

## Literary and Scientific Intelligence.

### *Tubular Bridges for Railways—Remarkable Triumph of Skill.*

—The tubular bridges erected by Mr. Stephenson, upon the Chester and Holyhead line of railway, must remain for many years unsurpassed, as specimens of science and engineering skill. In Telford's celebrated suspension bridge over the Menai Straits, the problem was solved of constructing a safe pathway for the transit of heavy burdens. Perfect rigidity, both as regards the lateral oscillations produced by the passage of the enormous trains at high velocities, and the perpendicular undulations so perceptible in ordinary bridges built upon the suspension principle, has been obtained by forming the massive iron beam into a hollow rectangular chamber, 25½ feet high, 15 feet wide, and (in the Conway tube) 412 feet in length, in the inside of which the trains are to travel along the rails. It forms, in fact, a long gallery, whose sides are composed of iron plates half an inch thick, and its ceiling and floor are formed of compound plates, consisting each of two laminæ of metal, kept apart at a distance of about 21 inches, by a series of plates of that breadth extending the whole length of the tube, dividing the top and bottom strata into a series of longitudinal cells, and aiding greatly in the resistance offered to the weight of the passing trains. The whole mass of iron employed is sufficient to form a solid beam 412 feet long from pier to pier, and 46 inches or nearly four feet square. Employed in this form, the beam would possess ample strength; but it would have been drawn down by its own weight into a catenary curve, dipping several feet in the centre, and altering in shape upon the passage of a few tons along its surface; while even the action of a high wind would have impressed on it a considerable lateral or horizontal vibration. The same metallic mass distributed into the compound parts of the gallery we have described, was fashioned into a curve rising only 7 inches in the centre, which the action of its own weight (1,300 tons) drew, as was intended, into perfect horizontality; and which has been proved to sink not more than a single inch by the added pressure of a hundred tons. A number of ingenious contrivances were brought into use during the process of construction. The compound tube consists of many thousand separate pieces, with every joint secured by covering plates, and T angle irons, fastened together with rivets, all driven red-hot. In drilling the rivet holes, more than a million in number, a curious machine was used, imitated from that employed in making the perforated cards for Jacquard looms, by which the work was done with beautiful regularity. The foundations of the supporting piers are laid upon piles driven by Nasmyth's steam pile-driver—an engine which seems to have been invented just in time. The huge structure was floated from the temporary stage whereon it was built, upon caissons which the tide lifted; and was elevated to its destined place by hydraulic pressure. So extreme is the accuracy of this wonderful work, that the thermometric change of shape produced by an hour's sunshine upon one side, or on the top, becomes readily perceptible; and one end of the tube is left loose upon the abutment to allow for this expansion.—[From "The Progress of Mechanical Invention" in the Edinburgh Review.]

*The History of Mechanical Invention* is full of curious examples of the introduction of a new material, or the suggestion of a new combination of parts rendering easy the improvements that have baffled the ingenuity of man for generations. It would be a curious injury to trace how many contrivances have been delayed for years from the mere want of knowledge or skill to execute the works; and obliged as it were to lie fallow until the cunning of the workman could sufficiently correspond with the ingenuity of the inventor. When Hadley first constructed the quadrant still known by his name, for a long period it was perfectly useless in the determination of the longitude, as the indications could not be depended upon to a greater accuracy than fifty leagues. But after Ramsden had invented his "dividing engine," the graduation was so vastly improved, that even in the commonest instruments, an error of five leagues was seldom to be feared. The minute measurements of angular distances by the micrometer were long subject to similar difficulties. The instrument waited, as it were, for Wallaston's discovery of the means to procure platinum wire so fine, that 30,000 might be stretched side by side within the breadth of an inch. The limit which was reached by this discovery, was followed by another pause. Then came a new advance, owing to the beautiful invention of an eye-glass composed of double refracting spar, so mounted as to revolve in a plane parallel to the axis of refraction, and give, by the gradual separation of the two rays, a measurement susceptible of almost infinite delicacy. So in the history of the steam engine. Bolton and Watt had been long partners, and the theory of his great machine was almost perfect, when Mr. Watt still found that his pistons fitted the cylinders so ill, as to occasion considerable loss from leakage. In 1774 Mr. Wilkinson, a large iron master, introduced a new process of casting and turning cylinders of iron. Watt at once availed himself of them; and in a few months the inaccuracy of the piston "did not anywhere exceed the thickness of a shilling." The steam-chamber presents a sectional plan somewhat resembling

five pointed Gothic arches set round a circle; the outline being formed by ten segments of circles all referring to different centres. The piston has to traverse round this singularly-formed chamber, preserving a steam-tight contact at both edges; and such is the accuracy of the workmanship that the leakage is barely perceptible.—[Edinburgh Review.]

