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THE TRAINING SHIP "EXMOUTH" DRYDOCKED AFTER 13 YEARS AFLOAT.

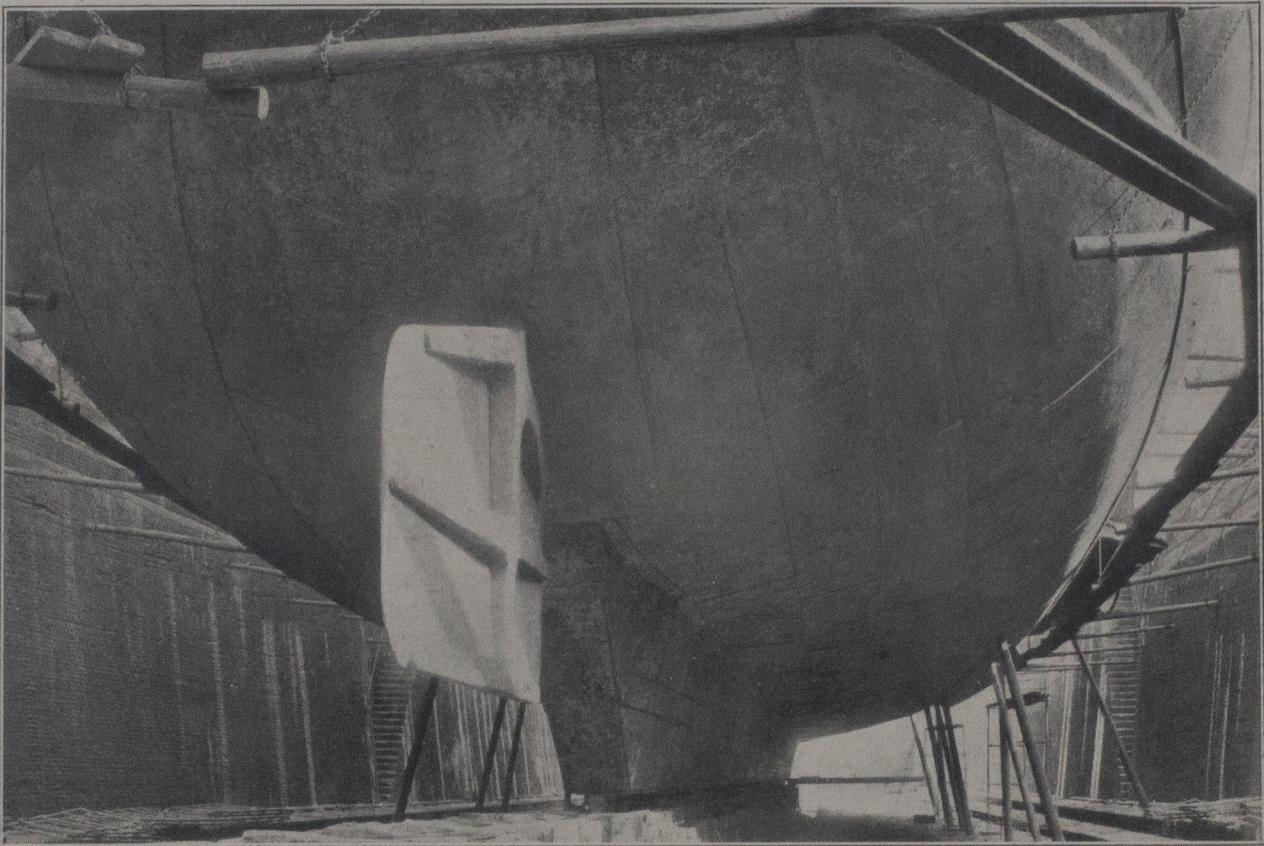
The Effect of Removing the Millscale by Immersion in Sea Water.

The training ship *Exmouth*, which is a steel vessel and was built by Vickers Limited at Barrow-in-Furness about 20 years ago to the plans and specifications of Professor Sir John H. Biles, in form and appearance is similar to our old wood line-of-battleship. After having been afloat without docking or repainting for 13 years the vessel is at present in drydock at Tilbury.

