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The advantages that Britain and France are not to any extent in the hands of foreigners but are held by their own people. The consequence is that the wealth of these nations is not depleted by the payment of interest to foreigners, while the people are taxed to meet interest charges, the money is distributed to their own citizens. It has been different in this country, as we have been paying interest abroad and reducing our own wealth or deducting from that which is annually produced. Another important feature is that a government which only owes its own people is stronger than the one which is indebted to foreigners, for, to their patriotism is added pecuniary interest.

The embarrassments to both government and people in this country have proceeded from the fact that we have relied on foreign capital, not only to meet the demands upon government, but to develop our productive enterprises, the profits from which have largely accrued to the benefit of foreign lenders and investors. These practices have continued as long as this country can stand it. The time has come when we should rely on our own capital, and it would be better to postpone enterprises for a time, and, until they can be undertaken with our own means, rather than to depend on aid from European money lenders, or those who seek investments in this country. When foreign money is being received, we are extension of the situation is pleasing, but it is quite different when pay- day comes, and that day arrives every six months or a year, so far as concerns the payment of interest on our bonds.

The need of the government would be independent, it should avoid indebtedness to other nations. There seems to be no need that we should contract foreign indebtedness, and perhaps under any circumstances. Our natural resources are abundant, and the intelligence and energy of our people are so great that we can in future provide our own capital and all the necessary capital. Every year in which we keep our produced wealth to ourselves will give us enlarged financial strength, and enable us to do our own work with our own resources.

It has been said that "a public debt is a public blessing," which has been disputed as an abstract proposition, but, as we have a public debt, it will linger with us for an indefinite time; it presents an opening for the safe investment of the funds of minors, old people, and many other kinds of which are necessary and thrifty. The surplus earnings of youthful and active years are so much stored labor, and Uncle Sam's treasury is a safe storehouse for it.

The successful experiment that has been made is likely of incalculable value in many ways. We are about to enter upon a new century and a new era, a career of American independence, financial and commercial, as well as national and political.

The INTERNATIONAL MINING CONVENTION.

According to the intensions of the objects of the association, as outlined in former issues of this Journal, if carried out, may be made to work much good to the mining interests of the Western States. If, however, we change our present federal mining laws, in respect to the most just provision contained therein—in allowing the prospector or miner to follow the dip of his vein or deposit parallel to the side lines of his own depth, then the proposed change will be a retrograde step, by changing to the square location of large area, and bounded by vertical side lines, produced downwards from the said side lines of the square location.

The large extent of mineral development attained in the Western States and Territories has been gained through the wise provision of allowing the fullest scope to the efforts of the miner to develop his ore body in depth, under the law of the apex and extra lateral rights, and to depart from this just custom is to adopt a system which stops deep mining, and which is as fruitful of litigation and lawsuits as that now in force. As pointed out in this Journal on former occasions, the error or evil does lie in the boundaries of our mining claims, but in our wrong manner of settling mining disputes in courts of law by lawyers, whose chief business is to carry on the litigation for all there is in it for their own interests.

Our mining laws ought to be administered in each State and Territory by a Commissioner of Mines, and by each of the disputants naming an arbitrator who is a mining engineer to act for them, and, if necessary, with power for them to name a third arbitrator. In this manner it is to the interests of these parties to obtain a settlement of the dispute, by taking the evidence in the case, and not in courts of law, and to act in the cause of justice to labor and capital invested in mining. As there is as much cause for dispute under the surface location as that with vertical boundaries, under the present law, it is clear that it is our system of dealing out justice in courts of law that is at fault, and not the just miners' boundary, with side lines running to the dip of his deposit. To create a boundary which stops deep mining, and to say to the industrious miner who has developed ore in depth, thus far and no farther than is given him in the law, is to cause the worst form of monopoly to exist, and to give to another the reward earned by the investment of labor and capital in deep mining, and that is what the proposed change in side line boundaries will do. Therefore, let side line boundaries alone and change our wrong system of administering justice in courts of law to arbitration on the ground by mining men conversant with mining conditions.

The SQUARE LOCATION.

The square location of large area is the system of surveying land in the eastern States, and is not a suitable or just system for the boundaries of the Western States. Another important objection to it is that within its area are sure to be included more than one class of deposit or vein of ore. This rule holds true for the best as well as the worst States. Our present mining system is in the form of a parallelogram, of six hundred by fifteen hundred feet, containing 20.06 acres, is wide enough under our present law, and to increase the width is to include in it other minerals or veins, deposits, than that for which the location is made. The square location is to be too large on that account in the Province of British Columbia, where it is now in force, and, for the last cause named, they desire to adopt a system somewhat similar to that of the United States. The fact is worthy of note, on account of a small minority in the United States who have no experience as to its unjust operation to the miner to change to that form of location. As long as there are two veins or deposits running parallel to each other, of the same general or ore location is made, it is not an exclusive grant of territory; but when another class of ore is found running parallel to it for which the miner has no use, that the large location prevents prospecting and causes a monopoly of the undeveloped minerals. It is therefore not a mining condition in the interests of the largest amount of mineral development, and one which cannot be removed by any cause but that of ignorance and monopoly.

