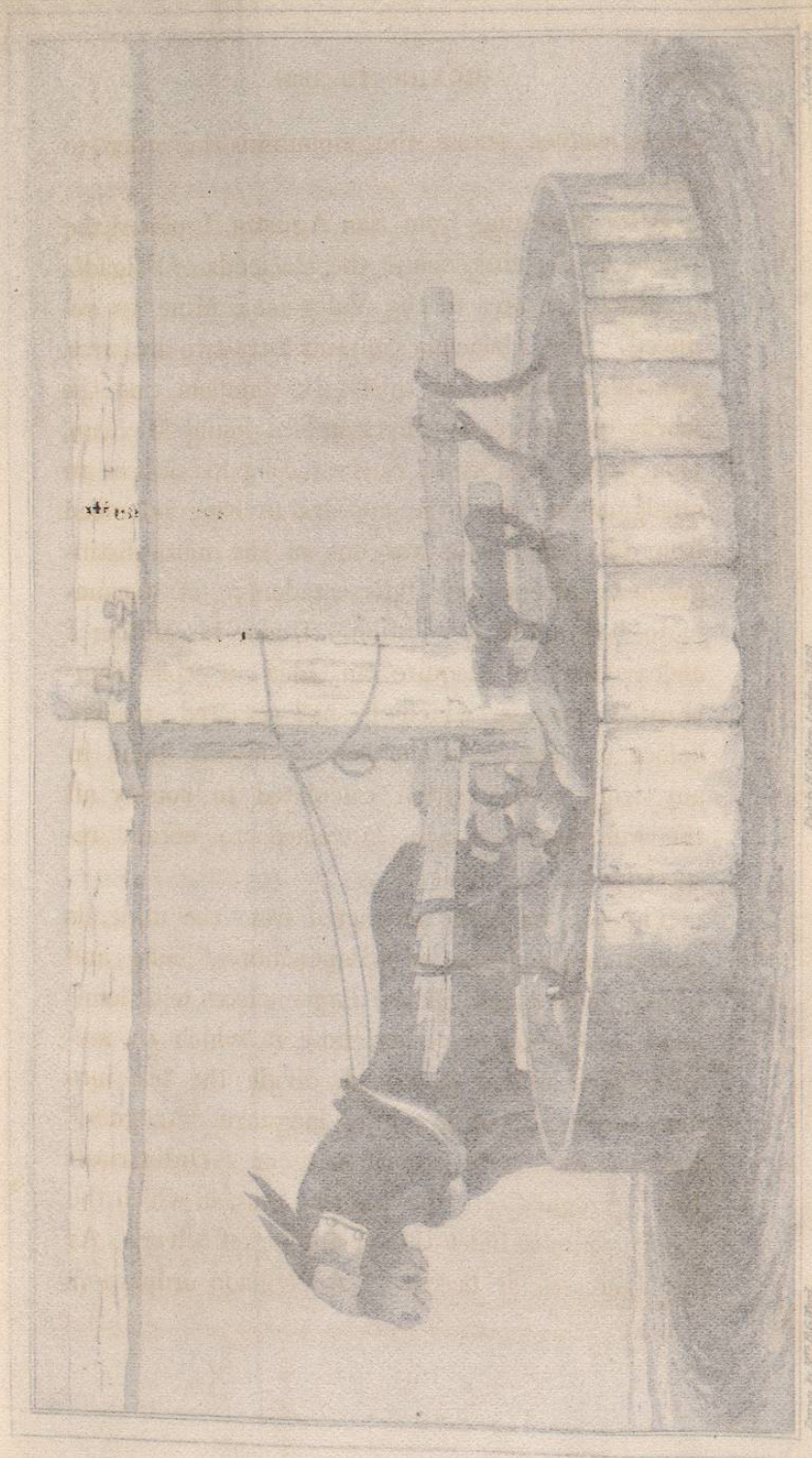


three leagues across the mountains in order to see it.

After returning from San Agustín, I passed the whole of the afternoon at the Hacienda of Sälgädö, in which the ores of the Valenciana Mine are reduced. The Hacienda contains forty-two arrastres, or crushing-mills, and thirty-six stampers, and the works are under the direction of a young Mexican, Don Pedro Bēlāuzārān, celebrated for his skill as an amalgamator, which he appears to have inherited from his father, who was one of the most distinguished miners and "Rescatadores" of Guana juato, before the Revolution. Under his tuition I endeavoured to acquire an idea of this complicated process, which I shall proceed to lay before my readers, never having myself found in any work a description calculated to convey all the information which I wished to obtain respecting it.

