

task of repairing the ruin, which this long season of abandonment had occasioned. Even for a Company it may be regarded as one of the boldest mining speculations ever yet attempted.

The drainage commenced on the 1st of February 1825. Steam-engines were not employed upon it, on account of the scarcity of fuel; but eight Malacates (horse-whims) of the largest kind were erected round the Tiro General, and kept at work day and night without intermission for twenty-one months, in which time they lowered the water 185 varas. As it descended, the levels which became accessible were repaired, and ores raised wherever veins of any promise appeared; and such was the vigour and activity with which these operations were carried on, that, (as I have already stated) a "Barra," or share in the Valenciana, which, in 1824, would not have sold for 20,000 dollars, was thought by the natives to be worth 100,000 dollars at the time of my visit. It is indeed true, that the difficulties of the drainage increase in proportion to the depth from which the water must be raised; but then they diminish in other respects, because the mine contracts below the level of La Soledad, towards which the water was gradually descending, and the volume of water to be raised consequently decreases. Upon the whole, I saw no reason to question the probability of a favourable result, and the natives were very sanguine in their anticipations of it, fixing for the completion of the drainage the term of eighteen

months. Long before this period arrives many valuable levels will be opened, which will prevent the prosecution of the enterprise from being, as it has hitherto proved, a drain upon the Association; for it is not so much in the deepest levels, (which are supposed to have exceeded the limits within which the Veta Madre of Guanajuato has proved hitherto most productive,) as in the extension of the lateral workings, that the value of the Valenciana as a mine is thought to consist. The outlay in September 1826 was 672,264 dollars, including the alimentos to the proprietors, which amount to 24,000 dollars annually.

We entered the Valenciana by the Boca de San Cäyētānō, at which the old Count Valenciana began his operations; a flight of steps, which even ladies can descend without difficulty, leads to the Capilla, about sixty varas from the surface, where passages branch off to different workings in the interior of the mine. Here a prayer is usually recited by the chief miner before a large picture of the Virgin, and after this the more fatiguing part of the excursion commences. We passed nearly five hours in exploring the different workings, the extent of which exceeds all that a person acquainted only with ordinary mines can imagine. I found the ventilation in general good, except in some "labores" where no communication with the shafts had been yet established. In these the thermometer rose to 90° and 94° of Farenheit; and the heat was very oppres-

sive; but even close to the water's edge there was nothing like foul air. The operation of retimbering, and, in many parts, of digging out the communications anew, was proceeding rapidly, and from some levels ores were raised which produced at times silver enough very nearly to cover the weekly expences of the mine. These amounted to six thousand dollars, including both the mining operations and the malacate horses employed for the drainage, which were upwards of three hundred in number; each malacate requiring thirty horses in the twenty-four hours.

On re-ascending from the lower levels, we visited the Tiro General, which is both a wonderful and an imposing sight. Its dimensions are unnecessarily large, but it is sunk with a magnificence unparalleled in the annals of European mining, the diameter being eleven Varas. The whole of the Tiro is sunk in solid masonry, and the sixteen cueros, or leather buckets, by which the water is raised, though composed each of two bullock's hides, are lost in the immense dimensions of the shaft.

The greatest praise is due to Mr. Williamson, the principal commissioner of the Anglo-Mexican Association, for the constancy that he has displayed in carrying on the drainage of the Valenciana with the means within his reach. Public opinion was unfavourable to the undertaking, until he demonstrated its practicability; and although in the deeper levels the application of steam may be necessary,

yet in a contract limited with regard to time, there can be no doubt that he has rendered the most essential service to the adventurers, by turning to all possible account the powers of the native machinery, which have been much underrated in Europe. What he has been enabled to effect by a proper application of them both at Valenciana, and in the mines of Sirena and Villalpando, may serve as an encouragement to those who are engaged in speculations in districts, where, either from the scarcity of fuel, or the difficulty of access, European machinery never can be introduced. The absurdity of the indiscriminate use of it, contemplated in 1824, has been already demonstrated. Many mines may be made to produce a reasonable profit for a given time by the use of the Malacate, that would never repay the costs of a steam-engine, doubled, as they always must be, by the expence of conveying it from the coast. There is a point indeed beyond which the Malacates cease to act; yet even then, with so many obstacles to be overcome, it is only on mines the richness of which is well ascertained, (as at Real del Monte, or Bolaños,) that it would be prudent or advisable to hazard the substitution of European machinery, with all its attendant train of workmen and artificers.