*The Progress of Mechanical Invention in England.*—When the first steam-printing machine was "working off" the impression of "The Times" newspaper at the rate of 2,500 copies per hour, the noise could be heard through the silence of early morning nearly across Blackfriars bridge. At present, conversation proceeds in the very room where the type-loaded frame, of far larger dimensions than heretofore, is travelling to and fro beneath the cylinders, and perfecting between 5 and 6000 double sheets in the same time. Dr. Cartwright describes the first powerloom as requiring the strength of two men to work it slowly, laboriously, and only for a short period. We may now enter a single apartment in a Lancashire mill, and see 250 looms at full work, each throwing 150 threads a minute; while a single shaft carried along the ceiling communicates motion to the whole, and with a noise by no means overpowering. In the manufacture of needles, the slender bars of a steel are forged out by a succession of hammers, each one less in weight and quicker in stroke than its predecessor. As the motion of the hammer is necessarily alternating, the dislocating effects of its momentum when thrown into rapid vibration would be enormous, but for the contrivance of giving the hammer a double face, and causing it to strike every time it rises against a block of steel placed above, from which it is thrown back upon the anvil. The vibration is thus produced by a series of rebounds, between two opposing surfaces; five hundred strokes can be made in a minute, while the power is materially economized, and the strain upon the axle nearly annihilated.—[Edinburgh Review.]

*Discovery of the Great Winged Human-Headed Lion in the Ruins of Nineveh at Nimroud.*—In the morning I rode to the encampment of Sheikh Abd-ur-rahman, and was returning to the mound, when I saw two Arabs of his tribe urging their mares to the top of their speed. On approaching me they stopped. "Hasten, O Bey," exclaimed one of them—"hasten to the diggers, for they have found Nimrod himself. Walah, it is wonderful, but it is true! we have seen him with our eyes. There is no god but God;" and both joining in this pious exclamation, they galloped off, without further words, in the direction of their tents. On reaching the ruins I descended into the new trench, and found the workmen, who had already seen me as I approached, standing near a heap of baskets and cloaks. Whilst Awad advanced and asked for a present to celebrate the occasion, the Arabs withdrew the screen they had hastily constructed, and disclosed an enormous human head sculptured in full out of the alabaster of the country. They had uncovered the upper part of a figure, the remainder of which was still buried in the earth. I saw at once that the head must belong to a winged lion or bull, similar to those of Khorsabad and Persepolis. It was in admirable preservation. The expression was calm, yet majestic, and the outline of the features showed a freedom and knowledge of art scarcely to be looked for in the works of so remote a period. The cap had three horns, and, unlike that of the human-headed bulls hitherto found in Assyria, was rounded and without ornament at the top. I was not surprised that the Arabs had been amazed and terrified at this apparition. It required no strength of imagination to conjure up the most strange fancies. This gigantic head, blanched with age, thus rising from the bowels of the earth, might well have belonged to one of those fearful beings which are pictured in the traditions of the country as appearing to mortals, slowly ascending from the regions below. It was some time before the sheikh could be prevailed upon to descend into the pit, and convince himself that the image he saw was of stone. "This is not the work of men's hands," exclaimed he, "but of those infidel giants whom the Prophet, peace be with him! has said that they were higher than the tallest date tree; this is one of the idols which Noah, peace be with him! cursed before the flood."—[Nineveh and its Remains, by A. H. LAYARD, Esq., D. C. L.]

*Dr. Layard, the Explorer of the Ruins of Nineveh,* has been appointed a paid Attaché to the British Embassy at the Sublime Porte. It is stated by the *Literary Gazette* that "it is her Majesty herself (doubtless through the interest her Royal Consort takes in every concern of literature, science, and the arts) to whom Dr. LAYARD is indebted for his late promotion." The trustees of the British Museum have voted Dr. LAYARD the sum of £3,000, divided into two equal moieties, to be appropriated by him to excavations on and about the site of Nineveh in this and the ensuing year.

*Monument to the Author of the Seasons.*—A monument, in the form of a column, is about to be erected to the memory of JAMES THOMSON, the "poet of nature," at Richmond, either upon the far-famed hill or upon the terrace walk in Richmond Park. THOMSON died in Richmond, in Aug. 1748, and was buried in the church-yard. A brass tablet in the Parish Church alone denotes that the ashes of so distinguished a poet rest there.