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THE ENGINEER, 17th May, 1912.

TO CORRESPONDENTS.

☞ *In order to avoid trouble and confusion we find it necessary to inform correspondents that letters of inquiry addressed to the public, and intended for insertion in this column, must in all cases be accompanied by a large envelope legibly directed by the writer to himself, and stamped, in order that answers received by us may be forwarded to their destination. No notice can be taken of communications which do not comply with these instructions.*

☞ *All letters intended for insertion in* THE ENGINEER, *or containing questions, should be accompanied by the name and address of the writer, not necessarily for publication, but as a proof of good faith. No notice whatever can be taken of anonymous communications.*

☞ *We cannot undertake to return drawings or manuscripts; we must, therefore, request correspondents to keep copies.*

MEETINGS NEXT WEEK.

(*See "Forthcoming Engagements," page* 528.)

DEATH.

On the 11th May, at Dean Cottage, Rotton Park-road, Edgbaston, PHILIP ELIOT HODGKIN, A.M. Inst. C.E., fifth son of John Eliot Hodgkin, F.S.A., aged 48.

THE ENGINEER.

MAY 17, 1912.

The Titanic.

IN printing a long letter on the loss of the Titanic by Sir William White, *The Times* deems it necessary to make some excuse for the breaking of the salutary rule that questions *sub judice* shall not be discussed publicly. We venture to think that no excuse was in the present instance necessary, and on the other hand, that no rule of man's devising would prevent the catastrophe being discussed. Much harm was done by premature circulation of the opinions of persons wholly unqualified to pass judgment, but now that certain broad facts have been established by two Commissions, there is no longer any need to withhold a full examination by experts of the technical questions involved; indeed, it will be widely held that the sooner such questions are thrashed out the more quickly will the credit of naval architects, shipbuilders, and, above all, the great shipping companies of this country be restored. In the immediate shadow of a great calamity judgment loses its way and things are said and done which in calmer moments are regretted. Much of the nervous tension provoked by the loss of the Titanic still remains, and it may lead to many foolish and ill-considered steps if it is not checked by the calm opinions of men well fitted by years of experience to weigh faults and prescribe remedies. For this reason we are glad that Sir William White has written this dispassionate review of the circumstances..