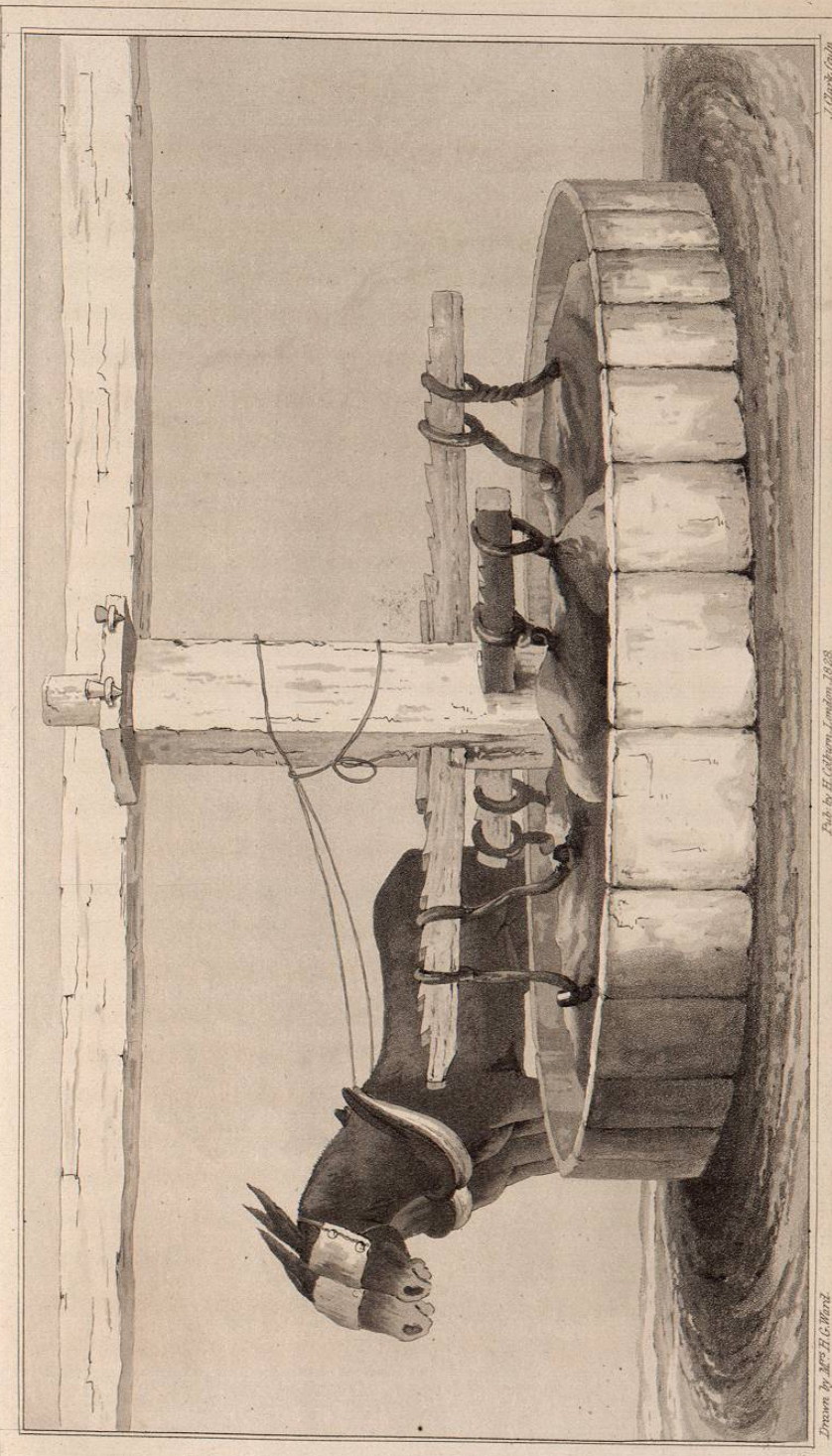
The ore, on being extracted from the mine, is placed in the hands of "Pēpēnādōrēs," men and women, who break all the larger pieces with hammers, and, after rejecting those in which no metallic particles are contained, divide the rest into three classes, called, in mining language, "Āzōguēs," and "Āpōlvillādōs," "Buenos" or "Ordinarios." The "Āzōguēs" are the inferior ores, in which the matrix contains but a thin sprinkling of silver. As this increases, it becomes "Apolvillado ordinario,"



