current of air from a fan blower. The introduction of air directly into the wort was, however, found to raise a froth or "fob," which would affect the soundness of the beer. Several other methods were tried, and at length the machine now described was constructed.

The wort is pumped up at a slow and regulated speed into a recipient at the top of the machine, divides into a series of thin films or streams, and trickles down the inside of a number of thin metallic tubes, set vertically, with their upper extremities quite level. Up these tubes is forced a current of air at any required velocity, which, meeting the descending wort, cools it inside, whilst a constant change of cold water takes place around the exterior of the tubes. The wort, on leaving the vertical tubes, is received into a second refrigerator, containing a number of horizontal pipes through which cold water flows. By this process the wort is cooled without producing any prejudicial effect upon its quality, and with a rapidity (as shown by the table) which would be extremely advantageous under certain circumstances.

This communication was accompanied by two drawings of the Refrigerator, and illustrated by a working model with which the experiments had been made.

"An Account of the Repairs and Alterations made in the Structure of the Menai Bridge, in consequence of the damage it received during the gale of January 7, 1839." By T. J. Maude, Grad. Inst. C. E.

Menai
Bridge.

The roadway of the Menai Bridge having been seriously injured by the storm of January 7, 1839, it was deemed expedient to renew entirely the suspended platform: and at the same time to carry into effect certain alterations in the construction, suggested by constant observation of the working of the Bridge during thirteen years, as well as its condition after the storm.

Roadway
Bearer.

In the original structure, each long roadway bar was fixed at three points to the vertical suspending rods. Motion being chiefly communicated to the roadway by the vibration of the windward chain, one end of the long bar suspended from it was lifted up, whilst the other two points of suspension remained nearly stationary. The bar thus became a lever with its fulcrum at the middle point of attachment, and at that weakest part it invariably broke. In order to remedy this defect, an augmented depth of half an inch has been given to the new roadway bars, with an additional enlargement round the eyes for attachment to the suspension rods, and each bar

is hung from two points only, permitting it to play when the Bridge is subjected to motion.

The same vibratory action occasioned frequent fracture of the suspending rods close to the surface of the platform; to such an extent, that during the storm a great portion of the platform was entirely torn from its fastenings on one side, and hung down flapping in the gale supported merely by one line of rods. To remedy this, a joint has been introduced in each rod just above the surface of the platform, so as to allow the suspension rods free action, and permit a motion in either of the carriage-ways or the footpath independently of each other. The dimensions of the short suspension rods have been increased to one inch and a quarter square, whilst the remainder of the rods are only one inch square. The effects of the lateral and undulating motions are provided against by the direction of the working of the joints, one of them being in the line of the roadway bar, and the other at right angles to it.

Additional rigidity has been given to the platform by applying a course of three-inch planking laid transversely throughout its entire length, and bolted through each plank at intervals of two feet six inches apart, the oak beams originally placed beneath the platform having been entirely removed.

For the purpose of checking longitudinal undulation, two lines of beams, formed of two pieces of Baltic fir, each 40 feet long, 13 inches deep, and $4\frac{1}{4}$ inches thick, are framed to the trussed bearers, and bolted up beneath each carriage-way the entire length of the platform: at the same time an increased depth has been given to the wheel guides, which are also bolted through to the planking. The total depth given by these strengthening beams and guides, is three feet four inches, while in the original structure it was one foot four inches.

The weight of the additional timber and iron-work introduced into the bridge, is about 130 tons. The whole of the timber has been Kyanized, and each coat of planking covered with Archangel tar; the felt has been discarded, as it does not appear to have answered its intended objects in the original structure.

In these alterations (which were designed by Mr. Provis, M. Inst. C. E.) one main object, which was never lost sight of, was to preserve that simplicity of construction which is so striking a feature in the original design; and should any future derangements occur, any part can be repaired or replaced without disturbing the rest of the structure.

This communication was illustrated by a drawing of the original platform, and of the alterations described in the Paper.