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THE NAVY OF TO-DAY

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By PERCIVAL A. HISLAM

AUTHOR OF "THE ADMIRALTY OF THE ATLANTIC," ETC.

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INTRODUCTORY NOTE

THE British Navy, the "first, second, and third line of defence" of the greatest empire in history, upon which the people of these islands have spent approximately £1,500,000,000 in a hundred years of peace, is a large subject to treat in so small a volume. It is hoped, however, that what has been written will be of some assistance to the average reader in enabling him to follow more intelligently the discussion that revolves interminably around the problem of naval armaments, and to see perhaps more clearly than before how our oldest national institution absorbs the weekly million sterling that is spent upon it.

In the region of naval affairs things move very rapidly, and it is therefore necessary to point out that the following pages are corrected to the end of July 1914, and that the battleships Benbow and Emperor of India, and the battle cruiser Tiger, of the 1911 programme, are treated as completed ships.

P. A. H.

THE NAVY OF TO-DAY

I.—THE NAVY'S BEGINNINGS AND GROWTH

ALTHOUGH it has become customary to describe Henry VII, who reigned from 1485 to 1509, as the "founder of the Royal Navy," and Alfred, who preceded him by six hundred years, as the "father of the British Navy," these titles have in fact very little historical foundation. Both monarchs did a great deal to advance the science of warship construction and to place the fleet on a firmer and more settled footing. Alfred created an organised personnel and built vessels for his navy which were "full twice as long as the others. . . . They were both swifter and steadier, and also higher than the others; they were shaped neither like the Frisian nor the Danish, but so, as it seemed to him, that they would be most efficient." Henry VII founded the national dockyards at Portsmouth and Woolwich—though yards for the construction of warships must have existed centuries before. He also built the Henri Grace à Dieu, which, so far as we know, was the first "two-decker" to figure in our fleet, and which certainly caused as great a sensation in her day as the Dreadnought did eight years ago. But, whether we call their ships a British navy, an English navy, or a royal navy, the people of these islands were familiar with the sea, with naval warfare (such as it was), and with the importance of a fleet as a guarantee against foreign interference long before the days of Alfred. Cæsar prepared the way for the invasion of Britain by annihilating a great fleet which was opposing his progress in the estuary of the Loire, and included in that fleet was a British contingent which, in different circumstances, might have proved a formid-

able obstacle in Cæsar's path when he came to cross the Channel. At a later date, but still 600 years before the reign of Alfred, the independence of Britain was won by an able, if unscrupulous buccaneer who had a fleet as his only weapon. It is worth while to give a brief space to this event in our history, for it is often completely ignored. In the latter half of the third century the Roman Empire was much troubled by the activities of Scandinavian pirates in the North Sea, and the emperors commissioned one Carausius to exterminate them, providing him with a fleet for that purpose, and giving him the title of "Count of the Saxon Shore in Britain." But Carausius himself was a pirate by nature, and he made it a rule never to attack the sea-rovers except at such times as he knew them to be laden with booty; then he would fall upon them, appropriate their spoils, and release them. In the end Carausius became so powerful that he set himself up as Emperor of Britain, and after defeating the Roman fleet he was duly acknowledged as such. For seven years he maintained his independence and ruled the country well; but, not satisfied with Britain, he tried to hold the port of Gessoriacum (the modern Boulogne) as well, and that brought about his downfall. He lost his fleet and was murdered by one of his advisers, and Roman dominion was restored. Judged by modern standards Carausius was not to be admired as a moral character; but until we know who commanded the British ships in the mouth of the Loire in 56 B.C. his claim to be remembered as the "father of the British Navy" is indisputable.

It would be impossible within the limits of this little book to attempt to summarise the history of the Navy; nor is it necessary, as our subject is "The Navy of To-day." At the same time, it will be advisable to touch upon some of the main features of our naval development, and particularly upon these which affected the growth of the fleet as an organised national force. The first record we have of a fleet organisation upon modern lines is in the reign of Edgar (958–975), who is declared in ancient chronicles to have possessed a fleet of 2400, 3600, and even 4800 keels. Even allowing for the usual exaggeration met with in these documents, it is evident

that he must have had a very large naval force; and he divided it into three squadrons, one being stationed in the North Sea, one in the Irish Channel, and one off the north coast of Scotland. In the spring of each year Edgar inspected these forces, cruising with each in the area it was appointed to guard. In those days warships were of a type quite distinct from the "round ship," or merchantman; but later on, as the art of sailing developed, the two became interchangeable. The reason for this will be readily understood. The seas everywhere, and particularly in the Mediterranean, were infested by pirates, and a trader had little chance of completing a voyage successfully unless he had the means for defending himself from these "enemies of mankind." His ships were therefore armed, and the crew trained in the use of guns and hand-weapons, so that the whole formed a vast reserve to the standing naval forces of the country. The Cinque Ports (Hastings, Romney, Hythe, Dover, and Sandwich) were granted certain privileges by William the Conqueror on condition that they undertook to supply him with a certain number of warships, manned and armed, whenever he should require them, and such vessels were, of course, primarily merchantmen. In the fleet of 197 ships which Lord Howard of Effingham led against the Spanish Armada in 1588, only 34 were "Queen's ships," the remainder being merchantmen specially commissioned for the occasion. Later on, as the art of organised naval warfare developed, so the need for specialised warships increased, as well as the necessity for having a sufficient force always available for meeting a national emergency; while a further impetus in the same direction was given during the reign of Henry VII, against whom shipowners formed a sort of combination with a view to secure exorbitant rates for the hire of their ships. The old system, however, is not yet entirely dead. All the principal naval Powers have a reserve of merchant ships which can be called upon and armed in the event of war, the British Admiralty having at their disposal in this manner the whole of the ships of the Cunard Line, including the Lusitania and Mauretania, whose armament in these circumstances would consist of twelve 6-inch guns. On the other hand, the United States have recently arranged for a

number of cruisers to be employed in peace time upon the carriage of mails and freight.

The establishment of the national dockyards was an important step in the development of our naval forces. Woolwich has been described as the "mother-dock of England," but there seems little doubt that Portsmouth was actually the first to be established, the date being 1495. The Thames yard followed shortly after, Chatham in 1510, and Deptford in 1513; and for nearly two hundred years these sufficed, for it was not until 1691 that Devonport dockyard was opened, followed by Sheerness in 1712 and Pembroke in 1812. For some years past Portsmouth and Devonport have been the only national yards to undertake the construction of large ships. In point of fact they cannot be said really to "build" them, as their work consists mainly in putting together the materials supplied by the great contracting firms in the north. Chatham and Pembroke still build small ships of the cruiser classes, and submarines are also built at the latter place; but Sheerness has been specialised as a repairing yard for torpedo-craft. So far as shipbuilding is concerned, Woolwich and Deptford ceased to exist in 1869. Some idea of the amount of work dealt with in these establishments may be obtained from the numbers of workmen employed in them. On July 1, 1913, the figures were: Portsmouth, 15,877; Devonport, 14,504; Chatham, 9200; Sheerness, 2250; and Pembroke, 2120: the whole exceeding the population of Lancaster. A great new naval establishment is in course of construction at Rosyth, on the Firth of Forth, and this is to be completed in 1916. As at present intended, however, this will be used exclusively for repairs, and not for shipbuilding.

From the time of the defeat of the Spanish Armada down to the introduction of iron shipbuilding there were no great or far-reaching changes in warship design. Naval architecture, of course, improved, and ships increased considerably in size; but the guns which were mounted in our first ironclad, the Warrior, fired a shot only two pounds greater in weight than that of the heaviest guns mounted in our ships at the Armada. The Sovereign of the Seas, launched at Woolwich in 1637,

was a three-decker mounting 126 guns; the Victory, Nelson's flagship at Trafalgar nearly two hundred years later, was a three-decker of 100 guns. The cost of such a ship as the Victory was about £70,000. Nelson's entire fleet of 27 ships of the line cost approximately 1½ millions sterling, while no single one of the battleships now in hand for the Navy will cost less than £2,250,000.

Steam as a motive power was first introduced into the navy in 1822, when a wooden paddle steamer of 238 tons, the Comet, was built at Deptford, and by 1849 there were exactly a hundred steam-propelled ships in the fleet, of which thirty were screw ships. The officials of those days strenuously opposed both the paddle and the screw—the former because it was obviously liable to damage in action, and the latter because they considered it would interfere with the steering of the ship; but their prejudices were gradually worn down, and about 1850 several first-rate line of battle ships which had been laid down as sailing ships were converted while on the stocks into screw steamers. The first ship of the line actually designed and built as a screw ship was the 80-gun Agamemnon, launched at Woolwich in 1852.

The introduction of iron, however, did more to revolutionise naval war and its material than did the steam-engine. Mention has already been made of the slow progress of ordnance between the Armada and the middle of the nineteenth century; the reason for which is to be found in the fact that there had been no change in the material opposed to it, so that the guns used at the time of the Armada would have been almost as effective as those actually in action at Trafalgar. The invention of armour-plating, however, brought about an immediate change. The smooth-bore muzzle-loading gun gave way first of all to the rifled gun—the rifling imparting to the projectile a twist which gave it greater range, accuracy, and penetration. The Warrior, our first sea-going ironclad, was launched at Blackwall at the end of 1860, and five years later rifled guns had been substituted for smooth-bores throughout the fleet. So began the battle between guns and armour which has continued ever since, and which has produced ships protected by 12 and 14 inches of hardened steel and guns which, requiring longer

to build than the ships themselves, are capable of flinging shells up to nearly 2000 lb. in weight through incredible thicknesses of armour at ranges of seven or eight miles. The muzzle-loading gun made a game struggle for existence, and reached its highest development in the battleship Inflexible, launched in 1876. This ship carried four 80-ton guns with a calibre (that is, diameter of bore) of 16 inches, firing projectiles of 1700 lb.; while the box-like citadel on which the guns were mounted was protected by iron armour 24 inches thick. Still larger guns—the largest, indeed, ever yet mounted on shipboard—were made about this time by the Armstrong firm for the Italian battleships Dandolo and Duilio, their calibre being 17·7 inches and the weight of the projectile just over 2000 lb. It may be noted here by way of comparison that while the Inflexible's 16-inch gun could penetrate 24¾ inches of wrought iron at the muzzle, the modern 15-inch gun under the same conditions has a penetration of 57 inches, and cannot be withstood by two feet of hardened steel at 3000 yards. On the other hand, 7 inches of modern Krupp armour is superior in resisting power to the 24 inches of wrought iron with which the Inflexible was protected.

In 1881 the heavy breech-loading gun made its appearance in the British Navy, the first ship to carry 12-inch guns of this description being the Conqueror. The loading of guns from the breech is usually regarded as an essentially modern device, but some of the oldest examples of ordnance brought up from the bottom of the sea were built upon this principle, though naturally their construction was very primitive. Our first 12-inch breech-loaders weighed 45 tons, and fired a shell of 714 lb., with a muzzle-energy of 18,060 foot-tons, but although the great majority of ships in our battle fleet to-day are armed with guns of this calibre, there has been an enormous advance in the power of the weapon. It is advisable that attention should be called to this point, because there is a tendency to imagine that all guns of the same calibre—as well as all ships of the same class, such as "battleships" or "Dreadnoughts"—are necessarily alike. How far wrong this assumption is, will be evident from the fact that the latest type of 12-inch gun is

50 feet long, weighs 66 tons, and fires a shell of 850 lb. with a muzzle-energy of 53,400 tons.

Between the launch of the Conqueror and the construction of the oldest battleships now on the effective list of the Navy there was an experimental period, during which many different types of battleships were built. The most remarkable of these were the Victoria, Sans Pareil, and Benbow, each of which was armed with two guns of the largest and heaviest type ever mounted in a British man-of-war. These guns were 16·5 inches in calibre and 110½ tons in weight, the projectile of 1800 lb. being expelled from the bore by a charge of 900 lb. of powder. The guns were not very successful, showing a tendency to droop at the muzzle, which accounts for the fact that they were mounted in only three ships. They were followed by a period in which the 13·5-inch gun was held in great favour, and then, just twenty years ago, there was a further decline to the 12-inch gun, which remained the standard weapon in the main armament of British battleships from 1894 until the first super-Dreadnought was launched in 1910.

II.—THE BRITISH BATTLE FLEET

THE ships of which the British Navy is composed may be divided into three general classes. The first consists of battleships and battle cruisers, which are frequently classed together as "capital ships." The second consists of cruisers of various types, and the third of torpedo-craft, both surface-keeping and submarine. The last two classes will be discussed in later chapters, but the capital ships must be dealt with first, as being at once the most costly, the most powerful, and the most important part of naval material. These vessels are the direct descendants of the "ships of the line" of the eighteenth and early nineteenth centuries. Among the principal maritime nations they are the final arbiters of sea-power, and their duty is to find and destroy the battle fleets of the enemy. They are intended to fight only with their equals. In case of war they would have no occasion to fight cruisers, for it is the first item in the cruiser's code to keep out of reach of a vessel more powerful than itself; and although torpedo-craft are designed primarily for the purpose of attacking capital ships (which, left to themselves, would have little means of defence against them), a properly constituted battle fleet is always equipped with a force of "anti-torpedo craft," whose business it would be to preserve the battleships intact until the moment arrived for them to engage the battle fleet of the enemy.

At the present moment the British Navy comprises sixty-two battleships and ten battle cruisers. The popular liking for labels has led to the division of the battleships into three, or even four groups. First, there are the oldest ships, characterised by the mounting of three types of gun—one for fighting other battleships at long ranges, another and smaller type for assisting the main guns against battleships at shorter distances, and a third destined to be used against torpedo-craft

should the ship be attacked by them. The guns falling under these heads are said to form the main, secondary, and anti-torpedo armament respectively, and the ships carrying all three are termed "pre-Dreadnoughts." This signifies, of course, that they were built before the Dreadnought, in which the principal feature was the elimination of the secondary armament. Something will be said later of the reasons which led to this step being taken; but what we have to note here is that the generic term "Dreadnought" is, in our own fleet, applied to those battleships and battle cruisers which, having no secondary armament, carry 12-inch guns (either eight or ten) in their main batteries. When the first Dreadnought was built, it was regarded more or less as the last word in battleship design; but in less than four years from the launch of that vessel we began to send afloat ships which, while embodying the same principles, carried 13·5-inch guns (firing 1250-lb. shells) as against the 12-inch 850-lb. shells of their predecessors, and to indicate this advance such vessels are known as "super-Dreadnoughts." So far the popular desire for a label has rested content with this; nevertheless, yet another increase in the size and power of the guns has been made, and the next capital ships added to the Navy will be armed with 15-inch guns firing shells of 1950 lb.—more than twice as heavy as those fired by the original Dreadnought. For these vessels Lord Haldane has coined the cumbersome but expressive title of "hyper-super-Dreadnoughts." After these general explanations our battle fleet can be described in detail, taking the ships in the order in which they were built.

Pre-Dreadnoughts.—There are forty battleships in the British fleet to which this term is applied, and the majority of them are built on the same general principle. The main armament consists of four 12-inch guns in two turrets, one forward and one aft, while the secondary battery is made up of twelve 6-inch guns (firing 100-lb. shells), mounted in casemates and arranged in equal numbers on either broadside. These are the main and secondary guns mounted in each of the following classes, all of which were designed by the late Sir William White:

Class[1] and Number.	Date of Launch.	Length (feet).	Tonnage.	Speed (knots).
Majestic (9) . . .	1894–96	390	14,900	17·5
Canopus (6) . . .	1897–99	390	12,950	18·25
Formidable (8) . .	1898–1902	400	15,000	18
Duncan (5) . . .	1901	405	14,000	19

It will be seen that there are considerable variations in the speed of these groups, but that does not entirely account for the differences in displacement. In the two largest classes (Majestic and Formidable), eighteen 3-inch 12-pounder guns are mounted in the anti-torpedo battery, while the others have only twelve; and the Majestics have five torpedo-tubes as compared with four in all the others. The most important differences, however, affect the protection. In the Majestics and the Formidables the main armour belt is 9 inches thick, but it is not of the same value in the two classes. The Majestics' armour is of Harveyed steel, while the Formidables' is of Krupp steel, and the difference between them is fifty per cent. in favour of the later ships. Further, the Majestic class are what is known as "soft-ended"—that is, the main armour belt extends over 220 feet amidships and leaves the ends quite unarmoured, while in the Formidables a 2-inch plating is carried right up to the bows. In the Canopus class the belt is of Harvey-nickel steel, 6 inches thick, the resisting power of this material being between that of plain Harvey and Krupp armour. The Duncan class have 7-inch belts of Krupp steel. Six of this type were built, but one, the Montagu, was wrecked on Lundy Island in 1906.

Twenty-eight of our pre-Dreadnought battleships have been accounted for above. The next two in order of date, the Triumph and the Swiftsure, stand in a class by themselves. They were designed by the late Sir Edward Reed, and were launched in 1903 for the Chilian Government; but shortly before the outbreak of the Russo-Japanese War they were thrown on to the market, and the British Admiralty purchased

[1] A full list of all ships, arranged in classes, is given in the Appendix.

them in order to prevent them falling into the hands of Russia. These ships are 436 feet long, the Swiftsure displacing 11,800 and the Triumph 11,985 tons; and they carry four 10-inch guns (500-lb. shells) in their main battery, fourteen 7·5-inch (200-lb. shells) in the secondary battery, fourteen 14-pounders for use against torpedo-craft, and two torpedo-tubes. Their principal side armour is 7 inches thick; but taking the ships as a whole they are much more lightly built than is usual with those designed for the British service.

After the Duncan class, the next battleships laid down for the Navy were the eight of the King Edward class, which marked the first step in the evolution of the "all-big-gun" ship. Displacement advanced at a leap to 16,350 tons, and while the thickness of the side armour amidships remained the same as in the Formidables, it was continued in a thickness of 4 inches to the bow and stern. The most notable change, however, was effected in the armament. What had for some years previously been the standard secondary battery of twelve 6-inch was reduced to ten, while a new type of intermediate gun was introduced in the shape of the 9·2-inch (firing 380-lb. shells), one being mounted at each of the four corners of the upper works. The principal reason for this alteration was that gunnery had so greatly improved that it had begun to be doubtful whether the 6-inch gun would ever be able to render effective assistance to the 12-inch in fleet actions, owing to the range at which they would be fought and the improved resisting powers of armour; and it was the continuation along this line of reasoning which gave us the next step towards the Dreadnought, and the Dreadnought itself. Eight ships of the King Edward class were built, their launching date being 1903–5. They were not only heavier by 1350 tons than any battleships we had previously built, but were also by a long way the most costly, their average working out to £1,445,770, or £89·03 per ton of displacement, as compared with averages of £1,118,171 per ship and £74·54 per ton for the ships of the Formidable class.