A MINE PLAN ON GLASS.

The recording of mining work in most mining camps is in a haphazard manner, and is paid in the large majority of cases. This step is necessary both on account of the interest of the employed and the owner and manager. The intelligent understanding of the location and extent of the deposit by the workmen is highly important. To attain this object, a mine plan of the underground workings is instructive and useful, in addition to the office plan on paper. For this purpose such a plan should be placed at the
shaft house or hoisting works most convenient to the shaft or tunnel. A working plan of the shaft and each level of the mine can be made by taking two sheets of plate glass, which are supposed to represent the vein, and ought to be placed at the angle of the dip of the lode, and bonding the glass with oil paint and the use of small pieces of wood, to represent timbers placed in the mine. A correct model of the shaft and level represented can be made, which can be colored to indicate the ground stopped, timbered, filled with refuse, as well as the ground unworked, with ore shoots or chimneys indicated, and so also with each succeeding level, the model being made by using sheets of plate glass of sufficient size, any desired scale can be made, and by the placing of the two sheets at the required distance apart from each other, a good model of the workings can be made.

Such a plan is of great service to the manager or foreman in giving instructions to the miners or timbermen, and in giving the employees a clear understanding of the location of the ore bodies and correct position of the workings.

KLONDIKE FAILURES.
As predicted in these columns in former issues, the return to the United States of many who went to the North Western gold fields some months ago, with ruined constitutions, and ruined fortune, or often without their outfit and penniless, are evidences of the truth and sincerity of our warning remarks which were not heeded. If this suffering came on those alone who went there it would not be so severe, but when it falls to the lot of widows and orphans, the Klondike craze will have cost as much money and lost as many lives, in proportion to those engaged, as has the present war with Spain, and the gain will be as great to the general interests of the country.

THE WAR TAX ON STOCKS.
If this tax has the effect of weeding out all stock gambling operations in bogue mining ventures, which have their existence mostly on paper, and on which the location of the supposed mine itself has been known to change from one prospect claim to another a few miles off, as in the case of one notorious fake mining enterprise of recent date, it will have accomplished one good and in aiding those who staid at home, as well as adding power to the sinews of war. The mining industry can well afford to pay its share to the cause of liberty and justice to the oppressed colonial subjects of Spain, especially if that will increase the mineral area and foreign trade of the United States, of which the miners will get their share, and it may also help in giving additional territory to prospect, develop and improve, thus increasing our people going to seek misery and misfortune in the inhospitable northern wilderness.

SOME REMARKS ON THE CYANIDE PROCESS.

There is no more doubt that an ore crushed to as even a size as possible is much better leachable than an ore crushed into various sizes. Even a very finely powdered silicious ore can be successfully leached if the size of the very small particles is more of an even size. Ores crushed to different sizes do not leach so well, because the minimum particles will always fill the minimum spaces left between the coarser particles, and render it, therefore, much more difficult for the solution to penetrate and in contact with the gold bearing particles of the ore.

On the Crown Reef mine, one of the best managed mines on the Rand, for instance, the ore is sorted on the minimum and slime ore by means of Spitzkasten, after leaving the plates. Each size is collected in a different leaching vat and treated by itself. The extractions are very good, as shown by the following figures.

In February, 1895, 16,056 tons of ore were treated, 59,721 per cent pure gold of the assay value of the ore were recovered over the plates. The first size, being the coarser and more pyritic ore, amounted to 1,057 tons. The residue of this size assayed 1.5 dwt per ton, after treatment by cyanide, and the amount of this gold recovered, 7,575 per cent of the assay value of the ore.

The second size, being the finer and more sandy ore, amounted to 10,152 tons, (residues assaying 0.67 dwt per ton after treatment by cyanide,) fine gold recovered 17,829 per cent of the assay value of the ore. Shlimes amounted to 4,347 tons, assaying 3.07 dwt per ton.

This gives a total actual extraction of 85.28 per cent on the assay value of the ore, and a loss of 14.78 per cent, of which however 8.557 per cent were contained in the shlimes, of which again about 85 per cent were recovered by a process worked out and introduced by Mr. Williams; so that there was an actual loss of only about 7 per cent of the fine gold contained in the ore, or about 1.5 dwt per ton of ore.

