BOILER EXPLOSIONS ACTS, 1882 AND 1890.

REPORT OF PRELIMINARY INQUIRY. (No. 2360.)

(Price—TWOPENCE.)

(Printed by BARCLAY & FRY, LTD., The Grove, Southwark Street, S.E.

Explosion from a Main Steam Pipe.

The pipe which gave way was made of copper, having a brazed longitudinal seam on the upper side, and was fitted with a brass flange brazed on each end, the pipe being in the form of a right-angled bend. It was one of two lengths used for conducting steam from the port main boiler to the main engines. The pipe was $5\frac{3}{4}$ inches in internal diameter $\frac{1}{4}$ inch in thickness, and 6 feet 3 inches long, over all. The flanges were $12\frac{1}{4}$ inches in diameter by $1\frac{1}{4}$ inches in thickness, each having 10 bolt holes, $\frac{15}{16}$ inch in diameter.

The steam pipe was periodically examined by a surveyor to Lloyd's Register. It was last examined by a surveyor in December, 1913, when it was taken down, annealed, and tested by hydraulic pressure to 350 lb. per square inch. It was also examined under steam in November, 1914, by the second engineer of the vessel. The pipe fractured circumferentially for a length of about 16 inches, close to the flange which was jointed to the Y-piece on the engine stop valve chest, and, through the opening thus formed, the steam escaped into the engine room until the boiler stop valves were closed, the pressure at the time being 160 lb. per square inch. The explosion was caused by the pipe being unable to withstand the stresses set up by the violent racing of the engines, and consequent vibration, during very heavy weather.

The steamer is a single screw, cargo vessel of 2,787 tons register, and was built in 1905. She is fitted with a set of triple-expansion engines, having cylinders 25 inches, 41 inches, and 67 inches in diameter, and a stroke of 48 inches. Steam is supplied by two main boilers of the usual single-ended type, working at a pressure of 175 lbs. per square inch. The engine stop valve chest is on the port side of the high-pressure engine-valve casing, and the main steam pipes from the port and starboard boilers are jointed to a Y-piece fitted on the engine stop

valve chest. The vessel left Glasgow on November 25th, 1914, bound for New Orleans, in ballast. Very heavy weather was experienced from the time of entering the Firth of Clyde, the engines racing violently and setting up considerable vibration. In consequence of this, the chief engineer reduced the boiler pressure to 160 lb. per square inch, and arranged for 6-hour watches to be taken by the engineers, there being two engineers on each watch, one of whom was standing by the throttle valve continuously. About 9 a.m. on November 30th, the second engineer noticed a slight leakage of steam coming from the port main steam pipe close to the flange which joined the Y-piece on the engine stop valve chest, and an examination showed that the pipe was slightly fractured on the under side. In order to prevent the fracture extending, and to stop the leakage, a substantial clamp was fitted round the neck of the pipe, and further along the pipe a bridle was fitted securely to the pipe and to the engine stop valve chest, to try and avoid a sudden rupture, and prevent the pipe drawing away from the flange. The escape of steam, however, gradually increased until 9.40 p.m. on December 3rd, when it had become so great that the vessel was stopped and steam was shut off. It was then found that the pipe had fractured almost completely round the neck, there being only about $2\frac{1}{2}$ inches of sound metal left on the top. This length of pipe was taken off, a blank flange was fitted on the Y-piece, and the port boiler was shut off, the vessel proceeding, after a stoppage of about 3 hours, with steam on the starboard boiler only, towards the Azores. St. Michael was reached on December 8th, and the pipe which failed was sent on shore, where the fractured portion was cut off, the flange re-brazed on the pipe, and it was then satisfactorily tested by hydraulic pressure to 330 lb. per square inch. The pipe was then re-fitted in place, a brass distance piece, $1\frac{3}{4}$ inches in thickness, being fitted between the flanges to make up for the piece cut off. The vessel left the Azores on December 11th for New Orleans, thence proceeding to Havre, and the Tyne, arriving in the latter on March 13th last, and during this time no further trouble was experienced. From the evidence of the first engineer, who examined the pipe on shore after it had been cut, there does not appear to have been any latent defect in the material. A new pipe has been ordered, but had not been fitted when the vessel left the Tyne.