

XVIII.—*On the Introduction of the Steam
Engine to the Peruvian Mines.*

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AS the introduction of Cornish machinery and Cornish intellect to the Spanish American mines, hitherto interdicted to foreigners, will probably form a remarkable epoch in the history of mineralogy, some notices of that singular event, may perhaps be deemed worthy of record in the annals of the Cornwall Geological Society.

Occurrences trivial in themselves, and apparently fortuitous, sometimes lead to important results. Among the captains, or foremen, of our Cornish mines, there are not a few, who, in addition to great skill in practical mining, attain to much mechanical knowledge and in-

genuity. Captain Richard Trevithick, of Camborne, is one of that superior class of miners, and one whose talents and attention had been long employed in plans to increase the power of the steam engine. He so far succeeded as at length to obtain a patent for his invention. In the mean time he had constructed a working model of his high pressure engine, which was so perfectly finished, that it found its way to London as a cabinet curiosity.

About the same period, a native of Switzerland, M. François Uvillé, had found in Peru some of the richest mines falling into decay, or totally drowned from the impossibility of draining them by manual labour; and hearing also that these mines were richer in silver ore than those of Mexico, he conceived the idea of introducing the steam engine, and determined to make the requisite enquiries when he returned to Europe. It appears that he came to London in the year 1811, but met with no encouragement to pursue his plan, on account of the impossibility, as it was thought, of transporting such ponderous materials several hundred miles over mountains inaccessible to any species of wheel carriage; and also from the inefficacy of steam in an atmosphere so rare as that on the elevation of the Peruvian Cordilleras. About to leave England in despair of accomplishing his great object, and passing by Fitzroy-square, he accidentally saw the model of a steam engine exposed for sale in the shop

of a Mr. Roland. He examined it, and being struck with the simplicity and excellence of the principle and construction, he purchased it at the price of twenty guineas. This was the Trevithick model. Mr. Uvillé took it to Lima, and hastened to try its effects on the highest ridges of Pasco. The experiment so convinced him and others of the adequacy of its powers and the practicability of conveying the machinery in parts, that on the 17th July, 1812, he formed an association with Don Pedro Abadia and Don José Aresmendi, opulent merchants of Lima, for the purpose of contracting with the proprietors of the flooded mines. The marquis de Concordia, then Viceroy of Peru, approved the plan, and, under his protection, the new company entered into contracts to draw several of the principal mines, for certain shares of the gross produce of ores, making an average ratio of 25 per cent. or one fourth of the whole. These contracts were made in the month of August, 1812, and in pursuance thereof Mr. Uvillé again embarked for Europe, and reaching Jamaica, he took his passage to Falmouth in the Fox Packet, Capt. Tilley, which arrived in the early part of the summer, 1813. Mr. Uvillé's mind was too full of the flattering expectations which his scheme inspired, not to be making frequent enquiries among his fellow passengers about mines and engines. One day conversing on this favorite subject with a Mr. Teague, and

expressing an anxious wish to find out, if possible, the author of the model he carried to Lima, he was most agreeably surprised to hear Mr. Teague reply : " Mr. Trevithick is my near relative, and within a few hours after our arrival at Falmouth, I can bring you together." It so happened accordingly, and in consequence Mr. Uvillé resided several months with Capt. Trevithick at Camborne, and was by him instructed in the practice of mining, and in the management of machinery.

After acquiring much practical information in Cornwall, Mr. Uvillé, accompanied by Mr. Trevithick, visited other mining districts, and London. He was introduced by a scientific gentleman, Mr. Campbell, of the East India House, to Messrs. Bolton and Watt, as being the first steam engineers in the universe. He explained to those gentlemen the elevation of the mines, and the mountainous precipices to be surmounted, and they were of opinion that it was not possible to attain the object in contemplation.

