have to go through. I do not think it can, but I am perfectly willing to admit, and I desire to impress upon everybody who hears me, that we are persuaded, and have been persuaded for a long time, that the proper application of the turret-system to a sea-going cruising ship was the exact opposite of what its worthy inventor, its parent I may say, thinks it ought to be. I am sure anybody will understand how difficult, therefore, it has been ever to come to any understanding on the subject. I have the strongest possible belief, founded, I think, on positions that cannot be shaken—that the high gun is essential to a turret-ship; a low gun cannot be used effectively in a sea-way—a low gun could only be fired, as I said before, when the ship is on the top of the sea, and even then, between her and the enemy there may be waves so high—because the height of waves differs in half-a-mile it may be, several waves of one height and several of another—the wave will be between her and the object, and she will not be able to see the object or to strike it; whereas, if the gun were fifteen or twenty feet out of the water, you would look over all those waves and see your object from first to last. When upon the deck of a vessel in a gale of wind, that deck being from fifteen to sixteen feet high, we have all repeatedly seen a vessel within 300 yards of us, disappear, and have seen nothing but his main topsail, but go to the masthead, and there you will never lose sight of him. Although that is an exaggeration of the position I wish to maintain, of the great advantage of the height of the gun, it is an illustration of how necessary it is, in a sea-way, to have a high freeboard and a high sight, all of which complicate the difficulties of constructing a ship in a very remarkable manner. I only wish to refer to one other subject, and it is one which applies not only to what I have now been saying, but it applies to all turret-ships as a general rule. It is a subject of considerable difficulty, and I should not have mentioned it if I had not seen it constantly and persistently overlooked. I am not bringing it forward as an absolute argument against the system, but only as one of the difficulties of the system—as one of the things we have to consider most carefully before we rush headlong into turret-ships. The turret invented by Captain Coles is, as you know, armour-plated above the deck. When it passes through the deck it ceases to be armour-plated, and the whole structure of the turret and the mechanism of the part on which it revolves, is entirely unprotected by armour-plating on itself, though it is defended from anything that may hurt it by the ship's side—that is, by the armour-plating on the ship's side, but it has no other defence. Now, unfortunately—I was going to say, those confounded artillerists, but those terrible artillerists, as soon as ever we contrive to get an armour-plate and some backing of some given strength or another, that resists, for the moment, all their efforts, do invent some horrible gun, and go clean through all our defences. It is very annoying, no doubt, and very provoking, but, however, they will not stop for anything that we can say; we know they do go through 8 inches of armour-plating and a considerable number of other defences. We know that if a shot or a shell passes through a ship's side in direct fire at 200 or 300 yards, that shot or shell striking upon the base, the unarmoured part, of the turret, where all the machinery is, would infallibly bring the whole of that turret to grief. Very little indeed would jamb the turret, and would prevent its

rollers from turning round, and very little indeed, in my opinion, would break through the unarmoured structure of the turret. That is not a fatal, not a vital objection, but it is an objection which people ought to weigh well before they put the whole of their guns into turrets. Recollect, according to the most general scheme that we are acquainted with, two turrets are the most that you find in a ship; therefore it is possible—I do not say it is very likely—but it is possible—that a couple of shot from an enemy's broadside might disable both turrets. Now, what is true of a turret-ship, is undoubtedly true of a broadside-ship; there is no question in the world, that shot and shell will find their way between the guns or above the guns, or into the centre armour-plated battery of any ship, whether turret or broadside. What happens? A certain amount of loss of life in one case, a gun disabled perhaps, but your broadside with six or eight guns on one side, stands the blow, and goes on. You have lost a gun, you have had a gun dismounted, you have a gun's crew killed—you cannot fight without these unpleasant accidents occurring—but you are not utterly disabled; you have still other guns and other men to come forward and carry on the fight, and we know very well most of our actions have been won when we have been half-beaten; but it is another consideration when your two turrets are your whole offence and defence, when you have no other;—one of these shot, or two of these shot passing through—and we know that they will pass through—may utterly disable or jamb the base of your turret and prevent its being used any more. As I said before, I do not the least intend to use that as an argument against the turret system; I only say that it is not all on one side; that there is a great deal to be said on every side of the subject—that it would not be prudent, that it would not be right, to embark the whole of the British Navy, or any considerable portion of it in turret-ships without further experience than we have now had; and I may say this—that so far from there being any disposition on the part of anybody in office or out of office, to my knowledge, to discourage the development of the turret system, very much the contrary is the case. Of course, like a member of the Cabinet, I have no business to retail Cabinet secrets; what passes, therefore, over the way at Whitehall, and the discussions that take place on this subject, of course you will not expect me to say anything at all about, but I think there are evidences which all here must be well acquainted with, that the subject has not only been most carefully considered, but has extremely warm advocates in that council chamber to which I have referred. Certain speeches which have been made in Parliament and elsewhere, certainly prove, I think, at least that there is no unwillingness to consider the turret-ship in all its points and in all its bearings. There is only one thing more I think I may refer to, which I believe was extremely well done by my friend Captain Scott. It is this. I did not hear, as I said, the lecture the other day, but I know that there is a strong desire and a strong feeling to represent the imperfections of broadside ships, as much as they possibly can be represented; and those who think a broadside ship is wrong in principle and wrong in practice, and the turret-ship is right, do well in every possible instance to advocate their opinions fairly, and represent all the evils which belong to the broadside-ships; but what I was going to say is this, there are every day in the broadside-ship improvements made which add enormously to its offensive and defensive character, and which take away many of the objections which are constantly urged against it. I am sure almost everybody in this room is familiar with the talents, with the labour, with the energy, with the unwearied zeal displayed by the Chief Constructor of the Navy in those productions which he has turned out. I think everybody will be aware that he improved the designs of the ships, improved the construction of the ships, and has been in a measure successful to an extent that perhaps it is hardly my province to say. He has shown, in every instance, the greatest possible desire to improve our constructions, his success has been prodigious, and at this moment I speak, having seen the opinions of many persons who have come to this country purposely to investigate our iron-clad ships, who came here with a desire to find fault with our Navy, who came here thoroughly impressed with the beautiful descriptions that the press sometimes gives of our performances, and believing that we were a pack of old women, and that we had no Navy, and were ready to be eaten up whenever they thought proper to open their mouths and swallow us. I have

