

with the greater majority by far of the districts in which tellurides are particularly known to occur. The treatment of tellurides for the extraction of gold depends very much upon the proportion of these substances, and upon that of the free gold associated with them. Rich tellurides are being treated at Schemnitz, in Hungary, by means of sulphuric acid, which dissolves the tellurium, this substance being afterwards reprecipitated and collected; the gold is obtained from the residues by smelting. As tellurium has, however, no special use in the arts, and is, in fact, only a chemical curiosity, it is not in the least likely that such an expensive process will find any extended application, and the tellurium in most gold-ores can only be regarded as an objectionable impurity to be got rid of as promptly as possible. The presence of tellurides appears in no wise to interfere with the amalgamation of any associated free gold; it is well known that the extraction by amalgamation of the gold-ores of the Californian Mother lode is exceedingly high, as good practice is being made there as in any part of the world, in spite of the presence of tellurides in most, if not all, of these ores. Of course, this statement applies to the free gold only; any gold in combination with tellurium is not affected by mercury, and cannot, therefore, be saved by amalgamation. The combined gold will, therefore, have to be caught by concentrating machinery, and in all the districts in which tellurides are abundant tellurium can be found in the concentrates. Unfortunately, however, most of these tellurides are very brittle minerals, and the action of the stamp-mill crushes them to the finest possible powder. Unless special precautions are taken a large proportion of these valuable tellurides is apt to be ground to an impalpable powder and lost in the slimes. Telluride ores need, therefore, the best and most accurate vanner arrangements; the mill screens should be as coarse as possible compatible with a complete amalgamation of the free gold; and the depth of discharge should similarly be kept as low as possible; the issuing pulp should be sized, and even the finer grades sent to separate vanners, so as to collect these valuable concentrates as completely as possible. All these precautions are well worth taking, because in many telluride ores a great portion of the value is locked up in the tellurides. Once obtained as concentrates there is no special difficulty in treating telluride ores. We do not know that it has yet been definitely proved whether the cyanide process is or is not capable of decomposing a telluride of gold, and of extracting the gold from it. We are inclined to think that such a reaction would not take place, and that telluride concentrates ought to be roasted before being cyanided. If this view is correct chlorination would probably prove preferable to the cyanide method of treatment, for in chlorination it is always necessary to roast the ore first. There is no special difficulty in roasting tellurides, which are completely decomposed in the calcining furnace. According to some authorities there are heavy losses of gold in calcining telluride ores, as much as 20 per cent. of the gold being thus lost according to one writer. That any such loss occurs in practice appears upon the whole quite unlikely, and it even seems questionable whether there is any abnormal loss at all in an ordinary chloridizing roast, seeing that chlorination has been most particularly successful in those two districts of the United States where telluride ores more especially occur—namely, on the Mother lode of California and on the gold belt of the south-eastern States. At any rate, it is in the highest degree improbable that any serious loss can occur if roasting is carefully conducted in a modern "Fortschaufelungssofen" (the multiple-bedded long calciners), especially if fitted with dust-chambers. As this calcination will remove the tellurium, the roasted product can of course be treated in identically the same way, whether tellurium be present or not, in the original ore. Telluride concentrates can also be treated by smelting. It is said that there is some liability to volatilisation in the smelter; and this may be true, but the difficulty can probably be overcome by suitable arrangements.

To sum up the subject in a few words, the presence of tellurides in the ores of a given gold district prove nothing as to the richness or poverty of the district, although tellurides generally characterize low-grade ores; they show that the permanent water-level has been reached, and render it probable that the character of the ore will continue from that point downwards without much change. Their treatment presents no difficulty that an experienced mill-man should not be capable of overcoming successfully.

CYANIDE PATENT.

ANALYST, Mines Department, to UNDER-SECRETARY FOR MINES.

SIR,—

Wellington, 17th November, 1896.

As you perhaps will be aware, I have discovered that free cyanogen does not attack gold. Consequently, as Mr. Button, M.H.R., was the first to point out to me and others, the cyanide patent appears to be invalid. Now, this is a discovery the *merit* of which, though belonging to me, may go a different way, and it is to place certain evidence on record that I state this evidence now.

It so happens that Professor Black also found out that if cyanogen attacks gold it is very slowly, and it had possibly to be *partially* decomposed first.

It also happened that he was examined *before me* in the cyanide case before the Registrar of Patents, and then gave evidence of the nature I have stated.

But this scientist was set on at this investigation by Sir Robert Stout, who himself was instigated, I believe, to this by a question asked of Mr. Greenaway (the Cyanide Company's agent), which question was, "Do you think that cyanogen itself would be of any practical use in the cyanide process?" I say "*believe*," because there is no *absolute* proof of this question instigating