



BOILER EXPLOSIONS ACTS, 1882 and 1890

REPORT OF PRELIMINARY INQUIRY (No. 3340)

Explosion from a Port Main Boiler on board the s.s. "BURMOUNT," O.N. 172789

Ministry of Transport,
Marine Surveyors' Office,
35, Seething Lane,
London, E.C.3.
9th August, 1949

Sir,

In accordance with the terms of my appointment, I have held a preliminary inquiry with regard to the above-mentioned explosion and have to report as follows:—

Date and place of the explosion

The explosion occurred at 5.40 p.m. on the 9th December, 1948, whilst the vessel was in the River Thames off Gravesend, proceeding to sea.

Name and address of the owners

The vessel was owned by the Gowan Shipping Company Limited, 15 St. Helens Place, London, E.C.3.

Persons killed or injured

No person was killed or injured.

Description and principal dimensions of the boiler

The boiler was of the single-ended cylindrical multi-tubular wet bottom marine type, 14 feet 6 inches outside diameter, 11 feet 9 inches in length over-all, and designed for a working pressure of 220 pounds per square inch. It was fitted with three corrugated furnaces of the Morison type, 3 feet 4 inches internal diameter and $\frac{5}{8}$ inch thick, arranged for coal firing with Howden's forced draught system. The boiler contained a total of 285 smoke tubes, 3 inches in external diameter, of which 105 were stay tubes. The usual mountings were provided and included a water gauge of the hollow column type connected in the usual manner to steam and water double-shut off cocks. These were of the right angled type and located, respectively, at the top and lower part of the end plate: the gauge was visible in the engine room. In addition, test cocks mounted directly on the boiler back plate were provided.

This boiler was one of three in the boiler room and was located on the port side aft of the firing platform, the other two boilers being situated one on the centre line of the vessel, and the other at the starboard side. The backs of the boilers formed part of the forward screen bulkhead of the engine room. The main and auxiliary feed check valves were attached to the back plate and were operated in the engine room.

Name of the makers and age of the boiler

The boiler was made by the Hong Kong & Whampoa Dock Company of Hong Kong in 1941. It was therefore 7 years old at the time of the explosion.

Particulars and dates of repairs

No major repairs appear to have been carried out to the boiler other than the usual voyage and routine maintenance repairs from time to time.

At London, prior to the explosion, the repairs to the boiler included:—

- (a) Caulking of a number of saddle rivets and re-caulking of the landing edge in way in the centre combustion chamber.
- (b) Various tubes expanded.
- (c) All test cocks completely dismantled and cleared.

Companies or Societies who have inspected the boiler

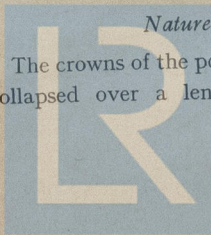
The boiler was inspected by the Surveyors to the British Corporation Register of Shipping and Aircraft, the last occasion prior to the explosion being on 9th December, 1948, when the safety valves were adjusted on all boilers.

Companies or Societies with whom the boiler was insured at the time of the explosion

The boiler, at the time of the explosion, was separately insured by Lloyd's Underwriters through Alfred Blackmore & Company Limited, 52 Leadenhall Street, E.C.3.

Nature of the explosion

The crowns of the port and starboard wing furnaces collapsed over a length of approximately 4 feet



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6 inches; the port furnace ruptured at a point 2 feet 6 inches from the back end where distortion had reached a depth of 21 inches. The rupture was 1 foot 3 inches long measured circumferentially, and opened to a maximum breadth of 1½ inches. The contents of the boiler escaped, the greater part into the uptakes, little damage being done to the front of the boiler; no one was injured.

Water was not discharged from the furnace in any appreciable quantity.

The crown of the starboard furnace collapsed to a maximum depth of 18¾ inches, but did not rupture. Plate I shows the damage to the port furnace, and Plate III shows the general arrangement of the boiler and details of the failures.

Cause of the explosion

The explosion was due to the boiler becoming short of water while normal firing was continued, with the result that the port and starboard wing furnace crowns became over-heated and distorted. The port furnace eventually failed, as described.

General remarks

The *Burmout* was built by the Hong Kong & Whampoa Dockyard Company Limited, in 1941, to Ministry of War Transport account, and was named "Empire Moonrise". She was a single-screw steel cargo vessel of 4,768 gross tons. The vessel was managed for the Ministry by Sir R. Ropner & Company Limited, until 1943, when the management was transferred to J. D. McLaren of 22 St. Mary Axe, E.C.3, who continued to manage her until 11th December, 1945, when she was bought by Gowan Shipping Company Limited, and was re-named "Hartland Point", J. D. McLaren continuing the management. On 12th February, 1947, the management of the vessel was transferred to the Burness Shipping Company Limited, 15 St. Helen's Place, E.C.3, and the vessel's name changed to *Burmout*.