the means of knowing, from letters that I have seen, that one and all have left this country with the impression that she is unrivalled in her constructions at sea—unrivalled. I am also able to say this one word—that the Assistant Secretary of a foreign Navy was over here for some considerable time, and was asked at a diplomatic dinner the other day, what chance our neighbours would have with us? It is as well not to give you that reply. But he was further asked, "What chance should we have with the British Navy?" He answered in these words, "You have got the finest line of defence on the waters in the world. Nothing can attack you, and your defence is perfect; but if you attempt to go to sea, if you attempt to cross the ocean, you would not be six months, before you would be swept away completely. You have not got a single iron-clad sea-going ship in your whole Navy;" and he said more—"I went to Chatham the other day, and the most splendid specimen of naval construction, I ever set my eyes on, both in design and construction, was the 'Hercules.'" I need not tell you Mr. Reed was the designer and the constructor of the 'Hercules.' I think all this is satisfactory. I am endeavouring, by what I have now said about broadside ships to point out that there is in broadside ships some virtue—that they are not altogether, as we have sometimes heard it said, absolutely out of date. The last construction in broadsides that we have put before the Admiralty, contains one or two features Captain Scott referred to, and which I think are of so much importance, as doing away with the objections generally made to broadside ships, that, at the risk of wearying you a little longer, I will state them. Of course everybody is aware that the great objection made to broadside ships is the want of power to train the gun upon all points of the compass. The great merit of the original idea that came across Captain Coles' brain, was that his turret could be pointed to every part of the compass. But he has been led astray by a will-o'-the-wisp, giving up his first love for something more specious and telling; he has given up that idea, and given up that all round fire, which was so precious to me and to all other consistent advocates of the turret system, and he has now gone in to limiting his fire. I regret it extremely. There is in the "Captain" a want of all that round fire which distinguished his early plans; but I say that the broadside gentlemen—those who are responsible for the construction of broadside ships—have now adopted a plan by which such a ship will command every point of the compass. In addition to those guns in the central battery—which has so often been denominated a box by way of depreciating it—not only have you guns in the box, but upon the upper deck, at a height, as Captain Scott has said, of something like 20 feet out of water, giving you, therefore, a tremendous command over anybody alongside of you, we have put two guns that will fire in a line with the keel and at a right angle to it. I see a gallant officer here—I am very glad to see him here to night—who has persistently advocated that principle in various ways, and who, I have no doubt, will be pleased at the development we have given it; for if we have not absolutely adopted all his recommendations, we have profited very much indeed by the lessons he has given us. We have got that fire, that fore and aft fire, which is to him so extremely precious, and which he has been for a very long time, not only a theoretical advocate for giving, but has in the ships whose construction he has directed, adopted with the utmost ability. It is satisfactory to be able publicly to say that that officer, Captain Symonds, has at all times, in many ways, contributed to us a vast amount of useful information—that he has put his models and his plans very often, indeed, at our disposal, and given us the benefit, and a very great benefit it is—of his talents, and of the attention he has paid to that subject. There is but one thing more, on the subject of broadsides. I am extremely sorry to have detained you so long, but I should not do justice to what I have to say, if I did not revert to this one point. The heavy gun in a broadside can only be worked by mechanical means. When, in 1863, the fact became evident that heavy guns would really succeed—(as everybody here knows, there was considerable doubt for some time—gun after gun burst—and those who were responsible for the adoption of ships to carry those guns were naturally staggered for a considerable time, and began to have a little doubt whether the big gun—the rifled gun—would stand the severe shocks it was exposed to, and would ever be a gun served out to the Navy for use:)—but in 1863, my friend Mr. Reed, with that prescient foresight

