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RMS Titanic was a British passenger liner that sank in the North Atlantic Ocean on 15 April 1912 after colliding with an iceberg during her maiden voyage from Southampton, UK to New York City, US. The sinking of Titanic caused the deaths of more than 1,500 people in one of the deadliest peacetime maritime disasters in modern history. The RMS Titanic was the largest ship afloat at the time it entered service. Titanic was the second of three Olympic class ocean liners operated by the White Star Line, and was built by the Harland and Wolff shipyard in Belfast with Thomas Andrews as her naval architect. Andrews was among those lost during the sinking. On her maiden voyage, she carried 2,224 passengers and crew.

Under the command of Edward Smith, the ship's passengers included some of the wealthiest people in the world, as well as hundreds of emigrants from Great Britain and Ireland, Scandinavia and elsewhere throughout Europe seeking a new life in North America. The ship was designed to be the last word in comfort and luxury, with an on-board gymnasium, swimming pool, libraries, high-class restaurants and opulent cabins. A wireless telegraph provided for the convenience of passengers as well as for operational use. Though Titanic had advanced safety features such as watertight compartments and remotely activated watertight doors, there were not enough lifeboats to accommodate all of those aboard due to outdated maritime safety regulations. Titanic only carried enough lifeboats for 1,178 peopleâ€"slightly more than half of the number on board, and one-third her total capacity.

After leaving Southampton on 10 April 1912, Titanic called at Cherbourg in France and Queenstown (now Cobh) in Ireland before heading westwards towards New York.[2] On 14 April 1912, four days into the crossing and about 375 miles (604 km) south of Newfoundland, she hit an iceberg at 11:40 pm ship's time. The glancing collision caused Titanic's hull plates to buckle inwards along her starboard side and opened five of her sixteen watertight compartments to the sea; the ship gradually filled with water. Meanwhile, passengers and some crew members were evacuated in lifeboats, many of which were launched only partly loaded. A disproportionate number of men were left aboard because of a "women and children first" protocol followed by some of the officers loading the lifeboats.[3] By 2:20 AM, she broke apart and foundered, with well over one thousand people still aboard. Just under two hours after Titanic foundered, the Cunard liner RMS Carpathia arrived on the scene of the sinking, where she brought aboard an estimated 705 survivors.

The disaster was greeted with worldwide shock and outrage at the huge loss of life and the regulatory and operational failures that had led to it. Public inquiries in Britain and the United States led to major improvements in maritime safety. One of their most important legacies was the

establishment in 1914 of the International Convention for the Safety of Life at Sea (SOLAS), which still governs maritime safety today. Additionally, several new wireless regulations were passed around the world in an effort to learn from the many missteps in wireless communicationsâ€"which could have saved many more passengers.[4] Many of the survivors lost all of their money and possessions and were left destitute; many families, particularly those of crew members from Southampton, lost their primary bread-winners. They were helped by an outpouring of public sympathy and charitable donations. Some of the male survivors were accused of cowardice for leaving the ship while people were still on board; the White Star Line's chairman, J. Bruce Ismay, faced social ostracism for the rest of his life.

The wreck of Titanic remains on the seabed, split in two and gradually disintegrating at a depth of 12,415 feet (3,784 m). Since her discovery in 1985, thousands of artefacts have been recovered and put on display at museums around the world. Titanic has become one of the most famous ships in history, her memory kept alive by numerous books, folk songs, films, exhibits, and memorials.

The name Titanic was derived from Greek mythology and meant gigantic. Built in Belfast, Ireland, in the United Kingdom of Great Britain and Ireland (as it then was), the RMS Titanic was the second of the three Olympic-class ocean linersâ€"the first was the RMS Olympic and the third was the HMHS Britannic.[5] They were by far the largest vessels of the British shipping company White Star Line's fleet, which comprised 29 steamers and tenders in 1912.[6] The three ships had their genesis in a discussion in mid-1907 between the White Star Line's chairman, J. Bruce Ismay, and the American financier J. P. Morgan, who controlled the White Star Line's parent corporation, the International Mercantile Marine Co. (IMM).