The King Edwards were the last battleships designed for the Navy by Sir William White. The first designed by his successor, Sir Philip Watts, marked another important step in

development, although they were very little heavier than the King Edwards. The principles involved in the latter, which have been briefly explained above, were given a more logical application, and in the 16,500-ton battleships Lord Nelson and Agamemnon, launched in 1906, the 6-inch gun was entirely dispensed with, the ships being equipped with a main battery of four 12-inch, a secondary battery of ten 9·2-inch, and an anti-torpedo battery of twenty-four 12-pounder guns. The main armour belt was increased to a thickness of 12 inches, tapering to 6 forward and 4 aft, and the only falling off was the slight one of half a knot in speed from the 18·5 of the King Edwards to 18. The Lord Nelsons were our first warships to cost over 1½ millions, the average for the two being £1,652,693, equal to £101·16 per ton.

In the very month when these ships were laid down (May 1905), the Admiralty decided upon the construction of the ship which has since become famous as the Dreadnought. We have already explained the causes which led to the passing of the 6-inch gun from battleship armaments, and it was for exactly the same reasons that the 9·2-inch had to go. Gunnery had so far advanced that the experts, having made it possible for actions to be carried on at extreme ranges, naturally turned their attention next to the increase of the power available at those ranges. The 9·2-inch is a fair weapon in these conditions. Taking all things into consideration it is roughly about half as destructive as the 12-inch gun, over which it has the advantage of a much more rapid rate of fire; and it is quite possible that if the process of "spotting" had not come to play such an important part in gunnery, it would have been retained. "Spotting" may be described as the direction of gun-fire by noting the fall of the shot. So long as the projectiles are all of the same calibre it is a simple matter to correct inaccuracies, but the mixing up of 850 and 380 lb. shells complicated matters so that in the interests of straight shooting it became necessary to eliminate the smaller gun. The Dreadnought, therefore, was armed with only a main and an anti-torpedo battery —ten 12-inch guns in the former and twenty-four 12-pounders in the latter. Her length is 490 feet (exactly 100 feet longer than our oldest battleships, the Majestics), and her nominal

displacement is 17,900 tons. Other features for which she was remarkable were her high speed of 21 knots; the fact that this was obtained by turbine machinery, no warship larger than a 3000-ton cruiser having previously been fitted with turbines; her great size—an increase of 1400 tons over the Lord Nelsons; her unprecedented cost, namely, £1,813,100, equal to £101·29 per ton; and the rapidity with which she was built. Laid down at Portsmouth Dockyard on the 2nd October 1905, she was launched by King Edward on the 10th February 1906, and steamed out of harbour for her trials on the 1st October of the same year.

There is no need to enter here into an account of the many consequences, direct and indirect, which followed upon the construction of the Dreadnought; but it may be pointed out that at the time when she was laid down the United States had already decided to build a ship embodying the same principles, and that Japan was building two ships, the Aki and Satsuma, which both displaced well over 19,000 tons. The Dreadnought did not, therefore, set the fashion of "monster" battleships, while it is apparent that if we had not laid down the first all-big-gun ship in 1905 some other Power would have done so very shortly after.

The Dreadnought's ten 12-inch guns are mounted in five turrets, one forward and two aft on the centre-line, and two abreast on the beams. She is thus able to fire eight out of the ten guns on either broadside, and as each gun fires a shell of 850 lb. she is said to have a broadside fire of 6800 lb. Following the Dreadnought we built six other ships almost identical, three of the Bellerophon type (18,600 tons, launched 1907), and three of the St. Vincent type (19,250 tons, launched 1908–9); the main point of difference being that in these ships 4-inch guns are mounted for defence against torpedo-craft, instead of 3-inch 12-pounders. This increase was rendered necessary by (1) the increase in the effective range of the torpedo, enabling it to be fired from greater distances than those at which the 12-pounder would be effective; and (2) the advance in the size of torpedo-craft to such dimensions as to make the smaller gun inadequate for attacking them.

The next important development in battleship design was

one intended to make the whole of the main armament, instead of only a proportion of it, available for firing on either broadside. The American naval authorities have been very consistent in this respect, all their Dreadnoughts, whether armed with eight, ten, or twelve guns, having the turrets on the middle line of the ship so that all the guns can be swung over on to either beam. We have seen that the Dreadnought and her six successors can fire only eight out of their ten 12-inch guns on the beam; but in our next three ships, the Neptune (1909), Hercules and Colossus (1910), a tentative movement was made towards the adoption of the American principle. One turret is mounted forward on the centre-line, and two aft; and of the latter the one nearer the centre of the ship is "super-posed"—that is, it is raised on a higher level so that its guns can be fired over the aftermost turret. The two turrets amidships, instead of being abreast, are *en échelon*—that is, on a line drawn at an angle of some 45 degrees to the centre line of the ship. Consequently, over a limited angle, the whole ten guns can be fired on either broadside. These three ships were the last Dreadnoughts—the last battleships armed with 12-inch guns—built for the Navy.

Super-Dreadnoughts.—Generally speaking, the 12-inch gun is sufficiently powerful to penetrate, at likely battle ranges, the thickest armour with which modern warships are protected. It will easily be seen, however, that mere penetration alone would produce little effect, and the aim of ordnance experts is not only to get the shell through the armour, but also to ensure that it shall do the greatest possible amount of damage after it has got into the interior of the ship. For this purpose the shells fired from heavy guns carry a "bursting charge" actuated by a fuse which explodes it the instant penetration is accomplished. Once inside the ship, the single shell is violently broken up into a number of smaller projectiles, which are flung in all directions, carrying death and destruction with them. The extent of this destruction will clearly depend upon the weight of the shell and the force with which it is exploded. Thus it arose that after the 12-inch gun had remained the standard "big gun" in our battle fleet from the Majestic of 1894 to the Hercules of 1910, it gave

way to the 13·5-inch firing a shell of 1250 lb.–400 lb. heavier. The weight of bursting charges is one of the things regarded by the Admiralty as confidential, but that there was a proportionate increase in this direction is well known. It has also been established that the 13·5-inch gun is more accurate than the 12-inch, especially at long ranges.

The first super-Dreadnoughts built for the Navy were the four ships of the Orion class, launched in 1910–11. They are 545 feet long, and displace 22,500 tons, their average cost being £1,833,879, or £81·5 per ton. They are protected by 12-inch belts of Krupp armour, and their armament comprises ten 13·5-inch guns in the main battery, sixteen 4-inch in the anti-torpedo battery, and three torpedo-tubes. Besides the increase in the size of the gun, the Orion class marked a further advance on previous British Dreadnoughts, inasmuch as the five turrets, each containing two heavy guns, are all mounted on the centre-line. There are two turrets forward and two aft, the one nearer the middle of the ship being super-posed in each case, while the fifth turret is amidships. The Orions have been followed by two four-ship groups of generally similar design—the King George V class, launched in 1911–12, and displacing 23,000 tons, and the Iron Duke class (1912–13, 25,000 tons). The 13·5-inch guns in these ships are of a more powerful type than those in the Orions, the projectile being lengthened and its weight increased to about 1400 lb., so as to carry a still larger burster. At the same time, further developments in the torpedo and in torpedo-craft have made the 4-inch gun very nearly as useless for protective purposes as the 12-pounder; consequently, the Iron Dukes are furnished with twelve 6-inch guns as an anti-torpedo battery—the same number and calibre as were carried by pre-Dreadnoughts in their secondary batteries. These ships also have four torpedo-tubes instead of three, and are equipped with two 3-inch guns on special mountings for attacking aircraft.

Hyper-super Dreadnoughts.—We have now completed our survey of our completed, ready-for-sea battle fleet; but there are thirteen ships in various stages of construction which must be briefly dealt with. Five of these, the Queen Elizabeth class, are approaching completion. A great deal has been

heard about these ships because they are to depend entirely upon oil fuel for raising steam in their boilers. The advantages of oil fuel as compared with coal will be dealt with elsewhere; but it may be mentioned here that one of its principal results is enormously to increase the radius of action of the ship burning it, besides taking up much less space than an equivalent quantity of coal. The Queen Elizabeths are to have the very high speed of 25 knots, and as this was the designed speed of our first four battle cruisers it is sometimes urged that the new ships should be regarded as such, and not as battleships. However, the Admiralty class them as battleships, so that we have authority on our side in following the same line. Apart from the fact that they are oil-burners, these new vessels are remarkable in registering a further development of naval ordnance. They will carry only eight big guns on a displacement of 27,500 tons, but the weapons will be of 15-inch calibre, firing a shell of 1950 lb.—the heaviest ever fired by a British warship. The muzzle-energy of this gun, which is 56 feet 3 inches long and weighs 96 tons, is 84,510 foot-tons, and it can be fired at the rate of six times every five minutes. Sixteen 6-inch weapons will form the anti-torpedo battery of these ships, and they will, it is believed, be protected by 13½ inches of armour. The eight remaining ships now in hand, the Royal Sovereign class, will be similar to the Queen Elizabeths, but they will depend mainly upon coal and will have a speed of only 21 knots.

Before turning to battle cruisers, the other class of capital ships, it will be interesting to summarise in tabular form the advance of the battleship in the twenty years covered by our present existing fleet. (See Table on opposite page.)

Where our Ships are Built.—The following are the principal private firms by which British warships are built: Messrs. Armstrong, Whitworth & Co., Newcastle; *Palmer's Shipbuilding and Iron Co., Jarrow-on-Tyne; *Messrs. Cammell, Laird & Co., Birkenhead; *Messrs. Vickers, Barrow-in-Furness; *Messrs. Wm. Beardmore & Co., Dalmuir; *Messrs. John Brown & Co., Clydebank; the *Fairfield Shipbuilding and Engineering Co., Govan; *Messrs. Scott's Shipbuilding and Engineering Co., Greenock. All the foregoing have built

Dreadnoughts, and they also build cruisers and other small craft. Firms which specialise to a greater or less extent in the construction of torpedo-boat destroyers are Messrs. Yarrow and Co., Scotstoun; Messrs. Thornycroft & Co., Woolston; Messrs. J. S. White & Co., East Cowes; Messrs. Denny and Brothers, Dumbarton; *Messrs. Hawthorn, Leslie & Co., Newcastle; and Messrs. Swan, Hunter and Co., Wallsend. Machinery for big ships is manufactured by those firms marked with an asterisk, and also by Messrs. Harland & Wolff, Belfast; the Wallsend Slipway and Engineering Co.; and the Parsons Marine Steam Turbine Co.

The principal firms engaged in the supply of armour and ordnance for His Majesty's ships are Messrs. Vickers, Armstrong, Whitworth & Co., Beardmore, and John Brown in the above list, and also Hadfield's Steel Foundry Co., the Coventry Ordnance Works, and Messrs. J. and P. Hill (Sheffield). Torpedoes are made by the Admiralty at the Greenock Torpedo Factory, and by Messrs. Whitehead at Weymouth, and Messrs. Greenwood & Batley at Leeds.

Battle Cruisers.—The battle cruiser may be regarded as a development of the armoured cruiser

Type—Ship.	Date of Launch.	Length, Feet.	Tons.	Horse-power.	Main Guns, and Broadside Fire.	Cost.
Majestic	1895	390	14,900	12,000	4 12-in. and 12 6-in. (4,000 lb.)	£978,282
Formidable	1898	400	15,000	15,000	” ” ”	1,097,245
King Edward VII	1903	425	16,350	18,000	4 12-in., 4 9·2-in., and 10 6-in. (4,660 lb.)	1,473,245
Lord Nelson	1906	410	16,500	16,750	4 12-in. and 10 9·2-in. (5,350 lb.)	1,654,098
Dreadnought	1906	490	17,900	23,000	10 12-in. (6,800 lb.)	1,813,100
Neptune	1909	510	19,900	25,000	10 12-in. (8,500 lb.)	1,715,258
Orion	1910	545	22,500	27,000	10 13·5-in. (12,500 lb.)	1,849,710
King George V	1911	555	23,000	27,000	10 13·5-in. (14,000 lb.)	1,910,889
Iron Duke	1912	580	25,000	29,000	10 13·5-in. (14,000 lb.)	2,080,918
Queen Elizabeth	1913	?	27,500	58,000	8 15-in. (15,600 lb.)	2,314,762 [1]

1 Excluding cost of guns.

of the pre-Dreadnought era, and it is briefly described as a battleship in which guns and armour are sacrificed in order to obtain a very high speed. All of our battle cruisers were built when we were arming our battleships with ten heavy guns and giving them 11-inch or 12-inch belts of armour; but the battle cruisers all carry only eight guns and have armour belts either 7 or 9 inches in thickness. The Invincible class of three ships, launched in 1907, were contemporary with the Dreadnought. They are 530 feet long and displace 17,250 tons, and while their turbines of 41,000 horse-power were designed for a speed of 25 knots, they have all in fact done over 27. Their eight 12-inch guns are mounted in four turrets, two on the centre-line forward and aft, and two *en échelon* amidships. Very similar to these, but 1500 tons larger, are the Indefatigable (1909), Australia and New Zealand (1911), the last two built at the cost of the Dominions after which they are named. In their case the length was increased to 555 feet in order that the turrets amidships might be placed farther apart, so permitting a larger angle to be covered on either broadside by the whole of the big guns. These six ships have been followed by four of the super-Dreadnought era, with all their turrets on the centre-line. The first two, the Lion and Princess Royal, were contemporary with the battleships of the Orion class, and a comparison between the two types brings out in a striking manner the enormous price that has to be paid for high speed:

	Orion.	Lion.
Speed	21 knots	28 knots
Horse-power	27,000	70,000
Length	545 ft.	660 ft.
Tonnage	22,500	26,350
Cost	£1,849,710	£2,057,708
Armament	10 13·5-in. 16 4-in. 3 torpedo-tubes	8 13·5-in. 16 4-in. 2 torpedo-tubes
Main armour	12 inches	9 inches
Officers and men	800	980

The Lion is therefore 115 feet longer and 3850 tons heavier than the Orion; and yet, because she is 7 knots faster, she cost £200,000 more to build, needs 180 more officers and men to man her, and is outdone in offensive power

by 25 per cent. and in defensive power (armour) by 33 per cent. This ship and her sister, the Princess Royal, carry the gun which fires a 1250-lb. shell, but the Queen Mary and Tiger, launched in 1913–14, have the improved gun, while the Tiger carries twelve 6-inch in place of 4-inch guns in her anti-torpedo battery. These are the last battle cruisers laid down for the Navy, although note has already been made of the fact that the Queen Elizabeth class have the same speed as the Invincibles, while they further resemble the typical battle cruiser in having only eight guns in their main armament. The only nations which have followed our example in building battle cruisers are Germany, Russia, and Japan.

III.—CRUISER TYPES AND AUXILIARIES

THE part which cruisers would play in a war involving Great Britain is a matter which does not appear to have been decided with any confidence. In the days of Nelson vessels of this class, then known as frigates, were employed principally upon the work of securing information as to the position, movements, and strength of the main forces of the enemy; to attack the enemy's cruisers or such other vessels as could be encountered with a reasonable chance of success; and to prey upon the enemy's commerce, at the same time protecting our own. Cruisers of to-day are intended for much the same duties, but there would probably be no unanimous agreement on the point. Many people argue that there will be no need to send out cruisers specially for the protection of our commerce in war because no Power likely to be at war with us has either sufficient cruisers to attack our merchantmen or any ports of call bordering the high seas to which such cruisers could repair for fuel and stores. Others urge that there would be no need for us to make special dispositions of our ships for the attack of the enemy's commerce, because in the ordinary course of events our main squadrons would occupy such positions as to make it impossible for ships to enter or leave the enemy's harbours. With regard to scouting and the collection of information, there is no doubt that aircraft, in the future, will be extensively used for these purposes, but they cannot very well displace the cruiser altogether, as the latter alone is able (as yet) to keep the sea for days at a time, and in all weathers.

That the naval authorities themselves are by no means certain or agreed as to the rôle of the cruiser in modern war is evident from the policy that has been pursued regarding these vessels in recent years. A short time ago the official system of

classification was altered, all cruisers other than battle cruisers being classed as either "cruisers" or "light cruisers"; but the following shows the designations under which our various types of cruisers were built, and the date of their launch:

1. Armoured Cruisers (34), launched 1899–1907.
2. Protected Cruisers, 1st Class (10), launched 1890–98.
3. Protected Cruisers, 2nd Class (38), launched 1891–1913.
4. Protected Cruisers, 3rd Class (11), launched 1890–1904.
5. Unarmoured Cruisers (7), launched 1908–12.
6. Scouts (8), launched 1904–5.
7. Light Armoured Cruisers (20 built and building), the first launched in 1913.

Under the official regrouping the first and second classes above are now rated as "cruisers" and the remainder as "light cruisers."

Our first armoured cruisers were built in 1899–1901 in consequence of the adoption of the type in Russia. Apart from the usual characteristics of a cruiser, which are high speed, light armament, and a wide radius of action, these ships are distinguished by a belt of side armour, having a thickness of 4 inches in the Monmouth class and 6 inches in all the others. There seems to have been an idea that these ships would have been able to assist the battleships in a general engagement, and it might easily be demonstrated that some of our armoured cruisers are greatly superior as all-round fighting ships to some of the older battleships in foreign fleets. As a general proposition, however, the armoured cruiser of the pre-Dreadnought era was never a ship of the line, as its guns would have been comparatively ineffective at battle ranges, while its armour would not have protected it against the more powerful weapons mounted in battleships proper. The construction of armoured cruisers nominally ceased with the three ships of the Minotaur class provided for in the Navy Estimates of 1904–5—the year before the appearance of the battle cruiser; but there is now a distinct tendency to return to the type. Some of our newest ships classed as second-class protected cruisers actually have a belt of armour along the waterline, while the vessels now being built to replace destroyers are officially termed "light armoured cruisers" from the fact of their having belts two or three inches in thickness.