about naval matters, which we have always known him to possess, and which is invaluable to a person in the official capacity that he holds, became thoroughly convinced that 12-ton guns would not only exist, but be mounted and worked in the broadside ships. At that time, I remember perfectly well, there came a number of naval officers to the council, that I have spoken to you about, and there was a great discussion, and the opinion given by all the naval officers was, that only a 5-ton gun could be worked upon a broadside ship. Now, it required some courage, and some knowledge of mechanism, and some confidence in his own resources, and in his own good sense, to induce Mr. Reed to say, I will build a ship, and she shall carry 12-ton guns to work on the broadside. And now came the question, how we were to work those guns. It was clear the plan of working a gun by handspikes would not do; for a long time it was persistently attempted to work these 12-ton guns on the broadside with tackles and handspikes, but there came upon the scene somebody who changed all that. I am happy to introduce Captain Scott as the person to whom we owe the change that has now taken place, in the opinion of all naval officers—a change, from the idea of its being absolutely impossible to work 12-ton guns on the broadside, to the conviction that it is the easiest thing in the world.—It is simply by the application of mechanism, and the mechanical foresight of Captain Scott, with an assiduity and a labour equal to the assiduity and labour which Captain Coles has bestowed upon his turret-ship, that he has worked out a system by which the heaviest guns are worked at sea, not only with as much facility, but with greater facility than the old 68-pounder on its gun-carriage. I am happy to say, that this is now a recognised fact. It required many trials and much perseverance on Captain Scott's part—it required a man whose temper was such, that he would take no denial; that he would work on in spite of all discouragement, and he has done so. The other day, I am happy to say, I read a report from a Rear-Admiral and five Naval Officers (a committee for mounting and working naval guns), who declared the difficulty was over, and that heavy guns could be worked on the broadside with perfect facility. The burden of what I have to say is this—pointing out the difficulty of getting a sea-going ship as a turret-ship with a low freeboard, pointing out the inevitable and insuperable objections to such a ship, and showing, as I think I have shown, the great facilities that now exist for mounting heavy guns on the broadside principle,—I think I have put the question on a fairer and more rational basis than it has yet stood upon. I think I have shown—or, at least, I hope I have shown, to this meeting, that it is perfectly possible to have the very best defence, and the very best siege artillery you can have in low turret-ships; that it is possible to have a sea-going turret-ship, provided you will give up the low freeboard, but that there is no reason whatever for supposing that the lately designed broadside ship mounting heavy guns upon its broadside by mechanical means shall not go into action with a turret-ship with equal chances, and that it is skill, nerve, resolution, whatever you please, that would decide that action.

Captain TYLER: I think we must all thank Admiral Robinson for the very able way in which he has spoken upon this occasion. Captain Coles gave us, with great ability, his side of the question, and we have now heard from the highest authority the other side of the question, in a manner with which, I think, we must all be charmed—in consequence of the impartiality and kindness with which Admiral Robinson has spoken of everybody concerned. Sitting opposite to this model, I have been watching it as Admiral Robinson spoke, and I have been struck with it as a most excellent illustration of what he has been telling us. Comparing *this* broadside vessel with this turret-ship, as a sea-going vessel, it struck me at once that, in order to arrive from the one vessel to the other vessel [pointing], you have to take a slice out of the former vessel on one side, and another slice out of the other side, and you pretty nearly equalize the two sections. As to the height of the gun out of the water, Captain Coles has said, that he can make the turret-ship gun the same height out of the water as the broadside-ship gun.

Captain COLES: I think you will find that it is about the same.

Captain TYLER: It appears to be about the same on the diagram.

Admiral ROBINSON: The very principle we contend for is that the guns should be high, and not low.

Captain TYLER: At all events, in this diagram it would appear the height is about the same; and as I said before, I do not see any reason why it should not be the same. If it is not so, it might be made so; but then there is no doubt this disadvantage, that the gun being withdrawn (and that is the principle of the turret-ship, that the gun is withdrawn) from the side of the vessel, it cannot certainly fire as directly upon the water as the broadside gun can.

Captain COLES: That gun can give seven degrees of depression, the same as the broadside.

Captain TYLER: It cannot possibly give the same as the broadside,

Captain COLES: Yes it can, it can be set to that angle of seven degrees.

Captain TYLER: I do not know what the angle is; at all events, if the gun comes a little within this point, it will fire upon the deck, that is obvious.

Captain COLES: No broadside can depress more than seven degrees.

The CHAIRMAN: You will have an opportunity of noticing the point in reply.

Captain TYLER: At all events it would appear, at first sight that the turret vessel would be a very uncomfortable vessel to go to sea in, as compared with the broadside vessel, there seems to be so very little room to move about in it. A great part of the narrow space is taken up by the turrets, and the remainder is unarmoured. Now the colour of the model struck me with the idea that, possibly, if a vessel of that description went into action, the first thing her enemies would endeavour to do would be to set fire to the wooden unarmoured part; and I apprehend, if the wooden unarmoured part were to be set in a blaze, it would be quite impossible to inhabit this turret-ship.

Captain COLES: This is all iron.

Captain TYLER: If that is all iron, it clearly will not burn, and my objection falls to the ground. Then it seems to me, with these turrets, two, or three, or four, as the case may be, it will be a very awkward thing indeed if a gun burst in a turret. Guns are liable to burst, and if a gun bursts in a broadside vessel it does a certain amount of damage, more or less, and the vessel is not disabled. But if a gun bursts in a turret, it becomes a very awkward thing indeed; at all events, that turret is disabled, and you have lost a half or one-third of your fighting power at once. Those are the principal objections that struck me, as I listened to this discussion; and I will not detain the meeting, not being a professional man, by any further remarks upon the subject.

Mr. BELL GALLOWAY: Mr. Chairman and Gentlemen, the subject under consideration is, as has already been stated, an all-important national one. It is a subject that has occupied my attention and study for about twelve years, and during that time I have been in correspondence with the Admiralty. My name is very well known there; and I am very happy to-night to meet the Controller of the Admiralty for the first time.

The CHAIRMAN: Will you kindly keep to the subject?