The White Star Line faced a growing challenge from its main rivals Cunard, which had just launched the Lusitania and the Mauretaniaâ€" the fastest passenger ships then in service â€" and the German lines Hamburg America and Norddeutscher Lloyd. Ismay preferred to compete on size rather than speed and proposed to commission a new class of liners that would be bigger than anything that had gone before as well as being the last word in comfort and luxury.[7] The company sought an upgrade in their fleet primarily in response to the Cunard giants but also to replace their oldest pair of passenger ships still in service, being the SS Teutonic of 1889 and SS Majestic of 1890. Teutonic was replaced by Olympic while Majestic was replaced by Titanic. Majestic would be brought back into her old spot on White Star's New York service after Titanic's loss.[citation needed]

The ships were constructed by the Belfast shipbuilders Harland and Wolff, who had a long-established relationship with the White Star Line dating back to 1867.[8] Harland and Wolff were given a great deal of latitude in designing ships for the White Star Line; the usual approach was for the latter to sketch out a general concept which the former would take away and turn into a ship design. Cost considerations were relatively low on the agenda and Harland and Wolff was authorised to spend what it needed on the ships, plus a five percent profit margin.[8] In the case of the Olympic-class ships, a cost of £3 million for the first two ships was agreed plus "extras to contract" and the usual five percent fee.[9]

Harland and Wolff put their leading designers to work designing the Olympic-class vessels. The design was overseen by Lord Pirrie, a director of both Harland and Wolff and the White Star Line; naval architect Thomas Andrews, the managing director of Harland and Wolff's design department; Edward Wilding, Andrews' deputy and responsible for calculating the ship's design, stability and trim; and Alexander Carlisle, the shipyard's chief draughtsman and general manager.[10] Carlisle's responsibilities included the decorations, equipment and all general arrangements, including the implementation of an efficient lifeboat davit design.[a]

On 29 July 1908, Harland and Wolff presented the drawings to J. Bruce Ismay and other White Star Line executives. Ismay approved the design and signed three "letters of agreement" two days later authorising the start of construction.[13] At this point the first shipâ€"which was later to become Olympicâ€"had no name, but was referred to simply as "Number 400", as it was Harland and Wolff's four hundredth hull. Titanic was based on a revised version of the same design and was given the number 401.[14]

The Boat Deck, on which the lifeboats were housed. It was from here during the early hours of 15 April 1912 that Titanic's lifeboats were lowered into the North Atlantic. The bridge and wheelhouse were at the forward end, in front of the captain's and officers' quarters. The bridge stood 8 feet (2.4 m) above the deck, extending out to either side so that the ship could be controlled while docking. The wheelhouse stood directly behind and above the bridge. The entrance to the First Class Grand Staircase and gymnasium were located midships along with the raised roof of the First Class lounge, while at the rear of the deck were the roof of the First Class smoke room and the relatively modest Second Class entrance. The wood-covered deck was divided into four segregated promenades; for officers, First Class passengers, engineers and Second Class passengers respectively. Lifeboats lined the side of the deck except in the First Class area, where there was a gap so that the view would not be spoiled.[17][18]

B Deck, the Bridge Deck, was the top weight-bearing deck and the uppermost level of the hull. More First Class passenger accommodation was located here with six palatial staterooms (cabins) featuring their own private promenades. On Titanic, the A La Carte Restaurant and the Café Parisien provided luxury dining facilities to First Class passengers. Both were run by subcontracted chefs and their staff; all were lost in the disaster. The Second Class smoking room and entrance hall were both located on this deck. The raised forecastle of the ship was forward of the Bridge Deck, accommodating Number 1 hatch (the main hatch through to the cargo holds), numerous pieces of machinery and the anchor housings.[b] Aft of the Bridge Deck was the raised Poop Deck, 106 feet (32 m) long, used as a promenade by Third Class passengers. It was where many of Titanic's passengers and crew made their last stand as the ship sank. The forecastle and Poop Deck were separated from the Bridge Deck by well decks.[19][20]

C Deck, the Shelter Deck, was the highest deck to run uninterrupted from stem to stern. It included both well decks; the aft one served as part of the Third Class promenade. Crew cabins were housed below the forecastle and Third Class public rooms were housed below the Poop Deck. In between were the majority of First Class cabins and the Second Class library.[19][21]