Before referring now to the above-mentioned so-called double treatment, I should like to quote a remark made by Mr. McArthur, at a meeting of the Society of Chemical Industry in 1890:

"Elsner has stated metallic gold dissolves in cyanide of potassium only in presence of oxygen. Not having seen the original account of Elsner's position to criticise his experiments, but I never could find that the presence of oxygen was necessary either to dissolve gold by itself or from ores by cyanide. If a piece of gold be taken and exposed to the air, and if the air act on it would have to penetrate two inches or three inches of the solution, the gold will dissolve in its usual slow and steady fashion. The experiment shows that either oxygen must be absorbed or hydrogen evolved. I have seen no evidence of the former, and can adduce no proof for the latter; but I think the latter the more probable, because I cannot conceive oxygen penetrating even the film of cyanide solution without at once oxidizing the cyanide to cyanate, whereas in the other case, as suggested to me by my friend Mr. Ellis, in presence of oxygen may be at once seized by the excess of cyanide present, and ammoniacal compounds formed. However, we do not concern ourselves much with the reaction and come to pure gold, but as a matter of fact we cannot find gold that is not playing any part in the cyanide extraction of gold that is supplied by the ores from ores. We have treated an ore with cyanide with free access of air, and then a parallel experiment with boiled water, the bottle filled to the stopper with solution and ore, and the stopper sealed. The extraction was the same in both cases."

Today no chemist is in doubt any more that Elsner's formula is correct, and that the presence of oxygen is absolutely necessary for dissolving gold by cyanide. That this is so was proven by many experiments, of which I will mention one as a very striking one:

Take two small pieces of filter paper, put equal quantities of precipitated fine gold in powder form on each of them. Make up a very dilute solution of cyanide into two beakers. Take one of the filter papers with the gold on it and put it in in one of the beakers, but so that it floats on the surface of the solution only. Take the other filter paper with the gold on it and bring it into the second beaker, but so that it is covered by the solution at once. Allow it to settle to the bottom of the beaker, and if it does not do this by its own gravity, assist with a glass rod.

You will notice that the gold on the first filter paper will be dissolved in a few seconds, on account of the cyanide solution coming in contact only from below, while the gold itself is exposed to the oxygen of the air. The gold on the second filter paper, which lies at the bottom of the beaker, and which is perfectly covered by the solution, therefore not being able to come in direct contact with the cyanide solution, requires hours before it becomes dissolved.

The practical confirmation of Elsner's theory has led to the so-called double treatment, which in fact is nothing but an oxidation process, in which the air takes the part of an oxidizing agent.

To apply the double treatment, two leaching vats are placed above one another, so that the contents of the upper one are easily discharged into the lower one, by means of Butter's patented bottom discharge. After the ore is charged into the upper vat, it is moistened with a dilute cyanide solution. After several hours, after which the ore is loaded into the lower vat. By doing so, the ore moistened with the cyanide solution cannot help coming in contact with the oxygen of the air.

The practical result is that the first leaching, followed with a very weak cyanide solution in the second vat, gives the second solution by far the largest percentage of the gold contained in the ore solution. Practically, this amount of the gold in cyanide solution, cyanide of potassium, had already taken place, and it requires only several washes with a very weak solution to extract the yellow metal.

Sufficiently sandy tailings do not require a double treatment, as the air brought into contact with the ore at the same time with the solutions is sufficient in these cases.

The double treatment has been worked with very good results on pyritic tailings, and I do not see why it should not work well with a low grade pyritic ore as well.

In cases in which the gold contained in the ore on the workers, is acted upon by cyanide, a so called artificial oxidation may be applied with success. Experiments have proven that an addition of oxidizing chemicals accelerates the solution of the gold contained in the ore, by oxidizing the gold to an oxidizing qualities for instance peroxide of potash, ferre cyanide of potash, peroxide of sodiam and other oxidizing chemicals may be of great advantage in extracting gold from pyrites and refractory low grade ores. It is certainly worth while in cases in which refractory ore is not tractable with success to make experiments in this line upon the directions of a good and competent metallurgist.

I have perfect confidence that the extraction of gold from ores by cyanide will increase in this country for a good many years.
to come, and that many low grade gold ore deposits, which were regarded as not payable heretofore, with some luck and treated successfully by the cyanide process, the process by which it became possible to increase the gold output of the whole world considerably, and which is one of the reasons that the United States take the lead today of all gold-producing countries, and which let us hope will be the case for many years to come, as a result of high commercial standing our country takes today amongst the countries of the whole world.