With the exception of the *Great Eastern*, which, owing to her great

preservation. On this occasion she was recoated with two coats of International Priming, and two coats of International Antifouling. Since that time she has been afloat for 13 years and is now in drydock with the result stated above.

It is considered that the formation of the millscale during the manufacture of steel plates is a cause of serious corrosion. This millscale is formed, to a large extent, by the sand which is thrown



The Bottom of the "Exmouth," in Good Condition despite 13 years' Immersion.

size, was unable to obtain a drydock from the time she was launched to the time of her destruction, this seems to be approaching a record for a vessel to be afloat without docking. Despite this 13 years' immersion, the bottom of the ship was in excellent condition and it will, no doubt, interest our readers to know how the hull was treated.

When she was first launched no paint had been applied and she lay in the water at Barrow-in-Furness for some weeks while being fitted up. During this time the sea water had an opportunity of destroying the millscale on the plates of the vessel. She was then towed to the Thames and placed in drydock, when her bottom was thoroughly cleaned with wire brushes and fresh water, and the following paints were applied:—One coat of Holzapfel Danboline paint; one coat of International Priming; two coats of International Antifouling.

These compositions were applied 18 years ago, whereupon the vessel took up her station in the lower reaches of the Thames, remaining afloat for five years. After that time she was again placed in drydock when her bottom was found to be in a state of good

on the plates during the process of rolling, in order to enable the rolls to have a proper grip. The silica of the sand then appears to form an integral part of the plate. On naval vessels this millscale is removed by dipping the plates into a hydrochloric acid solution which is subsequently neutralised, and in this process the silica is removed. This method, however, has been deemed too expensive for merchant vessels.

Mr. A. C. Holzapfel, in a paper which he read before the Institution of Naval Architects about 22 years ago, advocated that ships should be launched without paint in order that, while the ship was fitting out, and during the exposure of the bottom to the action of the sea water, this millscale might be removed.

Professor Biles accepted this proposal in the case of the *Exmouth*, and it must be admitted that his judgment has been amply justified. Merchant ships, however, almost invariably receive a coat of paint to the bottom on the stocks in the usual way.

Six months after going to sea, owing to vibration, also to unequal expansion and contraction, about half the millscale has probably

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fallen off, taking the paint with it. The vessel is then placed in drydock, superficially scraped and repainted. In many places, however, rust cones have formed during the six months which have elapsed, and a superficial scraping of these does not remove the whole of the rust down to the true surface of the steel. The result is that paint is applied over rust. Six or nine months later the vessel is again docked, more millscale has fallen off and she is again repainted in the same way. The rust, therefore, which has remained underneath the paint, continues to spread and results in the gradual formation of a thick layer of scale, which, after 10 to 15 years, has to be removed with scaling hammers, involving a considerable delay and expense to the owners. Moreover, a vessel whose bottom is covered with scale has a rough surface and loses speed in consequence. From the experience of the *Exmouth*, it would appear that all this could be avoided by following the method which Professor Biles adopted in regard to the *Exmouth*, in which case a permanent and sound protection of the outside surface of the bottom plating could be secured.

It is, of course, necessary in adopting this system that shipowners should use absolutely reliable and scientifically prepared paints, without which resistance against the action of sea water for such long periods cannot be expected.

We reproduce, on this and the opposite page, photographs of the *Exmouth* in dry dock. The repairs on the vessel are being undertaken by the London Graving Dock Company Ltd., London.

