

and without reflection as to the results; and he was of opinion that accidents of this description seldom, if ever, occur. This lucid explanation of the theory will, we trust, prove a salutary precaution to proprietors not to confide such dangerous engines of destruction to ignorant and incompetent workmen, for whose acts and incapacity they are, according to the law as laid down in the House of Lords, referred to in our last week's Journal, most clearly responsible.

Applying this theory to the facts of the present lamentable case, Mr. FAIRBAIRN came to the conclusion that such a boiler as that of Mr. WILLIAMSON's ought not to be worked with a pressure much above 40lbs. to the square foot, and certainly not exceeding 50lbs. It was difficult in this case, from the deficiency of the evidence, to ascertain the exact pressure; but, from the weights which had been placed upon the valves, it was necessarily excessive. In the course of his examination, Mr. FAIRBAIRN further stated, that mercurial gauges could not always be relied on, and were not in every instance correct indicators of pressure. He illustrated this by observing, that in the experiments, to which we subsequently refer, he had used two such gauges, and found a difference of 10lbs. between the pressure they severally indicated, with which, being of course dissatisfied, he was obliged to get columns of mercury, so as to check them, and bring them to a standard.

In answer to a question whether he conceived that one of the two valves ought to be out of the control of the engineer—whether, in fact there should be an inside valve, or one weighted from the inside, Mr. FAIRBAIRN replied that he had been once favourable to the use of lock-up valves, because he thought that they could not be tampered with. He declared, however, that he since had reason to change his opinion, and he now believed that valves completely exposed were the safer, either having a dead weight on them, or with levers in front, so that any person could see them. He once had valves on the top of the boiler, so cased up with a hood over them, that although the steam could escape through something like a Venetian blind, not even a stick or a piece of wire could be put through to tamper with the fittings. There was a pulley lever through the stuffing-box, by which the engineers were able to lift the valve, and there was plenty of room for everything to work freely. On board the navy steamers, they use the lock-up valves; but it is the duty of the chief engineer to report daily as to the state of the valves, as regularly as the log of the vessel is kept. Mr. FAIRBAIRN was pressed to say whether he considered it an advantage to have a valve locked up, or weighted from the inside of the boiler; to which he replied, that it was a difficult question to deal with, but that he had already given his opinion.

Mr. FAIRBAIRN also submitted the following tabular results of some experiments which he had made in order to ascertain the force which steam acquires in a comparatively short period of time when the engine is at rest, and the usual outlets for escape are closed:—

| Time in minutes. | Pressure in lbs. | Temp. Degrees. | Volume. |
|------------------|------------------|----------------|---------|
| 0 | 11-75 | 213-00 | 980 |
| 1 | 14-15 | 246-75 | 906 |
| 2 | 16-35 | 251-00 | 846 |
| 3 | 19-25 | 275-25 | 782 |
| 4 | 22-35 | 259-75 | 720 |
| 5 | 25-75 | 261-00 | 665 |
| 6 | 28-95 | 268-37 | 621 |
| 7 | 32-15 | 273-00 | 582 |
| 8 | 35-75 | 277-00 | 545 |
| 9 | 39-95 | 282-00 | 506 |
| 10 | 44-25 | 286-37 | 472 |

| Time in minutes | Pressure in lbs. | Temp. Degrees | Volume. |
|-----------------|------------------|---------------|----------------------|
| 11 | 48-35 | 291-00 | 445 |
| 12 | 52-75 | 295-37 | 418 |
| 13 | 57-75 | 300-00 | 392 |
| 14 | 63-75 | 304-25 | 365 |
| 15 | 68-95 | 308-75 | 344 |
| 16 | 74-75 | 313-00 | 324 |
| 17 | 80-35 | 317-75 | 306 |
| 18 | 87-25 | 322-00 | 288 |
| 19 | 93-95 | 326-12 | 273 |
| 20 | 101-15 | 331-00 | 257 |
| 21 | 108-75 | 335-62 | 243 |
| 22 | 112-00 | 337-00 | This experiment lost |

These experiments were made with a boiler prepared for the purpose; and it will be seen that the steam which was starting 11-75lbs. on the square inch, increased in density to nearly four times the pressure, and in 10 minutes more it was nearly nine times; that it continued to increase in an accelerated ratio, until in less than 20 minutes, had he been able to continue the pressure, it would have reached a point beyond all powers of resistance, when explosion must have been the result.

—*Mining Journal.*

Longitude of Kingston.

To the Editor of the Canadian Journal.

SIR,—The Longitude of Kingston is sometimes stated to be $76^{\circ} 40'$. This, however, differs considerably from the truth, as might be expected from the comparatively rough and hasty manner in which the portions of the principal points in a newly settled country must, in general, be first determined. Eclipses of the sun, it is well known, afford one of the most accurate means of determining the longitude, independently of such means as telegraphic communication with an Observatory, the Longitude of which has been already ascertained. The Longitude of Kingston, as deduced from two Eclipses of the Sun, and one Transit of Mercury; the time being taken from a carefully regulated clock, the pendulum having a wooden rod, is as follows:—

| | |
|------------------------|-------------------------|
| By Eclipse of Sun | Longitude W. |
| April 25th, 1845..... | $76^{\circ} 32' 45''$. |
| May 26th, 1854..... | $76^{\circ} 32' 59''$. |
| By Transit of Mercury. | |
| May 8th, 1845..... | $76^{\circ} 31' 45''$. |

Another Eclipse, May 6th, 1845, the time being taken from a carefully regulated watch, gave $76^{\circ} 31'$. The mean of these observations, $76^{\circ} 32' 7\frac{1}{2}''$ W., may, therefore, be considered as the Longitude of Kingston, very nearly. A lunar distance, worked out from observations with two instruments only, and which may be rejected except as an approximation, gave $76^{\circ} 30'$. The mean longitude, deduced from twelve observations of immersions, and emersions of Jupiter's satellites, a comparatively imperfect mode of its determination, gives $76^{\circ} 31' 17''$.

Those who are familiar with such questions are aware that, until a regular Observatory for astronomical purposes be established, there must, even after very careful observations, be some uncertainty at least in the determination of the longitude. But the limit of error in the above mean of $76^{\circ} 32' 7\frac{1}{2}''$ W. is, in all probability, not more than from a third to a half of a statute mile.

I do not know how far the Longitude and Latitude of Toronto may be considered as ascertained

I am, Sir, your very obedient servant.

JAMES WILLIAMSON