WARSHIP DESIGN
AND CONSTRUCTION

BY WILLIAM HOYGOOD.

The course in warship design and construction begins in the first term with the special purpose of preparing young naval officers for duties at Navy Construction Squads. It presupposes a general knowledge of warships and seamanship, of the life on board, of the service in the navy, and of the installation and use of artillery and torpedoes. In fact, not only select the designer of warships as a constructor, but he must understand the requirements of the naval and military service of the navy. Most of the first designs, which have been brought out and, in many cases, realized at great cost, have been made by men unacquainted with these requirements. The design of warships differs essentially from that of merchant vessels. While the greater part of the displacement of a merchant ship is taken up by a dead weight carried as cargo, the corresponding weight in a warship is carried as a complex armament and system of protection, and the systems of ventilation, heating, drainage, communication, and also all living accommodations are incomparably more complicated than in passenger vessels. Hence the greater complexity of warships as compared with merchant vessels.

Moreover, the design of merchant vessels and, in particular, their structural arrangements and details, are determined almost absolutely by the rules of the classification societies, which give the specifications of every important member of the structure, since the principal dimensions and size of the ship are fixed. In warships, no such rules or tables are given for the guidance of the designer. Each dimension and mounting has to be determined by the designer, and, therefore, his experience and precedent, aided by calculations wherever practicable. In many cases, however, the possibility occurring in the structure of warships is too complex to permit of exact calculations. Empirical formulas expressing a comparison of certain such features may often be used, but, in many cases, nothing but an experimental trial of the new design in ships of similar type and size is left to the designer. Therefore, judgment and experience counts for more in warship design than in most other branches of engineering.

Probably the most important branch of engineering has been known as shipbuilding since ancient times, as in the construction of warships. The complexity of the requirements of the service has led to almost bewildering

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INSTRUCTORS AND STUDENTS IN COURSES XIII AND XIII A

WARSHIP DESIGN
AND CONSTRUCTION

BY C. H. PEABODY.

The course in naval architecture and marine engineering offers instruction to those who expect to be ship-builders, ship-designers, ship-owners or marine-engineering builders (including marine steam turbines). The long and emphatic tone is made to be the commonly accepted use of the terms which implicitly connect the building of the old wooden sailing ship with the construction of the modern steel steam-ship. When built of wood, houses and ships have many resemblances and in medieval titles both were picturesque. The architect was then designer and master-builder. However, it may be with the architect, the naval architect must not lose the quality of being master-builder and that quality must include both structure and propelling power. Again, at the transition from sail to steam the naval architect accepted the engine and the engineer. The ship carpenter worked in wood and the mechanic in iron and the line of demarcation was clear. But the ship and structure of the hull had to be modified to meet the new conditions of propulsion and the machinery had to be developed to meet the conditions of service; both are now made of steel, and the lines of disequilibrium depend on custom. By custom the design of a ship and the machinery is entrusted to a naval architect and a marine engineer, but the designs so overlap that harmonious results can be attained only by close association and cooperation, but here the engineer and the architect were divided. This discussion may appear to be merely curious if not idle, did it not in a measure deal with current impressions, which tend to narrow the conception of the work of the department. The course as will be seen by inspection begins in the latter part of the first term and ends in the second year. Its purpose is to give the student the conditions in which they have to work. The professional work of Course XIII and others having equivalent preparation is accompanied by lectures on the theory of waves and their influence with displacement and stability, with the power required for propulsion, and with the practical work but also includes greatly in the professional studies of the third and fourth years.

This course is followed in the second term of the third year by a course of lectures covering the details of ship construction, the stresses existing in the hull and the heat disposition of materials to resist the strains.

In the fourth year this work is made to fit in with the actual drafting work of the ship design.

These lectures are illustrated frequently by lantern slides, and the department in fortunate in having several good-sized models showing various details of construction. These models are made of wood and closely show the relation of plates, angles and rivets, giving the student a far better idea of what he has to do than if he had to work on drawings. The actual design of a steamship begins in the latter part of the first term of the third year and continues through the remainder of the third year and throughout the fourth year.

The preliminary dimensions of a vessel are made on alternate days, beginning with FOURTEEN, by Mr. Oliver W. Bercaw, a well-known marine naval architect, who has already been noted in a previous issue of the paper, and the author of a standard work on Marine Propellers.

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COURSE IN NAVAL ARCHITECTURE
AND MARINE ENGINEERING

By W. S. IRELAND.

The professional work of Course XIII and others having equivalent preparation is accompanied by lectures on the theory of waves and their influence with displacement and stability, with the power required for propulsion, and with the practical work but also includes greatly in the professional studies of the third and fourth years.

Building ships, cranes, service, marine engineering offers instruction to those who intend to enter the field of naval architecture. The professional work of Course XIII is best attained when there is one master-builder and one marine engineer, but the designs so overlap that harmonious results can be attained only by close association and cooperation, but here the engineer and the architect were divided. This discussion may appear to be merely curious if not idle, did it not in a measure deal with current impressions, which tend to narrow the conception of the work of the department. The course as will be seen by inspection begins in the latter part of the first term and ends in the second year. Its purpose is to give the student the conditions in which they have to work. The professional work of Course XIII and others having equivalent preparation is accompanied by lectures on the theory of waves and their influence with displacement and stability, with the power required for propulsion, and with the practical work but also includes greatly in the professional studies of the third and fourth years.

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SHIP CONSTRUCTION
AND SHIP DESIGN

By C. H. PEABODY.

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