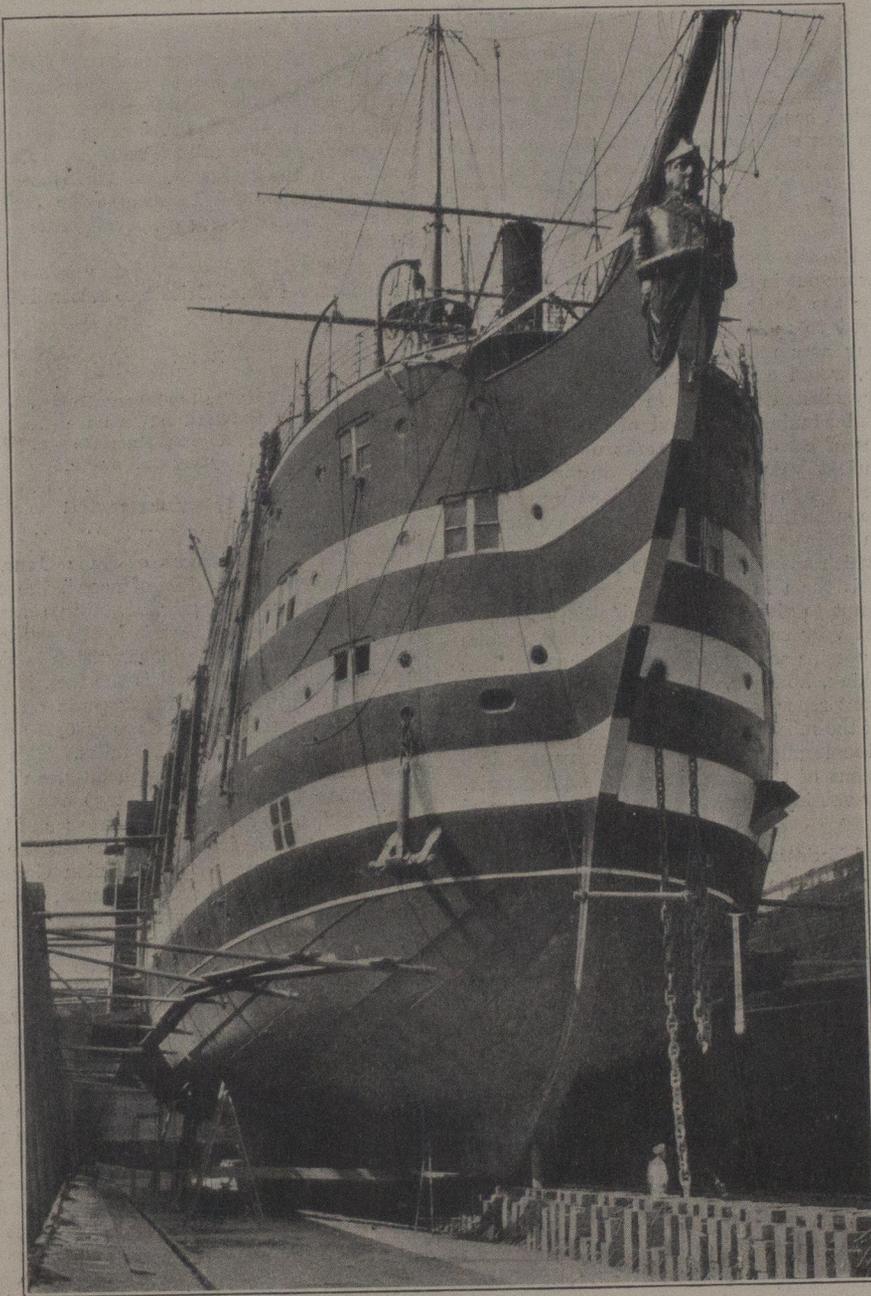
U.S. SHIPPING BOARD INCREASES WAGES.—The scale of pay for marine engineers and deck officers employed on Shipping Board vessels has been increased \$20 a month, says Reuter. Chief radio operators were advanced \$20 and first assistant \$15. Increases ranging from \$7 to \$15 have also been made effective in the stewards' department. As the scale of pay of the seamen had been increased in May, the Shipping Board completed the readjustments in the wages of the sea-going personnel on its 360 steamers. The increases represent about half of what the officers and men asked for in their conferences with officials.

A NEW TYPE OF GERMAN CARGO VESSEL.

