

instance, been confined to a single Mine, but has embraced a series, or suite of Mines, sometimes in the same, sometimes in different districts, each requiring a multiplicity of extensive works, not only in the interior, for the drainage and extraction of ores, but on the surface, in order to turn to account these ores, when raised.

It is in the immense mass of ores which they are capable of producing, and not by any means in the abundance of Silver contained in them, that the riches of the Southern, or Central mining districts of Mexico, consist. Before the Revolution, it was calculated that the three millions of marcs of silver, to which the average annual produce of the country amounted, were extracted from ten millions of quintals (hundred weights) of Ore; so that the proportion of Silver did not exceed two and a half ounces to the hundred weight.*

The quantity of machinery requisite, in order to reduce this mass into a fit state to be submitted to the action of the quicksilver, by which the silver is ultimately separated from it, was immense; and as the whole of it was destroyed during the Civil War, it became necessary to erect anew, horse-whims, (Malacates,) magazines, stamps, crushing-mills, (Arastres,) and washing-vats; to purchase hundreds of horses for the drainage, and mules for the conveyance of the ore from the mine to the Haciendas,

* *Vide* Report of Tribunal de Minería, and Humboldt, *passim*.

(where the process of reduction is carried on;) to make roads, in order to facilitate the communication between them; to wall in the Patios, or courts, in which amalgamation is at last effected; and to construct water-wheels wherever water power could be applied; nor is there one of these expences, that is not in so far indispensable, that, without them, the drainage of the mines themselves could lead to no sort of advantage.

It is, therefore, by works of this nature that the Companies have commenced their operations, and in them the largest portion of their outlay has consisted. Authorised by their contracts to look forward to a long term of possession, (generally from twenty to thirty years,) and entitled, by the former goodness of the mines, to expect an abundant produce, their preparatory works have been constructed in such a manner as to combine durability with convenience, and, in most instances, will require but few additions. Of the scale upon which things have necessarily been done, I shall beg leave to adduce a few examples.

The possessions of the Real del Monte Company, on the two great Veins of the Santa Brigida, and La Biscaina, (which are usually regarded in England as one *mine*,) cover a space of 11,800 yards, and are intersected, at intervals, by thirty-three shafts, varying in depth from 200 to 270 yards, but all sunk with a magnificence unparalleled in Europe. The whole of these shafts, together with the great

adit, which follows the direction of the two veins, branching off from the Santa Brigida Vein at the point where it intersects that of the Biscaina, and from which the wealth of the Regla family was principally derived, were delivered over to the Company, in July 1824, in a state of absolute ruin. Many of the shafts had fallen in, (though cut, at intervals, in the solid porphyritic rock;) in others, the timbers had given way, and in all, as the adit was completely choked up, the water had risen to an enormous height. In July 1826, when I visited Real del Monte, the adit was cleared, and retimbered, from the mouth, (near the mine of Mórán,) to the shaft of Dolores, (a distance of 2,807 yards;) seven of the great shafts on the Biscaina Vein, and two on that of Santa Brigida, were repaired down to the adit level, (213 varas,) forming in all a space of 12,439 feet, that had been retimbered, and 5,921 feet that had been actually dug out anew, in order to free it from rubbish, in the course of two years. 45,400 yards of road were likewise made during the same time, by which a communication for waggons was opened from the different shafts to the farms in the mountains, as well as to the great Hacienda of Regla, between which and the mines, six hundred mules were formerly employed daily in the conveyance of Ores. At all the principal shafts buildings were erected, with magazines, and workshops for carpenters and smiths, inclosed by lofty stone walls. At Regla, a thirty-six feet water-wheel had been

made, and a wheel-pit built for its reception. Eight of the old arastres, (worked by water,) had been repaired; dwelling-houses for miners built; smelting furnaces erected; stabling completed for 500 mules and horses; and every preparation made for putting the whole establishment into activity, the instant that the drainage of the mines could be effected.

To accomplish this, five large steam-engines, (three of Woolf's, and two of Taylor's,) together with one steam stamping-engine, and two small saw mill-engines, amounting in all to 1500 tons of machinery, were sent out from England; all of which, at the period of my visit, had been safely transported from the coast to Real del Monte, by the party under the orders of Captain Colquhoun, whose exertions in this most arduous enterprise, had they been made in the field, instead of having occurred in the service of a private Association, would have excited both the surprise and the gratitude of his country. Seven hundred mules were employed, during five months, upon this great work, with from seventy to one hundred men; without including those who had been previously occupied in repairing such parts of the road between Veracruz and Perote, as must have proved impassable for loaded waggons.

Nothing could be more honourable to the director, Captain Vetch, than the flourishing state of the establishment at the period of my visit; nor do I think that the most timorous of the shareholders would

have murmured at the expence, had they seen the ability with which the whole plan had been traced, and witnessed all that two years had enabled their agents to effect.