To give a very good example in order to show how important this question of crushing the ore to its proper size for leaching purposes with Cyanide solution is, I only need refer to what occurred some years ago at the new world renowned Mercur Mine, not very many miles away from here. At that time, six to seven years ago, the former managers of this mine and Cyanide extraction plant, which by the way, was the very first plant for treating ore in this country by the so-called direct Cyanide process, were advised to grind the ore to a size of about 600 mesh in order to attain the highest possible extraction. The result was an extraction of only about 40 cent of the assay value of the ore. This for some time proved quite a puzzle and was of great trouble to the managers. After many and not very successful experiments had been gone through, it was decided not to crush the ore so fine on account of the porous nature of the ore and its composition, a percentage of Talc and Alumina, which latter of course rendered the ore rather impenetrable for the Cyanide solution. The results were, that the coarser the ore was crushed the higher the extraction became, and today, while the ore is crushed only to the size of about 1/8 inch square, one of the highest extractions known, about 85 cent of the assay value of the ore, assaying on the average 15 to 18 dwt. per ton is gained.

During my last stay on the Rand in 1895 to 1896 I had the opportunity to convince myself that the classification and separation of the ores, according to size and specific gravity, before the treatment with Cyanide, was a great success. On my visit to the Transvaal in 1895 three processes were in use to recover gold from ore. First, amalgamation over copper plates, by which most of the free milling ore was recovered (about 50 per cent of the assay value). Second, subsequent chlorination of the concentrates from Free vangayers and Third, Cyaniding of the remaining tailings.

In 1897 the total output of the mines on the Rand amounted to over three million ounces fine gold, of which one-third, some one million ounces, were recovered by the Cyanide process. That the amount of gold recovered by Cyanide has increased so considerably during the last years and that the Cyanide process has become quite a strong competitor to the chlorination process on the Rand is mostly due,

Firstly, to the above-mentioned classification of the ore.
Secondly, to the so-called double treatment of the ore.

I thought it well to put a few words about these processes as in some cases they may be applied with advantage in this country. They may either help to increase the extraction or may lead to the successful treatment of ores which were not treatable before. On the Rand it was proven that,

First, a decided separation of the sandy ore from the slimes is necessary in order to obtain a good extraction.

Secondly, that by classifying a concentrated ore into different groups of different sizes and specific gravity a much higher extraction is gained.

This separation and classification of the ore is done by passing the ore as it comes from the plates through a system of so-called Spitschuiten and Spitzlauf, apparatuses well known to all of you and which I therefore do not think necessary to describe in detail.

(Barnes Upright Drill.)

A new drill, which W. F. & John Barnes Co., of 105 Ruby street, Rochford, Ill., has just built and are placing on the market, is the Barnes Upright Drill, No. 8, with 26 inch swing. It was produced in response to a very general inquiry for a sliding-head drill smaller than their 28 inch drill and it is thought this new machine will meet fully the requirements for a drill intermediate in size and capacity between the 25 inch stationary head drill and the 28 inch and 34 inch sliding head drills.

This new machine has been designed with special care, and it is believed to embody every feature necessary to make it a complete and perfect tool. The workmanship is thoroughly first-class in every respect. The feed arrangement is especially strong, and provides for all the different feeds which can be used on a drill press. The cut shows very clearly the feed mechanism, and, as will be seen, the drill has power self-feed with automatic stop and worm feed, and quick return for spilne. The feature of hand lever feed on a sliding head drill, in combination with worm and power feed, is new and increases the usefulness of the drill. The spindle is fitted with the No. 3 Morse taper.

The dimensions are as follows:

Height of drill. ........................................ 7 ft.
Greatest distance from spindle to base. ....... 53 in.
Minimum. ........................................ 21 in.
Diameter of column. ............................... 7 in.
Diameter of spindle. ............................... 1 11-16 in.
Width of column face. .............................. 6 in.
Travel of sliding head. ............................. 21 in.

Travel of spindle. ................................. 11 in.
Diameter of large pulley on cone. ............... 4 in.
Face of pulleys. ..................................... 3 in.
Tight and loose pulleys. .......................... 10x3 in.
Diameter of small pulley on cone. ............... 1 3/4 in.
Diameter of bevel pinion. ......................... 3 3/4 in.
Face of tooth. ....................................... 1 3/4 in.
Ratio of back gearing. .............................. 575 to 1.
Reach of spindles for space. ...................... 152 in.
Weight. ............................................... 1530 lbs.

In our issue of July 15th, on page 8, in our review of the second edition of Gas, Gasoline and Oil Engines, by G. D. Hiscox, we neglected to give price of same, which is $250. The publishers, Messrs. Norman W. Health & Co., of 132 Nassau street, New York City, will forward the hook to anyone on receipt of price.