The latest evidence proves pretty clearly that the fatal iceberg was sighted about 11.40, that it was probably about half a mile distant right ahead, that the helm was put to starboard as soon as possible, and that the ship had begun to swing to port at the moment of impact. There can also be little doubt that the speed at the time was in the neighbourhood of 21½ knots. The ship would, therefore, have traversed the distance separating her from the berg in but little more than a minute. We know also with some certainty that the impact took place above the double bottom, probably twenty-five feet or so below the water line, and that it extended from a point possibly fifty feet from the bows for a length of two hundred feet or so, and that no less than five compartments were flooded. The nature of the injury can only be conjectured, but Sir William White estimates that if the opening were no more than a foot wide, 12,000 tons of water could have entered in one minute if it had a free flow. Luckily such an enormous influx was prevented by various obstructions, or it is inconceivable that a soul could have been saved. These are the principal facts which may now be regarded as established, and which are laid clearly before the reader in Sir William's letter. The questions that we have now to ask is what lessons may be learnt from them? The general public, impressed by a single idea, has clamoured restlessly for more lifeboats. To it the only fact of importance is the loss of life, and since in this particular case more lives might—we ask attention to the word might—have been saved, it demands more boats. The naval architect knows well enough that "more boats" is not the answer to the question. It is not the lesson that must be learned, and though the demand may be satisfied we may rest assured that it will not content shipbuilders, designers, commanders and owners, however much it may restore the confidence of the public. These experts will look in other and better directions. They will endeavour to make collision with icebergs almost impossible, and in the rare instances where they must still occur to render them not fatal to the existence of the ship. The problem divides itself readily into two distinct parts. First, that of the commander, and, secondly, that of the builder. The commander may avoid accidents by taking a perfectly safe route—if the public will let him—he may reduce probability of collision by increasing his range of vision, or he may minimise the damage by going at slow speed. Whether the public will be content for long to spend more time on the journey, which would be the outcome of the first and last alternatives, remains to be seen. For ourselves we believe that unless some international agreement can be reached the lengthening of the passage is impossible; competition will prevent its continuance. Moreover, we may well ask if any reasonable reduction of speed would remove the danger. Sir William White estimates correctly that the energy stored in the Titanic was one million foot-tons. But will anyone venture to say that the fourth of that amount, which would have resulted from halving the speed, would have been too little to cause sufficient damage to sink her? It is worth noting the enormous forces at work. Presuming that the ship struck with her speed but little reduced, that she was pulled up in a distance of 200ft.—the length of the rent—and that the iceberg far exceeded her weight, then we have to deal with an average pressure over the whole distance of no less than 5000 tons. We may take the maximum pressure at double that amount, say, 10,000 tons, or enough to punch a hole between 3ft. and 4ft. square through the side of the ship, a hole which the remaining energy would develop into a long rip. Is it not certain that one-fourth of that energy would have been sufficient to do fatal damage? All we can say is that halving the speed would have given her two minutes instead of one in which to reach the fatal berg, and it might have allowed her time to pass it safely. But that a modern liner should travel at so low a speed as ten or eleven knots for a whole night is inconceivable. It would not be tolerated. Passengers would rather run the very distant risk of collision with an iceberg. If the speed be not reduced so low then there is little advantage in reducing it at all; the impact would still be enough to do fatal damage, and the time interval would rarely be sufficient in such cases as that of the Titanic to allow enormous ships to steer clear of huge obstacles. The provision of searchlights offers more hope than the reduction of speed, but there again it would often be the case that mist or fog would reduce or destroy their utility. No, the problem, in our opinion, as we have already said, and clearly it is the view of Sir William White also, rests with the naval architect and shipbuilder. It is the problem how to make ships safe against all the dangers of the sea. Sir William "ventures to predict that when natural but temporary excitement has disappeared, and when calmer consideration of the subject becomes possible, it will be seen that the question of boat equipment, important as it undoubtedly is, must be treated as subordinate to that of efficient water-tight subdivision." He is careful, at the present time, to express no opinion as to the right design of ship to adopt, but from the fact that he discusses longitudinal bulkheads and lateral compartments, there can be no doubt that he shares a view of their value common with many naval architects. That many others are opposed to their use on the grounds that they may, by unequal flooding, cause a vessel to capsize is true, but it is equally true that there is no insurmountable difficulty in joining the port and starboard compartments by a waterway through the double bottom, and in that manner removing the objection. It is, moreover, to be remembered that whereas now a vessel with transverse bulkheads is only safe when no more than two compartments are filled, it would be possible to fill many longitudinal wing bulkheads, possibly all, without destroying her floatation. "A ship within a ship" is at least one solution of the unsinkable vessel problem; the inner ship would, of course, retain transverse bulkheads to meet the contingency of such accidents as would rupture both skins. The question that the naval architect has to answer is how to effect construction of this nature on economic and practical lines. We have no doubt that he will succeed as ably with the mercantile ship as he has with the modern vessel of war. That the attempt has been made in few vessels up to the present time is readily explained. "It is right to recognise the fact," says Sir William White, "that long experience has given confidence in this sole dependence upon transverse bulkheads in the mercantile marine, and that in the case of collisions ordinarily occurring—in which a ship either drives her bows into the side of another ship or is herself struck in a similar fashion—well-spaced and strongly built transverse bulkheads furnish a good protection against foundering." But now that this confidence has been shattered we may rest assured that the naval architect will produce a pas-

senger ship that is more unsinkable than any that yet exists.

Sir William White looks for the time when the subdivision of mail and passenger steamers will be settled by international agreement. Let us hope, too, that at the same time the number of boats, rafts, and safety appliances will also be settled in the same way. No one who has travelled much on big steamers will deny that the hampering of the decks, which the carriage of more boats must involve, will be injurious to the comfort, convenience and attractiveness of ships, and it can scarcely fail in the course of time to be resented by passengers. It would be in the last degree regrettable if hurried legislation, which would hamper one country to the advantage of another, should be forced through. For ourselves we would rather see the number of boats reduced to the minimum required for service and the safety of the vessel itself raised to the maximum, than see a vessel below the maximum of safety loaded with boats.

Stocks and Strikes.

WE recently pointed out in our leader pages that the provision of a stock of coal sufficient to last three or four months would be a most potent remedy for the threat of a national miners' strike. The situation should be obvious. The strikers can hold out, we may assume, so long as strike pay can be had, and very little longer. If, now, those requiring coal have, say, three-fourths of all the fuel they require for a longer period, by cutting off superfluities they can get on very well, defy the strikers, and the community will not be much the worse. The scheme is excellent from the public point of view. It worked to admiration recently as far as it went. Its fault was that it was not complete or thought out enough. In a recent impression Mr. Crabtree takes exception to it, and we are glad that he does so, because the idea ought to be talked about and criticised, and not permitted to drop again into oblivion.