At Bolaños, (which, though a distinct company, was likewise under the direction of Captain Vetch,) the expences have been confined, almost entirely, to the preparations for the drainage, which consist of one great work, designed by Captain Vetch, and executed hitherto under his superintendence. The Company possesses there fourteen shafts, communicating with each other below ground, and occupying a space of 4,100 yards upon the vein.

The mines, though peculiarly rich, were abandoned in 1798, from the enormous expence of keeping down the water, in which, at that time, 5,000 mules were employed. As a substitute for these, a single water-wheel is now to be erected; it having been ascertained, by repeated measurements, that a sufficient fall may be obtained to work this wheel, by bringing a canal, or leat, from the river, which runs through the barranca, (rayine,) in which the mines are situated, at a considerable distance up its course.

The length of this canal is 6,176 yards, or three miles and a half, of which 3,034 yards, (or nearly one mile and three-quarters,) must necessarily be carried under ground, by excavating a tunnel.

In 1826, 1,943 yards of the open cutting, and 1,629 yards of the tunnel, were completed, (four feet deep and six wide;) in addition to which, ten

lumbreras, (or air shafts,) had been sunk, the aggregate depth of which was 180 yards. 1,309 yards more were driven before the 1st of February, 1827, which left only 450 yards to be completed.

The whole is regarded by the natives as a most judicious, and scientific work, which well deserves to be repaid by the success, which those acquainted with the district confidently predict.

The works of the Anglo-Mexican Company, comprise twenty mines in the district of Guañajuatō alone; three in that of San Crístobāl; two at Măcōnī; five at Zimăpān; three at Cătōrcě, and six at Real del Monte. Of the Guanajuato mines, some are upon an enormous scale, as Vălěnciană, Mělladō, Těpěyac, Sĭrěnă, and Vĭllălpăndō, all of which were delivered to the Company, in February 1825, in a state of complete ruin.

When I saw them, in November 1826, the machinery, and works connected with them, had been entirely rebuilt; the drainage in Sĭrenă, and Vĭllălpăndo, was nearly concluded, and in the Valenciana it was proceeding at the rate of 10,000 tons per week. Nine Haciendas de beneficio, (amalgamation works,) had been erected, and completely fitted up, with crushing-mills, and every other necessary. In most of these, the process of reducing ores was carrying on to a considerable extent: some were still idle, but the progress of the drainage in the Valenciana, and Villalpando, was expected very shortly to furnish a sufficiency of ores to bring them all into

activity. The number of mules and horses employed in the drainage was 3,100; in addition to which there were about 400 more used merely in the conveyance of ores from the mines. The weekly expences of the Valenciana mine alone, which is regarded as the principal undertaking of the Company, were about 1,200*l.*; the whole outlay upon it, in September 1826, was 134,452*l.*: but then the produce of the Valenciana, from 1788 to 1810, when the works were stopped by the Revolution, averaged 1,446,067 dollars (or 289,213*l.*) per annum; so that the investment is by no means disproportioned to the extent and importance of the object in view.

What I have stated, with regard to the three Companies already mentioned, is applicable to all the rest.

The outlay of the United Mexican Company is distributed amongst the principal mines of most of the principal districts, in all of which the preliminary works have been brought nearly to a conclusion, Haciendas built, and the necessary preparations made, at a very great expence, for carrying on operations upon a large scale. On the great mine of Rayas alone nearly 100,000*l.* have been expended. On the Veins of El Pävëllön, and La Veta Negra, at Sömbërëretë, at least an equal sum has been employed; as much more has been sunk in the mines of San Äcäsïö and San Bërnäbë, at Zäcätëcäs; but all these are undertakings of great promise, and upon so large a scale, that success, in any one, would repay

the outlay upon the whole in the course of a few years.

At Tlälpüjähua, the Company which bears that name is in possession of eighty-six mines, the very position of many of which, in 1825, it was difficult to ascertain, from the length of time which had elapsed since they had been abandoned; none of these mines is upon a very large scale, but, from their being so numerous, a multiplicity of works have been required, all of which have been executed with the greatest activity and talent. These works extend over a surface of 21,260 yards, comprised in the 106³/₁₀ Pertinencias, which belong to the Company. Thirty-nine mines were in work early in 1826; in addition to which three Haciendas had been built; a large stock of mules and horses purchased for drainage, (about 2000,) and such encouragement given to workmen, that, in lieu of 150 men, (no more could be obtained at first,) 2,300 labourers were in daily employment at the time of my last visit, (in January 1827,) by whose united efforts the appearance of the place had been entirely changed, and a flourishing town created, where, two years before, nothing but ruined houses were to be seen.