The Consolidated Kansas City Smelting and Refining Company have met with phenomenal success in marketing their new product, the Alchemist brand of blue vitriol. In November of last year they improved their copper plant in many ways, increasing their capacity to 550 tons per month.

The current year was started under the most auspicious circumstances, as they were awarded the entire contract for the consumption of the Western Union Telegraph Co. A young man has been appointed to the Mexican front, Old Mexico and Canada. Several shipments have also been made to the Mediterranean coast. The Alchemist brand of blue vitriol is now on the market in large and small crystals. Its great popularity is due to the high percentage of copper, and to the almost entire absence of impurities.

The Colorado Iron Works Company are working their plant to its full capacity, and making shipments to nearly all parts of the world. Among recent shipments were two 42x144 silver-lead smelting furnaces, with complete smelting equipment, to the Tasmanian Smelting Company, located on the Island of Tasmania. This order filled six cars. This company is also building a 14x144 silver-lead smelting furnace, for the Hanover Smelting Company, of Utah, and a 45x144 silver-lead smelting furnace, for the Germany Lead Works, Salt Lake City, Utah; both with complete smelting equipments. A large jacket smelting furnace for the Canadian Pacific R. R., British Columbia, one for the Great National Mexican Central Smelting Company, Old Mexico, and one for the Mountain Copper Company, in California.

This firm has established a reputation for its smelting furnaces because of superior design, workmanship and material, which brings orders from all over the world.

The name of the crude mill for crushing ore, the correct orthography of which is "arрастre," is written and pronounced in many different ways, some of them amusing. The senior editor of the Transcript once wrote a letter for publication in the east, from a mining camp in the Death Valley region, in which he mentioned a "raster." He got the name of the mill from another miner, and being a hundred miles from any kind of written authority, so wrote it.—San Bernardino Transcript.

While The Transcript devotes considerable space to mining news, and furnishes some first class mining literature, it is apt to be mistaken. If the senior editor of The Transcript will look farther into the matter, he will find that he has not spelt the word rightly as yet.
The Provo-Mercur 40,000 Volt Transmission.

By Leon W. Bly.

But few, even in the electrical transmission fraternity, are aware of the fact that the highest voltage employed in the commercial transmission of power over a long distance is that which is now being operated on the lines of the Telluride Power Transmission Company between Provo Canyon and Mercur, Utah. The Telluride people are pioneers in the field of extremely high voltage transmission and for several years have experimented, conjointly with the Westinghouse Electric and Manufacturing Company, on transmission lines with potentials ranging as high as 120,000 volts.

The line used for carrying out these experiments was a special one extending from the Telluride Company’s power house near Ames, Colorado, to the Gold King mine and having a length of 11,720 feet. The route of this line was over a rugged country subject to a heavy fall of snow in winter and rain with severe lightning in the summer. The poles were placed one hundred and eighty feet apart and supported three circuits of No. 8 galvanized iron wire. Practically all the different varieties of cross arms, pins and insulators to be found on the market were tested, as were also many new models of these appliances, devised at the time, and during the test runs, the condition of the atmosphere and of the line in regard to snow, rain and humidity were carefully noted. Up to the present, the results of these important experiments are reserved and every effort to secure the data deduced has been unavailing.

Reverting to the Provo-Mercur transmission, the plans of the Telluride company contemplate the early installation of two thousand horse power in two units of 750 kilowatts each, to furnish power and lights to the mining interests in and about Mercur and Tintic, Utah. These two districts, which are perhaps twenty miles apart, are respectively thirty-two and forty-six miles from Provo Canyon, where the power house is located.

Fuses, choke coils and lightning arresters on the Provo-Mercur Transmission.

The Provo-Mercur transmission line is the one which has been placed in operation, but work has been commenced on the construction of the independent line from Provo Canyon to the Tintic district, which will be, as stated, forty-six miles in length. After the Provo-Tintic line is completed, the substations at Mercur and Tintic will be connected together by a subsidiary transmission line so that in case of accident to either main line from Provo, service may be continued without interruption to both places. Immunity from pole line trouble seems to be perfectly secure by this arrangement as the two pole lines take entirely different routes.

At present, one 750 kw. type “A. P.” three phase General Electric generator is being operated by a flexible connection to a turbine wheel driven under a head of 125 feet and running at 300 revolutions, the turbine being temporarily hand-regulated. This generator has a periodicity of sixty cycles, is star wound, and gives a phase potential of 800 volts. Of the four 250 kw. raising transformers installed in the generating station, but three are in use, the remaining one being as reserve, and its connections are so arranged that it can be substituted in service for either of the other transformers at a moment’s notice. The normal primary potential applied to the raising transformers is 622 volts, the normal secondary being 23700 volts. As is the case with the primaries, the secondaries are connected in star, hence the three-phase high tension terminals have a phase pressure of 40,000 volts.