The successive classes of armoured cruisers built for the Navy were as follows:

Class and Number.	Date of Launch.	Length.	Tons.	Speed (Knots).	Armament.
Cressy (6) . .	1899-1901	440 ft.	12,000	21	2 9·2-in., 12 6-in., 12 12-pr., 2 torpedo-tubes.
Drake (4) . .	1901	500 ft.	14,100	23	2 9·2-in., 16 6-in., 12 12-pr., 2 torpedo-tubes.
Monmouth (9) .	1901-1903	440 ft.	9,800	23	14 6-in., 8 12-pr., 2 torpedo-tubes.
Devonshire (6) .	1903-1904	450 ft.	10,850	22½	4 7·5-in., 6 6-in., 2 torpedo-tubes.
Duke of Edinburgh (2) . .	1904	480 ft.	13,550	22·3	6 9·2-in., 10 6-in., 3 torpedo-tubes.
Warrior (4) . .	1905	480 ft.	13,550	22·3	6 9·2-in., 4 7·5-in., 3 torpedo-tubes.
Minotaur (3) .	1906-1907	490 ft.	14,600	23	4 9·2-in., 10 7·5-in., 5 torpedo-tubes.

These ships are still capable of very useful service, particularly in distant seas, but they would be of little value in a pitched battle between modern fleets.

Protected cruisers are distinguished by having for their protection only a curved armour deck, which rises from just below the water-line, the object of which is to prevent shells from bursting in the engine and boiler spaces. Larger ships also have these decks, which are generally from 1½ to 3 inches in thickness. Our first-class vessels of this type are practically obsolete, and so need not detain us; and the same is true of a large number of the second and third class vessels. Between 1909 and 1913, however, four groups of second class cruisers, fifteen in all, were launched, and these are now the only really modern protected cruisers in the fleet. The first were the five of the Bristol class, launched in 1909–10, and carrying two 6-inch and ten 4-inch guns and two torpedo-tubes on a displacement of 4800 tons. They were followed in 1910–11 by the 5250-ton Dartmouth class, four in number, which have eight 6-inch for their gun armament; and in 1911–12 by the three Chathams, sister ships to the Dartmouths, but

displacing 5400 tons. The last group consists of the three ships of the Birmingham class, which carry an additional 6-inch gun and displace 5440 tons. The speed of all these cruisers, which are turbine-driven, is either 25 or 25½ knots, and the two last classes have a thin belt of vertical armour along the water-line amidships. Of our ten third-class protected cruisers only four are now serviceable. These are the vessels of the Topaze class, launched in 1903–4, and displacing 3000 tons, their armament comprising twelve 4-inch guns and two torpedo-tubes, and the speed being 23 knots. The Amethyst, of this class, was the first warship in the world larger than a destroyer to be fitted with turbines. A few words concerning the eight vessels of the Sentinel class will complete this brief survey of our protected cruiser forces. These ships, which displace just under 3000 tons, were at first termed "scouts," and their armament originally consisted of ten 12-pounders; but in 1912–13 these weapons were replaced by nine 4-inch, and since then they have been officially classed as light cruisers. They were launched in 1904–5, and their speed is 25 knots.

Only one other cruiser group remains to be dealt with in this chapter. This consists of seven unarmoured or unprotected vessels of the Boadicea class, launched in 1908–12. Displacing from 3300 to 3440 tons, they have neither side armour nor a protective deck, whence arises their designation. They all carry ten 4-inch guns except the first two (Boadicea and Bellona), which have ouly six. They have never been regarded as very successful, and it is unlikely that any more will be built.

It will be noticed that we are not dealing here with the seventh and latest type of cruisers—those described as "light armoured." The reason is that these vessels are not intended for ordinary cruiser duties, but for the destruction of hostile destroyers. It will therefore be more fitting to deal with them in the following chapter. There is, however, another class of ship, of comparatively recent introduction, whose duties are to some extent similar to those of cruisers and which may therefore be disposed of at the same time. In the event of war a certain number of cruisers would be told off to wait upon the battle fleets—to assist in the search for the enemy and to "run

errands" for the commander-in-chief; and there would also be a number of ships not designed to fight, but to increase the efficiency of the whole in various directions. These vessels are called "fleet auxiliaries."

First in importance among these are the fuel ships—some designed to carry coal, some liquid fuel for the warships requiring it, and some petrol for the submarines. The only collier is the Mercedes, of 9930 tons; and the reason why there is only one of these vessels is that it is exceedingly difficult to transfer coal from one ship to another at sea. On the other hand, the facility with which this operation can be carried out with oil is one of the many advantages possessed by liquid fuel as a combustible. A coal-burning ship can only remain at sea for a given time, after which she must return to harbour—which may be hundreds of miles distant from the place where the ship is most needed—to replenish her bunkers. The mere operation of coaling, too, is a most fatiguing one for all concerned. For a ship with stowage for 2000 tons it means practically twelve hours' hard, continuous work for all on board, and naturally the crew cannot be fit for much for a lengthy interval after the work is completed. With oil, things are quite different. If a ship returns to port to fill her tanks she is simply moored alongside a quay, connection is made with pipes running down from the storage tanks ashore, and the whole operation is finished without a single person having unduly to exert himself. A far greater advantage even than this is that the ship need not return to port at all. A tank ship can be sent to the very spot where fuel is required, and in any ordinary weather a pipe connection can be made with the warship needing the fuel, which is then pumped through. A brief consideration will show what an enormous advantage this confers on the stronger or attacking power. Suppose a British fleet to be keeping watch over a foreign force in a harbour 500 miles distant from the nearest home depot. If, say, twenty ships are necessary for the purpose and only coal-burners were available, the commander would need at least 30 ships to keep 20 constantly off the port to be watched, because at frequent intervals each vessel would have to return home to fill its bunkers, the entire operation—allowing for the voyage home and out—requiring at least three

days. If, on the other hand, the ships were oil-burners, a bare twenty ships would suffice, for the fuel could be sent out from England and transferred to the warships on their war stations.

In order to derive the fullest value from this advantage the Admiralty have built or ordered a number of "oilers"—the abbreviated name by which these oil-carrying ships are officially known. One or two of the largest of them are being built so that the Admiralty may bring home its own oil from its own Persian oil-fields in its own ships, but the greater number are for attendance on the fleet at sea. The names of the vessels so far built or ordered are: Attendant, Burma, Carol, Ferol, Kharki, Olympia, Petroleum, Servitor, Trefoil, and Turmoil. Only one ship has so far been built for carrying petrol to the submarine flotillas at sea, this being the 980-ton Isla. In order that the "oilers" (or the warships themselves, should it be desirable for them to return to port) may have a depot as near as possible, enormous storage tanks for oil have been erected at various points round the coast. In these depots can be stored from 100,000 to 250,000 tons of oil, and the principal of them—naturally on the south and east coasts—are at Devonport, Portsmouth, Sheerness, the Humber, Rosyth, and Invergordon.

The Navy also possesses two large "repair ships," the Cyclops and Assistance, which are fitted with all sorts of machinery for dealing with minor repairs that may be necessary in the squadron to which they are attached. All large warships, of course, have their own workshops, and a large proportion of the crew consists of skilled mechanics—artificers, fitters, carpenters, smiths, plumbers, &c.; but the repair ships have much more elaborate means for dealing with work of this description, and are a sort of half-way house between the sea-keeping fleet and the dockyards. A third repair ship, the Reliance, is being fitted out. We also have repair ships for officers and men, as well as for ships. The hospital ship Maine, presented to the nation by American women during the South African War, was unfortunately wrecked in June 1914, but another vessel, which is of 8785 tons and will bear the same name, is being fitted out. When completed this vessel will be always in attendance on the fleet to deal with cases which for any reason cannot be treated on board the ship to which the

patient belongs; for all large vessels are, of course, furnished with a "sick bay," and carry a qualified staff for the treatment of the less important cases of illness and injury which arise in peace, and for dealing with the casualities of war.

Besides these, we have a large number of "depot ships" attached to the various flotillas of destroyers and submarines. The majority of them are old cruisers put to this use instead of being sold for a few thousand pounds as scrap-iron, but a few were specially designed and built for the purpose. These depot ships, which do not form part of the fighting organisation of the flotillas to which they are attached, discharge the combined functions of office and store-house. Thus, the submarine depot ship Maidstone, of 3380 tons, launched in 1912, makes a floating office for the commanding officer of the Eighth Submarine Flotilla, and also provides accommodation for double crews for the submarines. She is fitted with workshops, and carries all that the submarines would be likely to require in the way of reserve torpedoes and stores, besides a large quantity of petrol for their use. There are in all ten sea-going depots for destroyers (Aquarius, Blake, Blenheim, Dido, Diligence, Hecla, Leander, St. George, Tyne, and Woolwich), and twelve for submarines (Adamant, Alecto, Arrogant, Bonaventure, Forth, Hazard, Hebe, Maidstone, Pactolus, Rosario, Thames, and Vulcan). They vary considerably in size.

The science of aerial navigation has produced a new type of fleet auxiliary. For some months during 1913 the cruiser Hermes was in commission as an experimental ship for gaining information in the carrying of sea-planes, and as a result of the experience then gained the Admiralty have purchased a steamship which is to be converted into a vessel specially fitted for this purpose. Nothing has been allowed to become known concerning this vessel, but she is intended to accompany the fleet to sea with a number of aircraft on board, and will be fitted with special arrangements for launching, recovering and housing and repairing them.

IV.—TORPEDO-BOATS, DESTROYERS, AND "DESTROYER-DESTROYERS"

TORPEDO-CRAFT form by far the most numerous section of the British Navy. Not reckoning 70 torpedo-boats of little or no actual value, we have 248 destroyers built and building, 36 modern torpedo-boats, and 96 submarines—a total of no fewer than 380 vessels whose principal weapon is the torpedo. In addition, we have twenty vessels built and building which are specially designed for overhauling and destroying hostile torpedo-boat destroyers, and although the torpedo is not their main weapon, it is that which brought them into existence.

Even in these days, when so much is written about the Navy, there is a good deal of misconception as to what a torpedo is, and sometimes in respectable prints one finds a vessel referred to as "H.M. Torpedo 'So-and-So.'" The torpedo is, of course, not a boat of any sort. It is a projectile just as much as the shell that leaves the muzzle of a gun; but it differs in the following respects: the shell from a gun derives its velocity from the explosion of a charge of powder or other substance behind it, while the torpedo, although it may be expelled from its "tube" (the equivalent of the gun) by compressed air or a very small charge of powder, is thenceforward propelled by machinery in its own interior, actuated by compressed air. Then, again, the heavy shell from a gun travels through the air in a curve which, if the range be a long one, may reach a height of 20,000 feet or more before it begins to fall towards the object at which it is aimed; and, having struck its target, it is intended to penetrate whatever armour it may impinge upon and burst just beyond, inside the ship. The torpedo is very different. It may be fired either from a submerged or an above-water tube—the latter being the more favoured method, because the submerged tube cannot be trained

independently of the ship in which it is mounted. If the tube is above water, the torpedo, on being ejected, drops beneath the surface, its engines come into action immediately, and after a very short time it settles down at a high rate of speed, and at a depth which can be regulated beforehand, towards the object at which it is aimed. The fore part of the torpedo consists of a "war-head" containing a large quantity (it may be as much as 300 lb.) of damp guncotton; and on striking its objective, this enormous charge is fired by a detonator, with the result, at any rate in theory, that a huge rent is torn in the under-water skin of the ship attacked, which, if not sufficient to sink it, may at any rate upset its equilibrium and its internal arrangements to such an extent as to put it out of action not only during one engagement, but for many months. The torpedo has been tried several times in modern wars—notably in that between Russia and Japan—and one must say that it has failed to justify the high opinions held of its destructive powers; but improvements in its construction are constantly being made with a view to overcoming its acknowledged defects, and the extent of the confidence that is still placed in it will be evident from the figures quoted at the beginning of this chapter. These defects are, principally, the delicacy of the apparatus by which the torpedo is kept at a uniform depth, any mishap in this department sending the projectile either to the surface or to the bottom; and its comparative slowness. As regards the latter, great progress has been made. In 1903 the best torpedo in the British service had a range of 4000 yards, which distance could be covered at a speed of 18 knots. The latest projectiles made by Messrs. Whitehead, however, can cover 7000 yards at 45 knots and 11,000 yards at 30 knots. A torpedo would take nearly five minutes to cover the lesser distance, and in that time a battleship at full speed would change its position by about two miles—a fact which illustrates one of the difficulties in the way of the effective use of the torpedo. At the same time, it must be borne in mind that torpedo-boats and destroyers are expected to do most of their work at night, when they might be able to approach their intended victims much more closely, and perhaps find them at anchor. Another important point is that each

British destroyer flotilla consists of twenty boats, each able to fire two or four torpedoes on the broadside without reloading. If such a flotilla were able to discharge all its tubes in the direction of a hostile battle squadron steaming in line ahead it might easily do enormous damage.

The locomotive torpedo was invented in 1866 by an Austrian, Captain Luppis, but Mr. Robert Whitehead, who took up the invention, introduced so many improvements that it is now more generally associated with his name than with any other. As soon as it reached the practical stage the Powers set to work to create hordes of vessels of a type specially designed to carry it—small, fast vessels which would be able to approach a big ship by stealth in the darkness, launch torpedoes into her, and, if possible, make good their escape. These vessels were called torpedo-boats, and the first was launched on the Thames for the Norwegian Government in 1873. Four years later, the first British torpedo-boat, the Lightning, went afloat, and from that date onwards the cult of the special torpedo-vessel has never slackened. During the eighties especially vast numbers were built, and many people arose to declare not only that the torpedo-boat had made the existence of the battleship impossible, but also that it bade fair to deprive us of the command of the sea. That the menace of the torpedo-boat was serious is true enough, and in 1892 the Admiralty held a special series of manœuvres in order to test its capabilities and to devise the best method of countering it. The result was seen in the introduction of the "torpedo-boat destroyer"—usually abbreviated now to "destroyer" simply. These vessels, while still carrying torpedo-tubes, were also fitted with an armament of one 12-pounder and five 6-pounder guns; they were much larger than the torpedo-boats, and so were better able to keep the sea; and this, combined with their greater nominal speed, enabled them easily to overhaul any torpedo-boat, which they could destroy with their guns.

Our first destroyer, the Havock, long since removed from the effective list, was launched on the Thames in 1893; and in a very short space of time the construction of torpedo-boats began to fall off as the superior qualities of the new type asserted themselves. To-day it has practically ceased alto-

gether, although Germany adheres to the old name and calls her vessels "large torpedo-boats." With the passing of the torpedo-boat the meaning of the term "torpedo-boat destroyer" is, of course, lost; but the term is retained, and it is certainly expressive in its shortened form.

The destroyers which we possess to-day fall naturally into three main classes. First of all we have 75 vessels more or less similar in design to the first that was built. A dozen of the very oldest, launched in 1894–5, have a designed speed of 27 knots; and they are armed with the guns mentioned above, and two (in three cases only one) torpedo-tubes. The remaining 63 boats of the earliest destroyer era were designed for 30 knots. They were launched between 1895 and 1902, and displace from 340 to 420 tons, the armament consisting, as before, of one 12-pounder and five 6-pounder guns and two torpedo-tubes. There are three exceptions to this general rule. The Albacore and Bonetta, launched in 1906–7, were purchased to replace two vessels which were lost, and these displace 440 tons, have a designed speed of $26\frac{3}{4}$ knots, and carry three 12-pounder guns. The third exception is the Orwell, which has an armament of six 3-pounder guns.

It has always been the tendency of warship types to increase in size, and to this rule the destroyer has been no exception. Thus we find that in 1903 the displacement of our destroyers took a sudden jump to over 500 tons. The reasons for this were, firstly, that foreign destroyers had increased in size and power; secondly, that experience had proved the old type of destroyer—flush-decked save for a raised "turtle-back" forward—to be unsuitable for sea-going work; and thirdly, that it was deemed necessary to give the boats a larger fuel supply, enabling them to keep at sea for longer periods, and at the same time to make them more habitable for officers and men. The result of these considerations was the "River" class of destroyers, so called because all of them are named after rivers of the United Kingdom. Not all ships so named, however, belong to this class; for instance, the Avon, Leven, and Orwell belong to the earlier class of destroyers, while the Shannon is a large armoured cruiser,

and the Thames, Tyne, and Forth are depot ships. The River class destroyers, 34 in number, were all launched between 1903 and 1905; their displacements vary from 540 to 590 tons; and their designed speed is 25½ knots. They originally carried the same armament as the earlier destroyers, but a few years ago this was altered to four 12-pounder guns, each boat having two torpedo-tubes. In these vessels, as in all later destroyers built for the Navy, the forecastle is raised high above the level of the after-deck, a feature which increases their seaworthiness very considerably. They carry 125 tons of coal in their bunkers—an advance of about 40 tons over the previous average. It may be pointed out here that only seven of the River class destroyers are still kept in full commission; and excepting these we maintain in a constant state of readiness for war only one destroyer that was launched before 1909.

After the last of the River boats was launched the Admiralty made three important changes in their destroyer policy. The first, which was permanent (or has been so far) was the adoption of turbines in place of reciprocating machinery; the second, which has also been permanent except in the case of one year's programme, was the adoption of oil fuel in place of coal; and the third, which extended over only three years, was the construction of two types of destroyers, one for ocean-going work, and one for coastal service. Dealing with these in inverse order, the policy which gave us what were at first called "coastal destroyers" was pursued only in 1905, 1906, and 1907, twelve vessels being laid down in each year. Properly speaking they were superior to our first destroyers, but this type had advanced so much in size and power that when the "coastal destroyers" were built they were only about one-third of the size of contemporary destroyers, besides being very inferior in speed and armament. After a good deal of adverse criticism the Admiralty altered their designation from "coastal destroyers" to "torpedo-boats, new type," and gave them numbers instead of names; and these boats, numbered from 1 to 36, are now the only efficient torpedo-boats left in the Navy. They displace from 244 to 308 tons, and carry two 12-pounder guns and three torpedo-tubes, their designed speed being 26 knots.

