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The Status of the Naval Engineer.

ON November 20, 1925, the Admiralty issued a Fleet Order which, while to some extent affecting all branches of the Navy, has raised serious questions regarding the future status of the officers of the engineering branch. Hitherto there have been five branches in the service, but this order brought into being thirteen separate categories. Some of these, however, such as the dental branch, the schoolmaster branch, and the wardmaster branch, are but small sections of the personnel. The branch principally affected is the engineering branch, and the situation created by the order was felt to be so adverse to the best interests of the service that Lord Weir, Sir Charles Parsons, Sir John Thornycroft, and Sir Archibald Ross jointly addressed a letter to the press on the subject. This letter has been followed by other communications and articles, and on January 14 a deputation representing the Institutions of Civil Engineers, Mechanical Engineers, Naval Architects, and Electrical Engineers, and also the North-East Coast Institution of Engineers and Shipbuilders, waited upon the First Lord of the Admiralty (the Right Hon. W. C. Bridgeman) to place their views before him. So far no account of this deputation has been made public, but we can scarcely think that representations made by such a responsible body will be disregarded.

There have been engineers in the Navy now for more than a hundred years, and in the struggle of the engineer officers for adequate recognition there have been many memoranda, petitions, and deputations, but never before have the four founder engineering institutions taken so notable a step as that referred to, and their action can be taken as significant of the importance of the questions raised. It is therefore only right that the main points at issue should be made as clear as possible, so that whatever the results of the deputation, the whole position may be judged impartially.

It may, however, be said that no reasoned opinion on the engineering question can be formed without a knowledge of the past, and thus a few brief historical notes will be of use. Steam vessels appeared in the Navy so long ago as 1820. At first they were small dispatch vessels, and the engineers were mechanics of little or no education. By 1837 the steam frigate had been evolved, engines had become larger, and the engineers were given warrant rank. With the coming of the screw and its adoption in the old line-of-battleships, the steam department grew apace, and in 1847 engineer officers were raised to an equality with the masters and assistant masters who then

comprised the navigating branch. Even at that time there was a scheme for training boys for naval engineering duties, but this did not amount to much, and when the Crimean War was in progress, recruits had to be sought for over a wide area. By the 'sixties the boys had become engineer students, who were taught in the Dockyard Schools, and some of these passed to the Royal School of Naval Architecture and Marine Engineering at South Kensington. The officers so trained were the best marine engineers of the day, but when they entered the service they found themselves subjected to all sorts of disabilities as to pay, half-pay, promotion, retirement, accommodation, and relative rank. It is not surprising to know that these unsatisfactory conditions led to great discontent.

A new and promising chapter was opened in 1875 with the appointment of a committee of three executive officers and two engineer officers, Admiral Cooper Key being chairman, to report on the best method of staffing the engine-rooms of the Fleet. That committee was one of the ablest which ever investigated the matter. The members went into the question thoroughly and made valuable recommendations, many of which were adopted. But the most vital recommendation, that engineer officers should in the future belong to the military branch and not to the civil branch, but not to succeed to command, was shelved, and in the failure to adopt that salutary reform is to be found the cause of most of the agitation and dissatisfaction which disturbed the domestic peace of the Navy for more than a quarter of a century, and have again been revived by the recent order.

One of the outcomes of the Cooper Key Committee was the opening of, first, H.M.S. *Marlborough*, and then of Keyham College, as training schools for engineers. Though the latter was starved financially, it had a fine record of success as a technical college, and nearly all the engineer officers who held responsible positions at the Admiralty, in the dockyards, and in the Fleet during the War were men who had passed through its portals.

As it was in the 'sixties and 'seventies, so it was in the 'eighties and the 'nineties. Ships' machinery grew more and more complex, the engineer officers' duties were increased by the addition of new types of machinery, but for all that the Admiralty refused to recognise the engineer as a combatant, and, however absurd it may seem, the officers concerned with the upkeep and running of such vessels as the *Terrible* and *Powerful* were of civilian status.

Through this and other causes the competition for entry into Keyham College, which should have been keen, became almost negligible, and the avenues of entry into the engineering branch had to be thrown open wider and wider while the standard of attainments of the candidates became lower. In spite of this, the numbers forthcoming were insufficient and the staffing of the engine-rooms at the end of last century became so difficult as to constitute a national danger.

This was the position when, through the initiative of the late Mr. D. B. Morison, the engineering institutions of the north took up the question of reform and focussed public attention upon it. Papers were read at Newcastle, Glasgow, and elsewhere, and in 1901 a deputation representing the shipbuilding and engineering world was received by the Admiralty.

The result of this propaganda, together with the difficulties of the authorities in obtaining engineers, was somewhat unexpected. At the end of the year 1902 the Navy was startled with the oft-quoted Selborne Memorandum. Issued by the First Lord, this was really the work of the late Lord Fisher. By that memorandum, the entry, training, and careers of naval officers were reformed from top to bottom. Deck officers, engine-room officers, and marine officers were to be entered together, trained together, serve together, and their duties were to be interchangeable. In the words of the memorandum, every naval officer was to be "a seaman, a gunner, a soldier, an engineer, and a man of science." That scheme, it may be remarked, never had any considerable body of engineering opinion behind it, and many engineers declared it to be impracticable, as experience has indeed shown it to be.

