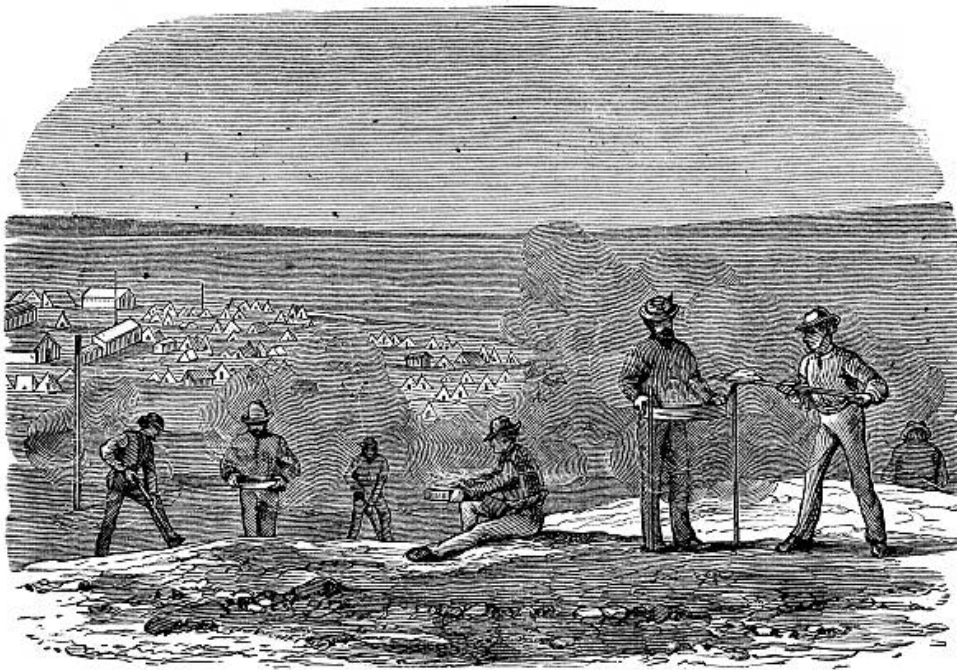


Chapter 2. The Division of Labour



Dry Sieving by hand.

Getty Images

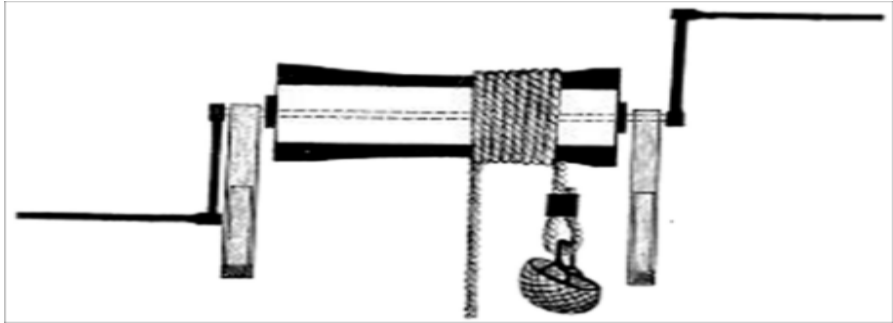
In the early days, mining and associated activities in the Sierra Almagrera were extremely labour intensive due to an almost total absence of mechanisation. Animal powered winches were installed in the more profitable mines but even this low level of technology was not employed by other mines, where the manual winch was the norm. With an absence of any reliable flow of water to power machinery, ore dressing at the pit head was also an almost exclusively manual affair, with the occasional mule doing a bit of the donkey work.

Some mines installed animal powered winches but, in the early days, manual winches (below) were the norm.

geovirtual



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Provisioning this workforce was also labour intensive, with everything from water to woven esparto ore baskets having to be brought up the mountain side on the backs of mules or donkeys. Ore, ready for smelting, was brought down in the same way. The animals proved to be something of a diversion for the workers as the muleteers drove them up and down. Bets could be placed as to which mule train would be the first to reach a given point, those labouring up the steep slope, or, those struggling to keep their feet as they slid down laden with two 50 kilo sacks of ore.