While these boats were in hand the Admiralty laid down the first vessels of the third of the three classes into which our destroyers are divided—that is, the ocean-going class. These vessels marked as great an advance on the "River" class as the latter did over their predecessors. The first dozen boats, known as the "Tribe" class, from the names they bear (such as Ghurka, Tartar, Maori, &c.), were all designed for a speed of 33 knots—an increase of 7½ knots over the "River" class—obtained by means of turbines and oil fuel. The first five (Ghurka, Tartar, Mohawk, Cossack, and Afridi) were originally armed with three 12-pounders and two torpedo-tubes, but two 12-pounders were subsequently added; while the later boats (Amazon, Saracen, Maori, Nubian, Crusader, Viking, and Zulu) carry two 4-inch guns instead of the 12-pounders, being our first destroyers to carry the heavier weapon. These—that is, the whole twelve—were also our first real destroyers to burn oil fuel, and (as a class) to be driven by turbines; but regarding the latter it should be mentioned that a few individual destroyers had previously been equipped in this manner. The first of all was the Viper, which, launched in 1899, had a very short life, becoming a total wreck in August 1901, through running ashore in the Channel Islands during a fog. The second, the Cobra, had an even briefer existence, for while she was being navigated to Portsmouth on delivery from the builders, she broke her back in the North Sea and went to the bottom with a loss of sixty-seven lives. Two other turbine destroyers built before the "Tribe" class are, however, still in existence, these being the Velox (420 tons, launched 1902), and the Eden, one of the River class, launched in 1903.

For reasons, into which it is not necessary to enter, the Admiralty reverted to coal in the destroyers of the Beagle class, which immediately followed the "Tribes," but all later vessels burn oil only. The following table summarises the principal characteristics of the Beagle class and their successors:

Class and Number.	Year Provided.	Tons.	Designed Speed (Knots).	Armament.
Beagle (16) .	1908–9	897–976	27	1 4-in., 3 12-pounder, 2 torpedo tubes.
Acorn (20) .	1909–10	720–780	27	2 4-in., 2 12-pounder, 2 torpedo tubes.
Acheron (23) .	1510–11	745–810	28–32	2 4-in., 2 12-pounder, 2 torpedo tubes.
Acasta (20) .	1911–12	928–964	29–31	3 4-in., 1 machine gun, 2 torpedo tubes.
Laertes (20) .	1912–13	965	29	3 4-in., 1 machine gun, 2 double torpedo tubes.
Mastiff (13) .	1913–14	..	..	..
"N" (12) .	1914–15	..	..	..

Of the above, all are now complete, except the last two classes; while in addition to them account must be taken of five vessels classed as "flotilla leaders"—destroyers of superior size and power designed to accommodate the officer in command of the flotilla and his staff. Only one of these has as yet been completed, this being the Swift, launched in 1907, which displaces 2170 tons, has a designed speed of 36 knots, and carries an armament of four 4-inch guns and two torpedo-tubes. The other four, at present under construction, are named Lightfoot, Marksman, Kempenfelt, and Nimrod, but beyond that nothing is known of them.

It will be seen from the above table that the rate of destroyer construction has fallen off considerably in the last five years, and while the question of comparative strength does not enter into the subject of this little book, it may be mentioned that our own programme for 1914–15 is exactly equal to the German. The reasons for the reduction, however, have been given fairly fully by the First Lord of the Admiralty, who has told us that the functions of the destroyer are being encroached upon by other types. The destroyer, as already explained, is designed, on the one hand, to act as a torpedo-boat against hostile battleships, and, on the other, to act as a destroying agent against the torpedo-craft of the enemy. The submarine, however, has so far advanced in size, speed, and seaworthiness as to be a powerful rival to the destroyer so far as discharging

the functions of a torpedo-boat is concerned; while, on the other hand, the First Lord has said that, as a destroyer of the enemy's surface-keeping torpedo-craft, the so-called destroyer is being superseded by the cruiser. There is, however, such a great difference between the old (and present) "destroyer," which was supposed to exist for the destruction of hostile torpedo-craft, and the cruisers which are said to be superseding them, that one cannot help wondering whether the "destroyer" would in fact be capable of carrying out the work for which it was originally designed.

The cruisers threatening the existence of the destroyer are those which have been referred to in the previous chapter as "light armoured cruisers." Twenty of these vessels have so far been provided for, and they have been referred to by the First Lord of the Admiralty as "destroyer destroyers," and as "the smallest, cheapest, and fastest vessels, protected by vertical armour, ever projected for the British Navy. They will be strong enough and fast enough to overhaul and cut down any torpedo-boat destroyer afloat." These vessels will be of between 3500 and 4000 tons in displacement, and will carry an armament of two 6-inch and eight 4-inch guns. Their designed speed is 30 knots, and they will burn oil fuel only, while the cost of the first and smallest batch averages about £310,000, or three times as much as the cost of a destroyer.

The names of the "destroyer destroyers" actually under construction are as follows:

Provided for in 1912–13: Arethusa, Aurora, Galatea, Inconstant, Royalist, Undaunted, Penelope, and Phaeton.

Provided for in 1913–14: Calliope, Caroline, Carysfort, Champion, Cleopatra, Comus, Conquest, and Cordelia.

Provided for in 1914–15: Four vessels as yet unnamed.

V.—SUBMARINES AND AIRCRAFT

In the last decade of the nineteenth century the submarine boat began to assume practical shape, and in both France and the United States a great deal of real progress was made with it in the nineties. The British Admiralty at this time were strongly criticised for the apparent indifference with which they regarded the development of this form of warfare, and in 1900 Lord Goschen, the then First Lord of the Admiralty, endeavoured to defend that position by declaring that "the submarine boat, even if the practical difficulties attending its use can be overcome, would seem, so far as the immediate future is concerned, to be eventually a weapon for maritime Powers on the defensive." Those "practical difficulties" have not even yet been fully overcome, but happily the Admiralty did not long persist in the attitude indicated by Lord Goschen's remarks. In the Navy Estimates for 1901–2 provision was made for building five submarines of the Holland type—so called from the name of their inventor, an American; and the first of them was launched at Messrs. Vickers' works at Barrow on November 2, 1901. Since that date the Admiralty have never looked back. Year by year the amount taken for the construction of submarines has increased, flotillas have been formed and multiplied, and the vessels themselves have advanced rapidly in size and speed. Whether the submarine will ever become such a formidable craft as to drive the big, surface-keeping ship out of existence remains to be seen, but it has at any rate established itself in the economy of navies, and, being no longer small, unreliable, and infinitely slow, is capable of useful service in the hands of a strong naval Power acting on the offensive.

Our first submarines, which were designated only by the numbers 1 to 5, were 63 feet 4 in. in length, 11 feet 9 in. in beam, and displaced 104 tons when steaming (or, rather,

motoring) on the surface in the condition known as "awash," and 120 tons when fully submerged. In the former condition they were propelled by four-cylinder gasolene engines of 160 horse-power with a corresponding speed of 8½ knots; while when submerged they were driven at 6 to 7 knots by electric motors of 70 electrical horse-power worked from a storage battery. They carried a single torpedo-tube in the bows, and, like all later vessels, were submerged by the admission of water into ballast tanks, from which it was expelled by pumps for bringing the vessel to the surface. Following the experience gained with these vessels, the British Admiralty and Messrs. Vickers in combination designed the next batch, thirteen in number and designated A1 to A13. These boats showed a considerable advance on the Hollands, being 100 feet long and having a submerged displacement of 204 tons, while the speed was increased to 11 or 11½ knots on the surface and 7 beneath. A1 had only one torpedo-tube, but in each of the others two were mounted. All the Holland boats, as well as the first four of the A class, have been removed from the effective list, so that the oldest submarine now in the Navy is A5, which was launched in 1904. A7, of this class, went to the bottom off Plymouth early in 1914, and has not been recovered.

Next came the B class, marking a further great advance in size. They are 135 feet long and 13½ feet in beam, with a submerged displacement of 316 tons and machinery of 600 horse-power for 13 knots on the surface and of 189 horse-power for 8 knots when under water. Eleven of this class were launched (B1 to B11) between 1904 and 1906, but B2 was run down and sunk by the Atlantic liner Amerika off Dover in October 1912. The numerous C class (38 vessels) followed the B's, being launched in 1906-1910. They are practically identical with the B class (although C19-C38 displace 321 tons when submerged), the main point of difference being that they have motors of 300 horse-power for under-water work, giving them a speed in that condition of 9 knots. C11 was lost in the North Sea in 1909 through a collision with the steamer Eddystone.

With regard to vessels subsequent to the C class, very few reliable details are available, and the following, except where they are stated to be official, must therefore be accepted with

reserve. Eight boats of the D class (D1 to D8) were launched between 1908 and 1912, and the Admiralty give the displacement (submerged) of D1 as 595 tons, of D2 as 600, and of the remainder as 620; while each boat carries three torpedo-tubes, and has machinery of 1200 horse-power for surface, and 550 for submerged work. These are the only official details available for the whole of our submarines subsequent to the C class; but both the D's and the E's (of which there are eighteen built and building), are driven by twin screws, and have speeds of 16 and 10 knots when respectively awash and submerged. Further, D4 carries a gun on a disappearing mounting, so that it can be stowed away below when the vessel is about to descend, while in the E class two 12-pounder guns are mounted, in addition to three torpedo-tubes. The E class, or at least the earlier vessels belonging to it, are 176 feet long and 22½ feet in beam, and displace 800 tons when submerged. A vessel building at Chatham, known as F1, is said to have a displacement of 1500 tons, speeds of 20 and 12 knots, and an armament of four 12-pounder guns and six torpedo tubes; and the fact that names have been given to two of the boats now under way seems to indicate that these will be a very considerable advance on all previous types, just as the named destroyer was upon the numbered torpedo-boat. In any case, however, the sea-keeping capacities of the submarine have already been conclusively proved. In ordinary British naval manœuvres submarines have cruised off the coasts of Norway; and in 1913 two Australian vessels of the E class accomplished the 13,000-mile voyage from Barrow to Sydney entirely under their own power and without convoy.

Mention has been made of the fact that our first submarines were built by Messrs. Vickers. In point of fact, this firm built all our under-water craft down to and including C16; but in 1906–7 the Admiralty began the practice of keeping two or three boats always in hand at Chatham Dockyard. The submarines that have actually been built and completed there are C17 to C20, C33, C34, D7, D8, E1, E2, E7, and E8. Otherwise, Vickers have been responsible for the whole of our completed submarine flotilla; but the area of construc-

tion has been still further increased recently, as will be seen from the following summary of the vessels now in hand:

Boats Building.	By Whom, and Where.
E class boats numbered 10, 11, 14, 15, 16, 17, and 18.	Messrs. Vickers, Ltd., Barrow-in-Furness.
V1, V2, V3, and V4.	
Nautilus.	
S1, S2, and S3.	Messrs. Scott's Shipbuilding and Engineering Co., Ltd., Greenock.
Swordfish.	
W1, W2, W3, and W4.	Messrs. Armstrong, Whitworth & Co., Ltd., Newcastle-on-Tyne.
E12, E13, and F1.	H.M. Dockyard, Chatham.

The rate at which our flotillas have expanded will be seen from the following statement of the number of ships launched in each year from the introduction of the type:

1901 . . .	1 (all scrapped)	1908 . . .	9
1902 . . .	5 (all scrapped)	1908 . . .	12
1903 . . .	3 (all scrapped)	1910 . . .	6
1904 . . .	3	1911 . . .	4
1905 . . .	13 (2 lost)	1912 . . .	7
1906 . . .	10	1913 . . .	4
1907 . . .	8 (1 lost)		

It will be noticed that there was a falling off in the last few years, but this must not be interpreted as indicating the decline of the submarine. On the contrary, it points rather in the opposite direction, as the Admiralty are now working strenuously to develop the submarine into a real, ocean-going warship, with the result that the cost of individual vessels is rapidly increasing. In 1910, when the apparent "decline" began, we spent only £516,477 on the construction of submarines, and the vote has increased steadily until, in 1914–15, it stands at £1,104,769. In the previous chapter mention was made of the fact that the submarine may in time displace the destroyer as a torpedo-boat. This is emphasized by the decline in our expenditure on destroyers accompanying the increase of that on submarines. While the latter more than doubled between 1910 and 1914, the former fell from £2,442,327 to £1,494,092.

The great defect of the submarine is its inability to see when totally submerged. All vessels are fitted with one or, in later vessels, two periscopes—long tubes which, when

projected above the surface of the water, throw an image of the surrounding area, by an arrangement of mirrors, on to a chart or screen below. But the periscope is, of course, distinctly visible at a fair distance, and in rough weather it is of very little use at all, as it becomes obscured by spray, and may have its area of vision entirely obliterated by the height of the waves. Another drawback to the efficiency of the submarine is the fact that its torpedo-tubes are of the fixed type, so that the aiming of the tube depends upon the steering of the ship.

On the other hand, the submarine has at least two great advantages over the battleship, for it can approach unseen, provided the battleship is stationary (if it is moving, the submarine must rise to take observations at intervals), while, if the presence of the submarine should be detected, the big ship has no dependable means of attacking it.

There is no doubt that the advent of the successful seaplane will affect the future of the submarine very considerably. Admiral Sir Percy Scott is of the opinion that aircraft will render such assistance to the submarine that the two in combination will make the existence of the battleship impossible; but there are other experienced officers who incline to the belief that aircraft will ultimately provide an efficient antidote to under-water vessels. It has been proved that under good weather conditions, and when the sea is smooth, an observer in an aeroplane can see a fair distance beneath the surface and detect submerged objects with comparative ease. Of course, one cannot depend upon the next war being carried out in fine weather or on smooth seas; but, on the other hand, the seaplane is as yet a very undeveloped machine, and we may be sure that no trouble or expense will be spared in the effort to make it an efficient "anti-submarine" weapon. A great deal of attention is being given in the Navy to the development of aerial navigation in all its phases, with a view to its adaptation to the requirements of naval war. Practical interest in the subject may be said to have begun in 1909, when an order for a dirigible airship of the Zeppelin type, 512 feet in length and having a gas capacity of 700,000 cubic feet, was placed with Messrs. Vickers. Unfortunately the

vessel never flew, although much useful information was acquired from her behaviour in high winds when moored to a post. As she was being brought out of her shed for the second time, on September 24, 1911, she was caught by a gust of wind which completely wrecked her. In March of that year the first four naval officers were appointed to undergo a course of instruction in flying with heavier-than-air machines (aeroplanes), those selected being Lieutenants C. R. Samson, R. Gregory, and A. M. Longmore, and Captain E. L. Gerrard of the Royal Marines. In the spring of 1914 the Navy possessed about 150 qualified pilots, 62 seaplanes, and 41 aeroplanes not specially fitted with floats and the other necessary gear for sea work. Speaking in the House of Commons on the 17th March 1914, Mr. Churchill gave some interesting general details of the capabilities of the Navy's aerial branch. He said: "We rely for the security of our east coast from raids very largely upon the Patrol Flotillas (of destroyers and submarines) which are grouped together at strategic points, and which can be summoned and directed to any point where an attempted landing is being made. No assistance can be more valuable than the assistance rendered by aeroplanes and seaplanes in bringing this information, in regard to which time is vital, to the bases where our Patrol Flotillas are held in readiness. Of course, the heavy seaplanes which we are developing now will carry formidable explosives, which could be dropped on to transports, and disturb the landing even before the Patrol Flotillas could arrive. The seaplanes fly by night as well as by day in ordinary weather. They carry wireless telegraphy, which enables them to signal 120 miles effectually, and they have quite recently even been able to receive a message while in the air." The places round the coast at which naval air stations have so far been established are the Isle of Grain (at the mouth of the Thames), Calshot (near Southampton), Felixstowe, Great Yarmouth, the Cromarty Firth, and Dundee. Fifteen dirigible airships are either built or under construction, and a large shed, at which a war airship station will be established, has been erected at Kingsnorth, not far from the Isle of Grain seaplane station. The Admiralty intend as far as possible to

pass officers and men on from the aeroplane to the airship section as they complete their period of usefulness in the former, where the work is naturally of a much more nerve-wrecking character. In this way the airship section will receive as its recruits men who are already thoroughly accustomed to aerial navigation.

The general direction of the Navy's aerial matters is in the hands of an Air Department at the Admiralty, presided over by a captain. The Central Air Office, headquarters of the Inspecting Captain of Aircraft, is at Sheerness, and there are two Flying Schools—the "Central" at Farnborough, which is used also by the Army, and the "Naval" at Eastchurch, near Sheerness, where a great deal of experimental work is also carried out. In July 1914 the Naval Wing of the Royal Flying Corps was formed into the Royal Naval Air Service, with an organisation quite distinct from that of the Navy itself.

Before leaving the subject of naval material, a few words remain to be said on the subject of submarine mines. These are in reality torpedoes without the power of locomotion, and they consist of large cases of metal filled with gun-cotton. They are of two main classes, called respectively "observation" and "contact" mines. The first are usually employed for the defence of harbours and approaches to harbours, and an observer ashore is able to trace the progress and position of any ship entering, and to explode any mine as the ship passes over it. Of similar character to these are "electro-contact" mines, in which, however, observation is not necessary, as the mine automatically explodes on being touched by a passing ship, which causes the completion of an electric circuit running through a cable from the shore. Such a mine makes no discrimination between friend and foe. The system of placing mine-fields for the defence of harbours was abandoned by this country in 1905, on the ground that such defence could be more efficiently discharged by submarines.

A third type, the "offensive contact" mine, has increased greatly in general favour since the Russo-Japanese war, when a large number of ships on both sides were either destroyed or put out of action by their agency. Among the ships sent to the bottom by this weapon were the Japanese battleships Hatsuse and

Yashima, and the Russian battleship Petropavlovsk and the cruiser Boyarin. The mines used for this purpose are of such a nature that they explode immediately on contact. They are either anchored to the bottom by means of weights, to which they are attached by cables which allow them to float a few feet from the surface, or else they are simply thrown into the sea and left to the mercy of wind and tide. In the latter case they become a danger not only to those whom they are intended to destroy, but also to those who set them afloat and to neutrals. Several mishaps of this nature occurred during the war in the Far East. Therefore, so long as fleets retain some trace of morale and organisation the last desperate resource of scattering mines to drift on the high seas is not likely to be adopted. On the other hand, all the world's navies are giving more and more attention to the means for laying fields of anchored mines, either at the entrance to the military harbours of an enemy, or in other places over which his fleets are likely to pass. The side which has laid the mines then knows where they are, and can avoid them accordingly, while they can be removed when it becomes clear that they no longer serve any useful purpose.