Mr. GALLOWAY: I beg to apologise. The subject-matter to-night is, whether is the turret principle or the broadside principle most valuable for the protection of our country? It has been properly said, and here I perfectly agree with the honourable gentleman, that each system has its advantages for particular purposes. In plain terms, I say, as a working man, we can do almost anything with two kinds of tools, but one is better adapted for the doing of work than the other may be. There is, however, a happy medium, and I contend for the medium thus. If we want, as I have said in another place, a perfect fighting ship, we shall be able best to attain that object by the combination of the two principles, namely, a fighting ship, part turret and part broadside. That can be done, and it might be well—and here I speak submissively—if the Admiralty would let but one of the old ships that has been sold, according to the statement made last night, at £2 16s. per ton, scarce the price of an old collier that is working between London and Newcastle—if but one of these ships could be placed at the disposal of Captain Coles and another party, who would gladly work with him, it would develop practically the truth of what I am now saying. I submit, and I speak respectfully in this assembly, that there is a consideration of the most paramount importance connected with our ships, besides the means of protection.

What would be the position of a ship of war during an engagement? I put it thus, what would be the position of a ship of war during an engagement from the effect of shot striking those heavy armoured plates, and then, by concussion and vibration, starting the rivets. I submit that your ship would be nothing more or less than a coffin for every soul on board, and I say that there exist means of preventing such a catastrophe in the application of the cellular principle of construction of armour, which ought to have been applied ere we had come to this state of things. Then, again, what would be the position of our ships of war, during the first engagement from the effect of any one shot—and there would be new fighting tactics—disabling the progress of that ship, by disabling the action of your screw propeller or rudder? What would be the position of the ship then? It would be simply a target to be shot at. And then, again, is it not a strange anomaly that there are actually plans existing.—(Question). I know of no more vital question.

The CHAIRMAN: These are questions not raised in the paper. This is not discussing the paper.

Mr. GALLOWAY: Two minutes more, and I shall have done. In all places and under all circumstances I will bow to order; but whatever may be the opinion of gentlemen here with respect to questions, the vitality of every question consists in the effectiveness of the Navy, upon which hang the destinies of our country; that is the all important question. With this one question I will close my remarks: How is it, and why is it that we have a Navy which is deplored in high circles? Even Sir John Pakington, in the House, admitted that it was not in the state of efficiency in which it ought to be. Now if there be plans, why, in the name of common sense, justice, and humanity, are those plans not applied to save thousands of lives, and the honour of our country?

Captain HEATHORN, R.A.: I wish to say one thing, which I do not think anybody has before mentioned in connection with the turret system, and that is, that you get a great amount of top purchase and rear purchase in a turret for your working gear. We know, now that shot and cartridges are beyond a man's handling (from their very large size and weight), that mechanical arrangements for lifting them are necessary, and it is important to those who have to scheme out the working of heavy guns, to have strong purchases both above and abaft a gun, as rigid bearings for running in and out gear, as well as for shot-lifting. In the turret system the whole arrangement of guns and turret revolving together, these bearings are always in the same relative positions with the gun. I have been engaged in sketching out the interior workings of some turrets, and this has been one of my greatest considerations, viz., to get all the bearings for working heavy weights always in the same relative positions. It is not necessary for a turret embrasure to be low, although a turret may be low, because on any scheme of muzzle-pivoting there is no difficulty in so arranging that every degree of elevation in that gun can allow the body of the gun to be below the embrasure; and although to raise the gun to positions of depression, it will have to be a little above the level of the port, the gun will usually be lower in the turret than the horizontal line of the embrasure.

Captain COLES: I am sure it affords me the greatest pleasure to have to reply after the very courteous way in which I may say the turret system *has not been attacked*, for I think generally, almost the whole of the arguments used last night, on the main points are admitted. As regards Mr. Reed, no one is so much pleased as I am to find that whatever he may have been, and into that question I will not enter, he is now a supporter of the turret system; and that he may be considered after his speech of last night, to have finally joined the "innovators," as he honoured us by calling us. His position, no doubt, precluded him from any attack upon any of the main arguments addressed by me, to show the superior advantages of the turret system over the broadside, for heavy ordnance. I will refer very shortly to the incidental points touched on by Mr. Reed. But, first, let me tell him, as regards my British sailors in the diagram, they are correctly drawn, and measure 5 feet 8 inches in height, on a quarter of an inch scale, and that the illustration they afforded my argument, was equally fair at both ports. I anticipated such a remark from past experience, Mr. Reed having made the same remark with regard to that diagram of rolling in 1863, which, by the Admiral's re-

port that I read last night, has only proved too true. I made both set of men exactly the same size. One would really have thought, from his criticisms on the height, that he, as a ship-builder, was not aware that the deck on which the sailor stands, was lower than the port-sill. As for the plating below water, I have not gone backwards in reducing that plating below water. I have shown that the low free-board will not roll a reduced quantity of armour out of water, and thus expose the unprotected part. Therefore to have added the additional quantity, would have been the surest bungling, if I may so call it. It would have been to make the country pay for an extra quantity of sheathing, to injure the qualities of the ship. At the same time, I should add in explanation, that the "Captain" has three feet less beam than the "Bellerophon;" and for that reason only requires somewhat less plating. As regards the comparative cost of the "Bellerophon" and the "Captain;" I will not go further into the Dockyard mystery of the charge for plant; for if Mr. Reed, with his official experience, thinks the mystery unfathomable, I am quite ready to put it down as one of those things which "no fellow can understand." At the same time, as the interest on contractors' plant must enter fully into the cost of the "Captain," I really do not see that the figures I have shown have been erroneous. It was £130,495, the cost of the "Bellerophon," (though the accounts are not made up, not complete,) and the cost of the "Captain," was £335,000. I stated, as you may remember, in both cases, that the accounts were not yet completed. As regards the statement, that the "Bellerophon" only had two guns:—what is stated in the Report is that the "Bellerophon" only fired two shot. Well, Mr. Reed states, and no doubt correctly, that she had but two guns, and fired one round from each. She might, of course, have fired the prescribed number of rounds from each of those guns, if it had been thought safe. Admiral Warden's Report says:—"We could have opened all the main deck ports, but judging by the effect of opening only five, it would have been to have washed the men away from the guns."