*A mule train.
anon.*



The lead animals were decorated with pompoms and bells and were controlled, in theory, by the shouts of the muleteer. The ensuing riotous mêlée when two teams crossed on the narrow paths would have been pure Spanish drama. A similar raucous greeting was extended to any woman seen to set foot on the tracks up the mountain.

The lead animal's harness was colourfully decorated.

Mulesaleresmipueblo.

J Ezquerria del Bayo, in his *Datos y Observaciones Sobre la Industria Mineria*, listed the workers at the Observación mine, one of the so called Jaroso Rich Mines, in 1844. The information was given to him by one of the foremen and interestingly doesn't include anyone higher up the chain than himself, so no mention of the director, or the engineers. Bayo was rather scathing about these *capataces principales*, or foremen, in the mines mainly because they were inexperienced. It was many years before the Vera school of mines opened its doors, so a *capataz* or foreman generally had little more knowledge than a chargehand, or indeed of any of the men beneath him. Observación had 8 foremen, two were principals responsible for directing the overall operation of the mine and working under the direction of the engineers, one during the day and the other at night. Two more were responsible for extraction operations, these were the *capataces de picadores*, one for each shift. Then there were the two *capataces de gavia*, these would best be described as overseers, responsible for the movement of equipment and ore both above and below ground. (More about these characters later as they were the bogeymen of the mines.) The *capataz de fortificación* was responsible for all of the shoring and other general safety features underground, while the *capataz de garvilladores* oversaw ore-dressing operations above ground.

Surprisingly, out of the 260 operatives, only 46 are described as *picadores* or pick-wielders, in other words, men actually winning the ore. These men would have been split into two shifts and generally worked in pairs which gives some indication of both the compact size of these small mining concessions and of the difficulties of mining veins rather than seams such as coal.



Picadores or barrenos.

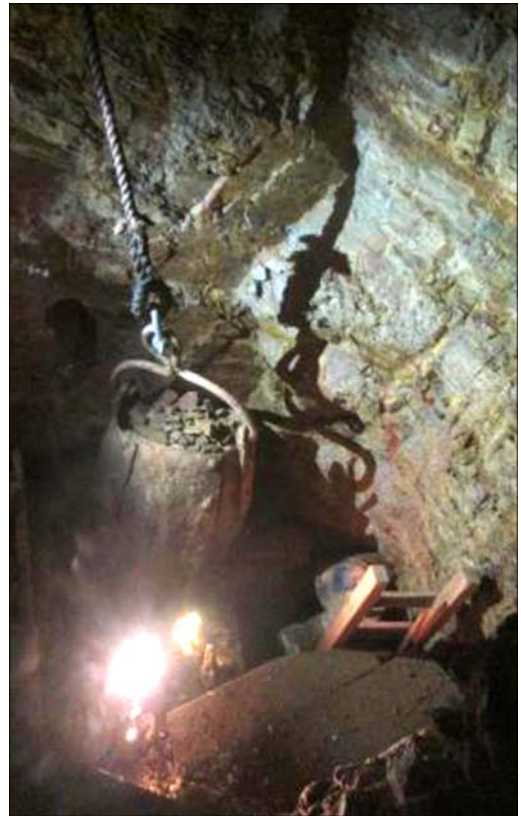
grassingtonmines

Once the *picadores*, also known as *barrenos*, had drilled and blasted the rock, the resulting pieces were roughly sorted into *mena* and *gangue* at the face. *Llenadores* then filled *esparto* baskets, the waste, or *gangue*, was not taken to the surface, but was used to backfill stopes, while the valuable ore, or *mena*, was taken by *gavias* to the main shaft.

At the shaft, onsets, known as enganchadores, either hooked the baskets on to the winch rope, or emptied the baskets into large kibbles to be raised to the surface where they were removed or emptied by banks-men known as amainadores.

Right: Enganchadores hooked the kibbles to the winch rope.
geevor.

