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IMPROVEMENTS WANTED IN WORKING GOLD AND SILVER ORES.

But few of the writers who treat of the working of gold and silver ores do more than describe the practiced methods, without attempting to criticise them or to suggest possible improvements; and especially is but little stress laid by any of them upon a point which seems to us to constitute one of the most necessary factors to successful working. We allude to fine comminution or pulverization of the ores.

The discovery and consequent working of our gold and silver mines introduced to us the prevailing methods and machinery of countries where cheap labor and lack of competition have always restrained inventive talent and conserved traditional ideas. In our ignorance and inexperience we were forced to accept and adopt these unsuitable guides, and, the choice being apparently justified by some isolated successes, the so-called "practical miners" seemed for years to be committed to a system of defence which gave no quarter to new ideas and improvements.

In evidence, however, that education, observation, and experience are gradually becoming substituted for the old order of things, we now find among mine managers a hopeful and growing belief that the science of metallurgy has not reached its limits; and, not seldom, a modesty of opinion which is most promising of progress and success.

It may not then be premature to inquire whether the stamps and pans of the present epoch satisfy the conditions for which they were intended. Because they are of simple construction and require but little intelligence or care on the part of superintendent or workmen, they have, naturally, maintained a preference over all other machines designed for the same work, a preference which has been strengthened by their successful use in mines of exceptional richness and celebrity.

And yet it may be fairly questioned whether experience has not demonstrated that a very frequent if not a principal cause of non-success has not been because these machines have failed to comminute the ore to the fineness requisite for an economical separation of the precious metals.

It is stated that some coarse gold ores have yielded nearly their assay value when reduced only fine enough to pass through a 10 mesh sieve, or 100 holes to the square inch.

A few years since preference was given to the 40 mesh sieve or screen for stamps, =1,600 holes per square inch, in successful mines. Now the 60 mesh is generally advocated, an evidence of progression which is very encouraging. From the stamps the ore, gold or silver, goes to the amalgamating pan or to the chlorinator. In the pans it is still further comminuted while being ground or rubbed into the mercury. This further comminution, slight as it is, as is apparent on an examination of the "tailings," is effected, however, at a most disproportionate expense; the cost of the wear on the pans being three or four times greater than on the stamps, for in grinding or rubbing the hard quartz or other stone has the advantage of iron. But the "tailings" still are sand, not powder, and these particles of sand may, and in many instances do, hold enveloped smaller particles of the precious metals which further comminution would have exposed to the action of the quicksilver.

The most approved writers on the subject agree that when the ores are in the most finely divided state the most satisfactory results are obtained in chlorination. But this assertion is not made when amalgamating in pans is treated of, because the pan process is a very imperfect one, and is not adapted to finely powdered ores.

Phillips says that in amalgamating the pan process gives better results than any other (naturally enough where stamps are used), and yet that the yield of the metal rarely amounts to 75 per cent, and that the average scarcely exceeds 65 per cent, and that the "tailings" from the pan process, after being exposed to the atmosphere for a few months (becoming further disintegrated), may sometimes be again advantageously worked over, thus increasing the total product to 85 per cent.

Küstel says that "not more than 50 to 60 per cent of the silver is ever obtained by this process; if it is higher it is owing to the presence of gold or silver glance." "The result of the operations depends considerably upon effecting a more or less perfect grinding in the pans."

The size of the apertures in the stamp grating or sieves, says Phillips, varies to a certain extent in conformity with the particular views of the superintendent of the mill on that subject.

It seems evident, then, that much finer comminution—say through a 90 or 100 mesh—would, in many instances, add 20 to 30 per cent to the product of mines now profitably worked, and would assure profits to many others which have been worked at a loss. But as the combination of stamps and pans cannot effect this, and as, even if the stamps were effective, the pans could not work such fine powder successfully, other machines must, in time, supplant them.

Stamps and pans are indispensable to each other, but stamps cannot economically make a fine powder of the ore so that all the metal shall be liberated from the matrix, nor can the pans successfully manipulate anything finer than sand. Both a new comminutor and a new amalgamator are needed.

It seems to us that the first principle of successful working is a thorough separation of the metal from its envelope, and, next, a presentation of the metal to the quicksilver without the rubbing and grinding which create "flouring" and "slimes."

WILL OUR MOON EVER RISE IN THE WEST?