Mr. REED: Excuse me, that is not the "Bellerophon."

Captain COLES: It was with the "Lord Clyde;" therefore, the "Bellerophon" had apparently a great advantage, in this little broadside difficulty, in having, at all events, four-fifths of her ports, clearly closed against the water. As regards the relative power of stowing extra coal in the "Bellerophon" and "Captain," Mr. Reed says it is, at least, equal, or, if anything, greater in the "Bellerophon," than in the "Captain." But, according to the plan of accommodation and battery of the two ships, it may be proved, if time would admit, that this could not be so. It could be stowed in the "Captain"—on the deck below, between the two turrets—without interfering with the accommodation necessary for the complement of 400 men; or with the battery, or the trim of the ship, as it would be in the centre of the vessel. Whereas, in the "Bellerophon," it could not be stowed in the centre without blocking up her guns; nor at the ends, without interfering materially with the requisite accommodation for her complement of 556 men; or, with the trim of the ship; because you would have to stow it either before or abaft the battery. Having thus noticed those points to which Mr. Reed seemed to attach importance, I must add that on the general question between turrets and broadsides, they are comparatively unimportant. Assume for the sake of argument, that the "Bellerophon" is the very best broadside ship that money or skill can produce, and that she will at all times have an efficient supply of water-tight cartridges, of what use would she be against a good turret-ship, if she cannot open her ports with safety in a good swell? and if she is liable to have her fighting crew disabled by the entry of only one 300-pound shell through any one of her ports, into her square box? However, now that she is built, I trust she will be as successful as her designer can possibly desire. Now, as to the "Wyvern," which has been quoted as a turret-ship on this occasion in the Admiral's reports, I very fully stated in my lecture the reason why she should not be considered a sea-going turret-ship. I said, as it is, the "Wirern," without the requisite addition, has been used to disparage the favourable conclusions as to the turret system arrived at by both Admirals and it is curious that the only remark Mr. Reed made in apparent or partial disparagement of that system was founded upon that very "Wyvern," and upon the assumption of her being a fair representation of a sea-going turret-ship. I agree with Mr. Reed, that it is not fair to quote

from a report only that which is in one's favour; and if I had admitted the "Wyvern" to be a reasonably fair representation of a sea-going turret ship, I should of course have quoted every word of the report which related to her. As I do not so consider her, and as early as 1864 wrote to the Secretary of the Admiralty to that effect, I think I was entitled without unfairness to read only such parts of the printed report as related to broadside ships, admitted to be good specimens of their respective classes, and to leave to others, if they thought it worth while to rest their defence of the broadside vessels, as Mr. Reed seemed inclined to do, upon the comparison with the "Wyvern." I think this also may answer Captain Scott upon that point. As regards the effects of a low freeboard upon rolling, Mr. Reed admits that up to a certain height the low freeboard has that effect. The only question between us, therefore, is one of degree. In the suggested comparison I made of the two vessels, you will remember that at the first they both rolled 20 degrees, their guns being assumed to be the same height above the water, and in that case the turret gun was not, and the broadside gun was, in the water. I think that is clearly shown. Then I assume the low free board would roll only 7 degrees to the broad side rolling 20 degrees. I assume that; it is part of my argument that the low freeboard rolls less, which is also partly admitted. Mr. Reed would admit that this will be true up to a certain height of freeboard. Here again the question between us is one of degree. Time will not admit of my answering every point, but I will try and answer a few. Captain Scott gave us a very interesting sketch of gun-carriages, and also of rolling and so on. With regard to the "Wyvern," I think that is already answered. With regard to the gun-carriages, he spoke of the exercise at some of these trials being made with old carriages. He should have stated that the gun-carriages in the "Royal Sovereign" were wooden carriages, and more or less defective; and, what is more, they were not fitted with the appliances which I had asked for, namely, the winches to run in and out. We heard the Controller of the Navy ably describe how necessary it was to have mechanical appliances to run the gun in and out. Now on this occasion, when these guns in the "Royal Sovereign" were fired, those winches were not applied, and they had the old carriages that had been condemned by Captain Osborn in 1864. But even then you see we fired at the rate of one round in 1 minute and 23 seconds. Now, Captain Scott quoted some other firing, and admitted that they did not fire at a mark. The report of Captain Key on this occasion goes on to say: "In both cases,"—the cases of the turret gun—a report upon the "Royal Sovereign," that is the double and single turret—"in both cases a small target was fired at 1,000 yards distance, and good practice made." Now I contend that if Captain Scott's quotation was of a gun, not fired at a mark, but of quick firing, it was no criterion at all, for the very essence of the turret system is the power of taking aim, and the power of seeing your enemy. It is a fact, and has always been known, that in broadside ports it is very difficult to see the object, particularly when it is moving, and this difficulty accounts in a great degree for the slowness of firing on that occasion, when, as Admiral Warden says, it took him three-quarters of an hour to fire 15 rounds. The quick firing of the "Bellerophon's" guns, which Captain Scott mentioned, I think is also answered by the consideration that they were not fired at a mark. One thing mentioned by Captain Scott was the rushing of the sea into the port, and he explained that you could shut the port up; but if you shut the port up, as every gunner knows, and you only have the little hole for the rammer to go in and out of, we all know that it is a very much slower process to load; and not only that, but during the whole of that time, the captain of the gun can see nothing whatever. He has to wait until the port is up, to know if his enemy happens to be near. He has to search for his enemy; he has to go right and left of the port; and, as we know, it is very difficult to see the enemy at all; and you are obliged to send an order from the upper deck, and then very often turn your ship to find your enemy. Another thing was, that the gun-carriages upon which the experiments were made, referred to by Captain Scott, I believe were of iron, were they not?

