volume of the immersed portion of the ship to the volume of the parallelepiped, whose length, breadth and depth are the same as the length, breadth and mean draught (without keel) of the vessel itself; and it will be seen that in three cases out of the five given, the immersed volume, *i.e.* the displacement, is 8o, or upwards of 80% of this circumscribing parallelepiped. The low speed, which is

found economical for the “ ocean tramp,” admits of this fullness, and provides that capability for large stowage accommodation for cargo which has brought it into existence. In vessels whose speed is of great importance the block coefficient varies from ∙5 to ·68, the lower limit being reached on the smaller vessels on cross-channel services, and the higher limit on very long vessels, such as Atlantic liners. In the moderately fast vessel D shown in table the block coefficient is ·68. The total weight of material in the hull, *i.e.* the iron or steel and woodwork, outfit, &c. and the propelling machinery, is called the vessel’s *light displacement.* The *load displacement* is made up of the light displacement, together with the weight of the cargo, &c., or the dead-weight carried; this, it will be seen from Table X., varies from two to two and a half times the amount of the light displace­

ment, except in case D in which the machinery and the passenger accommodation absorb much weight. British vessels may not be loaded deeper than a certain mark, known for many years as the Plimsoll mark, which has to be placed on the sides of all merchant vessels. The mode of measuring tonnage is based on the Act of 1894, which embodies preceding legislation and subsequent Acts (see Tonnage).

The numerous varieties of passenger steamers may for convenience be taken in the following order :—Ferry ; River and Sound ; Cross Channel; and Ocean Steamers; although it must be understood that in many cases a hard and fast line

cannot be drawn between steamers for the several services.

*Ferry Steamers.—*Ferry steamers are found on many rivers and harbours in the United Kingdom; they perform important services in transporting passengers and road traffic across sheltered waters where bridges are not available; and others are built in the United Kingdom for service in all parts of the world. The “ Guanabacoa,” a double-ended steel vessel built by Messrs Cammell, Laird & Co., for ferry service on Havana Bay, is 140 ft. long overall, breadth moulded 38 ft., depth moulded amidships 13 ft. 2½ in. Well-decorated saloons 12 ft. high extend along the sides of the vessel, and between them are wood-paved tracks for 30 to 40 carts and horses. One thousand passengers can be carried, and a fine promenade deck for them extends over the saloons, &c. Above all a light sun deck extends right fore and aft. Compound surface-condensing engines are fitted with a screw propeller at each end of the vessel, which drive her either way at from 10 to 11 knots. She made the passage to Havana under her own steam. A number of ferry-boats have been built by Messrs Thornycroft for service in India; they are 105 ft. long overall, of 20 ft. beam, 10 ft. moulded depth and 5 ft. draught;

their machinery of 500 I.H.P. is placed amidships and gives a speed of 12 knots; two saloons are arranged forward and two aft with access to a promenade deck from each, accommodation for 200 passenger with luggage being provided. A light wooden awning extends over all. These vessels are built of steel and divided into eight water-tight compartments; they were built and put together at Southampton, then taken to pieces, packed and shipped

abroad, re-erected and completed at Calcutta.

The largest ferry-boats are to be found in America, and

an interesting example is the “ Hammonton ” built in 1906 by the New York Shipbuilding Company. She is 168 ft. long overall, 38 ft. beam, 8 ft. 6 in. draught, 625 tons displacement. A feature of this vessel is that all details are arranged with the view to making the vessel practically fireproof, wood fittings being reduced to a minimum. The vessel is double-ended, carries over a thousand passengers and a large number of horses and vehicles on one deck. As in many American river vessels, the upper works extend to a considerable width beyond the body of the hull beneath to give large deck areas; the main deck being about 6 ft. above water and 55 ft. wide. Cart tracks are arranged along the midship portions of the deck with passenger saloons, &c., at the sides. A light shade deck extends forward and aft and carries a pilot house near each end. Water-tube boilers and three cylinder compound engines of 600 H.P. are fitted beneath the deck amidships and drive a propeller at each end of the boat. The “ Oakland,” “ Berkeley ” and “ Newark ” running at San Francisco are much larger than the "Hammonton,” and have a seating capacity for 2000 people each, with a fine promenade deck above the upper deck. The first two are fitted with beam engines driving side paddle-wheels, while the third has a screw propeller at each end of the vessel driven by vertical triple expansion engines.

Each of them burns oil fuel only.

*River and Sound Steamers.*—For service on rivers, harbours and

estuaries where the traffic is considerable, paddle-wheel vessels of limited speed are usually preferred, as possessing great manoeuvring

power, and therefore the capability of being brought alongside the landing-places with rapidity and safety. The paddle-wheel steamer

“ La Marguerite,” which formerly in the summer months made trips from London to the coast of Kent and to France, now conducts service between Liverpool and North Wales. She is 330 ft. long, has accommodation for a large number of passengers, and ob- tained 22 knots with 7500 I.H.P. on trial. Another well-known Thames steamer is the “ Royal Sovereign,” of length 300 ft., breadth 33 ft., depth moulded 10 ft. 6 in., draught 6 ft. 6 in., tonnage 891 tons gross, 190 tons net; carrying 2320 passengers at a speed of 21 knots.