The principal material used in the insulation of these high tension transformers is muslin and fullerboard, blocks of maple wood being used to separate the coils. The transformer cores and coils are immersed in mineral seal oil, with no other cooling device than that of the natural radiation of heat from the surfaces of their cases. This radiation is, however, very great because of the fact that the surfaces of the cases are rather deeply corrugated. To be exact, the corrugations are 3/4 inches deep and one inch wide. The general appearance of the high tension transformers is shown in the illustration appearing on page 11, which also shows plainly the method of supporting the interior high pressure circuits.

The high tension leads are brought out through the tops of the tanks through wood bushings, on the inside of each of which is a heavy porcelain tube extending from the top of the bushing down into the tank beneath the surface of the oil. The low tension leads are brought out at the sides of the tanks and these low tension leads consist of two series of twenty-eight turns in multiple of two three-quarter inch by 340 mils strap copper. The high tension windings consist of 1400 of No. 9 magnet wire. These transformers, as well as the lowering transformers at the Mercur sub-station, were built by the Wagner Electric and Manufacturing Company of St. Louis, Mo., upon the designs and specifications of the Telluride Power Transmission Company.

Tests made by the writer show the copper loss of the transformers to average about 2150 watts; the iron loss is about 5030 watts; the normal temperature at full load is 118 degrees above that of the surrounding air.

Three phase generation, three phase transmission and two phase distribution constitutes the scheme of the polyphase equipment, and all the three phase portions are star connected and the common center or neutral point of the star is grounded as will be described later. The line is protected by the Wurts non-arcing lightning arresters.

The line, which is carried on 35-foot cedar poles placed 125 feet apart, is of No. 5, 6, 7 & 8, medium hard drawn copper, supported so as to form the points of an equilateral triangle.
having six foot sides. One of the three wires is placed on top of the pole and the remaining two are run on the respective insulators of a seven foot cross arm, with a separation of six feet between the pins. The wires are not transposed, and a metallic telephone circuit is carried on brackets at a distance of 42 inches below the cross arm.

The insulators are of a special type of triple petticoat glass, having two corrugations around the top below the groove designed to carry the line wire. This arrangement not only has the advantage of increasing the surface of the glass between the wire and pin, but it also protects a portion of the surface from extreme moisture during rain storms. The approximate dimensions of the insulator are 6½ inches across the base by 6 inches high, and the insulator is supported by a specially long locust pin made proof against moisture by being boiled in paraffine wax. Great care was taken to fill the pores of the wood thoroughly, to effect which the pins were kept in the tank in which they had been boiled until they had become thoroughly cooled, after which the surplus wax was removed and the surface of the pin was made smooth by dipping it again in very hot paraffine wax. These pins, being extra long, supported the insulator clear of the cross arm by five inches and the pin used at the top of the pole is two inches longer still, making the separation between the top insulator and the pole to be seven inches.

It appears obvious that an insulator of this design will offer a high resistance to a discharge over its surface, but should it be assumed that it could reach the lower edge of the outside petticoat, there would be little induction for it to go further as the pin is at all times a good insulator and its surface is of such a nature that a film of moisture will not collect over it. On several occasions insulators have been shattered by marksmen, but it has been the experience that if trouble developed, owing to the grounding of the wire on the pin or cross arm, it would promptly rectify itself by the burning off of the cross arm, leaving the wire without support at that pole.

It will be interesting to note that at each pole along the line one can hear cracking from static discharges at all times, and during certain atmospheric conditions the insulators are dimly luminous with pale phosphorescence. The line itself, however, is non-luminous at all times except for the brush and discharges which sometimes exist from points of the line, such as from the tips of the tie wires. The lightning arresters, as before, are of the brush type.

About twenty-five arresters being kept between the line and the ground. Six choke coils are used, and these are placed edgewise on the top of the arrester case, and as the latter are designed to be as compact as possible, they measure over all but two feet, by 7½ feet, by 7 feet high. One of these banks of lightning arresters and choke coils are connected in each line wire as shown in the Illustration.

To be more explicit, the connections of the lightning arresters are arranged as follows: Six choke coils are coupled in series and cut into the line after leaving the transformers. For convenience, we will here designate the choke coils by numerals consecutively, coil number 1 being at the left and the discharges which sometimes exist from points of the line, such as from the tips of the tie wires. The lightning arresters, as before, are of the brush type. About twenty-five arresters being kept between the line and the ground. Six choke coils are used, and these are placed edgewise on the top of the arrester case, and as the latter are designed to be as compact as possible, they measure over all but two feet, by 7½ feet, by 7 feet high. One of these banks of lightning arresters and choke coils are connected in each line wire as shown in the Illustration.