The propelling machinery consisted of a set of triple expansion engines supplied with steam at 220 pounds per square inch by three single-ended boilers. The engines which developed 2,300 indicated horse power at 75 revolutions per minute, were situated amidships.

The vessel reached London, the terminal port, on 16th October, 1948, and after discharging cargo, machinery repairs were commenced. These included the cleaning and opening up of all boilers and mountings for inspection by the Classification Society's Surveyor. The steam and water breast cocks on the water gauge column of the port boiler were inspected by the Classification Surveyor at the time of his inspection of the boiler. They were of the right-angled type, the flange of the pipe connection provided for the column being at right angles to the flange connected to the back plate of the boiler. The plug, housed in the breast cock chest, was provided with two ports, also at right angles, their position being marked by the orthodox right-angled marking on the top of the square provided to receive the handle.

Evidence both from the surveyor who inspected the breast cocks and from the contractor's workman who overhauled them confirms that the cock was correctly marked, but that the marks were not fully defined and required to be slightly re-cut. The repairs to the port boiler were completed by the 30th November, when the lower manhole doors were fitted in place and the boiler partially filled through the top manhole to the level of the scum valve. The boiler remained in this condition until the 7th December, when the filling of the boiler was completed by means of a hose through the top manhole, to the proper working level; the level in the water gauge glass being checked against the level of the water in the boiler before the manhole door was put in place. The filling of the boiler and the checking of the water level was supervised by the chief engineer, who also looked at the steam and water breast cocks on the water gauge mountings on the port boiler. He observed that the steam breast cock plug on the mounting of the port boiler had three marks instead of the orthodox two right-angled marks, but attached no importance to this.

The raising of steam on the port boiler was commenced on the morning of the 7th December, 1948, and was continued until the morning of the 9th December, when all boilers were coupled together at 10 a.m.; the steam pressure at the time the boilers were coupled was approximately 120 pounds per square inch. Steam was admitted at the same time to the main engines for the purpose of warming through, and watches were set; the watch until noon was kept by the fourth engineer.

At approximately mid-day, the safety valves on all boilers were adjusted to lift at the designed working pressure, under the supervision of the Surveyor and in the presence of the Company's Superintendent Engineer.

After the safety valves had been adjusted, the third engineer remained in charge of the engine room and was relieved by the second engineer at 4 p.m. The second engineer, on taking over the watch, appears to have remarked on the high water levels in all the water gauge glasses and ascertained that the check valves at the time were set as follows:—

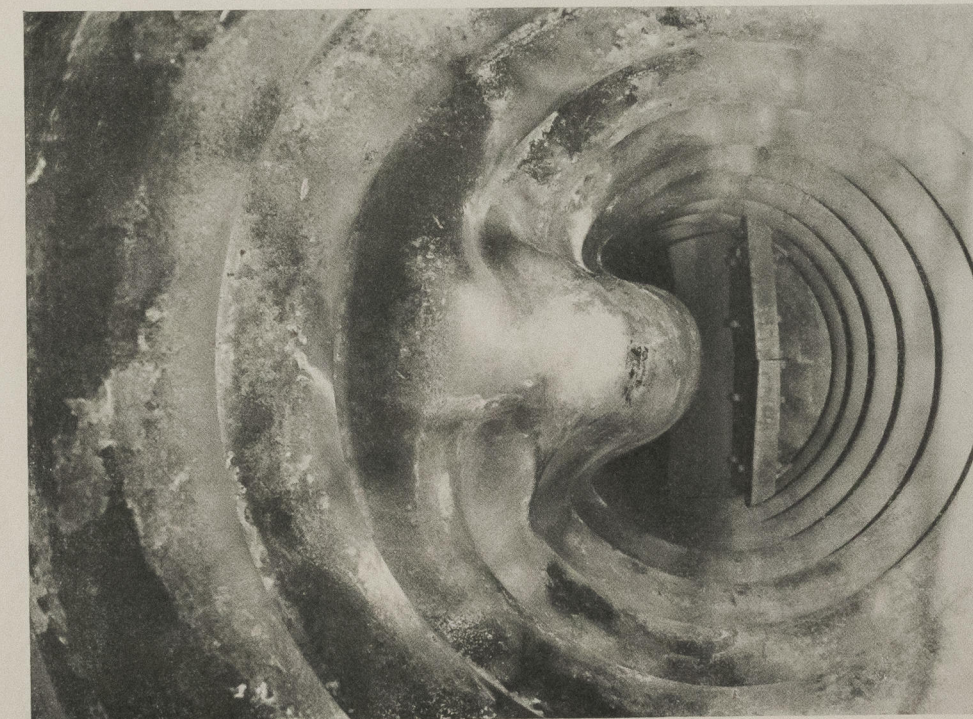
Port boiler	Valve just off face.
Starboard boiler	2 turns open.
Centre boiler	2 turns open.