It has previously been mentioned that, in favourable circumstances, a mine-field can be seen from an aeroplane. This circumstance is likely in the future to assist fleets in avoiding these areas of destruction, since (at any rate during the daytime) it will be possible for a number of aircraft to be sent on in advance of the fleet to warn it of the existence of the fields. When a field is discovered it can be destroyed by countermining—by the explosion of other mines in its midst—or the mines composing it can be "trawled" up. The submarine mine has therefore given rise to the introduction of two new types of auxiliaries — the mine-layer and the mine-sweeper. In the British Navy seven old second-class cruisers have been converted into mine-layers. They carry a large number of these weapons, which can be formed into a field by running them down rails and over the stern. These ships are the Apollo, Andromache, Latona, Naiad, and Thetis, of 3400 tons, and the Intrepid and Iphigenia of 3600. Each of them carries four 4·7-inch guns. The operation of mine-sweeping is carried

out by two vessels, each having on board the end of a long wire rope, weighted at the middle to keep it well to the bottom. The boats then place themselves one on either side of the field and proceed to "sweep," the mines being either brought to the surface or exploded by contact with each other. It is a hazardous undertaking, but war may make it a necessary one. Eight vessels of the obsolete torpedo-gunboat type have been fitted out for this work—the Circe, Jason, Speedy, and Leda, of 810 tons, and the Gossamer, Seagull, Speedwell, and Skipjack, of 735 tons. Besides these, the Admiralty have purchased a number of ordinary fishing steam trawlers and fitted them out for mine-sweeping, and have made arrangements by which a large additional number would be placed at their disposal in the event of war. Further, a section of the Royal Naval Reserve, known as the "Trawler Section," was brought into existence in 1911, and consists of 142 "skippers" and 1136 men recruited from the fishing fleets.

VI.—OFFICERS AND MEN

THE total number of officers and men authorised for the active list of the Navy in 1914–15 is 151,000, in which figures are included the Coast Guard and the Royal Marines. The number is higher than it has ever been before in our naval history. In the year of Trafalgar (1805) the number voted was 120,000, and the highest totals were reached during the later period of the war with France. In 1810–11–12, 145,000 officers and men were voted, and in 1813, 140,000; but the latter year saw the highest average of men actually borne in the whole of our history, namely, 147,047. The figure quoted for the present year represents a maximum to be reached at its close, the estimated average day by day being 148,500, or about 1500 more than the previous highest average. After the close of the wars with France and the United States in 1815 our naval forces were at once considerably reduced, and the following table of the voted strength of the personnel at intervals of ten years through the nineteenth century and down to the present time will convey an idea of the manner in which the fleet fluctuated:

Officers and Men

Voted in		Voted in	
1824	29,000	1884	56,950
1834	27,500	1894	83,400
1844	36,000	1899	110,640
1854 (*a*)	63,500	1904	131,100
1864	71,000	1909	128,000
1874	60,000	1914	151,000 (*b*)

(*a*) Crimean War. (*b*) This is the maximum to be reached; other figures are the average, as voted, for the year.

The great increase that has been brought about in recent years is attributable mainly to the expansion in the fully-commissioned fleet. Individual ships have not varied a great

deal in their manning requirements. The most important ship in the British fleet which defeated the Spanish Armada, the Triumph, had a complement of 780. The finest sailing ships of the line, built for the Navy in the 'forties of last century, required 880 officers and men to man them; while a battleship of to-day needs about 900 if she is a "super-Dreadnought," and from 750 to 850 if she belongs to an earlier period. Some of the battle cruisers—the Queen Mary, for example—have a crew of 1000, owing to the army of men required in the stokeholds to feed the furnaces creating the steam for the 75,000 horse-power turbines. With ships burning oil fuel the engine-room complement is greatly reduced, because, instead of men having to shovel coal into the furnaces, oil is burned at the end of pipes, through which it is pumped from the tanks.

The personnel of the Navy is divided into five branches—executive, engineer, marine, medical, and accountant. Under a scheme which was introduced in 1903, and which is still known as the "new scheme," officers of the first three branches are entered and, up to a certain point, trained together, subsequently "specialising" in one or other of the branches, or else remaining "non-specialists." Youngsters who are destined to become officers of the Royal Navy are entered between the ages of 13 years and 4 months and 13 years and 8 months. A few months ago the Admiralty issued a booklet dealing with the entry and training of cadets, from which we take the following description of the type of boy that is required: "There is scope and need in the Navy for many types of men and varieties of talent, for the cultivated faculty of scientific thought and for the personal force that assures leadership. But whatever the variety of talent, the naval officer is a man of action. Accordingly that boy has the best chance who is resourceful, resolute, quick to decide, and ready to act on his decision. He must be no slacker, but keen in work and play. He should be sound alike in wind and limb, and in the big and little principles of conduct. His life afloat with his brother officers and with the men will require him to be cheerful, unselfish, and considerate if he is to win repute as a good shipmate, and these qualities are essential to a leader. He should give promise of being responsive and observant, closely in touch with his sur-

roundings, but master of himself. The boy of sensitive, poetic spirit, the ruminating young philosopher, the scholar whose heart is in his books, are types that have a real use in the world, but their proper place is not the Navy."

Having passed the necessary entrance examinations the naval cadet proceeds to the college at Osborne. In normal circumstances he remains there for two years and then passes on to Dartmouth, where a similar period is spent in more advanced instruction. This is followed by a six months' cruise in a "cadets' training cruiser" (either the Cornwall or the Cumberland), after which he is sent into a regularly commissioned warship as a midshipman, by which time he is about eighteen years of age. He spends two years and four months in this rank, and then, on satisfying the authorities of his knowledge in seamanship and navigation he becomes an Acting Sub-Lieutenant. On passing further examinations at a later date in gunnery, torpedo, and engineering, he becomes a full Sub-Lieutenant, and on the manner in which he acquits himself in these tests depends to a great extent the rapidity with which he is made a Lieutenant. "After serving at sea for a period of from one to three years as Sub-Lieutenant and Lieutenant, officers may volunteer for selection as specialists in the branches of navigation, gunnery, torpedo, or engineering. Those who are selected take, first, a course of study at the Royal Naval College, Greenwich, which revises and extends their knowledge of the scientific matters that are directly relevant to the specialty in which they are to qualify. When this preliminary scientific course is over they go on to a qualifying technical course in the Navigation, Gunnery, or Torpedo School at Portsmouth, or the Engineering School at Devonport. On passing the qualifying course they are distinguished as Lieutenants (N), (G), (T), or (E)." Officers who qualify in a further advanced course of gunnery or engineering are distinguished as Lieutenants (G†) or (E†).

In addition to this, which is the usual method by which the Navy obtains and trains its officers, there are three others. The first, known as the "special entry" system, was introduced in 1913. Cadets are entered from the Public Schools between the ages of 17½ and 18½, and, after a modified course

of training, become Lieutenants when they are about a year older than those entered in the ordinary way. Medical and accountant officers do not come under the "common entry" system, but enter straight into the branches for which they are qualified. This is therefore known as the "direct entry" system, and it is being applied in an increasing degree to the Royal Marines, whose officers were originally intended to pass through Osborne and Dartmouth in the manner already described. Finally, the Navy obtains a proportion of its officers by promoting men from the "lower deck"; but as yet this applies only to the executive and engineering branches. The system of common entry and training for executive and engineer officers has been strongly criticised, particularly in its application to the latter branch, the principal ground of complaint being that an officer who, during the most receptive period of his life, has been trained both for deck (or executive) and engine-room duties cannot possibly make such an efficient engineer as those under the old scheme, who began and ended their naval careers in that department.

The following is a brief summary of the pay, service, &c., of the successive ranks through which a naval officer passes:

1. *Lieutenant.*—Rank is reached by examination, and its holders are eligible for service as specialists or watch-keepers (non-specialists) in big ships, and for the command of small craft, such as submarines, torpedo-boats, destroyers, and gunboats. Two ½-inch bands of gold lace are worn round the cuff, the upper one surmounted by a "curl" distinctive of the executive branch. Pay is 10*s.* a day on promotion, increasing 1*s.* a day every two years; while lieutenants (E) receive 4*s.* and lieutenants (E†) 5*s.* a day additional. Retirement is compulsory at the age of 45, but lieutenants promoted from commissioned warrant rank may serve until 55. Number allowed on the active list, including Lieutenant-Commanders, 2000.

2. *Lieutenant-Commander.*—Lieutenants are automatically promoted to this rank on completing eight years in the lower grade. Employment and retirement as for lieutenants; but pay begins at 13*s.* a day, and a stripe of ¼-inch lace is worn between the two wider bands.

3. *Commander.*—Officers are promoted to this rank by selection, and are employed as "executive officers" in big ships, in which they are responsible to the captain for the general efficiency of the vessel, and in the command of destroyers, small cruisers, &c. Three ½-inch rings of gold lace are worn, and pay is 22*s.* a day, with an additional 5*s.* for the (E) qualification, and 7*s.* for (E†). Retirement is compulsory at 50. Number allowed, 373.

4. *Captain.*—Promotion to this grade is by selection, and, generally speaking, all our important warships are commanded by officers of this rank. Pay is 33*s.* a day for the first 80, 27*s.* 6*d.* for the next 80, and 22*s.* 6*d.* for the remainder, the (E†) qualification carrying an additional 7*s.* Retirement is compulsory at 55, or on completing two years' unemployment. Number allowed, 253.

5. *Rear-Admiral.*—Captains are promoted to this rank by seniority, any vacancy being filled automatically by the captain at the head of that rank. A band of 1¾-inch gold lace, surmounted by one of ½-inch, is worn round the cuff, and pay is £3 a day, when employed and 25*s.* when on "half-pay." Rear-admirals are employed in command of cruiser squadrons and as second-in-command of battle fleets, flying the flag of St. George with two red balls. Retirement is compulsory at 60, or after two and a half years' unemployment. Number allowed, 55.

6. *Vice-Admiral.*—This rank is reached by seniority, officers promoted to it wearing one wide and two narrow gold bands, and, when afloat, flying a St. George's Cross with one red ball. Full pay is £4 a day, and half-pay 32*s.* 6*d.*, enforced retirement coming at the age of 65, or after being unemployed for three years. The higher commands afloat, as well as important administrative positions, are usually entrusted to officers of this rank, of whom 22 are allowed on the active list.

7. *Admiral.*—Here again promotion is by seniority, full and half-pay being £5 and £2, 2*s.* a day respectively. As a rule only two Admirals are employed afloat, one in command of the Home and the other of the Mediterranean Fleet. The commander-in-chief at each of the three home ports (Ports-

mouth, Devonport, and the Nore) is, however, almost invariably an Admiral. One wide and three narrow bands of gold are worn on the cuff, and the flag is a plain St. George's Cross. Compulsory retirement is enforced at 65, or after three continuous years of unemployment. Number allowed, 12.

8. *Admiral of the Fleet.*—Officers are selected for this rank by the Sovereign, the choice falling as a rule upon the senior admiral. It is not usual for officers holding it to be employed, either afloat or ashore; but their full pay is £6, and half-pay £3, 7*s.* a day. The rank is the highest it is possible to reach, and the retiring age is 70. Number allowed, 3.

Engineer officers (old scheme) enjoy the same ranks as the executive branch, from Lieutenant to Rear-Admiral, with the word "engineer" prefixed in each case. Their gold lace does not carry the executive "curl," and there is a narrow strip of purple velvet between the stripes. Medical officers bear the following titles, according to their seniority: Surgeon, Staff Surgeon, Fleet Surgeon, Deputy Surgeon-General, and Surgeon-General, and they have a scarlet stripe of velvet between their rings of gold lace. Accountant officers enter as Assistant Clerks, and rise through the ranks of Clerk, Assistant Paymaster, Paymaster, Staff Paymaster, Fleet Paymaster, and Paymaster-in-Chief. In their case the velvet stripe is white.

The men who form the rank and file of the Navy are usually referred to as the "lower deck." The bulk of them are either seamen (a term which includes all gunnery, torpedo, and signal ratings), or stokers; but there are very many other classes which go to make up the crew of a modern first-class warship. What is known as the artisan branch includes carpenters, shipwrights, joiners, blacksmiths, coopers, plumbers, painters, armourers, and electrical artificers. There are writers, ship's stewards, and cooks, who come under the accountant branch; sick berth attendants, ship's corporals and masters-at-arms (who are the ship's police), schoolmasters, officers' stewards and cooks, tailors, sailmakers, and shoemakers. In the seaman branch the majority are entered as boys, and receive their first training either at Devonport (H.M.S. Impregnable and H.M.S. Powerful) or at Shotley (H.M.S. Ganges). At the age of 18, or earlier, if they are particularly smart,

they are rated ordinary seamen, and may subsequently advance to able seamen, leading seamen, petty officer, and chief petty officer. Under a scheme introduced in 1912 a petty officer who is in every way fitted for advancement, may be selected for a special course, by means of which, after passing the ranks of warrant officer and Mate, he may become a Lieutenant at a comparatively early age, with the chance of rising much higher in the Service. The others who are not so smart or so fortunate may become warrant officers, commissioned warrant officers, and subsequently Lieutenants, but those who pass through these stages rarely reach the rank of commissioned officer at a sufficiently early age to enable them to make any further progress. The Mate system has been extended to the engineer branch, so that a man who is, say, a fitter, may join the Navy as an engine-room artificer and become first a Mate (E) and then an Engineer Lieutenant. The usual method of progression in this department, however, is to chief engine-room artificer, artificer engineer (warrant officer), and chief artificer engineer (commissioned warrant officer). As in the executive branch, a few who work up by these stages may be advanced to commissioned rank (Engineer Lieutenant).

In recent years the Admiralty have added considerably to the opportunities open to the stoker branch. Men in this department may not only reach the rating of chief petty officer, but, if selected for the rating of mechanician, may become warrant officers (warrant mechanicians), and commissioned mechanicians.

With so many different branches and ratings it is manifestly impossible to deal with them all in this little book, of which about four pages would be required even to give the various rates of pay. We will therefore confine ourselves, so far as pay is concerned, to the imaginary case of a boy who enters at sixteen years of age and, taking the longer route, leaves at fifty-five with the rank of Lieutenant. It will be found that "progressive pay" occurs in many ratings, a man receiving an increase after being so many years in the rating. The full details of these are given, but it should be pointed out that a man who served in each rating long enough to earn the maximum rate would have no chance of

reaching even warrant rank. With this reservation, then, the financial career of our imaginary friend would be as follows:

Rating, &c.	Pay per Day. s.	d.
Boy, 2nd class	0	6
Boy, 1st class	0	7
Ordinary Seaman	1	3
Able Seaman	1	8
Do. after 6 years from being made "ordinary"	1	11
Leading Seamen	2	2
After 3 years, if passed for Petty Officer	2	4
Petty Officer	3	0
After 3 years	3	2
After 6 years	3	4
Chief Petty Officer	3	8
After 3 years	4	0
After 6 years	4	4
Gunner[1] (Warrant Officer)	6	0
After 5 years	7	0
After 10 years	8	0
After 15 years	9	0
Chief Gunner (Commissioned Warrant Officer)	10	0
After 2 years	10	6
After 4 years	11	0
After 6 years	11	6
After 8 years	12	0
Lieutenant (Commissioned Officer)	13	0
After 2 years	13	6
After 4 years	14	0
After 6 years	14	6
After 8 years	15	0

The ordinary term of service for a man or boy entering the Navy is twelve years, and if he is under eighteen on entry he undertakes to serve for twelve years from reaching that age. On completing this period of service he may either leave the Navy or re-engage for a further term of ten years, on completing which (at the age of forty) he leaves with a pension according to his rating and length of service. With very few exceptions this applies to all ratings below the rank of warrant officers, who serve until they are fifty-five.

How the Navy is fed is a problem which often puzzles the landsman. There is in the first place a "daily standard ration" supplied by the Admiralty, and which in normal

[1] If the Chief Petty Officer has not specialised in gunnery he will become a Boatswain on being promoted to warrant rank.

circumstances consists of the following: 1 lb. bread (or ¾ lb. bread and ¼ lb. flour); ½ lb. fresh meat; 1 lb. fresh vegetables; ⅛ pint of spirit; 4 oz. sugar; ½ oz. tea (or 1 oz. coffee for every ¼ oz. tea); ½ oz. chocolate (or 1 oz. coffee); ¾ oz. condensed milk; 1 oz. jam, marmalade, or pickles; 4 oz. preserved meat on one day of the week in harbour, or on two days at sea; mustard, pepper, vinegar, and salt as required. If soft bread is not available, ½ lb. biscuit or 1 lb. flour is issued instead; while if fresh meat and vegetables cannot be obtained, salt pork and preserved meat are issued on alternate days, together with split peas, celery seed, and potatoes on "salt pork day," and flour, suet, raisins (or jam), and potatoes on "preserved meat day." Rice may be substituted for the pudding materials, and haricot beans or marrowfat peas are issued when potatoes cannot be obtained. In addition to the above, all those in ships, depots, and shore establishments receive a messing allowance of 4*d.* a day. The spirit ration is not issued to commissioned officers, and men who do not wish to take it up are credited with a monetary allowance in lieu, amounting to 17*s.* a year. Officers are allowed 9½*d.* a day towards the cost of their food, and receive ½*d.* in lieu of the rum ration.

All the articles so far mentioned are included in the Paymaster's stores, and are served out by him and his staff of ship's stewards. In addition to these, however, every large ship carries a canteen, from which the men may purchase whatever else they may require in the way of foodstuffs, &c. The canteens are tenanted by large catering firms, who undertake to supply articles of good quality at prices approved by the Admiralty. No one, of course, is allowed to sell beer, wines, or spirits on board, but otherwise the canteen stocks a wide range of articles. The system is not altogether popular with the men, but that is a matter which can hardly be discussed here. The tenants pay a rental of 6*d.* per man per month for all men victualled, and this goes into what is called the Ship's Fund, which is used for various purposes in the men's interest—for sports, amusements, benevolent purposes, and so on. There is a third system by which goods may be obtained by the men, known as "issue on

repayment." The only articles obtainable are those which are issued in the ordinary way by the victualling officer (spirit being excepted), and the value of the goods issued in this way is recovered at the end of each month from the messing allowance of 4*d.* a day.