D Deck, the Saloon Deck, was dominated by three large public roomsâ€"the First Class Reception Room, the First Class Dining Saloon and the Second Class Dining Saloon. An open space was provided for Third Class passengers. First, Second and Third Class passengers had cabins on this deck, with berths for firemen located in the bow. It was the highest level reached by the ship's watertight bulkheads (though only by eight of the fifteen bulkheads).[19][22]

E Deck, the Upper Deck, was predominantly used for passenger accommodation for all three classes plus berths for cooks, seamen, stewards and trimmers. Along its length ran a long passageway nicknamed Scotland Road, in reference to a famous street in Liverpool. Scotland Road was used by Third Class passengers and crew members. [19][23]

G Deck, the Lower Deck, was the lowest complete deck that carried passengers, and had the lowest portholes, just above the waterline. The squash court was located here along with the travelling post office where mail clerks sorted letters and parcels so that they would be ready for delivery when the ship docked. Food was also stored here. The deck was interrupted at several points by orlop (partial) decks over the boiler, engine and turbine rooms.[19][24]

The Orlop Decks and the Tank Top were on the lowest level of the ship, below the waterline. The orlop decks were used as cargo spaces, while the Tank Topâ€"the inner bottom of the ship's hullâ€"provided the platform on which the ship's boilers, engines, turbines and electrical generators were housed. This area of the ship was occupied by the engine and boiler rooms, areas which passengers would not be permitted to see. They were connected with higher levels of the ship by flights of stairs; twin spiral stairways near the bow provided access up to D Deck.[19][24]

Titanic was equipped with three main enginesâ€"two reciprocating four-cylinder, triple-expansion steam engines and one centrally placed low-pressure Parsons turbineâ€"each driving a propeller. The two reciprocating engines had a combined output of 30,000 hp and a further 16,000 hp was

contributed by the turbine.[15] The White Star Line had used the same combination of engines on an earlier liner, the SS Laurentic, where it had been a great success.[26] It provided a good combination of performance and speed; reciprocating engines by themselves were not powerful enough to propel an Olympic-class liner at the desired speeds, while turbines were sufficiently powerful but caused uncomfortable vibrations, a problem that affected the all-turbine Cunard liners Lusitania and Mauretania.[27] By combining reciprocating engines with a turbine, fuel usage could be reduced and motive power increased, while using the same amount of steam.[28]

The two reciprocating engines were each 63 feet (19 m) long and weighed 720 tons, with their bedplates contributing a further 195 tons.[27] They were powered by steam produced in 29 boilers, 24 of which were double-ended and 5 single-ended, which contained a total of 159 furnaces.[29] The boilers were 15 feet 9 inches (4.80 m) in diameter and 20 feet (6.1 m) long, each weighing 91.5 tons and capable of holding 48.5 tons of water.[30]

They were heated by burning coal, 6,611 tons of which could be carried in Titanic's bunkers with a further 1,092 tons in Hold 3. The furnaces required over 600 tons of coal a day to be shovelled into them by hand, requiring the services of 176 firemen working around the clock.[31] 100 tons of ash a day had to be disposed of by ejecting it into the sea.[32] The work was relentless, dirty and dangerous, and although firemen were paid relatively generously[31] there was a high suicide rate among those who worked in that capacity.[33]

Exhaust steam leaving the reciprocating engines was fed into the turbine, which was situated aft. From there it passed into a condenser, to increase the efficiency of the turbine and so that the steam could be condensed back into water and reused.[34] The engines were attached directly to long shafts which drove the propellers. There were three, one for each engine; the outer (or wing) propellers were the largest, each carrying three blades of manganese-bronze alloy with a total diameter of 23.5 feet (7.2 m).[30] The middle propeller was slightly smaller at 17 feet (5.2 m) in diameter,[35] and could be stopped but not reversed.