Below: Amainadores unhooked them at the surface.
smhccg.org



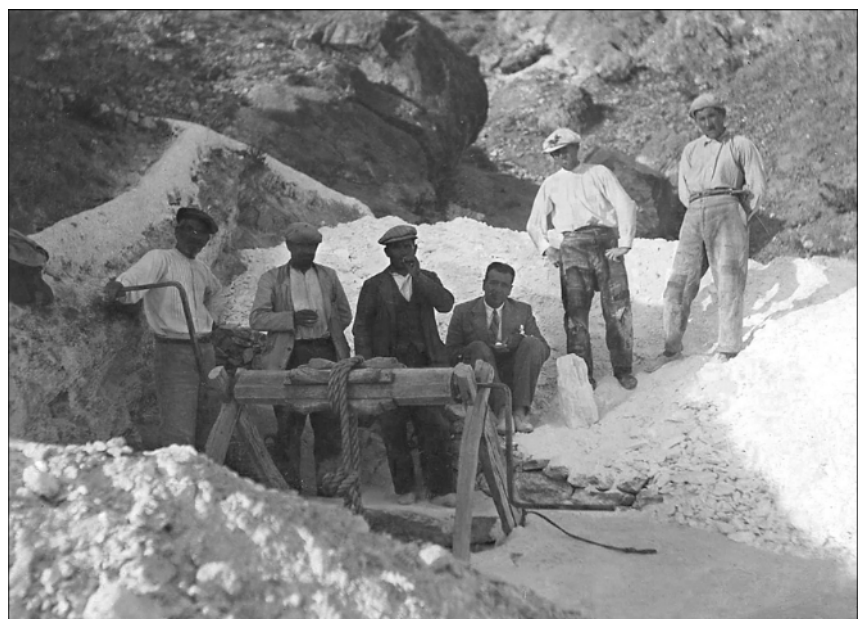
Including the army of 86 gavias and the 46 picadores, a further 34 men were employed in getting the ore to the surface, 20 of whom were torneros. Torneros, or winchmen, worked the double handled winches with the pack-saddle shaped barrel known as a torno de albardillo. It was no easy task lifting the esparto baskets laden with heavy ore, so they sometimes used a system known as the torno corrido, or running winch. Included by Halse in his 1908 Dictionary of Spanish Mining Terms, and attributed to Molina, it is described as:

'Torno corrido, mines of Gador and Almagrera, Sp. method of extracting with a winch by using five men, one or more of whom rest alternately so that the extraction continues without loss of time (Molina);'

A torno no corrido!

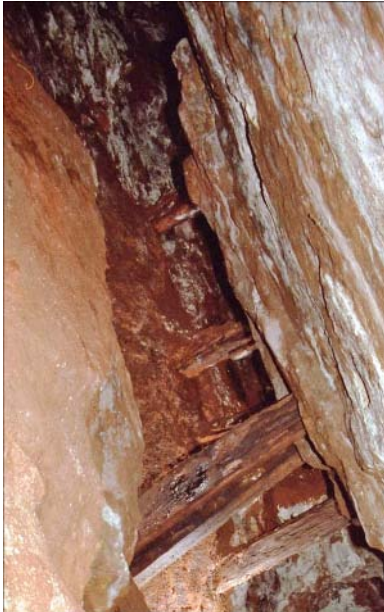
Not in the Almagrera but at a talc mine in the 1940's.

Los berruezo.



There were also three bricklayers and one carpenter on the Observación's payroll. With so little timber available for fortification and general shoring of the work areas, it was often cheaper to use the locally made brick. In 1867, Casimir Delamarre wrote of the fortification in the mines, in the *Bulletin de la Société de Géographie*:

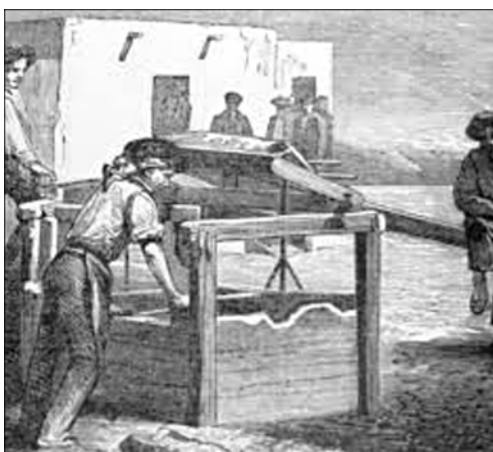
'The descent by the ladders is solid enough, but the interior work is far from what is desired. The integrity of our (French) engineers would never allow such placement of props so flimsy, often broken so as to be useless. But in the province of Almería, wood is expensive and a man's life costs little. Any accident results in 'requiescat in pace' and a stone in a cemetery.