While, however, the Selborne plan of naval training has had to be modified almost out of recognition, it had two excellent features, common entry and equality of status, and these were its chief legacies. The commanders (E.), the lieutenants (E.) who have passed through Dartmouth, were all, until November last, executive officers like lieutenants (G.), (T.), and (N.) who have specialised in gunnery, torpedo, and navigation. They had the same commission, they wore the same uniform, but by becoming engineers had forfeited the right to command. They in fact represented the engineer as suggested by Admiral Cooper Key in 1876 as belonging to the military branch, not the civil branch, but they were not to be allowed to succeed to command.

It may be asked, What became of the older engineer officers who were already in the Navy when the Selborne scheme was introduced? What difference did the new plans make to them? Practically none. It is true they were given semi-military titles such as engineer commander and engineer lieutenant, but they remained members of a civilian branch. The

engineer officers who fought in the Bight of Heligoland, who lost their lives at Coronel, and those who drove the *Inflexible* and *Invincible* into action at the Falklands, all fought as civilian officers.

The removal of this anomaly was the result of war. At the end of 1914 the Admiralty made all engineer officers part of the military branch, and thus for the first time recognised their importance. Many were the tributes paid to the engineering branch during the War, and when military status was conferred, Lord Fisher telegraphed to Mr. Morison: "The unapproached efficiency of our engineers in the Navy merited this tardy recognition of their all-important part in the present splendid fighting condition of our whole fleet, and this has been combined with an unswerving loyalty to a changing system which they one and all recognised to be for the public benefit and the good of the Navy." The effect of the new order was felt right throughout the service. The engineer officers were proud of the distinction conferred upon them, and it has been their aim ever since to uphold the highest traditions of the branch to which they were admitted.

It will be seen that the position attained by the naval engineer has only been gained through a long process of evolution. But to-day he unfortunately stands shorn of the military status so tardily given. The Fleet Order of November, by a stroke of the pen, abolishes the military branch and creates a new executive branch from which all engineer officers are excluded. Is it any wonder that parents of young officers, officers themselves throughout the Fleet, and the engineering profession generally, regard the action of the Admiralty as a grave breach of faith? To criticism, the reply is made that the executive officers might equally complain that with the abolition of the military branch they have been deprived of military status. Such a reply is altogether untenable. In a fighting service there must always be a military branch. You may call it by another name but you cannot get rid of it, and to-day the new executive branch stands in the place of the old military branch while the engineer officers are practically reduced to civilian status again.

After all these years, it is indeed high time that the entry, the training, the status, and the appointment of engineers should be placed upon a sound and permanent basis, and Mr. Bridgeman can do the Navy no higher service than by removing these things from the realm of uncertainty, and thus preventing the recurrence of the deplorable controversies which have marked the progress of the naval engineer in the past. The first step, however, is the restoration of military status.

Steel and the Nation.

Metallurgy and its Influence on Modern Progress: with a Survey of Education and Research. By Sir Robert A. Hadfield. Pp. xvi+388+71 plates. (London: Chapman and Hall, Ltd., 1925.) 25*s*. net.

THE author of this handsome volume has played an active part in the metallurgical world, as the head of a famous firm of manufacturers, as an inventor and investigator, and as the president of several technical societies. He has received many public honours, and has been prominent in the life of his city and of the industrial community. Above all, he is personally acquainted with most of the leaders of industry, of physical science, and of education in this and several other countries, and has kept in close touch with related movements, so that he brings to the task of writing a book on metallurgy an exceptionally wide range of experience. From time to time, in presidential and other public addresses, he has reviewed the progress of science and invention, the scope and objects of education, and similar subjects, and it is the material of those addresses, expanded and supplemented by other matter, which has been recast into the form of the present volume, which is well and lavishly illustrated.

The work is not easily classified, being in part a history of metallurgical and engineering industries and of the sciences on which they are based, in part a detailed account of the nature and properties of certain selected systems of alloys, and in part a review of the place of science in the community and of the forms of education best suited to a nation which depends on manufactures for its existence. The metallurgy considered is that of steel, the non-ferrous metals being ignored. The author has written of those things in which he is himself interested, and has made no attempt to construct a systematic treatise.

After a preliminary sketch of the history of the subject, the influence of carbon on iron is considered, leading up to an account of the development of alloy steels. Next follows a description of the two alloys with which the name of Hadfield is chiefly connected, the remarkable manganese steel which was the first of the alloy steels to be investigated thoroughly and still remains unique in its curious combination of toughness and resistance to wear, and the silicon iron which is now in general use for electrical transformers, having a high permeability with a high resistance. The history of these two inventions and of their gradual adoption by the industries is told at length in an interesting fashion, with many personal reminiscences of the men who were associated with the work. The story is most instructive in regard to the importance