Notwithstanding the weight of a decision from such high authority, Capt. Trevithick was not deterred from the pursuit. He applied his mind intensely to some improvement of his high pressure engine, and, having succeeded, he entered into an engagement with Mr. Uvillé, on the 8th of January, 1814, to provide the apparatus for nine engines, which cost about £10,000. and were dispatched by the ship Wild-

man, which sailed from Portsmouth on the 1st September, 1814, accompanied by Mr. Uvillé and three Cornishmen, namely, Thomas Trevarthen of Crowan, Henry Vivian of Camborne, and William Bull of Chasewater, to direct the erection of the machinery, permission having been granted by the British government. They arrived safely at Lima, and were welcomed by a royal salute, and public rejoicings. Such however are the almost insurmountable difficulties to the transport of such heavy materials, that it was not till the middle of the year 1816 that the first steam engine, ever seen in South America, began to work.

Great ceremony, it appears, was observed on the occasion, and the most distinguished honors vouchsafed by the viceregal government. The official deputation appointed to superintend this new and very extraordinary operation, made a report to his excellency the Viceroy, conceived in the high sounding style of Spanish diplomacy. This report was published by authority in the Lima Gazette of the 10th August, 1816. "Immense and incessant labour," (they say) "and boundless expense, have conquered difficulties hitherto esteemed altogether insuperable; and we have, with unlimited admiration, witnessed the erection, and astonishing operation of the first steam engine. It is established in the celebrated and royal mineral territory called the mountain of Yauricocha, in the province of Tarma; and

we have had the felicity of seeing the drain of the first shaft in the Santa Rosa Mine, in the noble district of Pasco." "We are ambitious" (they continue) "of transmitting to posterity the details of an undertaking of such prodigious magnitude, from which we anticipate a torrent of silver, that shall fill surrounding nations with astonishment." They then go on to name a number of individuals on whom "the eternal gratitude of all good Spaniards," is invoked; and it is somewhat remarkable that the only Englishman mentioned by name in this list of worthies, is *Mr. Bull!*

In the mean time Mr. Trevithick had been employed in providing further supplies of engines, considerable quantities of coining apparatus for the royal Mint of Peru, and also furnaces for purifying silver ore by fusion; an experiment, which will be, if it succeeds, of incalculable advantage to the American mines, as amalgamation becomes more and more expensive and limited, by the want of quicksilver. This second cargo of machinery was sent by the ship *Asp*, a South-Sea Whaler, which sailed from Mount's Bay on the 20th of October last, and, after a quick voyage, arrived at Lima on the 6th of February. Mr. Trevithick went out in this vessel, accompanied by Mr. Page, of London, Attorney-at-Law, and James Sanders, an Engine-maker, of Camborne. He was immediately presented to the Viceroy; was most

graciously received; welcomed by the most flattering attention of the inhabitants; and his arrival was officially announced in the Lima gazette of the 12th February. By this gazette, public notice was given of the completion of the second engine, said to be far superior in size and beauty to the first, with a detail of the wonderful effects produced; and announcing the reception of some parcels of ore of extraordinary richness, raised from the mines thus restored by the operation of the steam engines; and continues thus—"To this agreeable intelligence we have the happiness to add that of the arrival of the British ship *Asp*, from London, having on board a large quantity of machinery consigned to the royal Mint of this City, and for constructing eight engines equal to those already erected on the *Santa Rosa* and *Yauriacocha* Mines in *Pasco*, with this advantage, that they are of the latest improvement. But that which is of still greater importance, is the arrival of *Don Ricardo Trevithick*, an eminent professor of mechanics, machinery and mineralogy, inventor and constructor of the engines of the last patent, and who directed, in England, the execution of the machinery now at work in *Pasco*. This professor, with the assistance of the workmen who accompany him, can construct as many engines as shall be wanted in *Peru*, without the necessity of sending to Europe for any part of these vast machines. The excellent character of

Don Ricardo, and his ardent desires to promote the interests of Peru, recommend him to the highest degree of public estimation, and make us hope that his arrival in this kingdom will form the epoch of its prosperity, through the enjoyment of its internal riches, which could not be realised without such assistance, or if the British government had not permitted the exportation from England; an object hitherto deemed unattainable by all who know how jealous that nation is of all her superior inventions in the arts or industry."