Platform timbering and props were probably recycled as wood was in such short supply.

geevor.

Before larger ore processing mills, or lavaderos, were set up along the banks of the Rambla de Muleria, the extracted material was dressed at the pit head before being taken to the smelters. Due to the chronic shortage of water in this arid area, the ore had to be dry dressed without even the use hotching tubs. With the introduction of steam power to the Sierra Almagrera, rainwater collection cisterns, known as balsas, were constructed. These allowed the occasional use of hotching tubs, and, there are examples of round buddles, or rumbos, in the Jaroso ravine, which made use of the outfall water from the pumping station, but without water to grade ore gravimetrically and to power machinery, recourse to manual methods was needed.



A hotching tub, or criba cartagenera in use.
lámpara minera.



A buddle, or rumbo in the Jaroso ravine, both separation methods required water for their operation.
Author's Photo.

One of the problems of this dry, manual processing of ore was that clay particles were not washed out of the mix and the presence of so much sterile material added to the cost of smelting. This was one of the reasons why the fine powder resulting from all of the manual operations was generally regarded as waste, whereas with wet processing, the resulting fine particles mixed with water, and known as slimes, were routinely processed and smelted. Observación seems to have been one of the first mines that processed the fine powder, known as polvo. Madoz in his *Diccionario Geográfico, Estadístico y Histórico de España, y sus posesiones de Ultramar* wrote, “*In addition, the shareholders of the Observación have sold the dust and dirt resulting from previous sievings that had been left on the ground up until last year, when they learned to smelt it, giving it a value. This revenue was sufficient to cover their operating costs for the year, so such an operation was very profitable, but little seen at other mines.*” Observación’s shareholders also had interests in the San Ramon smelt mill on the coast at Garrucha, where there was abundant water. Here, hotching tubs were used to wash the ore prior to smelting, and the polvo would either have been treated in settlement tanks or have been treated in kieves, a kind of dolly tub. In a kieve, the fine dust was shovelled carefully down the sides of tubs half filled with water. Everything was then vigorously stirred with a paddle, to the point where the water almost reached the top of the tub. The slurry was then allowed to settle, with the lead ore settling at the bottom. Apparently the sides of the tub were also hit with hammers to encourage settling. The water was then syphoned off into another tub, the waste skimmed off, and the ore shovelled out.



A dolly tub and paddle.

killhope

The Observación’s slimes might well have been treated in kieves similar to these.

Although the initial sorting of the mena from the gangue was done by the barrenos and the llenadores in the mine itself, the material required further sorting at the surface, where it was sorted into ore, waste and undifferentiated material. Any pure ore, graded as recio, was broken and stored, the waste was dumped, and the remainder, the mixed, was processed further. A laborious cycle and recycle of grading, using either ramp or hand-held sieves, pounding with hammers, and picking by hand followed.



Above, galena with associated gangue & right, the same sample after crushing.

foro de minerología

Three limpiadores (cleaners), 65 garbilladores (siewers), and 12 guardilloneros (who dealt with what was left), are listed by Bayo at this mine and all 80 men were involved in ore dressing.

Two french engineers, M Pernolet and M Saglio wrote for the Annales Des Mines, Vol. 16, 1849. They documented the preparation of minerals in the Sierra Almagrera and is the only source that I have found which details this dry processing.

The limpiadores, or cleaners, selected the pieces of recio (rich ore) and using small hammers, knocked as much gangue as possible from them. Then, after reducing the ore with heavy, short handled hammers and hand picking, this recio was screened, weighed, bagged, sealed and securely stored. (Although crime had already been committed as some inferior grade material was routinely added to the bags). The work of these limpiadores was carried out by women in many other parts of Spain and the rest of Europe.



Cornish Bal Maidens knocking waste off ore.

HendersonCobbingLge.

Bal Maidens crushing ore.