Uniform is another subject on which there is a good deal of misconception, which may, however, be dispelled in a few words. All lower-deck ratings on entering the Navy are supplied with a free outfit, but thenceforward for the whole of their service they have to maintain it and provide new articles whenever they are necessary.[1] The Navy is the only uniformed force in the employ of the State which has to buy the clothes it is forced to wear. Gratuities are, however, given to men in certain cases of promotion involving change of uniform. The traditional bluejacket's dress is, with some exceptions, worn by all ratings of and below the grade of petty officer, while chief petty officers wear a reefer coat. These uniforms are known in the Navy under the respective titles of "free and flowing," and "fore and aft."

Before leaving the subject of personnel a brief account may be given of the reserve forces at the disposal of the Navy. In point of fact, the old laws authorising the "press-gang"—the forcible impressment of seamen—have never been repealed, though they are not likely again to be put into force. The actual reserve forces behind the Navy comprise the following:

1. The Royal Naval Reserve.
2. The Royal Fleet Reserve.
3. The Royal Naval Volunteer Reserve.

The Royal Naval Reserve is drawn from the merchant service, and numbers 1790 officers and 17,160 men, who are required to undergo periodical training with the Fleet. The Trawler Section, to which reference is made in Chapter V, is not included in the above figures. The Royal Fleet Reserve consists of petty officers and men who have served in and left the Navy, and is divided into three sections. Class A, 8327 strong, comprises pensioners (*i.e.* men who have left after twenty-

[1] The Royal Marines are provided with a "free maintained kit."

two years' service); Classes B and C, 18,740 strong, consist of men who left before completing their time for pension, and who receive a retainer. The third class is of recent institution, and is known as the Immediate Reserve, comprising men who undertake to respond to the call of the Admiralty at very short notice, and without the issue of a Royal Proclamation, which is necessary before the other reserves can be called upon. The Volunteer Reserve is, as its name indicates, the naval equivalent of the Territorial Force ashore. It consists of 4700 officers and men, with divisional headquarters in London, Glasgow, Bristol, Liverpool, Hove, and Newcastle. Finally, and not included under any of the above headings, there is the Auxiliary Royal Naval Sick Berth Reserve, consisting of about 1500 men qualified in first-aid work, who have volunteered to hire their services to the Navy in the event of war.

As is well known, the men of the Royal Navy are frequently landed, either alone or in company with military forces, to take part in operations ashore; but there is one section of the personnel embarked specially for this purpose—the Royal Marines, whose motto is "Per mare, per terram." At almost every period of history it has been customary for soldiers to be carried in warships—it was so in the days of Rome and of Elizabeth; but the corps of Royal Marines was actually founded by Charles II in 1664. It is divided into two sections, the Artillery and the Light Infantry, the total number provided for in 1914 being 18,445, of whom, in normal circumstances, about two-thirds are distributed among the squadrons afloat, the remainder being in barracks or naval establishments ashore. The organisation, uniform, and titles of the corps are all military, but it plays an important part in the maintenance of fleet efficiency, and the names of many men of both branches will always be found among the best big-gun shots in the Navy. Royal Marines have recently been selected for the important duty of manning the defences of Cromarty, this being the first time that the Navy has had to furnish a regular garrison for coast fortifications.

The Coastguard, a force descended from the Preventive Service maintained round the coast when smuggling was a flourishing trade, is composed of about 3000 seamen and stokers

transferred from the Royal Navy, and distributed among "stations" round the coast. Their duties are almost innumerable, for in addition to co-operating with the Navy generally, they have, among other things, to patrol the coast in protection of the revenue, enforce quarantine laws, assist vessels in distress, recruit for the Navy, man the shore wireless telegraph stations, stop illicit distillation in Ireland, protect the shore ends of submarine cables, and give assistance in the training of Boy Scouts. The general business of the Coastguard is supervised by an Admiral Commanding Coastguard and Reserves, while the coast is divided into six "Districts," each in charge of a Captain, the Districts being subdivided into Divisions, and the Divisions into Stations.

VII.—THE ADMINISTRATION OF THE NAVY

Except for a break of sixteen months in 1827–28, when His Royal Highness the Duke of Clarence (later William IV) filled the office of Lord High Admiral, the affairs of the British Navy have since 1709 been administered by a Board of "Commissioners for Executing the Office of Lord High Admiral of the United Kingdom of Great Britain and Ireland," &c. These Commissioners form the Board of Admiralty, having at its head a "First Lord," supported by others, who may be either professional seamen or civilians, and who occasionally vary in number. Since the system of an Admiralty Board became the settled basis of our naval administration, the office of First Lord has changed hands on sixty-eight occasions, and only eighteen of its occupants have been naval officers, the last being Rear-Admiral the Duke of Northumberland, who was First Lord from March 1852 to January 1853.

The Board of Admiralty consists now of nine members, whose titles and general business are as follows:—

First Lord	General direction of all business.
First Sea Lord	Organisation for war and distribution of the Fleet.
Second Sea Lord	Personnel.
Third Sea Lord	Material.
Fourth Sea Lord	Stores and transport.
Civil Lord	Works, buildings, and Greenwich Hospital.
Additional Civil Lord	Contracts and Dockyard business.
Parliamentary Secretary	Finance.
Permanent Secretary	Admiralty business.

Under the political system favoured in this country—and, indeed, in many others also—the principal member of the Board is a politician who, in the majority of cases, has no knowledge of naval affairs when he is appointed to the office.

However, his business is mainly a political one, for he acts as a buffer between his professional advisers on the one hand, and the Cabinet and the House of Commons on the other. It is to him that the country looks for information concerning our naval position, to explain why certain ships are necessary and a certain expenditure inevitable, and to ensure that the demands of the Board as a whole are not unduly cut down to meet the possible exigencies of party politics. On the other hand, it is also his duty to exercise a restraining influence on those demands, which, as may easily be seen, might tend to become unreasonably extravagant if a board of professional men were allowed a perfectly free hand. A First Lord who is a politician fills another useful function in doing all the public talking that may be necessary.

In an official memorandum of September 1912, the duties of the various members of the Board were set out in some detail. In addition to the general supervision and direction of all business relating to the Navy, the First Lord is charged with the duty of supervising promotions in and removals from the Navy, the distribution of honours and rewards, and the appointments of senior officers. The First Sea Lord is charged with "preparation for war"—a term which involves the maintenance of efficiency and thorough "up-to-dateness" in a force of about 600 ships and 151,000 men, and the proper expenditure of a million sterling a week. The phrase is amplified by the following: "Fighting and sea-going efficiency of the Fleet, its organisation and mobilisation, including complements of ships as affecting total numbers; system of gunnery and torpedo exercises of the Fleet, and tactical employment of air-craft, and all military questions connected with the foregoing; distribution and movements of all ships in Commission and in Reserve."

The Second Sea Lord deals with the manning (recruiting) and training of the Fleet, the Royal Marines, coastguard, and reserves, hospitals, signals, discipline, and the appointments of all officers except those reserved to the First Lord. The Third Sea Lord's province includes the design of material for the Fleet, "including ships and their machinery, armour, naval ordnance, and gun-mountings, aeroplanes and airships, and docking facilities, also alterations and additions to ships which

affect design or fighting efficiency; preparation of estimates of cost of all new construction falling due in any year under current and prospective programmes; superintendence of the Departments of the Director of Naval Construction, Engineer-in-Chief, Director of Naval Ordnance, Director of Naval Equipment, Director of Air Department, and Superintendent of Compasses." The Fourth Sea Lord deals with all questions concerning pay, coaling, victualling, and stores of all descriptions, as well as questions affecting uniform, medals, detention barracks, deserters, collisions, and salvage. These four "Sea Lords" are the only naval officers on the Board of Admiralty.

The Civil Lord deals with "works and buildings, including purchases of land; coastguard buildings, sites, and leases," Marine and dockyard schools, Greenwich Hospital business, &c.; while the Additional Civil Lord (a post created only two years ago) occupies the position of general business manager to the Board, superintending "contracts for material for the Fleet (including ships and their machinery, armour, naval ordnance, and gun-mountings, aeroplanes and airships), works, dockyard machinery, and stores of all descriptions; contract arrangements in connection with the disposal, salvage, or loan of vessels or stores; superintendence of the Contract and Purchase department." His duty also includes the "general organisation of Dockyards, including provision of labour and plant, and all business questions in connection with the building and repair of ships and their machinery, whether in the Dockyards or in private yards." The Parliamentary and Financial Secretary's principal duty is with "finance, estimates, and expenditure generally, and all proposals for new and unusual expenditure"; while the Permanent Secretary supervises the general office organisation of the Admiralty.

The Board of Admiralty is, of course, primarily responsible for the efficiency of the fleet and its readiness for war; but it is assisted in its colossal task by several subsidiary departments, of which by far the most important is the Admiralty War Staff, which was formed out of the older Intelligence Department in January 1912. The Chief of the War Staff is an Admiral, and each of the three sections into which the Staff is divided is presided over by a Rear-Admiral. The business

of the Intelligence Division is to acquire the information on which action may be taken—information, that is, concerning the progress of the art of naval warfare in general and of foreign fleets in particular. The Operations Division deliberates upon the facts thus obtained in relation to the policy of the State, and reports thereupon to the Board of Admiralty; while the third, the Mobilisation Division, takes the necessary steps to put into effect the decisions taken by superior authority (the Admiralty) upon the reports submitted by the Operations Division. The War Staff possesses no executive authority and discharges no administrative duties. Its responsibility ends with the tendering of advice and with the accuracy of the facts on which that advice is based. The decision as to accepting or rejecting the advice of the Staff rests with the First Sea Lord.

Training for War Staff duties begins at a comparatively early stage in an officer's career, the following arrangements having been made by the Admiralty: Candidates for the Staff will be selected from among Lieutenants of suitable seniority as well as officers of other branches throughout the Service, and those who pass the necessary examinations, after undergoing a special War Staff Course at the Royal Naval War College at Portsmouth (whence it will shortly be moved to Greenwich) will be eligible to receive appointments either at the Admiralty or on the staff of Flag officers afloat. In all cases, however, regular periods of sea-going executive duty will alternate with the other duties of staff officers of all ranks, in order that they may be kept up to the necessary standard as practical sea officers. All appointments on sea-going staffs will in the course of time be filled by these officers, and form the proper avenue to eventual employment in the highest staff positions at the Admiralty.

The actual work of designing our ships of war is carried out in the Department of the Director of Naval Construction, whose duty it is to embody in its designs the speed, armament, protection, radius of action, and so on, required by the Admiralty Board. Down to 1839 the design of ships was carried out by the Surveyor of the Navy, an office somewhat similar to that of the Third Sea Lord to-day; but the appointment of

naval officers to be Surveyors led in the year mentioned to the creation of the office of "Chief Assistant and Draughtsman" to the Surveyors, which, in turn, was superseded in 1848 by the appointment of a "Chief Constructor." This was the title in use until 1875, when "Director of Naval Construction" replaced it. It is a noteworthy fact that, almost from the introduction of steam into the British Navy, there have been only six Chief Constructors, or Directors of Naval Construction, at the Admiralty. Their names, and the years during which they held office, are as follows: Sir Isaac Watts (1848–1863); Sir Edward Reed (1863–1870); Sir Nathaniel Barnaby (1872–1885); Sir William White (1885–1902); Sir Philip Watts (1902–1912); and Mr. E. Tennyson d'Eyncourt, the present Director. Sir Edward Reed resigned the appointment owing to a difference of opinion with the Board of Admiralty, and the post was left vacant for two years, when his brother-in-law was appointed to fill it.

All matters concerning the weapons supplied for the armament of our ships are supervised by a department presided over by the Director of Naval Ordnance and Torpedoes, while there is a Department of the Director of Naval Equipment, to deal with professional naval questions relating to the equipment and fittings of ships. Other departments which contribute towards the administration and maintenance of the Navy are the following:

Hydrographic Department.
Navigation Department.
Department of the Engineer-in-Chief.
Department of the Director of Dockyards.
Dockyard Expense Accounts Department.
Naval Store Department.
Compass Branch.
Air Department.
Department of the Accountant-General of the Navy.
Victualling Department.
Transport Department.
Department of the Medical Director-General of the Navy.
Director of Works Department.
Contract and Purchase Department.
Greenwich Hospital Department.
Director of Naval Education.

The list is a formidable one, and it is not surprising that the

annual cost of the Admiralty Office is only a trifle under half a million sterling.

The domestic arrangements of the fleet are governed by various Naval Discipline Acts, and by the "King's Regulations and Admiralty Instructions for the Government of His Majesty's Naval Service." The first code of domestic naval laws of which we have any detailed record was that issued by Richard I at the time of the first Crusade. They were not remarkable for their finesse, and were mainly penal. A man who killed another was to be tied to the dead body and thrown into the sea; or, if the crime were committed ashore, he was to be buried alive with the corpse of his victim. Opprobrious or contumelious words directed at another were to be expiated by an ounce of silver; while anyone convicted of theft "should have his head shaved and boiling pitch poured upon it, and feathers or down should then be strewn upon it for the distinguishing of the offender; and upon the first occasion (opportunity) he should be put on shore." The "King's Regulations" of to-day are more in the nature of a house-keeping guide, but the code of punishments is, of course, included. These vary from stoppage of grog and of leave for minor offences, to death for such a serious crime as mutiny. Summary punishments, which can be awarded by commanding officers for all sorts of things which, on shore, would not count as offences, are steadily declining in the Navy. In 1898, when the number of petty officers and men was 82,261, the number of summary punishments was 102,526; but in 1912 (the last year for which the figures are available) the punishments were 117,283 for a strength of 119,903, which means that the petty offences committed averaged less than one per man throughout the year. In most big ships a staff of Ship's Police is carried, but the need for them has fallen off considerably in recent years. In one or two ships the experiment has been tried of doing without them and placing the men on their honour, and it has worked so well that the abolition of the police system may be regarded as being within sight.

In the case of serious offences against discipline a court-martial is assembled to investigate the matter, and, if necessary, to award punishment, and as these are generally more

severe than those which can be inflicted summarily, the confirmation of the Admiralty is necessary before they can be carried into effect. The following comparison between 1902 and 1912 as regards the number of offences punished by court-martial will give further evidence of the all-round improvement of the Navy in respect of discipline—a result which is due as much to the more liberal outlook of the officers as to the improved morale of the men:

Punishment.	1902.		1912.	
Inflicted for:				
Mutiny	...		...	
Striking, or attempting to strike	172	373	86	111
Threatening language	33		6	
Disobedience	50		5	
Behaving with contempt	72		5	
Drunkenness	20		5	
Desertion	26		4	
Numbers borne	104,724		119,903	

VIII.—FLEETS AT HOME AND OVERSEA

The organisation of the fleet itself is necessarily undergoing constant change. Its distribution must be altered from time to time in accordance with the international political outlook, while the number of ships maintained in a continuous state of readiness for war must perforce be increased proportionately with such increases as may be made in the commissioned fleets of possible enemies. Twelve years ago we could be content with six battleships in full commission in home waters, while we had thirteen in the Mediterranean and five in the Far East. But the rise of the German Navy has affected these dispositions profoundly, as also has the alliance with Japan. We no longer have a single battleship in full commission in the Far East, and, partly because of the *entente* with France, our strength in the Mediterranean has been greatly reduced; but these reductions have been accompanied by an enormous increase of our strength in home waters, where, indeed, it can safely be said that eighty per cent. of the entire Navy is concentrated.

Another factor leading to change in fleet organisation is the delivery of new ships, which, unless an increase in the numerical strength of the fleet is desired, displace older vessels (which pass into the reserve) when they are commissioned for fleet service. For this reason it would be a waste of time to give in detail the composition of our various naval forces, but it is nevertheless possible to give a broad outline of the general, as apart from the particular organisation of the fleet.

In home waters all ships capable of useful service in war, from the newest to the oldest, are attached to one or other of the Home Fleets. These fleets are under the command of a single flag-officer holding the acting or actual rank of Admiral, whose official title is "Commander-in-Chief, Home Fleets."

The Fleets themselves are three in number. The First Fleet consists of those ships which are kept in a condition of instant and constant readiness for war, though every ship has to pass periodically into dockyard hands for overhaul and refit. They have full crews constantly on board, and are officially termed "in full commission." The Second and Third Fleets are not in full commission, and, together, are under the immediate orders of a "Vice-Admiral Commanding Second and Third Fleets," but this officer is subordinate to the Commander-in-Chief. The Second Fleet includes the best of the ships which it is not necessary to keep in full commission. In normal conditions—that is, in time of peace—they have on board about one-half of their full nominal crews, but the proportion of expert gunnery, torpedo, and engine-room ratings is higher than this. These nucleus crews, as they are called, are sufficient to take the ship to sea and to carry out the ordinary routine of fleet work for a short period; but the distinguishing point about them—apart from the fact that they are not in full commission—is that their crews can be completed to full numbers without calling up any of the reserves. There is always a large number of men in the Naval Depots at Portsmouth, Devonport, and Chatham, and in the various training establishments, gunnery and torpedo schools, &c., and the necessary arrangements are always in working order whereby these men could at very short notice join the ships of the Second Fleet and so place them in full commission. The normal state of the Second Fleet is called "active commission." The Third Fleet comprises those vessels which are nearing the end of their days on the effective list, and which would not be used save in the gravest emergency. They have only a small proportion—not more than one-fifth—of their full crews normally on board, and to complete their complements it would be necessary to issue a Royal Proclamation calling out the reserves. This, however, does not apply to one of the two battle squadrons which are included in this fleet, which could be sent to sea by the aid of the Immediate Reserve alone (see p. 62). The Third Fleet is said to be in "Reserve Commission."

The main fighting line of the First Fleet is made up of four groups of battleships, known as the First, Second, Third, and

Fourth Battle Squadrons. Each of these consists nominally of eight battleships, but for the time being the Fourth Squadron, which is based upon Gibraltar, consists only of four. Each of these squadrons consists as far as possible of ships of the same general type, but the principle of homogeneity, although its advantages are recognised, is difficult to adhere to when the science of naval war and architecture advances so rapidly, and when only four or five ships are laid down each year. Each squadron is commanded by a Vice-Admiral, with a Rear-Admiral as second-in-command; but the Fourth Squadron, having as yet only four ships, has no Rear-Admiral. The flagship of the Commander-in-Chief is not attached to any squadron, being what is called "outside the line."