The high tension switches, illustrated on page 10, are inserted on each of the three line wires. They are rigidly connected together, so as to be operated by a common switch bar as shown, and each give to a six-foot break, the separation between the switches being five feet.

The substation now in operation is installed in the Golden Gate mill, at Mercur, which is believed to be one of the largest, if not the largest, cyanide mill in the world. Its electrical equipment, aside from the induction motors used for mining and milling purposes, and as about to be described, consists of three, 300-kw. lowering transformers, by means of which the 40,000 volt three phase current is reduced to 2,000 volts, the phase current, used for lighting and for operating Westinghouse two phase type "C" induction motors. The plan of connections for the step-down transformers is illustrated in the sketch "Outline circuits," which is a comprehensive outline drawing of the electrical connections of the entire equipment from the generator to the ultimate motors and incandescent lights operated by the system.

The lowering transformers are the same in general design as the raising transformers in the power house at Provo Canyon, and differ therefrom only in capacity and voltage. It will be noticed, too, that, as in the case in the generating station, an extra transformer is installed for emergency use, and its connections are so arranged that it can be substituted for either of the other lowering transformers with celerity.

The transforming of three phase current to two phase current, and vice versa, by two transformers, in generally understood, and will therefore not be taken up. As previously stated, the neutral point of the three phase system in both the generator and the high tension side of the raising transformers are grounded, and the practice of grounding is carried out even in the low tension distribution circuits in the manner to be shown.
The neutral point of a three-phase circuit, in a three-phase two-phase transformer, may be determined graphically by erecting the perpendiculars on the point of the capital triangle shown in the corner of the wirework circuit connections, and upon this perpendicular, a, locate the center of the triangle, and on the point of the capital e of the capital triangle, a measured on the jetpans 100 per cent side of a three-phase two-phase transformer, when the line e a will represent the 80 per cent transformer, and the line a b measured from b a is at this point the tap for the ground is brought out, and it is located in the three-phase transformers at one-third of the turns of the 86 per cent transformer, from the side connected to the center of the 100 per cent transformer.

The 600 volt secondary is also grounded through incandescent lamps, as shown at c, where two 110 volt lamps are connected in series between either of the three wires of the two-phase distribution, and the ground. Moreover, a tap is brought out from the center of each of the three phases comprising the two-phase system, and this tap constitutes the neutral wire of the Edison three wire system, which is used at Maxwell for incandescent distribution service. Lighting service is taken from both transformers, great care being exercised to keep the entire system in perfect harmony with the Maxwell system, but also to keep each of the two phases balanced with the other. The thoroughness with which the various portions of the high tension three phase system is grounded, as well as the effective grounding of the 220 volt system, leads to the belief that no danger from shock is present.

A further feature that will excite surprise is the fact that current is carried from the lower transformers to the center of distribution in the Golden Gate mill and hoist house by a three-conductor concentric cable, each of the three conductors being a sectional area of 1,000,000 circular mils. The length of this cable leads into the mill 220 feet, and from its terminal is tapped off for six induction motors, consisting of one 500 hp, one 400 hp, one 300 hp, one 200 hp, one 150 hp, and one 125 hp motor operating the roasters; one 30 hp. motor operating pumps; two 15 hp. motors operating blowers, and one 10 hp motor in the machine room, which is length of cable along the hoist into the hoist house is about 60 feet, and from its terminal is tapped off leads for three motors, consisting of one 150 hp and one 75 hp motors operating hoists and one 100 hp motor operating an air compressor.

Two other motors, each of 50 hp operating rock crushers, are run on independent leads from the transformers, and complete the plant.

**ELECTROLYTIC REFINING OF LEAD.**

BY SHERARD COWPER-COLLES, M. I. E. E., A. M. C. E.