It will be seen, however, that our correspondent's criticisms are limited. The weights of coal that would have to be stored for iron and steel works would represent an intolerable locking up, he surmises, of capital. Possibly this is the case, though we do not think so; but why not leave the ironworks out for the moment? All the blast furnaces in Great Britain might be blown out for six months, and we should still be able to keep our heads above water. But we dare not contemplate what would happen if the railways were quite closed for even two or three days. Let enough coal be stored to provide for the service of our railways, our electric generating stations, and our gasworks for six months, and the situation would be nationally saved. The conditions presented are exceedingly interesting alike to the engineer and the political economist. A volume might be written, and we hope will be, concerning them. It would seem that the provision of reservoirs might well become a national work, to be carried out in different suitable parts of the country, and at a much smaller cost than may appear likely at first sight. The tanks would be shallow—20ft. deep at the most; a tank 1000ft. by 100ft. wide and 20ft. deep would hold about 60,000 tons of coal. The water would eliminate the danger of arson, as well as of spontaneous combustion. They would be made in out-of-the-way places, and would involve no subsequent outlay when once completed and stored; and it must not be forgotten that so far as is known good coal will retain all its excellent quality under water for many years. Mr. Crabtree appears to think that coal could not be stored for long periods, so that depositing it and withdrawing it would represent a continuous outlay. It has certainly got to be proved that this would be required. The storage of coal under water is by no means new. We can refer our readers to an account published in our issue of September 4th, 1903, of the experiments carried out by Mr. John Macaulay, general manager of the Alexandra Docks and Railway, Newport, Monmouthshire. The results at that time went to show that coal which had been submerged for periods of from three to ten years gained in calorific value by nearly 2 per cent. But it is not necessary to argue about precise figures. It seems to be quite certain that there is no depreciation to be feared. The Admiralty have not thought it wise to make the results of their elaborate experiments public yet.

There is not now in the kingdom a railway company that dares to do without coal stocks. If, perhaps, we except the Great Eastern, the service on which was not in any way reduced during the recent strike; ostensibly because Mr. Holden has a large number of very powerful locomotives oil-fired. He generally uses refuse coal oil from the East London Gasworks at Beckton for this purpose; but, of course, Astaki is available in the Port of London. It is all a question of price. If the storage scheme was taken up by a Government, it could be carried out almost without notice after the first few months. There is no reason why a private syndicate might not be formed for national coal storage, save one—that the very creation of the stores would render the chance of their utilisation very small, and reduce the prospect of the earning of a dividend to a minimum.

The fact is, however, that the whole question must be considered from a far wider aspect than that taken by our correspondent. We have it forcibly impressed on our minds that there are three parties in the State, the producer, the capitalist, and the consumer, whose interests are very largely antagonistic both in appearance and in reality. The consumer is very slowly, but very steadily, learning that, unless he bestirs himself, he may at any time be crushed between the other two. A serious complication lies in the circumstance that both the other parties are liable to injury. The union funds, accumulated for years, supply the weapons of the strikers. The stocks of the railway companies, to cite one example, supply the weapons of the consumer. It seems pretty clear that the success or failure of either party must depend, other things being equal, on their armament. This being so, Mr. Crabtree's argument to a mere question of how far it is or is not for the consumer to be prepared for contingencies arising out of so-called intolerable conditions of labour, gusts of passion, political conditions, and so on. Now, already in every manufacturing process it is the practice to accumulate stocks; we advocate nothing more than an extension of a prevailing practice. That it must represent an outlay of capital is certain. But we do not think that many directors who have gone through the last three months would hesitate to risk a large outlay, provided it would leave them certain that, come what might, they could continue a fairly useful train service for, say, half a year.

It is not possible to discuss the great questions involved within the compass of a leading article. The more carefully they are considered, the better will they be found to repay consideration. We can get down to the root, and find out on what the threat of the universal strike is based, and whether such a thing is or is not possible, and what it depends upon for its chances of success. We must balance against each other the stocks of the consumer and of the producer who stops producing, and we can easily see that during such a strike as that just past every ton of coal possessed by the railways or gas companies had an extraordinary adventitious value. It is quite useless to argue that it will be mere waste of capital to lock it up in reservoirs full of coal. On the contrary, if a structure is to stand, it must have a good foundation; and the sooner it comes to be learned that whatever may be the case with private undertakings, our railways, electric and gas works must possess stability enough to carry them above the sea of political torment for a few months, the better. Whether it would be well that the storage of coal should be done by Government out of national funds or not we shall not attempt to decide. Our great cities find it necessary to store water enough to meet long droughts; why should not the same principle be applied to the storage of coal by municipalities? That this may represent a heavy outlay who shall doubt? Yet it is no worse than the poor rate, and if it gives confidence and stability to business, it will very quickly repay itself many times over. The danger is that the necessities for stocks having passed, they will not be accumulated, the subject will be allowed to drop, and when we least expect it we shall find ourselves once again bemoaning our fate and calling all our gods to witness that it is a national misfortune, not a national folly, under the blows of which we are suffering.