Five squadrons of cruisers are attached to the First Fleet. These are called respectively the First Battle Cruiser Squadron, the Second, Third, and Fourth Cruiser Squadrons, and the First Light Cruiser Squadron. Each consists of four ships, which, in the order in which the squadrons are named, are battle cruisers (of the super-Dreadnought type), armoured cruisers (pre-Dreadnoughts) in the next three, and protected cruisers in the last. The First Light Cruiser Squadron is commanded by a Commodore, but the others are under the orders of Rear-Admirals. The ships of the Fourth Cruiser Squadron, whose cruising ground is the West Indies, are used largely for putting the finishing touches to the training of boys and youths before they are drafted in the ships in home waters.

Apart from a flotilla of four mine-sweeping gunboats, the composition of the First Fleet is completed by the First, Second, Third, and Fourth Destroyer Flotillas. Each of these consists of twenty boats built under the same year's programme, the First Flotilla being composed of those of the 1910–11 programme, the Second of the 1909–10 programme, the Third of the 1912–13 programme, and the Fourth of the 1911–12 programme. All these boats are driven by turbines, and burn oil fuel exclusively. Each 20-boat flotilla is attended by a depot ship and a flotilla cruiser, and the whole of them are under the command of a commodore, who is officially described as "Commodore (T) in Command of Destroyer Flotillas of First Fleet."

The Second Fleet comprises, in the first place, the Fifth and the Sixth Battle Squadrons, each of eight ships, the Vice-Admiral commanding, whose headquarters are at Sheerness, having a Rear-Admiral associated with him in the command of the Sixth Squadron, while an officer of the same rank commands the Fifth. The attached cruisers are divided into the Fifth and Sixth Cruiser Squadrons, the former being commanded by a Rear-Admiral; but both the strength and the composition of these forces are constantly changing. The battleships and cruisers of this fleet are not ordinarily grouped together in squadrons, but are split up indiscriminately between the Nore, Portsmouth, and Devonport.

Torpedo-craft form an important part of the Second Fleet, which includes two flotillas composed entirely of destroyers, two of destroyers and modern torpedo-boats together, and seven of submarines. The whole of these form what are known as the Patrol Flotillas, and they are under the immediate direction of a Rear-Admiral at the Admiralty, who is called the "Admiral of Patrols." Under his orders a Commodore supervises the submarine flotillas, which, unlike the destroyers and torpedo-boats, are provided with full and relief crews. The normal composition and distribution of the Patrol Flotillas is as follows:

Destroyer Flotillas—	
Sixth (Portsmouth)	24 destroyers and 3 flotilla cruisers.
Seventh (Devonport)	22 destroyers, 12 torpedo-boats, 1 depot ship, and 1 flotilla cruiser.
Eighth (The Nore)	12 destroyers, 12 torpedo-boats, 2 depot ships, and 1 flotilla cruiser.
Ninth (The Nore)	24 destroyers, 1 depot ship, and 3 flotilla cruisers.
Submarine Flotillas—	
Third (Devonport)	6 submarines and 1 depot ship.
Fourth (Portsmouth)	7 submarines and 2 depot ships.
Fifth (Harwich)	6 submarines and 1 depot ship.
Sixth (Harwich)	6 submarines and 2 depot ships.
Seventh (Dundee)	12 submarines and 2 depot ships.
Eighth (Portsmouth)	17 submarines and 2 depot ships.
Ninth (Lamlash)	3 submarines and 1 depot ship.

It is upon these flotillas that we depend very largely for our security against raid and invasion, for any fleet convoying transports would be seriously embarrassed, to say the least of it, if

its operations were disturbed by the appearance of fifty or sixty destroyers, or by the unseen but no less effective attack of submarines. As three of the four destroyer flotillas of the First Fleet are based upon East Coast ports—Harwich, Rosyth, and Invergordon—the forces of "mosquito craft" immediately available for repelling an invading fleet in the North Sea are really enormous, although their ultimate efficiency must depend upon the nature and strength of the forces opposed to them and the celerity with which the invading operations were carried out.

The Third Fleet comprises the oldest battleships and cruisers on the effective list, the battleships of the Majestic and Canopus classes being divided into the Seventh and Eighth Battle Squadrons, while various cruisers form the Seventh, Ninth, Tenth, Eleventh, and Twelfth Cruiser Squadrons.

Our strength on foreign stations is always changing. In the Mediterranean at present we have 3 battle cruisers, 4 armoured cruisers, 4 light cruisers, and 16 destroyers, but in 1915 a squadron of eight battleships is to be stationed there in consequence of the increase of the Italian and Austrian Fleets, and this will probably lead to changes among the less important ships. In the Pacific the Navy is represented by three squadrons, one in the East Indies, one in the Far East, and one in New Zealand; and the present composition of these and other oversea forces, and the rank of the officer in command, are given below:

Station and Rank of Officer in Command.	Battleships.	Armoured Cruisers.	Smaller Cruisers.	Sloops, &c.	Destroyers.
China (Vice-Admiral)	1[1]	2	2	6	8
East Indies (Rear-Admiral	1	..	3	4	..
New Zealand (Captain)	..	..	3	..	..
Cape of Good Hope (Rear-Admiral)	..	..	3	..	..
West Coast of Africa (Commander)	..	..	..	1	..
South-East Coast of America (Captain)	..	..	1	..	..
West Coast of America (Captain)	..	..	..	2	..

[1] Not in full commission.

The Navy of the Australian Commonwealth has already reached respectable proportions. It is at present commanded by a Rear-Admiral of the Royal Navy, who has as his flagship the battle cruiser Australia, the rest of the sea-going part of the fleet comprising the light cruisers Encounter, Melbourne, and Sydney, the destroyers Parramatta, Warrego, and Yarra, and the submarines AE1 and AE2. When, in 1911, Admiral Sir Reginald Henderson was commissioned to inquire into the naval needs and policy of the Commonwealth, he reported in favour of the creation, by 1933, of a fleet of 8 battle cruisers, 10 protected cruisers, 18 destroyers, 12 submarines, 3 depot ships and a repair ship, the whole to cost about £23,000,000 and to require a personnel of 15,000 officers and men. So far, however, no decision upon this wider policy has been taken.

IX.—ON THE RECOGNITION OF WARSHIPS.

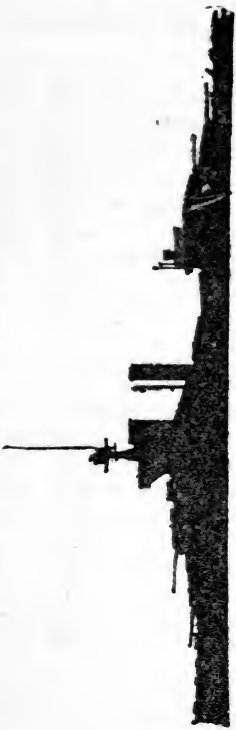
THERE are few spectacles that delight the average landsman more than an assembly of warships. Whether they be in motion or at rest they convey an irresistible impression of the power to destroy—an impression that loses nothing from the fact that in all probability the nature of the embodiment of that power is a profound mystery to the spectator. In those ships—never "on" them—as many as a thousand officers and men may live; a single battle squadron of the Home Fleet absorbs as many men as ten cavalry regiments, whose horses would nominally provide about one-fifth of the power required for driving a single ship at full speed.

One of the minor troubles besetting the lay spectator of a naval gathering is the difficulty of distinguishing one class of ship from another. In the case of individual ships of the same class such distinction is almost impossible without assistance, and this assistance is given by a system of "funnel bands." For instance, the King Edward class consists of eight battleships which, for all practical purposes, are identical in appearance; but in order that individuals may be recognised at a distance the following markings on the funnels are used. The Africa's two funnels are plain; the Britannia has one white band on the after funnel; the Commonwealth, one on the fore funnel; the Dominion, one on each funnel; the Hibernia, two on the after funnel; the Hindustan, two on the fore funnel; the King Edward VII, two on each funnel; and the Zealandia, one red band on each funnel. This system is in use right through the Navy, down to and including destroyers in full commission, which in some cases have been built in batches of twenty.

Funnel markings, however, help only in the recognition of individual ships, and give no clue to the type or class to which

they belong. It would, too, be impossible to put down in black and white (having due regard to considerations of space) any

TYPES OF BRITISH ARMOURED SHIPS



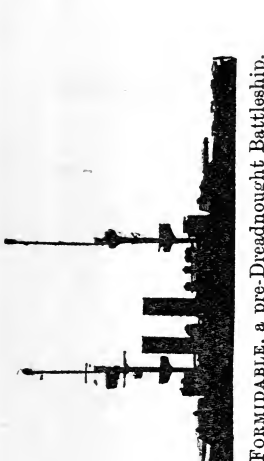
H.M.S. KING GEORGE V, a Super-Dreadnought Battleship.
(Note the five turrets—each with two 13·5-inch guns—and unequal funnels.)

H.M.S. LION, a Super-Dreadnought Battle Cruiser.
(Note enormous funnels, unequally spaced, great length, and four turrets.)

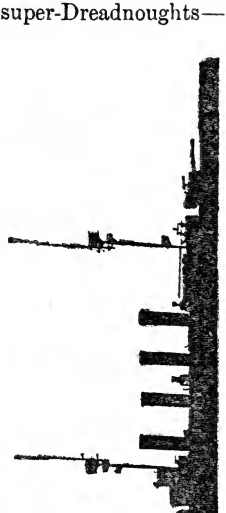
sure guide to the recognition of types; but the following notes and illustrations may be of some use in this direction. The

illustrations are reproduced by permission from *Fighting Ships*, an annual publication edited by Mr. Fred T. Jane.

In the first place, all British battleships, of whatever era or class, have two straight funnels, and the majority have also two straight masts. The accompanying silhouette of the King George V, however, shows only one mast, and this feature is more or less characteristic of super-Dreadnoughts—that is,



H.M.S. FORMIDABLE, a pre-Dreadnought Battleship. (More symmetrical appearance, much shorter, and only two turrets.)



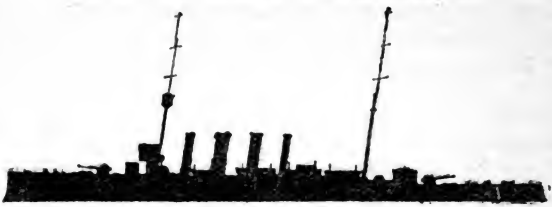
H.M.S. WARRIOR, a pre-Dreadnought Armoured Cruiser. (Speedy in appearance, but much lighter-looking than the Battleship, in spite of greater length. Smaller turrets.)

battleships of the Dreadnought era armed with the 13·5-inch gun. In a few of the earlier super-Dreadnoughts (those of the Orion class) the single mast is placed between the funnels. In all Dreadnought battleships the masts are of the tripod type.

There is a strong family likeness between all battleships of the pre-Dreadnought era, with the exception of the Lord Nelson

and Agamemnon, of whose two masts the main, or after one, is of the tripod type. Dreadnoughts are much heavier-looking

TYPES OF BRITISH SMALL CRAFT



H.M.S. CHATHAM, a Light (Protected) Cruiser.

(Much less formidable in appearance than any armoured ship. No solid look about them. Gun casemates fore and aft very small.)

Destroyer of the Acorn or Acasta class.

(Two masts, three funnels; foremost funnel high and thin. Many modern destroyers have only two funnels, of equal height.)

Destroyer of the River class.

(One mast only; high forecastle; may have only two funnels.)

Destroyer of earlier class.

(Note low forecastle. Some have only three funnels.)

and much longer than their predecessors, which also differ in apparent (as in actual) bulk among themselves. The illustration

given herewith is a silhouette of a ship of the Formidable class, which is typical of our pre-Dreadnought battleships. When seen in profile, the ships of the Majestic class would appear to have only one funnel, as their two are placed abreast.

Battle cruisers can easily be distinguished by their enormous length. All of them have three funnels, and in those that carry 12-inch guns the foremost funnel is several feet higher than the others. As the funnels in all cases are unequally spaced and vary in thickness, there is no difficulty in picking out these ships.

Nearly all of our modern cruisers of smaller types—armoured, protected, and unarmoured—have four funnels and two masts. In distinguishing these three groups one from another the main thing to bear in mind is that armoured cruisers are on an average more than twice as heavy as protected cruisers, while the latter are some 50 per cent. heavier than unarmoured ships. These differences are naturally reflected in the general appearance of the various types. In armoured cruisers, too, the funnels and masts are perpendicular, or very nearly so, while in the smaller classes they have a considerable "rake." Among modern groups of cruisers there are two exceptions to the four-funnel rule, the Monmouths (armoured) having three which are quite perpendicular, and the Topaze class (protected) three which slope fairly sharply.

Destroyers are too numerous, and differ so greatly in appearance among themselves, to permit of a detailed account of the various classes. They can be recognised as a type, not only by lying very low in the water, but also by their colour, for while all other classes in home waters are painted dark grey, destroyers and torpedo-boats are a uniform black. The most modern destroyers are to be recognised by having two masts, and in some of those which have three funnels the foremost one is longer (and considerably thinner) than the others. The fact that a destroyer belongs either to the River or a later class will be apparent if the deck forward of the funnels is raised well above the after part. The River class have only one mast, and can therefore be distinguished by this means from the ocean-going boats, all of which have a second

mast, light and short, aft, to carry one end of the wireless receiving gear. Submarines, of course, are easily recognisable. The later ones, when cruising on the surface, have a flush deck about five feet above the level of the water, with a large conning-tower, surmounted by a navigating bridge, amidships.

The accompanying silhouettes are all drawn to scale.

APPENDIX

THE BRITISH NAVY

NOTE.—The following abbreviations are used:—"pr."=pounder; "T.T."=torpedo-tubes.

Where "Engines, T." occurs, the machinery is of the turbine type; in all other cases it is reciprocating.

Unless "Oil Fuel" is stated, coal is the principal fuel, though oil may be used as an auxiliary.

Cruisers are classed according to the designation under which they were built (see page 29).

Names printed in heavy type provide the class-name of the group.

DREADNOUGHT BATTLESHIPS

Royal Sovereign, Royal Oak, Revenge, Resolution, Ramillies, Renown, Repulse, Resistance. First five provided for in 1913–14, others in 1914–15. Displacement, 25,500 tons; speed, 21 knots; armament, 8 12-inch and 16 6-inch guns. Engines, T. (Under construction.)

Queen Elizabeth, Warspite, Valiant, Barham, and Malaya, launched 1913–14. Displacement, 27,500 tons; speed (oil fuel only), 25 knots; armament, 8 12-inch and 16 6-inch guns. Engines, T. (Under construction.)

Iron Duke, Marlborough, Emperor of India, and Benbow, launched 1912–13. Displacement, 25,000 tons; speed, 21 knots; armament, 10 13·5-inch, 12 6-inch, and 2 anti-aircraft 3-inch guns; 4 T.T. Engines, T.

King George V, Centurion, Ajax, and Audacious, launched 1911–12. Displacement, 23,000 tons; speed, 21 knots; armament, 10 13·5-inch and 16 4-inch guns, and 3 T.T. Engines, T.

Orion, Thunderer, Conqueror, and Monarch, launched 1910–11. Displacement, 22,500 tons; speed, 21 knots; armament, 10 13·5-inch and 16 4-inch guns, and 3 T.T. Engines, T.

Colossus and Hercules, launched 1910. Displacement, 20,000 tons; speed, 21 knots; armament, 10 12-inch and 16 4-inch guns, and 3 T.T. Engines, T.

Neptune, launched 1909. Displacement, 19,900 tons; other details as for Colossus class. Engines, T.

St. Vincent, Collingwood, and Vanguard, launched 1908–9. Displacement, 19,250 tons; other details as for Colossus class. Engines, T.

Bellerophon, Temeraire, and Superb, launched 1907. Displacement, 18,600 tons; other details as for Colossus class. Engines, T.

Dreadnought, launched 1906. Displacement, 17,900 tons; speed, 21 knots; armament, 10 12-inch and 24 12-pr. guns, and 5 T.T. Engines, T.

Battle Cruisers

Tiger, launched 1913. Displacement, 27,500 tons; speed, 28 knots; armament, 8 13·5-inch and 12 6-inch guns, and 2 T.T. Engines, T.

Queen Mary, launched 1912. Displacement, 27,000 tons; speed, 28 knots; armament, 8 13·5-inch and 16 4-inch guns, and 2 T.T. Engines, T.

Lion and Princess Royal, launched 1910–11. Displacement, 26,350 tons; speed, 28 knots; armament, 8 13·5-inch and 16 4-inch guns, and 2 T.T. Engines, T.

Indefatigable and New Zealand, launched 1909 and 1911. Displacement, 18,750 and 18,800 tons respectively; speed, 25 knots; armament, 8 12-inch and 16 4-inch guns, and 2 T.T. Engines, T.

Invincible, Inflexible, and Indomitable, launched 1907. Displacement, 17,250 tons; speed, 25 knots; armament, 8 12-inch and 16 4-inch guns, and 5 T.T. Engines, T.

Pre-Dreadnought Battleships

(Engines R. in all.)

Lord Nelson and Agamemnon, launched 1906. Displacement, 16,500 tons; speed, 18 knots; armament, 4 12-inch, 10 9·2-inch, and 24 12-pr. guns, and 5 T.T.

King Edward VII., Africa, Britannia, Commonwealth, Dominion, Hibernia, Hindustan, and Zealandia, launched 1903–5. Displacement, 16,350 tons; speed, 18·5 knots; armament, 4 12-inch, 4 9·2-inch, 10 6-inch, and 12 12-pr. guns, and 4 T.T.

Swiftsure and Triumph, launched 1903. Displacement, 11,800 and 11,985 tons respectively; speed, 19 knots; armament, 4 10-inch, 14 7·5-inch, and 14 14-pr. and 2 12-pr. guns, and 2 T.T.

Duncan, Cornwallis, Exmouth, Russell, and Albemarle, launched 1901. Displacement, 14,000 tons; speed, 19 knots; armament, 4 12-inch, 12 6-inch, and 12 12-pr. guns, and 4 T.T.

