large number of second-class passengers. The “ Princess Charlotte ” is of 3600 tons and 20 knots speed.

Japan has built and engined two cross-channel steamers, which maintain a service between Japan and Korea. They are 335 ft. long, 43 ft. beam, gross tonnage 3200, displacement, at 17 Ft. draught, 3880 tons. Parsons turbines of 8500 H.P., made in Japan, are fitted and give a speed of 21 knots.

*Ocean Liners.—*The article on Steamship Lines gives an account of the rise of the great shipping companies. The steamships of 12,000 tons and upwards, referred to on page 873, are shown in Table XI. :—

|  |  |  |  |
| --- | --- | --- | --- |
| Table XI.—*of 12,000 Tons and upwards afloat June 1910.* | | | |
| Name. | Gross  Tonnage. | Name. | Gross  Tonnage, |
| *British.@@l* |  | *German.* |  |
| Mauretania | 3i>938 | George Washington | 25.570 |
| Lusitania | 31.550 | Kaiserin Auguste Victoria | 24.58! |
| Adriatic | 24,541 | Amerika | 22,622 |
| Baltic . . . . | 23,876 | Kronprinzessin Cecilie | 19.503 |
| Cedric . . . . | 21,035 | Kaiser Wilhelm II. . . | 19.361 |
| Celtic . . . . | 20,904 | President Lincoln | 18,168 |
| Caronia | 19.687 | President Grant | 18,072 |
| Carmania | 19,524 | Berlin | 17,324 |
| Oceanic | 17>274 | Prinz Friedrich Wilhelm | 17,082 |
| Arabic ... | 15,801 | CIeveland | 16,960 |
| Laυrentic | 14,892 | Deutschland . . . . | 16,502 |
| Megantic | 14.878 | Cincinnati | 16,339 |
| Minnewaska | I4.3I7 | Kronprinz Wilhelm | 14,908 |
| Saxonia  Empress of Ireland | 14,281 | Kaiser Wilhelm der Grosse | 14.349 |
| 14,191 |  | 261,341 |
| Empress of Britain | 14.189 | 8 other vessels of 12,000- |
| lvernia | 14,067 | 103,435 |
| 14,000 tons .... |
|  | 326,945  317.358 |
| 25 other vessels of 12,000-14,000 tons | 22 ships. Total | 364.776 |
| *Belgian.*  Lapland  Finland |  |
| 42 vessels. Total 644,303 | | 17.540  12.185 |
| *Dutch.*  Rotterdam | 24u49 | Kroonland .  Vaderland | 12,185  12,018 |
| 4 ships. Total | 53.928 |
| Niew Amsterdam Noordam . . '. | 16,967  12,531  12,527 |
| Rijndam | *French.* |  |
| Potsdam | 12,522 | La Provence . . . .  Espagne | 13.753  13,600 |
| 5 ships. Total . | 78,696 |
| 2 ships. Total | 27f353 |
| *American.* |  |
| Minnesota @@2 | 20,718 | *Japanese.* |  |
| Manchuria | 13.639 | Tenyo Maru@@8 . . . | 13.454 |
| Mongolia | 13.639 | Chiyo Maru . . . . | 13.426 |
| 3 ships. Total . | 47.996 | *2* ships. Total | 26,880 |

|  |  |  |  |
| --- | --- | --- | --- |
| *Summary.* | | | |
| Country. | Ships in No. | Gross 'Tonnage. | Average (Tons). |
| British | 42 | 644.303 | IS,341 |
| German . | 22 | 364.776 | 16,581 |
| Dutch | 5 | 78,696 | 15,739 |
| Belgian . | 4 | 53.928 | 13,482 |
| American | 3 | 47.996 | 15,999 |
| French | 2 | 27,353 | 13,676 |
| Japanese | 2 | 26,880 | 13.440 |
| Grand Total | 80 | If243,932 | 15,549 |

*Atlantic Liners.*—The Atlantic liners running between Europe and the United States of America are the best known of all ocean liners ; they exhibit the highest attainment of excellence in merchant-ship building, and their great size and speed, and continuous rivalry, excite universal interest.

Particulars of the famous liners which have had a share in the development of the trans-Atlantic service from 1819 to 1900 are given in Table XII., some of which is taken from *The Atlantic Ferry* by A. J. Maginnis. The “ Persia ” (fig. 22, Plate IV.) was the first iron steamer to be placed on the Atlantic service by the Cunard Company (1856). She was followed two years later by the “ Great Eastern,” 688 ft. long, 82∙8 ft. broad, 48∙2 ft. depth and 32,160 tons displacement with a gross tonnage of 18·915 tons and 11,000 H.P., giving her a speed of 13 knots by paddle-wheels and screw. She was built from designs by I. K. Brunel, and remained the

largest vessel afloat until the “ Cedric ” was built 45 years later. Fig. 23 is the “ City of Rome,” built in 1881 at Barrow for the Inman Line, one of the most graceful vessels placed on the Atlantic. The “ Campania ” (fig. 24) and her sister-ship the “ Lucania,” each 600 ft. long and built in 1893 for the Cunard Company by the Fairfield Shipbuilding Company, held the record for fast passages across the Atlantic for several years. With twin screws and triple-expansion engines they attained a speed of 23⅛ knots on trial with 31,050 I.H.P. On her best runs the “ Lucania ” crossed the Atlantic, 2823 nautical miles, in 5 days 8 hours 38 minutes, the mean speed being *22* knots for the run, maintained with a consumption of coal amounting to *20½* tons an hour.