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AN ARRASTRE, OR CRUSHING MILL.

and "Apolvillado bueno" when very rich. Sulphuret of silver, where it occurs but little intermixed with other substances, is designated as "Polvillos;" (probably because when reduced to "polvo," (dust,) this dust is found to be richly impregnated with silver,) and "Molonques," or "Petanques," are the names given to the masses or crystallizations of pure silver, which are not unfrequently met with. The three last are too rich to be submitted to the ordinary process of amalgamation; but the "Azogues" and "Apolvillados" are transmitted in *costales*, (miner's sack,) weighing 150lbs. each, to the Hacienda, where they are delivered to the Administrador, (overseer,) who gives a receipt for the amount. They are then submitted to the action of the Morteros, (stamps,) one of which of eight stampers, (Mazos,) is capable of reducing to powder ten cargass of ore, (each of 350lbs.) in twenty-four hours. This powder not being thought sufficiently fine for the quicksilver to act upon it with proper effect, it is transferred from the Morteros to the arrastres, (crushing-mills,) in which water is used. Each of these reduces to a fine, impalpable, metalliferous mud, six quintals of powder in twenty-four hours. At Guñajūatō, where water-power cannot be obtained, the arrastres are worked by mules, which are kept constantly in motion at a slow pace, and are changed every six hours. The grinding-stones, as well as the sides and bottom of the mill itself,

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are composed of granite, four blocks of which revolve in each arrastre, attached to cross-bars of wood. This part of the operation is thought of great importance, for it is upon the perfection of the *Molienda*, (literally, the grinding,) that the loss of quicksilver is supposed in a great measure to depend. It is performed usually in a covered shed, or "Galera," which, in a large Hacienda like Salgado, from the number of arrastres at work at the same time, is necessarily of considerable extent. From the arrastres the ore is again removed to the *Patio*, (amalgamation court,) where it is disposed in *Tortas*, the size of which varies according to the dimensions of the *Patio*, or the fancy of the Administrador, (overseer.) The number of Montones, (heaps,) contained in each *Torta*, is consequently uncertain; but the Monton of Guanajuato consists of nine Cargas, and two arrobas, or thirty-two quintals of ore; each carga containing fourteen arrobas of 25 lbs.

The Monton requires three arrobas of salt, (from Colima,) at one dollar, or nine reals the arropa. This is added to the mass three days before any other ingredient.

One arropa of ordinary Magistral, (from Tépėsälär, near Aguäs Cäliëntēs,) or 7lbs. of the very best quality, (Pepena.)

Quicksilver, in the proportion of 3lbs. for every marc of silver that the ores of the Monton are supposed by the amalgamator to contain, and varying,

consequently, according to the quality of the Monton, which is determined by the eye.

In the amalgamation of a large *Torta*, the same proportions are always observed; and the mass is repeatedly worked up by men and mules, (repasadores,) in order to promote the incorporation of the silver with the mercury, which it requires six weeks in winter, and one month in summer, to effect. When the amalgamator supposes the *Torta* to have "rendido," i. e. to have yielded all the silver that it contains, it is washed in large vats, (*Tinas*,) until all the earthy particles are got rid of, when the amalgam, which remains at the bottom of the vat, is strained in leather bags until no more quicksilver can be separated from the silver by pressure. The remainder is cut into wedges, which are conveyed to the *Quémädērö*, (burning-house,) and arranged in a circular pile round a copper-plate called the *Vaso*, with a hole in the centre, and a receptacle for water beneath, care being taken to make the hollow left in the centre of the pile of amalgam correspond exactly with the hole in the *Vaso* below. The whole is then covered by a large iron bell, called *Capella*, or *Capellina*, which is strongly luted down; a wall of mud bricks is raised round it, and the intervening space filled with charcoal. The fire is kept up for twelve hours, in which time the quicksilver is sublimed, and afterwards condensed in the water, where it is subsequently collected. The pure silver (*Plata quemada*) is then cut again into wedges, or

melted down into bars, (containing 135 marcs each,) in either of which shapes it may be transmitted to the mints.

The loss of quicksilver at Salgado in the whole process, in the year 1825, amounted to nine ounces on each marc of silver; but this was thought to be an instance of very successful management on the part of Mr. Bělaūzārān, as the proportion is, in other Haciendas, from ten to eleven ounces. He attributed the difference to the excellence of the "Molienda," which he always caused to be continued until there was nothing harsh, or gritty, in the mass upon which the mercury was to act. He added, that the residue of the Torta, when washed, might contain some small portion of silver, but it had not been found that the quantity was sufficient to repay the cost of any farther process, as at Chico; (*Vide* Section IV. of preceding Book,) and it was consequently thrown away.