Tramways and Road Obstruction.

IT will be remembered that in our issue of January 12th last we gave the gist of a memorial which the Roads Improvement Association had forwarded earlier in that month to the Board of Trade regarding the alleged obstruction to traffic in the metropolis by the operation of the London County Council's tramways. The Board of Trade promptly forwarded a copy of this memorial to the Council and asked whether it desired to offer any observations upon it. The matter was referred to the Highways Committee, which as long ago as March 8th replied at considerable length to the Board of Trade, but decided to keep the tenor of its reply even from the Council, as it considered that the matter should not be made public until after the Board had had its views before it. Now, however, the whole question is discussed in a report made by the Committee to the Council and published in the usual weekly White-book of that body. It may be best perhaps if, before proceeding to refer to this report, we remind our readers of the allegations of the Roads Improvement Association. These fell roughly under four headings: (1) The frequent and close running of an unnecessary number of tramcars during the periods of the day when the traffic is light; (2) congestion at junctions of tramway lines; (3) the stoppage of tramcars abreast on parallel lines; and (4) the manner in which certain track repairs are carried out. It was pointed out that the tramways were laid in roads which formed important arteries for traffic of all descriptions; that much of that traffic was of a commercial character; that delay in its passage involved serious pecuniary loss; and that the increase in speed and the consequent facility in the passage of traffic which the introduction of the motor lorry and other vehicles propelled by mechanical power had secured, was to a large extent neutralised by the obstruction occasioned by the tramcars. It was further complained that, in contravention of by-law No. 24 of the Board of Trade, which provided that no tramcar should follow another on the same line at distances of less than 50 yards, except at junction points and on single lines of tramways, the near approach of tramcars to one another was of frequent occurrence. The Association asked that the Board should see that its by-laws were more strictly enforced, and that from 30 per cent. to 50 per cent. of the tramcars should be kept out of service and retained in the depots between the hours of, say, 11 a.m. and 4 p.m.

In another column—page 510—we deal in detail with the reply of the Highways Committee to these allegations, and therefore we need only here refer to the general tone of this reply. It is contended first of all that as regards half of the places of observation chosen by the Association these were quite close to termini, and that had the numbers of passengers per car been counted a little further along the routes the average per car would have been much higher. On the other hand, a position of *tu quoque* is taken up. As soon almost as the accusations of the Association were promulgated the Highways Committee turned its attention to what was happening with regard to other methods of travelling. It chose various places at which it counted the numbers of passengers carried by motor omnibuses. It found that the averages at three points where a good midday traffic might be expected were 10.55, 9.72, and 12.06 respectively. In other places fewer numbers than these were found, and the discovery calls for the remark that "if, as is asserted by the Association, the Council is running too many cars during the middle of the day, the same remarks apply with even greater force to the services maintained by the omnibus companies at that time." Indeed, the whole effort of the Committee appears to be directed towards proving that the omnibus is just as much a sinner as, in fact, more so than, the tramcar. The place where the shoe pinches is quite evident, for it is complained that in the cases of some of the poorly filled omnibuses "there was ample accommodation in the tramcars passing these points for the passengers carried on the omnibuses, and as the electric cars were in operation before the introduction of motor omnibuses on these routes, it would appear that it is the motor omnibus companies and not the Council which have placed a number of unnecessary vehicles on the streets." Having shown these facts to its satisfaction, the Committee goes on to say that between the hours of 10 a.m. and 4 p.m. on weekdays only 63.96 per cent. of the Council's tramcars required for the "rush" hours are run, and maintains that to make further reductions would entail inconvenience to the public and loss to the Council, though, as it is, the car mile receipts between these hours are higher than those of the cars which are only in service during the busy periods of morning and evening. Why this is the case is not explained.

The defence of the Highways Committee is, in short, that the congestion in the main thoroughfares is not caused so much by tramcars as by other vehicles. Indeed, it is claimed for the tramcar that with its great seating capacity "it appears to cause much less obstruction in proportion to each passenger carried than any other vehicle using the streets." The very fact that the tramcars run on rails and do not deviate from the course laid down for them is brought forward as evidence that they cause less tendency to congestion, while their powerful motors give them such an acceleration that they can ". . . pass through a junction, after being held up for traffic, more quickly than most other traffic." It is even asserted that since the introduction of electric traction the congestion at tramway junctions, although there are many more vehicles running, has been decreased. Broadly speaking, therefore, the reply of the Council's tramway authorities is "We do not sin, or if we sin there are worse sinners than we are." The reply, in fact, cannot be said to be entirely satisfactory. It is too earnest