The new cargo vessel *Grete*, of the Reederei Carl Wohlenberg, now on her first trip to New York, Philadelphia and Savannah, represents a new type of construction in which special provision is made for the accommodation of the crew and for the handling of

cargo. Built by the Neptunwerft Rostock, the vessel is of 9,500 tons d.w. and has a triple-expansion engine of 3,000 i.h.p.; on the trial trip a speed of 14 knots was maintained. The vessel is of double-deck construction with special provision for deck cargo. There are six cargo hatches and 22 derricks, including four for heavy loads. Sixteen of the steam winches are rated at 5 tons lifting capacity, and four for heavier loads. Wireless equipment is installed, also apparatus for submarine signalling. The principal dimensions are 460 ft. by 57 ft. by 32½ ft.

The deck and engine room hands are accommodated in the stern. A deck structure provides separate lavatories, &c., for the stokers (port) and seamen (starboard). A central structure, similarly divided, contains messrooms which, according to *Hamburger Nachrichten*, are equal to the officers' messrooms on many larger vessels. Below these are the sleeping quarters, which are separate cabins, each for three stokers or two seamen. Electric fans are provided in the messrooms and cabins, and "the



The "Exmouth" in Dry Dock at Tilbury.

accommodation could hardly be improved unless each man were given his own cabin." The officers' quarters are on the bridge structure, the captain having a private suite. The other members of the crew, engineers, cooks and stewards, are accommodated in deck cabins. From the statement that "this simple cargo vessel will demonstrate German *Kultur* abroad," it may be questioned whether its special equipment has not been provided for propaganda purposes. From the description the question of the comfort of the crew has been given every consideration and is above the usual German standard. Possibly the aim of the owners has been to influence the crew to stick to their vessel!

ECONOMIC SIZE AND SPEED OF VESSELS.

Imperial Shipping Committee's Report—Subsidies Necessary to Maintain Fast Mail Services—Calling in the Air Post—Alternative Suggestions—Passenger Accommodation.

The report of the Imperial Shipping Committee on the economic size and speed of vessels trading between the United Kingdom and Australia, and on the subsidies necessary to maintain speeds in excess of the economic speed, has now been issued. The Committee were asked to undertake this enquiry by the Government of the Commonwealth of Australia and have, therefore, confined their investigation to the Australian trade, though they think that the conclusions at which they have arrived should be pertinent to other trades.

At the outset, it seemed to the committee that any investigation which would purport to work out in detail the economic dimensions and speed of vessels for the Australian trade, or to assess the additional subsidy required to maintain speeds in excess of the economic speed, on varying assumptions as to the future character and volume of the trade, would call for the assistance of expert technical advisers at a very substantial cost. In view of the present instability in building and running costs and of the conjectural character of the estimates of earnings, the results obtained could at best only be of transient value. Moreover, any predictions might, within the next few years, be entirely falsified by changes in the methods of ship propulsion, as for instance by improvements in the internal-combustion engine. The committee decided, therefore, to aim at a report which should disentangle the main factors in the problem and exhibit them in their proper relation to one another, rather than attempt to give a concrete solution which, as we have said, would very soon be out of date. It follows that they do not return a specific answer to certain of the questions which were put. They think, however, that the principles which they set forth in the present report are those which should in the main govern the amount of the subsidy necessary for a faster service, and that they should afford some guidance to those who may negotiate on behalf of the Government of the Commonwealth of Australia. The precise amount of any subsidy must, of course, be a matter of bargaining.

Type of Existing Vessels.

The Committee consider that the best evidence of the type of vessel which may be termed economic for the Australian trade under existing conditions is to be found in the additions made by shipowners to their fleets during recent years. The following figures are fairly representative of the average vessels of each line now engaged in the trade:—

	Fair weather Speed. Knots.	Gross Tonnage.
Peninsular and Oriental Steam Navigation Company (mail vessels)	16½	16,000
Orient Steam Navigation Company (mail vessels)	16½	14,500
Commonwealth Government Line	16	13,500
Alfred Holt & Co.	14	14,500
		(Two vessels)
Alfred Holt & Co.	13	10,000
		(Three vessels)
Aberdeen Line	14	14,000
Peninsular & Oriental Branch Line	13½	13,000
White Star Line	12½	12,500
Commonwealth & Dominion Line	13	11,000
Federal Steam Navigation Company	13	12,000