Captain Scott: Certainly. As you have questioned me, I may state I have not quoted the "Royal Alfred's" firing, which was with iron carriages, but there was no increase of quickness over that from wooden carriages—none whatever in firing.

Captain COLES: At all events those carriages were of iron. I now have the honour of answering the Controller of the Navy, and it is with great diffidence that I do answer an Officer who has done so much for the Navy, and who holds such a distinguished position in the Admiralty. I believe that one of the first things the Controller mentioned was, that in smooth water he considered the turret principle was the greatest weapon of offence and defence—that is, as long as the ship is steady, and that is the pith of the whole thing. I have contended, and I do contend, that low freeboard is what will enable you to keep the ship comparatively more steady than by any other means. That is the present question. It is a matter of degree to what extent you carry it. Another point the Controller of the Navy mentioned was, that the turret gun, not being high out of the water, waves 13 feet high, interposed between the gunner and the enemy, would prevent his seeing the enemy, or prevent a shot hitting the enemy; but as the “Bellerophon’s” gun is not 13 feet out of the water, the same thing would occur with her.

Admiral ROBINSON: I stated the figure. I stated the height of the gun being 5 feet in one case, and the interposing wave 13 feet. If you wish to draw a comparison with the “Bellerophon”—

The CHAIRMAN: You did not hear that Captain Coles said, that the “Captain’s” guns, which is a ship approximating in size to the “Bellerophon,” are 11 feet 6 inches out of the water.

Admiral ROBINSON: I thought he was quoting what I had said.

Captain COLES: I was quoting the height of the wave. In fact, I think I had not explained myself. The wave is 13 feet high, so that any broadside ship, with a gun less than 13 feet out of water (and I do not think any broadside ships have their guns 13 feet out of the water)—any ship with a gun less than 13 feet out of the water would have such a wave interposed between the gun and the object. But with regard to a difference as to the height of the gun out of the water; I think it may have escaped the Controller’s memory at the moment, he seems to think that our great difference of opinion was about the height out of the water of these turret-ships, but it will be found that I have proposed, and do propose, vessels of all descriptions and heights out of water. For instance, you will see here a high freeboard, and different ways of mounting turrets have been sent to the Admiralty. *Here* is a turret mounted on a pivot going down to the lower deck; *here* is a turret on a circular box, on purpose to give her a high freeboard. *Here* is a ship, the first sea-going ship drawn out by Mr. Barnaby, No. 4; she has a square box in the centre, on purpose to give a high freeboard. That ship’s guns are higher than most ships, they were 13 feet out of water. That ship was proposed by me, and drawn out in the Controller’s office in 1863. The “Royal Sovereign’s” guns are 12 feet out of water. The “Naughty Child”—a vessel sent in in 1863—her guns were 10 feet out of water. The turret-ship designed in 1863 I have noticed. The “Captain” is 11 feet 6 inches out of water. So that it is a mere matter of degree how high you have your gun out of water, and, of course, your freeboard, it may be supposed, is governed by that. But it is not so in a turret-ship. You can have a low freeboard and a gun a great height out of the water, as much as 11 feet or even more. You have only, as I have explained, to slope the deck considerably, as you see there; I merely raise the turret a little, and get my gun higher. Instead of that, if you wish to get a gun higher out of water in a broadside ship, you have to increase the height of your broadside ship, and to increase all that extra weight. I have only to increase the height and the small weight of the cylinder of the turret. On this point, I think the Controller said we have not been able to come to any decision in these turret-ships. But I hope I may be allowed to say that, with all the various propositions which I have sent in from time to time, the Controller had a great many specimens before him, and it did not rest with me whether a ship of that sort was built or not; I had only to give my plans, and it rested with the Controller’s department. I merely made suggestions. I did not prevent ships from being built, and therefore I cannot quite see that I have been the stopper to the sea-going ships, when I see all these different classes proposed by me. But, again, how is it, if I have been the stopper to building sea-going ships, how is it that sea-going turret-ships, built at private yards, have crossed the Atlantic; when

we have not a sea-going ship in the Navy. Now, Gentlemen, a letter was put into my hand, which, if you will allow me, I will read, and I think it will be very interesting. It is written to me by an officer of distinction in the Peruvian Navy:—

“London, 1st May, 1867.

“Captain Coles, R.N.

“Sir—As you are giving a lecture on turret-ships, perhaps you would like to have the following particulars of the turret-ship ‘Huascar,’ which was built under my direction for the Peruvian Government, by Messrs. Laird Brothers, and taken out by me to Peru.