The best of the "mōntōnēs" which I saw at Salgādō, were expected to produce fourteen marcs of silver; and those of an inferior quality, eight marcs. Two marcs and a half pay the costs of reduction, which amount to twenty dollars on the mōntōn. Allowing as much more for raising the ore, and the share in the general expences, there would remain a profit of three marcs, or twenty-five and a half dollars, on each monton of the poor "Azogue" ores; while on the richer "montones" it would amount to seventy-six and a half dollars, in-

cluding the loss of quicksilver, which, in 1826, was worth six reals per pound.

Nov. 15. We devoted the whole of this day to the Valenciana mine, it being impossible to form an idea, in less time, of the extent and importance of this vast undertaking. The history of the Valenciana, like that of the Biscaina Vein, was first made known to us by Humboldt, and is now almost forgotten; it may be advisable therefore to state that the mine is situated to the North of the town of Guānājuātō, upon a part of the Větā Mādrě, which, after being slightly worked towards the end of the sixteenth century, had been neglected as unpromising until the year 1760, when Mr. Ōbrėgōn, a young Spaniard of very small fortune, resolved to explore the vein upon one of those points where it was believed to be "*emborrascada*," or destitute of mineral riches. For six whole years he continued to work upon this spot, with a perseverance which nothing but a presentiment that he was to make his fortune there can account for; and in 1767, having exhausted his own means, as well as the patience of those from whom he had occasionally obtained supplies, (*Avios*,) he entered into partnership with a shopkeeper of Rāyās, called Ōtērō, wielding with his own hands, it is said, the tools of the miner, until the year 1768, when the works having attained the depth of eighty metres, the vein suddenly began to produce enormous masses of rich ore; which continued to increase in value and extent to such a degree, that the profits

of the proprietors amounted, in several successive years, to one million and a half of dollars. From 1788 to 1810, the produce averaged 1,383,195 dollars, and the profits 527,701 dollars, as may be seen by a reference to the Tables annexed to the Third Section of the Fourth Book. A town of 7,000 inhabitants was formed in the vicinity of the mine, in which 3,100 individuals found daily employment, under the immediate inspection of an Administrador, to whom the proprietors paid a salary of 12,000 dollars, (2,500*l.*) conceiving, very properly, that the value of the situation was the best security for the good conduct of him by whom it was held.

A number of different "Pertinencias" are united at Vălenciănă, the works in the interior occupying nearly half an English mile in extent. In order to give access to the different levels, various shafts have been sunk, the first of which, called the Tiro Viejo de San Antonio, is said to have cost 396,000 dollars. Through this the first "Bonanza" was raised. The Tiro de Burgos, and the Boca de San Ramon, were next purchased and incorporated with the great mine, (they cost 82,000 dollars;) and the Hexagon shaft of Nuestra Señora de Guadalupe was afterwards sunk at an expence of 700,000 dollars. All these being deemed insufficient, the great Octagon shaft, called El Tiro General, was begun in 1801, and carried on until the commencement of the Revolution, when it had cost nearly one million of dollars, and attained the depth of six hundred and

thirty-five Mexican varas. When the Company took possession of the mine, the whole of the interior was filled with water to within one hundred and eighty-five varas of the mouth of the great shaft: there were consequently four hundred and fifty varas to drain, and this not merely in perpendicular depth, but disseminated throughout the whole of the workings, most of which had been so long under water that the communications were destroyed, the timbering falling to pieces, and many of the lower levels filled up with masses of rock, or Tĕpĕtātĕ, detached by the action of the water from those above. Had this volume of water proceeded from internal springs, the attempt to carry it off by any power of machinery would have been hopeless; but up to a very late period, the mine of Valenciana was distinguished by its extreme dryness, which was such that the workmen were at times much incommoded by the dust. The water was first admitted by an injudicious communication with the neighbouring mine of Tĕpĕyāc, and it was allowed to accumulate during the whole of the Revolution, the machinery having been much injured by Hidalgo's troops in 1810, and subsequently destroyed by Mina's followers, after his unsuccessful attempt upon Guanajuato in 1818. The effect of such an accumulation in a country where a river is often formed in an hour by the Tropical rains, can hardly be conceived by those who are not acquainted with their violence. It was such that no individual could have undertaken the