These examples tend to show, *inter alia*, that the economic speed for vessels of the intermediate type does not generally exceed 14 knots and for vessels primarily concerned with the carriage of cargo 12½ to 13 knots. This conclusion, of course, refers only to the present. The economic type is not a static one; there is a continuous effort on the part of shipowners to improve their vessels up to the limits permitted by the physical and economic conditions of the trade. This is shown by the fact that ships are now building for the Australian trade whose dimensions are in advance of the averages given in the table above.

The mail services maintained to Australia at the present time by the Peninsular and Oriental Steam Navigation Company and the Orient Steam Navigation Company follow the Suez route. In

both of these services the mails are sent overland for embark at a Mediterranean port to save the time involved in the sea journey via Gibraltar. The Orient mails are at present taken on board Toulon and those of the P. & O. at Marseilles. Before the war companies' ports of call for mails were Taranto and Brindisi respectively. In the discussion on the Suez route the committee assumed Toulon and Taranto as the Mediterranean terminals what they say is, of course, equally true in respect of Marseilles Brindisi.

London and Melbourne being taken as terminal points distances from Great Britain to Australia by the various routes as follows:—

Route.	Nautical Miles.*	
	Land Section.	Sea Section.
Via Toulon, Suez Canal and Fremantle	2,636	8,148
Via Taranto, Suez Canal and Fremantle	3,125	7,550
Via Cape of Good Hope and Fremantle	1,884	10,825
Via Panama and Sydney and overland to Melbourne	513	12,481
Via Canada and Sydney and overland to Melbourne	3,860	9,322

Advantages of Suez Canal Route.

From the point of view of speed, the committee say the Suez route offers particular advantages over other routes, not because the aggregate transit is the shortest, but also because a large proportion of the journey is on land.† A further feature of importance, so long as coal is the fuel, is that whereas the sea section between bunkering ports on the Suez route is 1,884 miles, the longest by the Cape is 6,480 miles, by Panama 4,417 miles and by Canada 4,417 miles. This involves on the three routes, as compared with Suez, an increase in bunkering capacity, a corresponding decrease in cargo capacity. In the case of burning ships, however, the importance of this factor is diminished.

The alternative of a fast service *via* the Cape of Good Hope is subsidised in part by the Union Government involves difficulties. The Union Government, as providing a port for the subsidy, would necessarily demand the allocation of a proportion both of passenger accommodation and cargo capacity. This would lead to the uneconomic result that ships would have to run partially empty both ways between the two Dominions failing some material development of their trade with one another in the future. Another possible solution which the committee have taken into account is that of a fast service having a Mediterranean port and Fremantle as its terminal points. They were, however, unable to reject it. At the Australian end, the use of Fremantle as a terminal port would mean that cargo and parcel mails to other parts of Australia would have to bear the heavy cost of transshipment or be transhipped to coasting vessels; and the transshipment of produce in refrigerated cars across the Continent, even if possible, would be prohibitive in cost. At present a large proportion of passengers to and from the Eastern States of Australia make the whole journey by sea. To embark or disembark at Fremantle would involve a long railway journey which might prove inconvenient and expensive, especially to passengers with children, a business man or other traveller, to whom a saving of time is essential. The already travels by the Trans-Continental Railway, and the use of Fremantle as a terminal would make no difference to him. If there is at present no graving dock at Fremantle, nor are there terminal facilities for overhaul.

Speeding up the Suez Canal Route.

The committee believe that the Suez Canal route offers other advantages. They conclude that with steamers now running in course of construction and with existing railway facilities

*In Sections 14 to 18, distances on land have been reduced to nautical miles to render them comparable with the distances on the ocean.

†The case for the Suez route, from the point of view of mails, is stated in a report from the Postmaster-General to the Colonial Office, dated April 3, 1914. It is in full among the Dominions Royal Commission papers in Cd. 8460 of 1917.