Besides the mines already enumerated, the Anglo-Mexican Company possesses that of Mëllädö, belonging to the family of Rühl. The contract and Alimentos are the same as those of Villalpando. The

mine was almost paying its own expences in 1826, the weekly sales being about seven hundred dollars; but the drainage was proceeding very slowly in consequence of the difficulty of coming to an arrangement with the proprietors of the neighbouring mines. The works in Tēpēyāc were likewise suspended, the contract with the proprietor, Colonel Chico, being considered disadvantageous; it was thought, however, that more favourable terms would be obtained. In 1826 the Alimentos were 16,000 dollars; making a yearly disbursement of 88,000 dollars in all on the part of the Company, the periodical recurrence of which, in conjunction with the very large investment required by some of the mines, has proved a burthen heavier than many of the shareholders were inclined to bear.

That they might have commenced their operations on more favourable terms, had they possessed the knowledge of the country which they have since acquired, there can be little doubt; but even now, deducting from their future profits all their unnecessary expenditure in salaries, and machinery, and confining their works entirely to their principal mines, it is the opinion of their agents, that their whole outlay may be repaid in three years, and that their profits will amount subsequently to twenty-six and a half per cent. upon their nominal Capital.

I do not vouch for the correctness of this calculation, but I give it as the opinion of a gentleman extremely temperate in all his views, much

looked up to and respected by the natives, and indefatigable in his efforts to promote the interests of those, by whom he has been entrusted with the conduct of an enterprise of greater magnitude than any in which British Capital has been employed hitherto beyond the limits of the British dominions.

Both Mr. Williamson and Mr. Jones do justice to the liberality and good faith displayed by the Mexican proprietors in all their transactions with the Company. The accounts of each mine are balanced and finally wound up at the end of every year; and nothing has yet occurred to interrupt this good understanding, by which the interests of both parties are so effectually promoted.

17th and 18th of November. I passed both these days in visiting the mines worked by the United Mexican Company at Guanajuato, the most important of which are Rāyās, Sēchō, and Cātā.

The first of these "San Juan de Rāyās," (so called from its original proprietor,) is one of the most valuable mines upon the Veta Madre; and the most ancient document in the archives of Guanajuato is the certificate of its denunciation. It is situated in one of those Cañadas, or ravines, in which the great riches of the vein have been usually found concentrated, immediately below the mines of Santa Anita, and San Vicente, both of which are prevented from pushing their works downward by levels extending from the mine of Rayas below the whole of their "Pertinencias," as marked out upon the surface.

The right of thus intercepting the workings of another mine is conceded by the Mining Code, according to which the "Pertinencia" only extends two hundred varas in perpendicular depth. Below this the ground is free, and the desire to secure it in the richer portions of the vein often occasions a trial of activity between the proprietors of two neighbouring shafts. The one who succeeds is said to "encampanar" his rival; and as the evil cannot be remedied, he enjoys afterwards undisturbed possession of the vein, from immediately below the pertinencia of his adversary, down to any depth to which he may find it convenient to work.

The extraordinary richness of the ores of Santa Anīta, some of which were sold during the great Bonanza of that mine in 1740 for their weight in silver, in consequence of the large proportion of gold contained in them, first induced the grandfather of the present Marquis of Rayas, (Don José Sardanēta,) who had acquired ten bars in the mine as "Aviador," to endeavour to "encampanar" the "pertinencias" on the upper part of the ravine, by carrying his own works below them. After several years spent in the attempt, which was prosecuted slowly from the want of funds, he died without having attained his object, bequeathing his projects to his son, and assuring him with his last breath that although he ended his life in poverty himself, a little perseverance in his plans would ensure opulence to his descendants.

This prophecy was fulfilled. The vein of Santa

Ana was found to increase in richness as it increased in depth, and Rāyās having obtained exclusive possession of it, the shaft of Santa Rosa was sunk, through which the first great Bonanza was obtained.

This rich mass of ores (clavo rico) being exhausted, new workings were tried in a S. E. direction, and the shaft of San Miguel was sunk by the father of the present proprietor, at an expence of 700,000 dollars: through this the family of Sardaneta obtained a second Bonanza, which lasted several years, and produced a net profit of eleven millions of dollars, clear of all expences.

From 1760 till 1780 the Mine continued to be worked with considerable profit; but in that year an accident occurred, which very nearly caused it to be entirely given up. A torrent, formed suddenly in the mountains, took its course down the Cañada of Rayas, and entered the mouth of the mine, which had no protection against so unforeseen a danger, filling in a moment the lower levels, and destroying almost all the workmen employed at the time. So great was the volume of water admitted, that nineteen years were consumed in the drainage, which was not completed till 1799, when the mine was again rendered productive, and yielded, in each of the four succeeding years, a clear profit of 400,000 dollars. Since then, the greatest part of the produce has been absorbed by the construction of the new Tiro General, commenced by the pre-

sent Marquis in 1805. It is a stupendous undertaking, the shaft being an octagon, like that of the Valenciana, but exceeding it in diameter by two varas and a half. The depth, however, is only 450 varas in lieu of 635.