When the periods of Encke's comet were found to be shortening it was suggested, by way of explanation, that the cause might be some appreciable resistance to the comet's motion by the luminiferous ether, it being one of the paradoxes of astronomy that resistance must cause a planet's motion to be accelerated. But this explanation was open to two serious objections: there was no other occasion for suspecting such action on the part of the luminiferous ether, and subsequent observations and computations showed that the quickening of the comet's motion was not uniform. In some of its periodic revolutions the velocity of the comet was accelerated, in others no acceleration appeared. Obviously some cause acting irregularly is at the bottom of the puzzle.

When it was discovered that the inner moon of Mars had an anomalously rapid motion, revolving around its primary three times while the planet revolved on its axis once, the puzzle rose to a problem of the most serious magnitude. Such a flat contradiction of what should have been expected, according to the nebular hypothesis, would be little less than fatal to that hypothesis unless it should appear that some cause had been acting with special force to shorten the radius of the moon's orbit and so accelerate its motion.

The most reasonable explanation of the anomaly yet offered is that of Professor Doolittle, of the United States Coast Survey; and his suggestion answers equally well for Encke's comet. Professor Doolittle rejects the hypothesis of resistance on the part of the luminiferous ether, since that substance, whatever it may be, is so different from ordinary matter that it is scarcely proper to say what is credible or incredible in regard to it. There is, however, in the interplanetary spaces a well known form of matter, in quantity presumably sufficient to produce the effects observed, namely, the matter of aërolites or shooting stars. It is well known that a larger number of these bodies strike the earth in front than in the rear, and it is quite possible that the impact of these bodies may cause resistance to planetary bodies sufficient to shorten their radii and accelerate their velocities. This action would tend to increase the relative velocity of satellites in three ways: (1) by striking the satellite and increasing its velocity by making it revolve in a smaller orbit; (2) by striking the primary, and thus increasing its mass and its attraction of the satellite; (3) by increasing the mass of the primary, and thereby consuming its original velocity of rotation through the taking up of this addition to its mass. However slight may be the average annual effect thus produced, any assignable diminution of radius and increase of velocity is thus attainable in a sufficient number of years.

By reason of its going faster than the surface of its primary the inner moon of Mars must, to an inhabitant of that planet, rise in the west and set in the east. And to this condition all the planets and satellites are destined to come if the causes now in operation continue to operate as in the past. Some curious changes may fall to the lot of our earth if the meteoric rain is not abated. The time will surely come when our moon, too, will rise in the west and set in the east. But before that there must be a period, perhaps very long, when the moon will revolve around the earth just once a day, and consequently hold an unvarying position in the sky, visible to half the world, invisible to the rest. Possibly during this period it may happen to fall in the shadow of the earth, and so suffer eclipses of long duration. Or it may chance to fall between the earth and the sun and be invisible save in slow eclipses of the earth's chief source of light and heat.

All this assuming that the meteoric storm goes on as heretofore. But Professor Doolittle suggests that after all the minor moon of Mars may continue as now an exception. It is known that aërolites belong largely, perhaps wholly, to the solar system. If so, their number must be finite and exhaustible—may be they are already nearly all picked up. Such being the case the acceleration of planetary motions through their action must gradually come to an end. This danger to the stability of the solar system will cease; and though our remote descendants will miss the sight of a moon rising in the west, their lot will not be without its compensations.

WORK AHEAD FOR INVENTORS.

It has been a favorite dogma with speculative philosophers that the surest road to human improvement and happiness lies through a limiting of man's wants. All our troubles and most of our crimes, they tell us, arise from the multiplicity of our artificial needs and desires—from our complicating life with innumerable inventions.

A practical philosopher, though a transcendentalist, has a truer conception of the order of human progress and the conditions of human happiness. The hope of the future rests not on Arcadian simplicity—an impossible civilization of bare-backed and empty handed philosophers—but on the continued conquest of the materials and forces of nature, and the widening of all men's wants, until every possibility of art and nature shall be made tributary to every-day life.

Emerson, in his latest utterance, "The Future of our Republic," takes this standpoint, and hints of the predominant part to be played by inventors in the great drama of the future. In the effort to meet one want a thousand others may be created and satisfied; and any one of these may mark an enormous advance in the progress of civilization and the elevation of human existence.

"Our modern needs," says Emerson, "stand on a few