Formidable, Implacable, Irresistible, Venerable, Bulwark, London, Queen, and Prince of Wales, launched 1898–1902. Displacement, 15,000 tons; speed, 18 knots; armament, 4 12-inch, 12 6-inch, and 18 12-pr. guns, and 4 T.T.

Canopus, Albion, Glory, Goliath, Ocean, and Vengeance, launched 1897–9. Displacement, 12,950 tons; speed, 18½ knots; armament as for Duncan class.

Majestic, Magnificent, Cæsar, Hannibal, Illustrious, Jupiter, Prince George, Mars, and Victorious, launched 1894–6. Displacement, 14,900 tons; speed, 17·5 knots; armament, 4 12-inch, 12 6-inch, and 18 12-pr. guns, and 5 T.T.

Armoured Cruisers

Minotaur, Shannon, and Defence, launched 1906–7. Displacement, 14,600 tons; speed, 23 knots; armament, 4 9·2-inch, 10 7·5-inch, and 16 12-pr. guns, and 5 T.T.

Warrior, Cochrane, Achilles, and Natal, launched 1905. Displacement, 13,550 tons; speed, 22·33 knots; armament, 6 9·2-inch and 4 7·5-inch guns, and 3 T.T.

Duke of Edinburgh and Black Prince, launched 1904. Displacement, 13,550 tons; speed, 22·33 knots; armament, 6 9·2-inch and 10 6-inch guns, and 3 T.T.

Devonshire, Antrim, Argyll, Carnarvon, Hampshire, and Roxburgh, launched 1903–4. Displacement, 10,850 tons; speed, 22·25 knots; armament, 4 7·5-inch and 6 6-inch guns, and 2 T.T.

Monmouth, Berwick, Cornwall, Cumberland, Donegal. Essex, Lancaster, Kent, and Suffolk, launched 1901–3. Displacement, 9,800 tons; speed, 23 knots; armament, 14 6-inch and 8 12-pr. guns, and 2 T.T.

Drake, King Alfred, Leviathan, and Good Hope, launched 1901. Displacement, 14,100 tons; speed, 23 knots; armament, 2 9·2-inch, 16 6-inch, and 12 12-pr. guns, and 2 T.T.

Cressy, Aboukir, Bacchante, Hogue, Euryalus, and Sutlej, launched 1899–1901. Displacement, 12,000 tons; speed, 21 knots; armament, 2 9·2-inch, 12 6-inch, and 12 12-pr. guns, and 2 T.T.

Protected Cruisers, 1st Class

Europa, Amphitrite, Argonaut, and Niobe (last named lent to Canada), launched 1897–8. Displacement, 11,000 tons; speed, 20·5 knots; armament, 16 6-inch and 12 12-pr. guns, and 2 T.T.

Edgar, Grafton, Hawke, Endymion, Gibraltar, and Theseus, launched 1890–92. Displacement, 7,350 tons (except Gibraltar, 7,700); speed, 19 knots; armament, 2 9·2-inch, 10 6-inch, 1 12-pr. guns, and 2 T.T.

Crescent and Royal Arthur, launched 1891–2. Displacement, 7,700 tons; speed, 18·7 knots; armament, 1 9·2-inch, 12 6-inch, and 1 12-pr. guns, and 2 T.T.

PROTECTED CRUISERS, 2ND CLASS

Birmingham, Nottingham, and Lowestoft, launched 1913. Displacement, 5,440 tons; speed, 25·5 knots; armament, 9 6-inch guns and 2 T.T. Engines, T.

Chatham, Dublin, and Southampton, launched 1911–12. Displacement, 5,400 tons; speed, 25·5 knots; armament, 8 6-inch guns and 2 T.T. Engines, T.

Weymouth, Dartmouth, Falmouth, and Yarmouth, launched 1910–11. Displacement, 5,250 tons; speed, 24·75 knots; armament as for Chatham class. Engines, T.

Bristol, Glasgow, Gloucester, Liverpool, and Newcastle, launched 1909–10. Displacement, 4,800 tons; speed, 25 knots; armament, 2 6-inch and 10 4-inch guns, and 2 T.T. Engines, T.

Challenger, launched 1902. Displacement, 5,880 tons; speed, 21 knots; armament, 11 6-inch and 9 12-pr. guns, and 2 T.T.

Highflyer, Hyacinth, and Hermes, launched 1898. Displacement, 5,600 tons; speed, 20 knots; armament as for Challenger.

Talbot, Diana, Doris, Isis, Juno, Venus, and Minerva, launched 1895–6. Displacement, 5,600 tons; armament, 11 6-inch and 9 12-pr. guns, and 3 T.T.

Eclipse, launched 1894. Displacement, 5,600 tons; speed, 19·5 knots; armament, 5 6-inch, 6 4·7-inch, and 9 12-pr. guns, and 3 T.T. Engines, R.

Vindictive, launched 1897. Displacement, 5,750 tons; speed, 19 knots; armament, 10 6-inch and 9 12-pr. guns, and 2 T.T.

Astræa, Fox, Charybdis, and Hermione, launched 1893. Displacement, 4,360 tons; speed, 19·5 knots; armament, 2 6-inch, 8 4·7-inch, and 1 12-pr. guns, and 3 T.T.

Sappho, launched 1891. Displacement, 3,400 tons; speed, 20 knots; armament, 2 6-inch and 6 4·7-inch guns.

PROTECTED CRUISERS, 3RD CLASS

Topaze, Amethyst, Diamond, and Sapphire, launched 1903–4. Displacement, 3,000 tons; speed, 22 knots; armament, 12 4-inch guns and 2 T.T. Engines, T. in Amethyst only.

Pelorus, Proserpine, Pegasus, Pyramus, Psyche, launched 1896–1898. Displacement, 2,135 tons; speed, 20 knots; armament, 8 4-inch guns and 2 T.T.

Philomel, launched 1890. Displacement, 2,575 tons; speed, 16·5 knots; armament, 8 4·7-inch guns and 3 T.T.

Unarmoured Cruisers

Boadicea, Bellona, Blanche, Blonde, Active, Amphion, and Fearless, launched 1908–12. Displacement, 3,300 to 3,440 tons; speed, 25 knots; armament, 10 4-inch guns and 2 T.T., but only 6 4-inch in first two. Engines, T.

Scouts

Sentinel, Skirmisher, Attentive, Adventure, Forward, Foresight, Pathfinder, and Patrol, launched 1904–5. Displacement, 2,670 to 2,940 tons; speed, 25 knots; armament, 9 4-inch guns and 2 T.T.

Light Armoured Cruisers

Arethusa, Aurora, Galatea, Inconstant, Royalist, Undaunted, Penelope, and Phæton, provided for in 1912–13. Displacement, 3,500 tons; speed, 30 knots (oil fuel only); armament, 2 6-inch and 8 4-inch guns. Engines, T. (Under construction.)

Calliope, Conquest, Cordelia, Carysfort, Cleopatra, Comus, Caroline, and Champion, provided for in 1913–14. Details as for Arethusa class but slightly larger. Four additional vessels provided for in 1914–15. (Under construction.)

Flotilla Leaders

Swift, launched 1907. Displacement, 2,170 tons; speed, 36 knots; armament, 4 4-inch guns and 2 T.T. Oil fuel only; engines, T.

Lightfoot, Marksman, Kempenfelt, and Nimrod, building. Details not known.

Destroyers

"**M**" class (1913–14 programme). Milne, Moorsom, Morris, Matchless, Murray, Myngs, Miranda, Minos, Manly, Mentor, Mansfield, Meteor, and Mastiff. Details not known.

"**L**" class (1912–13 programme). Laertes, Lark, Linnet, Lysander, Laforey, Lawford, Louis, Lydiard, Loyal, Legion, Leonidas, Lucifer, Lance, Lookout, Laurel, Liberty, Laverock, Landrail, Llewellyn, and Lennox. Displacement, 965 tons; speed, 29 knots; armament, 3 4-inch and one machine gun, and 2 double T.T. Oil fuel; engines, T.

"**K**" class (1911–12 programme). Acasta, Achates, Ambuscade, Ardent, Fortune, Garland, Christopher, Cockatrice, Contest, Shark, Sparrowhawk, Spitfire, Paragon, Hardy, Lynx, Midge, Owl, Porpoise, Unity, and Victor. Displacement, 908 to 964 tons; speed, 29 to 32 knots; armament, 3 4-inch and 1

machine gun, and 2 T.T. Oil fuel; engines, T. Hardy has one Diesel engine for cruising speeds.

"I" class (1910–11 programme). Ariel, Acheron, Archer, Attack, Badger, Beaver, Defender, Druid, Ferret, Forester, Goshawk, Hind, Hornet, Hydra, Jackal, Lapwing, Lizard, Phœnix, Sandfly, Tigress, Firedrake, Lurcher, and Oak. Displacement, 745 to 810 tons; speed, 27 to 30 knots, but 32 in last three; armament, 2 4-inch and 2 12-pr. guns, and 2 T.T. Oil fuel; engines, T.

"H" class (1909–10 programme). Acorn, Alarm, Brisk, Cameleon, Comet, Goldfinch, Fury, Hope, Larne, Lyra, Martin, Minstrel, Nemesis, Nereide, Nymphe, Redpole, Ruby, Rifleman, Sheldrake, and Staunch. Displacement, 720 to 780 tons; speed, 27 knots; armament, 2 4-inch and 2 12-pr. guns, and 2 T.T. Oil fuel; engines, T.

"G" class (1908–9 programme). Beagle, Basilisk, Bulldog, Foxhound, Grampus, Grasshopper, Harpy, Mosquito, Racoon, Rattlesnake, Renard, Pincher, Savage, Scourge, Scorpion, and Wolverine. Displacement, 897 to 976 tons; speed, 27 knots; armament, 1 4-inch and 3 12-pr. guns, and 2 T.T. Coal fuel; engines, T.

"F" class (1906–7 and 1907–8 programme). Amazon, Crusader, Nubian, Maori, Saracen, Viking, and Zulu. Displacement, 970 to 1090 tons; speed, 33 knots; armament, 2 4-inch guns and 2 T.T. Oil fuel; engines, T.

"F" class (*continued*) (1905–6 programme). Afridi. Cossack, Ghurka, Mohawk, and Tartar. Displacement, 865 to 885 tons; speed, 33 knots; armament, 5 12-pr. guns and 2 T.T. Oil fuel; engines, T.

"E" class (1901–2, 1902–3, and 1903–4 programmes). Arun, Boyne, Chelmer, Cherwell, Colne, Dee, Derwent, Doon, Eden, Erne, Ettrick, Exe, Foyle, Garry, Itchen, Jed, Kale, Kennet, Liffey, Moy, Ness, Nith, Ouse, Ribble, Rother, Stour, Swale, Test, Teviot, Ure, Usk, Waveney, Wear, and Welland. Displacement, 540 to 590 tons; speed, 25·5 knots; armament, 4 12-pr. guns and 2 T.T. Eden has turbines, others reciprocating machinery. All are coal burners.

"D" class (launched 1896–9). Angler, Coquette, Cynget, Cynthia, Desperate, Fame, Mallard, and Stag. Displacement, 335 to 355 tons; speed, 30 knots; armament, 1 12-pr. and 5 6-pr. guns, and 2 T.T.

"C" class (launched 1896–1902). Albatross, Avon, Bat, Bittern, Brazen, Bullfinch, Cheerful, Crane, Dove, Electra, Fairy, Falcon, Fawn, Flirt, Flying Fish, Gipsy, Greyhound, Kestrel, Leopard, Leven, Mermaid, Osprey, Ostrich, Racehorse, Recruit, Roebuck, Star, Sylvia, Thorn, Velox, Vigilant, Violet, Vixen, and Vulture. Displacement, 350 to 400 tons, except Velox (420) and Albatross (430); speed, 30 knots; armament, 1 12-pr. and 5 6-pr. guns, and 2 T.T. Velox has turbines, others reciprocating machinery, and all burn coal.

"B" class (launched 1906–7). Albacore and Bonetta. Displacement, 440 tons; speed, 26 knots; armament, 3 12-pr. guns and 2 T.T.

"B" class (*continued*) (launched 1895–1901). Arab, Earnest, Express, Griffon, Kangaroo, Lively, Locust, Myrmidon, Orwell, Panther, Peterel, Quail, Seal, Spiteful, Sprightly, Success, Syren, Thrasher, and Wolf. Displacement, 355 to 400 tons, except Arab (470) and Express (499); speed, 30 knots; armament, 1 12-pr. and 5 6-pr. guns, and 2 T.T., except Orwell, 6 3-pr. guns and 2 T.T.

"A" class (launched 1894–5). Conflict, Fervent, Lightning, Opossum, Porcupine, Sunfish, Surly, and Zephyr. Displacement, 310 to 350 tons; speed, 27 knots; armament, 1 12-pr. and 5 6-pr. guns, and 2 T.T., but Sunfish and Opossum have only 1 T.T.

Torpedo-Boats

Nos. 1 to 36 (launched 1906–9). Displacement, 244 to 308 tons; speed, 26 knots; armament, 2 12-pr. guns and 3 T.T. Oil fuel; engines, T.

Seventy older vessels (launched 1885–1901) of little fighting value.

Submarines

(*For submarines building, see page* 46.)

"E" class. E1 to E9 (9 boats). Launched 1912–13. Displacement, 800 tons; speed, 16/10 knots; armament, 2 12-pr. guns and 4 T.T.

"D" class. D1 to D8 (8 boats). Launched 1908–1911. Displacement, 595–620 tons; speed, 15/9 knots; armament, 3 T.T., but D4 and later have 1 12-pr. gun also.

"C" class. C1 to C10; C12 to C18 (17 boats). Launched 1906–1909. Displacement, 316 tons; speed, 13/8 knots; armament, 2 T.T.

C19 to C38 (20 boats). Launched 1909–10. Displacement, 321 tons, otherwise as for other C class.

"B" class. B1, and B3 to B11 (10 boats). Launched 1904–6. Displacement, 316 tons; speed, 13/8 knots; armament, 2 T.T.

"A" class. A5, A6, and A8 to A13 (8 boats). Launched 1904–5. Displacement, 204 tons; speed, 11/7 knots; armament, 2 T.T.

SHIPS OF THE ROYAL AUSTRALIAN NAVY.

Battle Cruisers.—Australia (launched 1911). Displacement, 19,200 tons; speed, 25 knots; armament, 8 12-in. and 16 4-in. guns, and 2 T.T. Engines, T.

Protected Cruisers.—Sydney, Melbourne, and Brisbane (launched 1912, except Brisbane, which is under construction). Displace-

ment, 5,400 tons; speed, 25·5 knots; armament, 8 6-in. guns and 2 T.T. Engines, T.

Encounter (launched 1902). Displacement, 5,880 tons; speed, 21 knots; armament, 11 6-in. and 9 12-pr. guns, and 2 T.T.

Pioneer (launched 1899). Displacement, 2,200 tons; speed, 20 knots; armament, 8 4-in. guns, and 2 T.T.

Destroyers.—Parramatta, Yarra, and Warrego (launched 1910–11). Displacement, 700 tons; speed, 27 knots; armament, 1 4-in. and 3 12-pr. guns, and 3 T.T. Swan, Derwent, and Torrens under construction.

Submarines.—AE1 and AE2 (launched 1913). Similar to British E class.

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BRITISH NAVAL HISTORY.—The works dealing with one phase or another of our naval history are almost innumerable. The most complete is *The Royal Navy: A History* (seven volumes), edited by the late Sir W. Laird Clowes, which deals not only with the military side of the Navy, but also with its civil, social, and administrative aspects, and with the progress of maritime exploration and the art of shipbuilding. The *British Battle Fleet*, by Fred T. Jane, is a more compact work (one volume) on the same general lines. The history of the Navy as an international force (*i.e.* as a political and fighting machine) is best told in the following series of works by Mr. Julian S. Corbett: *Drake and the Tudor Navy; The Successors of Drake; England in the Mediterranean; England in the Seven Years' War;* and *The Campaign of Trafalgar.* Among the best biographies are Mahan's *Life of Nelson;* Captain Anson's *Life of John Jervis;* Laughton's *From Howard to Nelson;* and Campbell's *Lives of the Admirals.*

The social side of naval progress is well treated by Commander C. N. Robinson in *The British Fleet* and *The British Tar in Fact and Fiction*, the latter being unique for its literary and artistic explorations. *Sea Life in Nelson's Time* (John Masefield), and *The Inner Life of the Navy* (Lionel Yexley), deal with specific periods, the latter covering the later part of the nineteenth century.

The development of shipbuilding from ancient times to the end of the sailing era is excellently told and illustrated in E. K. Chatterton's *Sailing Ships and their Story*, while *Warships and their Story* (R. A. Fletcher) covers the whole ground down to the super-Dreadnought era. *Warships*, by Mr. E. L. Attwood, is a technical account of warship construc-

tion ten years ago, but the value of later works of a similar character is modified by the secrecy enjoined upon those engaged in the design and construction of modern ships. *Submarine Boats, Mines, and Torpedoes*, by Captain M. F. Sueter, R.N., gives the best description extant of the progress of these aids to naval warfare, but there is no modern work on guns and gunnery, the most recent (*Naval Gunnery*, by Captain H. Garbett, R.N.) having been published in 1897. Naval warfare in comparatively recent times is the subject of *Ironclads in Action* (H. W. Wilson), *Four Modern Naval Campaigns* (Laird Clowes), and several books by Russian officers giving their experiences during the war with Japan. The best of these are *The "Novik"* (Lieut. E. P. Steer), *From Libau to Tsushima* (Engineer-Lieut. Politovsky), and *Rasplata* (The Reckoning), by Commander Semenoff.

Works of Reference.—*The Naval Annual* and *The Navy League Annual* give lists of British and foreign warships, with articles on various phases of naval progress, technical and political. *The Naval Pocket Book* gives only a list (with some plans) of the world's warships and docks, though the details are fuller than in the two first mentioned. *Fighting Ships* (Fred T. Jane), issued annually, gives photographs and descriptive plans of almost every class of warship in the world, besides a series of silhouettes enabling them to be recognised at a distance. The *Navy List*, published monthly by the Admiralty, gives the name, class, displacement, horse-power, armament (guns only), and station of every ship in the British Navy, as well as a full list of the commissioned and warrant officers, and of the personnel of the administrative departments at the Admiralty.

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