

May 15, 1838.

JOSHUA FIELD, V. P., in the Chair.

The following were elected: John Hague, a Member; Thomas Turner, a Graduate; and Lieutenant Frome, R.E. an Associate.

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Mr. Brunel stated that they were at present more inconvenienced by fire than by water. Some of the gases which issue forth ignite very rapidly; and the reports from Guy's Hospital stated some of the men to be so injured by breathing these gases that small hopes were entertained of their recovery. The explosions are frequent, and put out the candles of the workmen; but the largeness of the space prevents their being dangerous. The thickness of made ground above them is about 18 feet. He conceives that these deleterious gases issue from the mud of the river; they proceed from a corner at the top. They had used chloride of lime, but without any great success; there appeared no remedy for the inconvenience. The breathing the gas produces sickness.

Thames  
Tunnel.

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A communication was read from Mr. Timperley, of Hull, on the explosion of the boiler of the Union Steam Packet at that place last summer. This was attributed to the water in the boiler having become so far reduced as to lay bare the tops of the flues, which would probably be heated to a very high temperature. Water coming in contact with them in this state, on a slight lateral motion of the vessel, steam of sufficient intensity to produce the effects described might be produced.

Explosion  
of Steam  
Boilers.

Mr. Macneill stated that the boiler plates had in the above instance been rent across like a sheet of paper. There was not a single rivet broken.

A long discussion took place on the causes to which these extraordinary cases could be referred: the violence of the explosion on bursting appearing greater than could be referred simply to the pressure of the steam. If the water were supposed to be decomposed by contact with the hot plates, some of the oxygen would be absorbed by the metal, and the proportion requisite for an explosive mixture destroyed. But there were great difficulties in conceiving the decomposition of water by the plates of a boiler. The commission of the Franklin Institute concluded this to be impossible.\*

\* See Report of Franklin Institute on the Explosion of Steam Boilers.

It appeared then that there were grounds for doubting the fact of the presence of oxygen, such as would cause an explosion. And it seemed almost unnecessary to resort to any such explanation, as the sudden generation of steam of high elasticity would produce a pressure sufficient to blow out or rend the boiler in the weakest part before the pressure could be transmitted through the steam to the safety valve. The transmission of pressure through an elastic fluid requires time, but the action on the solid is instantaneous.

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“Steam Expansion Table. By George Edwards, M. Inst. C. E.”

Edwards's  
Expansion  
Tubes.

A paper by Mr. Edwards was read descriptive of the principle and method employed in dividing his Steam Expansion Table, an account of which had been laid before the Institution last session.

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May 22, 1838.

The PRESIDENT in the Chair.

Bursting  
of Steam  
Boilers.

The minutes of conversation on the Explosion of Steam Boilers having been read, considerable doubts were expressed as to the probability of the formation of an explosion under the circumstances in the interior of a boiler. It was suggested whether a large portion of hot surface might not become suddenly exposed by the cracking off of the incrustation on the sides of the boiler. The metal expands more rapidly than the incrustation; portions of the latter may crack off and expose a large extent of hot surface to the steam and water; a sudden increase in the elastic force of the steam would necessarily ensue. The incrustation is itself a bad conductor of heat.

Mr. Field, in reply to a question respecting the rapid decay of the bottoms of copper boilers, stated, that copper is very rapidly injured by repeated heatings, and will not long bear high degrees of temperature.

Mr. Cubitt stated that he had not known of any case of explosion of a boiler containing plenty of water. With respect to a recent accident in America, which had taken place soon after the boat had started, he thought that a boiler was more likely to be short of water at starting than at any other time, for the steam will probably have been blowing off for some time, and the men neglected to

supply the boiler; whereas after the vessel has started, the pumps worked by the engine supply the boiler. He should think that a boiler is more likely to be short of water before or just after starting, than at any other time.

Mr. Field stated that the vessel had stopped, and the explosion took place while taking up a passenger; the safety valve had been held down. In all these cases of explosion the difficulty which he experienced was, how to account for the pressure being suddenly increased by the amount which must be supposed. It did not appear to him sufficient to suppose that water flowed over hot flues. If the whole of the top of the fire-place were red hot this could not produce the effect. The steam boilers in America are generally of a form ill adapted to resist pressure.

Mr. Buddle stated the only clearly ascertained fact seemed to be that these explosions took place when the boilers are dry. He had a case of twin boilers, standing side by side; the dry one exploded; no cause could possibly be assigned but that it was dry. The steam communication betwixt the boilers was free, by a pipe *eight* inches diameter. It was not a collapse, but the boiler was torn into a thousand pieces. There are two distinct cases; the one a rent or bursting, the other an explosion, in which the parts are thrown to a considerable distance.

Mr. Cubitt called attention to the remarkable case mentioned by Mr. Buddle of two boilers connected together by a steam pipe of eight inches diameter, the communication free betwixt them, but one short of water; the other having its proper quantity of water. The dry boiler blew up with a great explosion, the other remaining uninjured. The steam was blowing off at the time. With respect to the nature of the report, Mr. Buddle stated that he had not himself heard it, but it was represented as sudden and short; any representation of this nature cannot be depended on, as two persons situated in different positions will give very different accounts. This had occurred to his knowledge on the explosion of a coal mine. He was close by and thrown down; the report was smart like that of a six-pounder; at two miles off it was like a peel of thunder, shaking the houses and throwing down the furniture. One peculiar feature in the explosion of the steam boilers is the rending and crumpling up of the boiler plates. The plates are rent and twisted as if of paper.

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