“In the report addressed by Commander Garcia, commanding officer of the Peruvian ironclad frigate ‘Independencia,’ to the head department of the Navy, on his voyage from Europe to the Pacific, in convoy with my ship the ‘Huascar’ (carrying the Commodore’s flag) and the wooden corvette ‘America,’ the following extract from that report is to be found inserted in the newspaper *El Comercio*, dated the 21th of August, 1866:—

“‘On our arrival to the Pacific, the barometer began to fall with admirable rapidity, and as it was blowing hard from the N.W., we did not doubt we were going to meet one of those heavy gales so frequent in those latitudes. The weather, until then cloudy and rainy, began to appear stormy on the 30th and 31st of May. This last day we met a very strong northern, which, changing suddenly into N.W., became a violent and protracted storm, accompanied with hurricane squalls. As it was impossible, under these circumstances, to steer the ship’s course, mainly by the terrible broadside swell which was rising, we were lying to with fore staysail and trysails, steaming under very easy steam, to enable us to put the bows to the sea. Although the storm’s strength did not allow us to carry more sail than that which we carried, we were obliged to set the topsails under the close reef, as the only remedy to check the extraordinary rolling of the ship, which exceeded in many cases 30° on each side.’

“Notwithstanding losing the convoy of the ‘Independencia’ and the ‘America,’ I had so much confidence in the ‘Huascar’ that I made my direct course for Chiloe, and arrived there at 9 A.M. on 6th June, the ‘America’ the next day at 11 A.M., and the ‘Independencia’ at 2 P.M. the same day, that is, 29 hours after the ‘Huascar.’

“I may add that the ‘Huascar’ is 1100 tons, carrying two 12½-ton guns in her turret, and two 40-pounders aft on deck, and that she was very buoyant and a good sea-boat. The ‘Independencia’ is a broadside box ironclad, of upwards of 2,000 tons and 550-horse power, not carrying any gun heavier than 150-pounders.

“I am, Sir,

“Your obedient servant,

“JOSE M. SALCEDO.

“P.S.—We left Chiloe on the 11th June for Valparaiso, and met the same night a severe gale, when we again parted company with the ‘Independencia,’ but arrived at Valparaiso on the 15th, the ‘Independencia’ not arriving until the next day.”

That was the first ironclad ship that went across the Atlantic, and that gentleman, I believe, is present here to-night, and I have no doubt he will tell you, if you wish it, with his own mouth, that that vessel was a beautiful little sea boat; her deck was six feet out of the water. So much for the sea-going qualities of turret-ships. The Controller says that the turret-gun is unprotected between decks; that is that the turret is only protected by the ship’s side. That is one of my very great arguments in favour of low freeboard. Suppose, for instance, that a ship’s side is ten feet out of water, and it is covered with six-inch iron, if you reduce that portion to five feet, it is evident you can double the iron on that portion which would make it one foot of iron. So that if that is the case in low freeboard, that is another great reason why you should adopt it. And again, if the turret-guns are unpro-

ected, are not the guns of a broadside-ship much more unprotected, where you have the very much higher side, and, as we find, a very much thinner side in proportion, with all these numerous port-holes for the entry of shell, and, I think, you all know that the entry of one shell in such a casemated battery as the "Bellerophon" would be quite sufficient to put that ship *hors de combat*; at all events for some time—shells with 12-pound charges. Another objection was that the all-round fire of the "Captain" had been sacrificed. It has been sacrificed to a certain point. That is, we can fire the 600-pounder within six degrees of the line of the keel. Now, is there any other ship in the service that could fire the 300-pounder at the same angle? They may fire their smaller guns by poking them out of the port-holes in the bow, but they will not be able to fight those guns steaming against a head sea, whereas the gun in the turret-ship being well placed, can, when steaming that ship against a head sea, still be firing nearly right ahead. I think, gentlemen, nothing can be more satisfactory, or more kind, than what the Controller has said. There is, however, one point more. It was mentioned that a gun bursting in a turret would do very great damage, but I must remind you, that the gun or a shell bursting, or anything bursting in a turret, is just where it would have the advantage over a broadside-ship. If the gun bursts in a broadside-ship it creates a panic on the whole of that deck, and may not only kill the crew of that gun, but the crew of the gun next to it; whereas a gun bursting in a turret is localised to that particular point, to that one turret. Perhaps if the gun burst here, you would lose the power of one turret of two guns, but if a gun burst on that deck most likely the whole deck would be put *hors de combat*, particularly with these 40-pound charges. In fact that is one of the great points that are pointed out as an advantage in the turret by Captain Powell in his report of 1861. I will not trouble you by reading that report, as I think I read it last night, but it says that one of the great advantages is, that if a shell burst in the turret, or a gun burst, it would be localised to that particular turret. There is yet one other point that I will refer to. The Controller said, and I was very glad indeed to hear it, that he had always been a great advocate of the turret, and is so now, for special purposes. Well, Gentlemen, it has given me the greatest pleasure, nothing could have been more satisfactory, for what did I say last night? I think you will find that I particularly pointed out that, as a rule, special vessels must be built for special purposes where armour is involved, but that the turn-table and shield which combine to form my turrets, admit of war ships being constructed which can serve for more general purposes than the broadside principle admits of. "For instance, vessels capable of the defence of our shores," that is the very first thing, I think, the Controller of the Navy was pleased to grant to the turret-system, "or colonies, fit for the close attack of an enemy's strongholds, carrying the heaviest cannon that we can manufacture, and yet capable of crossing the widest ocean, can only to-day be found in existing vessels with a very low freeboard and turrets." I think upon that point we may consider that we have no longer the slightest difference of opinion. I do not know whether there are any other particular points which I may be called upon, or which it is necessary to answer, but I think I have touched generally upon all. I can only conclude by saying, that this lecture and discussion, however much trouble they may have caused me, have been an immense pleasure to me, not only because I consider that, to a very great extent, the turret principle is admitted to be right, but I have found, and am happy to see, that there is such a great disposition and such a great effort that our Navy should benefit by it. It only remains with me to thank you, and to thank the Controller, and all of those gentlemen who have contributed to the information which I have gained, and which it has been my purpose to gain in laying my views before others. I still think and feel, as I say, that for special purposes you must have different vessels. As I mentioned last night, those vessels with very low freeboard, whose sails were left out, are not meant for sailing, they are only meant for steam-power, and with regard to the whole of those vessels, my opinions are very much strengthened by what I have heard. I hope, gentlemen, that we shall not only hear of other vessels crossing the Atlantic, but that we shall soon have turret-ships to do the same.