The second engineer apparently had no reason to doubt the levels of the water in the water gauge glasses, and did not take any steps to check the levels.

The vessel left the berth and proceeded into the river, leaving the Tilbury Docks at approximately 4.50 p.m. on the 9th December. Whilst proceeding down the river, the explosion took place.

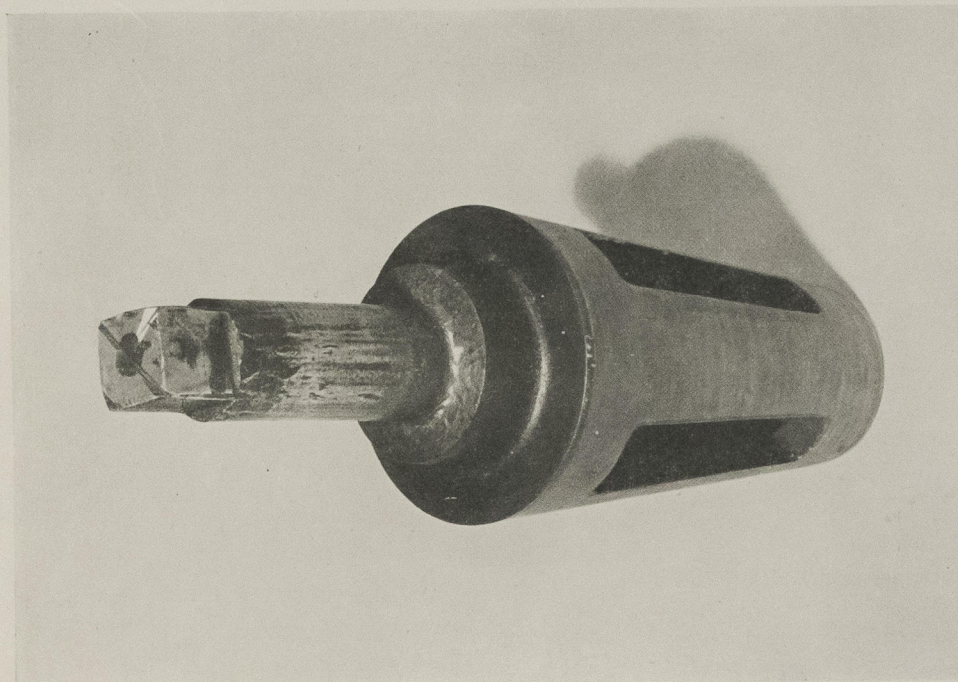
The stokehold, and to a lesser degree the engine room, was filled with vapour, and after this had cleared slightly, the chief and second engineers made their way on to the top of the boiler and closed the boiler steam stop valve.

(REPORT No. 3340) EXPLOSION FROM A MAIN BOILER ON BOARD S.S. "BURMOUNT" O.N. 172789.



PORT FURNACE.

PLATE I.

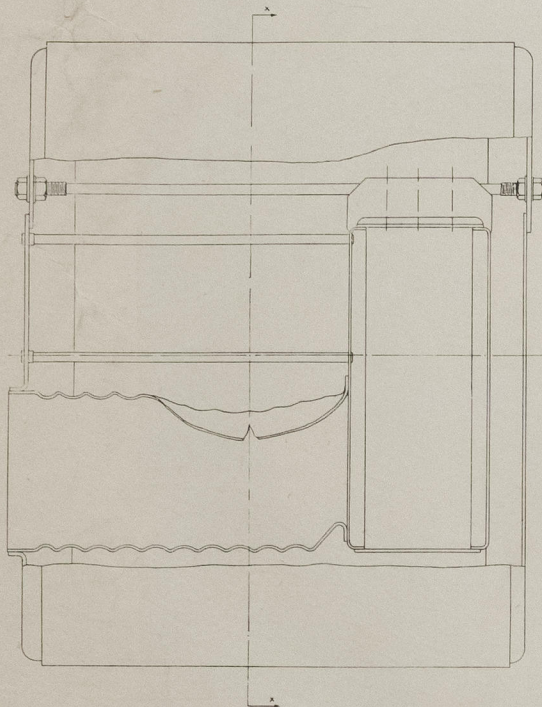


DETAIL OF MARKING ON BREAST COCK PLUG
ON STEAM END.