It is to be observed, that the engine which has obtained such singular celebrity in South America, is on the principle of Capt. Trevithick's improvement, whereby he sought, through intense heat, to impart a greater elastic force to the steam, and which is necessary to its application in the rare atmosphere of very elevated regions: a result however not at all in contemplation when he was studying the improvement.

So much importance was attached to Mr. Trevithick's personal superintendance, that the Viceroy ordered the Lord Warden of the mines to escort him with a guard of honor to the mining district, where the news of his arrival in America caused the greatest rejoicings; and many of the chief men came to Lima, a distance of many days journey over the mountains, to welcome him. Mr. Uvillé wrote to his associates, "that heaven had sent him

out for the prosperity of the mines ; and that the Lord Warden proposed to erect his statue in massy silver." In this narrative of incidents, almost romantic, it is not the least to be remarked, that a Cornish miner should be found superintending the Royal Mint of Peru. Such, it appears, is the fact ; and that Mr. Trevithick had also been directed to use his endeavours to increase the powers of the coining machinery six fold : a circumstance which shews the confidence of the government in obtaining a vast increase of the precious metals. It was necessary to augment the power of a water wheel : but the means of so doing were to be found only within the enclosure of a convent of one of the strictest orders, into which it was not permitted for any male, (except the father confessor) on any pretence, to enter. The officers of the Mint, having before made every effort to obtain access, were so convinced of the utter impossibility of succeeding, that they could not be induced to renew the application. That which the strong arm of power had failed to do, Mr. Trevithick accomplished ; and the triple doors were unbarred to a layman, a foreigner, and a heretic. Probably he had not yet learnt the fearful respect with which these consecrated retreats are regarded by the natives ; and unaccustomed to shrink from difficulties, he resolved to go straight forward, and boldly ask admission. Whether the novelty of such a visit, or a curiosity to

see the celebrated stranger, removed the interdiction, does not appear: entrance however was obtained; and the manner and result cannot be so well told as in his own words. "Without the knowledge of Don Abadia, or any one except Mr. Page and my interpreter, I walked up, without seeming to know there was any objection to admit men, and rung the bell at the outer door. A female slave came to the grate, to whom the interpreter told my name and business, which she carried in. Presently three aged nuns appeared, and said I could not be admitted. I informed them that I had come from England for the purpose of improving the Royal Mint, and could not proceed without examining and measuring the water-courses. They then retired, and, after consultation, we were admitted, conducted over the premises, and shewn the chapel and other places without reserve."

The latest accounts left Capt. Trevithick in the enjoyment of increasing distinction, and a flattering prospect of great wealth: having, in addition to his emoluments as patentee and engineer, one-fifth part or share in the Lima Company, from which, it is said, on a moderate computation, £100,000. per annum may be expected. His great influence in the country, his zeal for the prosperity of this Society, and the promises, repeated since his arrival in Peru, joined to his knowledge of mineralogy, will enrich our cabinets with a more splendid

and instructive series of South American specimens than has yet reached Europe.

These notices of the extraordinary fact, of Cornwall stretching out the beneficent hand of science, to the remotest regions of the earth, will excite, perhaps, different feelings and anticipations in the mind of the statesman, the miner, and the merchant; but the philosopher will rejoice in the diffusion of useful knowledge. He will hail with pleasure every approach to that free international communication of the benefits peculiar to each, which the best of men have wished, and the wisest recommended. In this instance we see the barriers of national jealousy and religious bigotry yielding to the force of truth. We have seen the unprecedented phenomenon of a Lima gazette extolling the superior attainments of foreigners, and the liberality of the British government, for imparting the benefits of our improvements.

Whether "the torrent of silver," which the Peruvian viceregal deputation so confidently anticipate, will produce effects analogous to those experienced in Europe by the great influx of the precious metals in the 16th century, and accelerate the march of improvement in art and science, may form a subject of curious speculation. To a scientific society, it must always be pleasing to contemplate the progress of instruction: but at the same time it will be the cause of regret to the Members

of this Institution, that it may still be said, 'Cornwall has no school of mines—no professor's chair—no suitable encouragement to promote the pursuit of mineralogical science.' Shall we wait to be taught the value of such establishments by the half-peopled, half-civilized wilds of America?—I hope not.