A VISITOR: I am requested by Capt. Salcedo, as he does not understand English

very well, to translate for him, and he will have much pleasure in answering any question put to him about the "Huascar."

The CHAIRMAN: Can you say what is the thickness of the armour-plating?

A VISITOR: Four inches and a-half armour-plating.

The CHAIRMAN: What was the size of the vessel?

Captain COLES: I can give you all the information.

The CHAIRMAN: At this late hour, perhaps it is hardly necessary for me to add anything. I should like to have made some remarks, but at this late hour it is not desirable. It must be remembered that the condition of the turret and broadside question is very different now to what it was when it was enunciated by Captain Coles, and I must say that I think the present position of the matter is very much owing to the persistent and talented way in which he has prosecuted his work under very great disadvantages. He has already stated to you that we have not got a turret-vessel in his estimation such as would afford us the information that we really require to enable us to come to anything like a satisfactory conclusion as to the relative merits of the two systems, and I do think that the burden that has been laid upon the "Wyvern" is too great, and is not at all such as would warrant any comparison whatever between her and "Bellerophon." She is a very small ship; you cannot make any real comparison, unless the two ships are similar in size. It is quite out of the question. It is quite clear the main principle of the turret system, that is, the idea that Capt. Coles has, that a low freeboard will produce an easy vessel, a vessel that would not roll much, is admitted by Mr. Reed very justly. I quite endorse his opinion that it would have that effect. I also endorse his opinion that if the freeboard were high, in proportion as it were high, it would do away with the advantage which had been originally contemplated by Captain Coles, and the vessel would be in that proportion uneasy. Therefore the statement of the Admiral that if the vessels had had their guns a certain height in the turret-ship that they would have had great advantages over the broadside ships—Captain Scott did not quote correctly—I beg his pardon, he quoted correctly, but I do not think he interpreted it correctly, because the latter clause of the quotation clearly implied that the Admiral was speaking of the height of the gun, and not the height of the freeboard. Now as the principle of the turret system is to have a low freeboard for the purpose of getting an easy ship, it would have been destroyed by having a high one; therefore, if the gun is high, that is all that is really wanted. You have a high gun, a low freeboard, and you get an easy ship. Now, I believe, a combination of the two systems would make a far better one. I am quite sure that the old system of French ships was a very wise system. It was discontinued in great measure because of the necessity of having more space on the decks for larger guns. Now you are introducing that which undoubtedly is due to Captain Coles, and that is the turn-table, and that practically is a long approach towards his system, and certainly he is entitled to the full and undoubted credit of that. I do not think that you could have fought the large guns with advantage, or with safety if you did not use the turn-table. Therefore that is of very great importance, and I do think the fact of his having introduced the turret and the turn-table, has led very much to a more early adoption of large guns into the Navy. I quite feel, too, that the discussion on the turret system will lead to what I believe to be essential in easy ships, and that is, narrower ships than we have. With respect to the uneasiness and the difficulty of those ships firing their guns, Captain Scott says, it was a defect of the carriages, but why were the carriages so defective? Because the sudden, the rapid, and extensive motions of the ships, required more than ordinary skill and care of mechanical construction. With respect to the construction of those carriages, I say, the very failure of the carriages, while it obliges you to get a more effective carriage, also ought to point out a defect in the ship, either in the stowage arrangement, or construction, or form, I cannot say which. It is, no doubt, a very complex question, and one not easily dealt with, but as attention does overcome difficulties that ought to be overcome, it is essential that it should be overcome, and I do not believe that there is any insuperable difficulty in overcoming it. There are advantages in the turret system which I think are very decided with respect to the gun and to pointing of the gun,

and I must say until this discussion took place, I was not aware it had so many advantages as it has. Of course we are not prepared to say, that it has perhaps the extreme advantages claimed for it by Captain Coles, or that the broadside system has the extreme disadvantages. However, I accept, and I think we all agree to that, that there are specialties, and you must have particular ships for them. You cannot say you will have all turrets, and you cannot have all broadsides. But what is really wanted is, that we shall all put our heads together and agree to work together, as we have a common object, a common end, a common interest, and each accepting opinions and ideas one from the other, borrowing not stealing, giving credit where credit is due, and honor where honor is due. I think you will allow me to return your thanks to Captain Coles for his very clever, and very ingenious principle, and I am sure if he had not had a more than ordinary mechanical genius he could not have overcome the difficulties that he has had to contend with; and he would not have brought it to the perfection he has. On the other hand, we must give credit to the Departments who are going in the direction of recognizing the principle distinctly, and of frankly avowing the value of that principle, and are adopting it so far as they conceive consistent, and of course every man in a position of trust and responsibility, must exercise his own judgment, he must not accept another man's judgment. He is responsible, and of course as he is responsible, he must exercise his own judgment in the matter. I have much pleasure, Captain Coles, in returning you the thanks of the meeting.