It is to be regretted that the sudden change of feeling, which took place in England, with regard to Mining adventurers in general, should have compelled the directors of the Tlälpüjähua Company to suspend the execution of one of the most mag-

nificent mining works that has yet been planned in Mexico; the execution of which, although attended with considerable expence at the outset, would have proved highly advantageous to the interests of the shareholders, had proper provision been made for its completion. The mines of Tlalpujahua, having been worked at a time when the science of mining was in its infancy in Mexico, cannot be drained by machinery without a very considerable expence; it having been found necessary, in many instances, to begin by enlarging the shafts, in order to allow of the application of the larger horse-whims, (Malacates,) used in other districts. To remedy this inconvenience, as well as to obviate the disadvantages with which drainage, by a multiplicity of small adits unconnected with each other, could not fail to be attended, it was in contemplation to drain all the principal mines at once, by the construction of one immense adit, (*Galerie d'écoulement*;) for which the local peculiarities of the district seemed to offer extraordinary facilities. The ground was surveyed by the principal Engineer of the Company, Mr. Moro; and the opinion of the Director, (Mr. Rivafinoli,) with regard to the utility of the projected work, coinciding entirely with that of the Head Miner, (Mr. Burkart,) of whose indefatigable exertions it is impossible to speak too highly,—the line for this stupendous gallery was traced, and the work itself commenced early in 1826.

The whole length of this adit, from its mouth, which is situated in the valley of Tepetongo, about a league from Tlalpujahua, to the point at which it intersects the great Coronas Vein, will be 5,176 yards. At 4976 yards it cuts the Vein of La Borda, upon which some of the most promising mines of the Company are situated; and, in both instances, a depth of 132 yards below the deepest of the old workings will be obtained. The Gallery is two yards wide, and three and a half high, being constructed in such a manner as to allow of the use of small carts. In order to facilitate its construction, twelve lumbreras, (air-shafts, *puits d'airage*;) have been opened, at intervals of from 350 to 450 yards from each other; and from each of these, again, two galleries extend to the right and left upon the line of the adit, so as to admit of the greatest possible number of workmen being employed at the same time. The depth of the twelfth of these air-shafts, which is the deepest, is 300 yards: the first is only sixty-three yards deep; but the aggregate depth of all amounts to 2,332 yards. It is in this that the great expence of the undertaking consists, as well as its difficulty. The aggregate depth of the air-shafts constructed for the Tunnel at Bolaños, is only 180 yards; and the tunnel itself, being merely a water course, is upon a much smaller scale than the Tlalpujahua adit, (four feet deep, by six wide).

There can be no doubt, however, that both Mr. Burkart, and Mr. Moro, are perfectly competent to carry through the undertaking in which they have engaged, provided they are supported by the Shareholders at home; and every one at all acquainted with mining must perceive the immense advantages which would result from it to the Adventurers, as, in all their principal mines, it would ensure both the drainage, and the extraction of Ores, for the space of 132 yards of virgin ground, without the expence of machinery above; which requires not only a permanent investment of capital, but frequent additions, for repairs, as well as for keeping up the supply of animals, by which it must be worked.

In the Autumn of 1826, fifty yards of the great Gallery had been driven, (from the mouth,) and the air-shafts, Nos. 1, 2, 3, 10, 11, and 12, commenced. Some of these had already attained a considerable depth, but the panic of the Shareholders in England has, I believe, rendered the farther progress of the work extremely slow.

The time which has been consumed in the undertakings, which I have described in the preceding pages, is not more than might have been foreseen, had the nature of the enterprise been inquired into beforehand. The capital required might, undoubtedly, have been less, under better management; but still, it has effected what it was intended to effect, and it has purchased, besides, a stock of experience,

which the Companies may turn to great account in their future operations.

Under these circumstances, to allow discouragement to rob them of the fruits of their labours, at the very moment when they are almost within their reach, would be both melancholy, and absurd.

It was, however, a *dénouement*, to which the sudden revulsion of feeling, that took place in England in 1826, was very near leading. Had the despondency occasioned by that period of distress continued, the whole advantage of what has been done would have reverted to the Mexicans alone; for such is the present state of the mines, that the proprietors would easily have found funds to carry on the works, if abandoned by the Companies, and *intended*, in almost every instance, to do so.

Fortunately, confidence has been, in some measure, restored; and, notwithstanding the serious consequences with which the errors of the first six months must be attended, (consequences, which I have not attempted either to palliate, or to disguise,) it is in my firm conviction that, with a little perseverance, the result of the different enterprises now carrying on with British Capital, will be productive both of adequate returns to the Adventurers, and of permanent advantage to their Country.

To what extent these returns may be expected to go, and what the advantages are, which both England and Mexico will derive from them, it will be the object of the next Sections to inquire.