Wikipedia.

The term ‘garbilladores’ like so many terms in the Sierra Almagrera was brought from the Alpujarras, where a garbillo was the name given to a simple piece of equipment which was used as a substitute for a hotching tub. It was made of a 70cm diameter esparto mat and a 50 cm diameter piece of tarred canvas, attached to a wooden hoop in much the same way as an embroidery hoop. An incredible 17 kilos of crushed ore was put into the canvas and then the worker, holding the hooped screen by the edges at waist height, performed a series of semi-circular movements, while at the same time tilting the screen from side to side. This had the effect of setting the contents into a rolling motion, with the lighter, waste elements working to the top. The screen was then lifted to head height and flipped rapidly backwards and forwards, causing the waste scree to be jettisoned over the edge. The sequence of movements were carried out fluidly and rapidly, an incredible feat given the weight of the charge. These garbillos were little used in the Sierra Almagrera, where the differing densities of the ore and the waste were not such that they could be separated in this way and needed to be hand-picked. However, the term garbillo was used for the similar looking sieves, but with an open side, used to concentrate the crushed ore, and garbilladores were the men who used them.

The garbilladores operated a system of crushing the better grade ore in a stone-lined circle and then sieving it in fashion closely resembling winnowing. The men positioned themselves where there was a good up-draught of air, then, rather than the usual side to side sieving motion, an up and down motion was used. The combination of gravity pull and air up-force worked to separate the contents of the sieve in the same way that wheat is separated from chaff. The heavier lead particles were allowed to fall into a second sieve placed on the ground and the waste was blown away. When the second sieve was almost full it too was treated in the same way. The cycle was repeated until the material in the garbillo was judged to be of the right grade to satisfy the assayers.



Ore was crushed in stone lined circles like this one in the Jaroso ravine. *Author's Photo.*



The ore was 'winnowed' in sieves similar to these shown above.

wikipedia & imagescollections mfa.org

Only 15 of the 65 garbilladores at the Observación mine were on the pay-roll, the rest were working 'á partido' and were paid by the quintal (approx. 46kg.) of ore which they processed.

Mixed material from the primary screening, which was obviously poor grade but not worthless, was processed in the same way as the good grade, but by a group of workers known as guardilloneros, and the results were classed as guardillon, which roughly translates as leftovers.

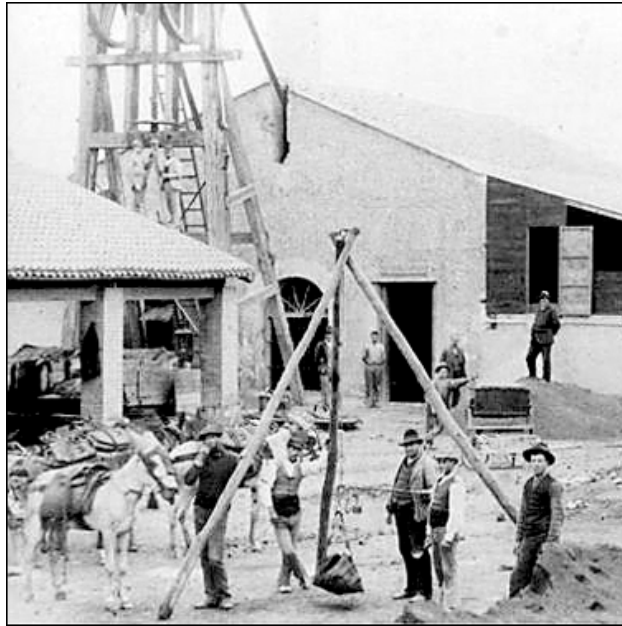


Cerand10

Primary screening would have either been with hand sieves (left), or with (right) ramp sieves.



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Bagging and weighing the processed ore.

La Verdad Pozo Montserrat Murcia.

Guarding all of the stored ore were 2 guardas, the night guard and a day guard.

And so to the gavia army and their overseers. Gavias were the children who were paid a pittance to do all of the fetching and carrying above and below ground. It was upon the bony shoulders of these children, who comprised one third of the workforce, that the results of poor organization and lack of mechanisation were carried.

The next chapter is theirs.