which has elapsed since the trigger was depressed. When the signal has returned entirely into the case, the apparatus has resumed its original state, ready to be again acted upon.

Several ingenious modifications of the apparatus (Figs. 2 and 3) are described ; and it is stated that the signals which have been at work for a considerable period at the London and Birmingham and Great Western Railways, have fully answered the expectations entertained of their efficacy. Detailed drawings of the signals and machinery accompany the paper.

“Description of the Harbour of Port Talbot (Glamorganshire).”
By Henry Robinson Palmer, V. P. Inst. C. E.

Harbour of Port Talbot The harbour described in this communication is situated upon the outfall of the river Avon, on the eastern shore of Swansea Bay. The adjacent mountainous district terminates abruptly at about half a mile from the shore, in a tract of marshy land, for the most part composed of sand, with detached beds of clay and peat of various thickness, at about 10 feet below the surface.

The river, which, at its issue from its rocky channel, had been diverted from its course by accumulations of sand, nearly at right angles with its point of discharge into the sea, would appear at some period to have had a direct channel thither. It has been the object of the author, by whom the works were designed and executed, to restore this obvious course for the land water, and by means of embankments, to convert into a dock that portion of the old channel which extends through the marshes. A new channel has also been formed from the outfall to a convenient part of the dock, with a lock 45 feet in width for the passage of vessels.

As the works were undertaken by a few private individuals, every proper economy was enjoined ; and in order to diminish the expense of excavating by manual labour, a channel of 100 feet wide and a mile in length, Mr. John Vigurs (whose extensive tin-plate and copper works are situated in the adjoining valley) proposed that the new channel should be formed by the force of the land floods, which descend with great impetuosity. A trench of 20 feet wide by 10 feet deep, was therefore cut in the line of the proposed channel ; and a few days after it was finished, a heavy land flood descending from the mountains rushed through it, carrying out to sea from the sides and bottom of the trench an immense quantity of the soil. Every succeeding flood increased the size of the trench, and by judicious

guidance of this natural excavator, the channel was formed of the requisite dimensions; and it is now generally kept clear from accumulation by the land floods, but in dry seasons by the sluices in the lock-gates. The bed of the channel is stated to form a regular inclined plane of more than a mile in length, free from a shoal or any other impediment.

The confluence of the two channels has been rendered permanent, by a pier of copper slag, with an active slope of five to one. When finished, this pier will extend full half a mile in length.

The paper then describes generally the ordinary modes of construction adopted in the works, and more particularly the lock, the cill of which is 23 feet below the level of an ordinary spring tide: the coping is 2 feet above that level, and the gates are 25 feet 6 inches high.

The fabric of the lock is composed of hard silicious sandstone, cemented with blue lias lime mortar. The ashlar work of the walls is 4 feet in thickness, with counterforts, and the spaces between them are filled with rubble, grouted with lime and sand. The whole thickness of the walls may therefore be taken at 8 feet, excepting at their bases, where they are 10 feet. The walls rest in part upon an inverted arch, three feet in thickness, and the whole mass, including the invert, rests upon a concrete of large and small rubble.

The harbour is stated to be in immediate connexion with extensive copper and tin-plate works, and also with a great extent of coal-beds bordering the valley of the Avon, and the trade is rapidly increasing, its position in the Bristol Channel being highly favourable to a foreign trade.

A plan of the harbour, with the streams and channels, and a transverse section of the lock accompanied the paper.

“Description of the Calder Viaduct, on the Wishaw and Coltness Railway, with the Specifications, Estimates, and a series of Experiments to ascertain the Deflection of two of the Strutted Beams.”
By John Macneill, M. Inst. C. E.

When first the author was called upon to carry out the extension of the Wishaw and Coltness Railway, he found that the funds for that purpose were very limited, and that it was necessary to construct the works in the cheapest manner possible. To accomplish this it was necessary to design and lay out a single line of railway, which would be sufficient to carry on the trade by horse power, but if possible, and consistently with limited funds, to construct the viaduct

Calder
Viaduct:
Deflection
of Beams.