In the ’fifties the Collins Line took the record for speed to America, but, apart from that, the competition was chiefly between British companies until 1897, when the “ Kaiser Wilhelm der Grosse ” made a better record than the “ Campania ” or “ Lucania,” and for ten years from that date the fastest vessels were in German hands. The “ Deutschland ” (fig. 25, Plate V.), built at Stettin for the Hamburg- American Line, took the record in 1900, traversing the Atlantic from New York to the Eddystone in 5 days 17 hours 28 minutes, at a mean speed of 23∙36 knots. The North German Lloyd Co. added three splendid vessels: the “ Kronprinz Wilhelm ” in 1901, the “ Kaiser Wilhelm II.” in 1902, and the “ Kronprinzessin Cecilie” in 1906, the machinery being respectively of 35,000, 42,000 and 45,000 I.H.P. and forming the finest series of reciprocating engines ever built for ships. The “ Kaiser Wilhelm IL” raised the record on the homeward run to 23∙71 knots, and made practically the same speed as the “ Deutschland ” on the outward run, viz. 23∙12 knots. The “ Kron- prinzessin Cecilie ” (fig. 26, Plate VI.) raised the outward record to 23∙21 knots, and homeward her best passage was at 23·58 knots.

In 1903 the British government made an agreement with the Cunard Company under which two vessels of 24 to 25 knots speed across the Atlantic were to be built for mail and passenger service, and to be available for the use of the Admiralty in time of war. In accordance with this agreement the “ Mauretania ” (fig. 27, Plate VI.) was built by Swan, Hunter, Wigham Richardson & Co., and the “ Lusitania ” by John Brown *& Co.,* and both were supplied with Parsons turbines of 70,000 H.P. driving four screws. The latter vessel was the first on service in 1907, and at once regained for Great Britain the Atlantic record, the “ Mauretania ” following a little later and doing still better. Both vessels maintained very high speeds, and steadily improved their records, until the “ Mauretania ” averaged 26∙06 knots and the “ Lusitania ” 25∙85 knots on the passage. They are 790 ft. long overall, of 88 ft. beam, 57 ft. moulded depth, 42,000 tons displacement on a draught of 33½ ft. and of 32,000 tons gross tonnage. They are thus 100 ft. longer, 5 ft. wider, 6000 tons more displacement and of 70% greater gross tonnage than the "Great Eastern.” Figure 28 is a section of the “ Mauretania,” which shows clearly the great height of the decks.

The French liner “ La Provence ” was built in 1905, of 13,753 tons gross, and 22 knots speed. On her displacement of 19,160 tons she must carry about 3500 tons of coal for the voyage, which leaves a margin of about 900 tons for passengers and cargo. The “ France,” launched September 10, is of 23,000 tons, 45,000 H.P. and 23½ knots. A notable tendency in recent years is to build vessels of great size to run at more moderate speeds. The American liners “ St Louis ” and “ St Paul ” (fig. 29, Plate VII.), built in 1895, are of 11,630 tons gross and 21 knots; while the “ Finland ” and Kroonland,” built in America in 1902, are of 12,185 tons and only 16 knots. The last-named vessels are now running under the Belgian flag (see Table XII.). The“ Caronia ’’and“ Carmania,” built by the Cunard Company in 1905, furnished evidence of the advantage of the turbine for Atlantic liners, and also illustrate the gain due to a lower speed. Their dimensions are given in Table XII.; as compared with “ La Provence ” it will be seen that they are of 12,000 tons greater displacement, 2 knots less speed and 10,000 less H.P. Allowing for the voyage two-thirds the quantity of coal carried by “ La Provence,” these vessels thus have a margin of about 10,000 tons compared with the 900 tons of that vessel, so that a much larger quantity of cargo maybe taken when required. The “ Rotterdam,” of 24,170 tons gross tonnage, can load *to* a displacement of 37,200 tons. Her speed is 17 knots; the reduction of engine-power gives space and weight for no less than 3585 passengers and nearly 13,000 tons of cargo after allowing for accommodation of crew and for coal, water and stores for the voyage. The second “ Oceanic,” of 17,274 tons (fig. 30, Plate V.), built in 1899 for the White Star Company, was the largest vessel then built and had 21∙5 knots speed; she was followed by the “ Celtic,” “ Cedric,” “ Baltic ” and “ Adriatic ” for the same company, of 16 to 18 knots speed and size increasing up to nearly 25,000 tons gross. These vessels each carry about 3000 passengers as well as a crew of 350 and upwards, and very large cargoes. The “ Adriatic ” (fig. 31, Plate VII.) is of 24,541 tons gross, 30% greater tonnage than the “Great Eastern.” The“ Titanic ’’and “ Olympic,” which in 1910 were in course of building by Harland & Wolff for the White Star Line, are not only much larger than the “ Adriatic,” but they are 90 ft. longer, of 13,000 tons greater tonnage and of. 18,000 tons greater displacement than the “ Mauretania ”; a combination of reciprocating and turbine machinery of 50,000 H.P. is provided for driving the vessels at a speed of 21 knots.

@@@1 “ Titanic,” launched October 10, 43,500 tons.

@@@2 Sister vessel “ Dakota ” was lost on Japan coast March 1907.

@@@3 A third vessel of same size was being completed.