When the Civil War broke out, 318 varas of this shaft had been sunk, but the Marquis was too much impoverished by the Revolution to carry on so Herculean a labour out of his own resources, after the declaration of Independence in 1821; and was consequently compelled to apply for assistance to the British United Company, of which his cousin, Don Lucas Alaman, is the principal director. The Company, finding it impossible to attempt the drainage of the mine by the shaft of Santa Rosa, or by that of San Miguél, which has now fallen entirely in, agreed to undertake the continuation of the Tiro General, which, when concluded, will lay open the rich levels called La Sangre de Cristo, and render accessible a large portion of the vein that has never hitherto been explored.

In November, 1826, forty-nine varas had been added by the Company to the 318 sunk by the Marquis: eighty varas still remained; but the work was proceeding at the rate of one vara and a half weekly, and it was expected that as soon as the number of malacates, which it was intended to apply, could be increased from six to eight, half a vara more might be accomplished. It is in the erection of these malacates that the principal ex-

pendence of the enterprise has consisted; for the mouth of the great shaft of Rayas being situated upon a steep slope, it has been found necessary to excavate the mountain on one side, and to raise a platform upon the other, in order to command a sufficient space for the action of the machinery. One of the Mälacätēs of Rayas is the largest ever built in America, the cylinder, or drum, being eight and a half varas in diameter, and the palanca, or beam, by which it is moved, twenty-four varas in length; it is worked by eight horses, which are changed every three hours, and occupies the whole of an enormous "Galera," built in the vicinity of the shaft.

When the Company commenced its operations, the Tiro General was inaccessible from the quantity of water that it contained. This was supposed to proceed from some internal communication with the mine, and it consequently became requisite to carry on the drainage of the two simultaneously; for which purpose three Malacates were erected at the shaft of Santa Rosa. By their operation, the water was gradually lowered eighty-one varas and three-quarters, and the bottom of the new shaft laid open; but it was not until October 1825, that it was rendered sufficiently accessible for the great work of deepening it to recommence. Even then it was only with difficulty that workmen were found willing to undertake the task, for of all mining labours there are none so dangerous as those which are

carried on in an open shaft of such enormous depth, that the smallest stone detached from above, might prove fatal in its descent to some one of those engaged beneath. In addition to this, the water oozes continually from the sides of the shaft, loosening the earth, and keeping the miners below constantly wet; and as there is no "Partido," or share in the ore raised, to compensate these disadvantages, it is only by giving great additional wages that a supply of hands can be procured.

I know few sights more interesting than the operation of blasting in the shafts of Rayas. After each "barretero" has undermined the portion of rock allotted to him, he is drawn up to the surface; the ropes belonging to the different malacates are coiled up, so as to leave every thing clear below, and a man called the "Pegador" descends, whose business it is to fire the slow matches communicating with the mines below.

As his chance of escaping the effects of the explosion consists in being drawn up with such rapidity as to be placed beyond the reach of the fragments of rock that are projected into the air, the lightest malacate is prepared for his use, and two horses are attached to it, selected for their swiftness and courage, and called Caballos del Pegador, from being reserved for this particular purpose. The man is let down slowly, carrying with him a light, and a small rope, one end of which is held by one of

the overseers who is stationed at the mouth of the shaft. A breathless silence is observed until the signal is given from below by pulling the cord of communication, when the two men by whom the horses are previously held, release their heads, and they dash off at full speed until they are stopped, either by the noise of the first explosion, or by seeing from the quantity of cord wound round the cylinder of the malacate, that the Pegador is already raised to a height of sixty or seventy varas, and is consequently beyond the reach of danger.

It often happens that the matches do not ignite, in which case the Pegador is lowered down again, and the whole operation repeated, until all the mines have exploded. But in spite of every precaution, accidents will frequently occur, and there are more Pegadores maimed, or destroyed, than any other kind of mining servants. They acquire, however, great presence of mind in the course of their arduous business, for the Marquis of Rayas told me that a few weeks before my visit, the man whom I saw descend, after lighting all the matches, found himself abandoned at the bottom of the mine from the over anxiety of those above, who, mistaking a mere vibration of the cord for the signal, ordered the horses to start, and drew up the malacate rope far beyond his reach, before either he or they became aware of the mistake. Instead of losing courage, or wasting time in fruitless efforts to make himself heard above,