Titanic's electrical plant was capable of producing more power than an average city power station of the time.[36] Immediately aft of the turbine engine were four 400 kW steam-driven electric generators, used to provide electrical power to the ship, plus two 30 kW auxiliary generators for emergency use.[37] Their location in the stern of the ship meant that they remained operational until the last few minutes before the ship sank.[38]

The interiors of the Olympic-class ships were subdivided into sixteen primary compartments divided by fifteen bulkheads which extended well above the waterline. Eleven vertically closing watertight doors could seal off the compartments in the event of an emergency.[39] The ships' exposed decking was made of pine and teak, while interior ceilings were covered in painted granulated cork to combat condensation.[40] Standing above the decks were four funnels, each painted buff with black tops, though only three were functionalâ€"the last one was a dummy, installed for aesthetic purposesâ€"and two masts, each 155 feet (47 m) high, which supported derricks for working cargo.

Titanic's rudder was large enoughâ€"at 78 feet 8 inches (23.98 m) high and 15 feet 3 inches (4.65 m) long, weighing over 100 tonsâ€"that it required steering engines to move it. Two steam-powered steering engines were installed though only one was used at any one time, with the other one kept in reserve. They were connected to the short tiller through stiff springs, to isolate the steering engines from any shocks in heavy seas or during fast changes of direction.[41] As a last resort, the tiller could be moved by ropes connected to two steam capstans.[42] The capstans were also used to raise and lower the ship's five anchors (one port, one starboard, one in the centreline and two kedging anchors).[42]

The ship was equipped with her own waterworks, capable of heating and pumping water to all parts of the vessel via a complex network of pipes and valves. The main water supply was taken aboard while Titanic was in port, but in an emergency the ship could also distil fresh water from seawater, though this was not a straightforward process as the distillation plant quickly became clogged by salt deposits. A network of insulated ducts conveyed warm air, driven by electric fans, around the ship,

and First Class cabins were fitted with additional electric heaters.[36]

Titanic was equipped with two 1.5 kW spark-gap wireless telegraphs located in the radio room on the Boat Deck, in the Officers' quarters. One set was used for transmitting messages and the other, located in a soundproofed booth called the "Silent Room", for receiving them. The signals were transmitted through two parallel wires strung between the ship's masts, 50 feet (15 m) above the funnels to avoid the corrosive smoke.[36] The system was one of the most powerful in the world, with a range of up to 1,000 miles (1,609 km).[43] It was owned and operated by the Marconi Company rather than the White Star Line, and was intended primarily for passengers rather than ship operations. The function of the two wireless operatorsâ€"both Marconi employeesâ€"was to operate a 24-hour service sending and receiving wireless telegrams for passengers. They did, however, also pass on professional ship messages such as weather reports and ice warnings.[44]

The passenger facilities aboard Titanic aimed to meet the highest standards of luxury. According to Titanic's general arrangement plans, the ship could accommodate 833 First Class Passengers, 614 in Second Class and 1,006 in Third Class, for a total passenger capacity of 2,453. In addition, her capacity for crew members exceeded 900, as most documents of her original configuration have stated that her full carrying capacity for both passengers and crew was approximately 3,547. Her interior design was a departure from that of other passenger liners, which had typically been decorated in the rather heavy style of a manor house or an English country house.[45]

Titanic was laid out in a much lighter style similar to that of contemporary high-class hotelsâ€"the Ritz Hotel was a reference pointâ€"with First Class cabins finished in the Empire style.[45] A variety of other decorative styles, ranging from the Renaissance to Victorian, were used to decorate cabins and public rooms in First and Second Class areas of the ship. The aim was to convey an impression that the passengers were in a floating hotel rather than a ship; as one passenger recalled, on entering the ship's interior a passenger would "at once lose the feeling that we are on board ship, and seem instead to be entering the hall of some great house on shore".[46]

Passengers could use an on-board telephone system, a lending library and a large barber shop.[47] The First Class section had a swimming pool, a gymnasium, a squash court, a Turkish bath, an electric bath and a Verandah Cafe.[46] First Class common rooms were adorned with ornate wood panelling, expensive furniture and other decorations, while the Third Class general room had pine panelling and sturdy teak furniture.[48] The Café Parisien was located on a sunlit veranda fitted with trellis decorations and offered the best French haute cuisine for First Class passengers.[49]

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