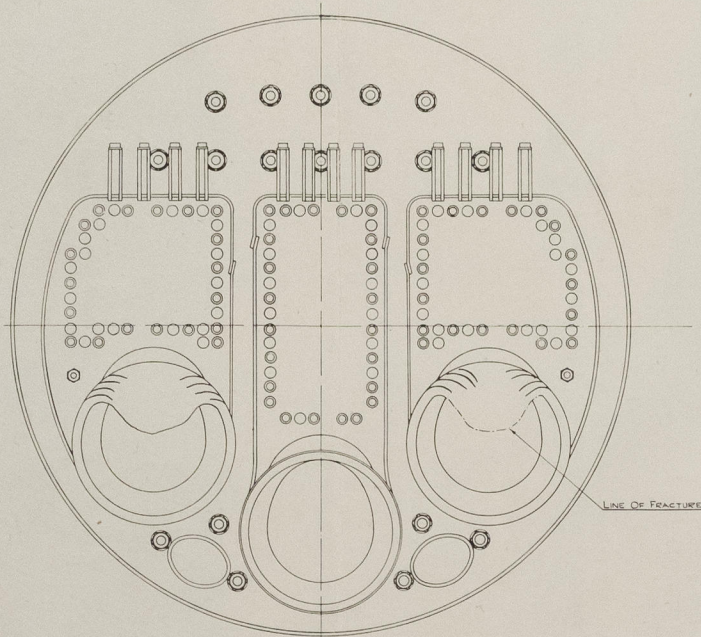
PLATE II.

(REPORT No. 3340)

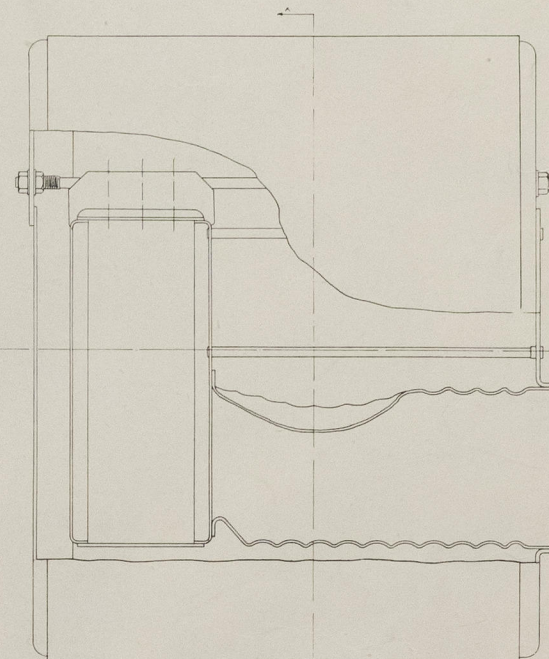
EXPLOSION FROM A MAIN BOILER ON BOARD s.s. "BURMOUNT" O.N. 172789.



SECTION THIRD PORT FURNACE



SECTION ON X-X



SECTION THIRD STAYED FURNACE



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PLATE III.

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The vessel returned to moorings.

On visiting the vessel I found that both furnaces had been damaged as shown on Plate III, and on inspecting the water gauge that the steam cock had been left in the closed position although the marking on the cock was such as would lead one to believe that the cock was in an open position. From the appearance of the top of the square on the plug, it was obvious that an additional mark had recently been made, but I was unable to ascertain who had made it. Plate II shows the marking as it was found.

I am, Sir,

Your obedient Servant,
S. MATHEWS.

Comments by the Engineer Surveyor-in-Chief

The collapse of two wing furnaces in this marine boiler, accompanied by the serious rupture of one, was due to acute shortage of water in the boiler, brought about by the continued acceptance over some hours of a water level that should have been obviously false to any watchkeeping engineer.

In his report the Ministry Surveyor describes how the marks cut in the end of the plug of the water-

gauge steam cock, to indicate the position of the ports in the plug, had been added to during the overhaul of the boiler, by some person unknown. The cock had thereby the appearance of being open when, in fact, it was closed.

That was admittedly a dangerous condition, and it did lead in this case to the explosion that occurred.

It did not, however, relieve the watchkeeping engineers from responsibility in the matter.

The boilers were under steam and coupled up, and watches were set, about seven hours before the explosion happened. During the whole of that time, it may be assumed, the water level was not in sight in the port boiler glass, and the check valve on that boiler was never operated; a condition that called for investigation long before the rupture took place.

It was fortunate indeed that the explosion was not accompanied by serious hurt to someone, and it is hoped that the lesson shall not have been lost to the engineers mainly concerned.

JAS NICOL JARVIE

*The Assistant Secretary,
Marine (Safety) Division.*



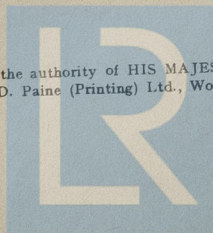
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Has a survey also been held on the Ministry of the Sea? If so, is the Report sent now, or when will it be sent?

no answers are requested not to write on or below the space for Committee's Minutes.)