Lead, when recovered from its ores by smelting, is obtained as a crude metal, the so-called work lead, which has to go through a refining process in order to obtain soft or market lead. Market lead is produced either by roasting reactions, by reduction, or by the precipitation process. Refining is effected either by oxidation after fusion or by electrolysis. Lead is never obtained pure when smelted, and it is always alloyed with all the other metals contained in the ore itself. Apart from the fact that the useful properties of the metal are affected by these other metals, it is, of course, advisable for economical reasons to recover the precious metals present, such as silver, platinum, and copper. One of the first methods worked on a commercial scale for the electrolytic refining of lead by electrolysis was that of Kelih. In this process the crude metal lead is melted at the annealing temperature in iron kettles from which it is tapped into moulds. The anodes thus produced are fastened to metal rods by suitable clamps, and enclosed in clamps which are insulated with a covering of cork. The electrolyzing cells are made of wood or iron; the cathodes are thin metal plates attached to rods in a similar manner to the anodes. The decomposition of the lead sulphate dissolved in an aqueous solution of sodium, it is made by electrolyzing with lead anodes a mixture of 1 1/2 lbs. of acetic acid of sodium, 2 1/2 lbs. of sulphuric acid and 9 gal. of water, and is heated to 381° C. The sulphuric acid attacks the lead and the anode dissolves the lead, zinc and iron of the anodes. The zinc and iron, being electro-positive, go to the lead anode, while the solution is discharged into the cell to assist in the electrolysis. The process has been used in a very large extent in the electroplating industry, and in the preparation of lead for the production of lead-acid accumulators. The lead anodes are made by mixing such a proportion of lead and zinc as will give the correct amount of the lead and zinc on the anode, and this is placed in a lead crucible and baked in an oven for a length of time to cause the zinc to oxidize, and the lead anodes are then ready for use in the cell. The lead anodes are then placed in the cell and the molten lead is added, and the cell is then ready for the electrolysis process. The anodes are then immersed in the molten lead and the current is passed through the cell. The lead is now deposited on the cathodes and the anodes are recovered in pure form. The cell is then ready for another cycle of electrolysis.

While hydrochloric acid and chloride of lime are used in chlorination processes, the combination is not received with as much favor as the combination of sulphuric acid and chloride of lime, CaOCl₂ -- H₂SO₄ = CaSO₄ + Cl₂ + H₂O + Cl₂.

Concerning Chlorination. The British Columbia, July 13, 1898.

To the Editor: Minors & Metallurgical Journal.

Shibon Block, Los Altos, California.

W.--When pointing out the error in the description of the Chlorination Process, I omitted to give the equation showing the reaction which takes place when the lime chloride (not lime, as incorrectly stated) is acted upon by hydrochloric acid (muriatic acid) as follows: CaOCl₂ + 2HCl = CaCl₂ + H₂O + Cl₂.

Yours Faithfully,

J. O'SULLIVAN,

Chief Assayer and Chemist, The British Columbia Limpet Co.
THE ELECTRO CHEMICAL INDUSTRIES OF ENGLAND.*

JOHN E. C. KERSHAW, F. L. C.

Twenty years ago the industrial applications of electricity in Europe in the domain of chemistry and metallurgy were limited to two manufactures—that of electroplate, a business in the hands chiefly of the famous Birmingham firm of Elington Bros., and that of refined copper. The latter industry was carried on upon a very small scale of operations, and the combined output of the Pembrey and Hamburg refineries—the two largest at this date—did not much exceed 1,000 tons per annum, while the total number of refineries in Europe was only six or seven.

Ten years later, electro-plating and copper refining were still the only two electro-chemical industries. But the latter industry has steadily increased in Europe under the stimulus of the demand created by electrical engineering for the purest form of copper, and the electrolytic method of copper refining had been introduced into the United States by the Balbach Company of Newark and by the Baltimore Smelting and Refining Co. At this date there were four electrolytic copper refineries in operation in England, with from eight to twelve scattered over the Continent of Europe.

The progress that has been made since 1885 has however been remarkably rapid, and while ten years ago there were many who believed electricity would have but a very minor role to play in the chemical and metallurgical industries, the enormous expansion of the electrolytic copper refining industry, and the marked success which has attended the use of electrolytic methods in the manufacture of aluminum and chlorate of potash, have now reduced the number who hold this belief to a very small minority of the community. This change in the views of practical men with regard to the possibilities of electricity as an agent for promoting chemical reactions upon a manufacturing scale, is due to the rapid growth of the past ten years.

There are now no fewer than eighteen distinct electro chemical or electro metallurgical manufactures carried on in different parts of Europe and America in over 150 manufactories.

*Electricity.

CELL ROOM IN THE CASTNER-KELLNER ALKALI WORKS, WESTON POINT, ENGLAND. CAPACITY 1,200 M. P.

ENGAGE AND DYNAMO ROOM OF THE CASTNER-KELLNER ALKALI WORKS, WESTON POINT, ENGLAND.

ries, while the production of one article—electrolytic copper—has increased from between ten and twenty thousand tons in 1887 to over 150,000 tons in 1897—that is, to an amount nearly equal to one half the total copper production of the globe.

This progress would have been impossible except for the cheapened sources of electricity that are now available when current is required in large quantities.

The experience gained in the period 1880-1899, when electric lighting was absorbing all the attention of electrical engineers, has led to valuable improvements in the efficiency of both engines and dynamos, and the more recent development of large water powers for manufacturing purposes has still further tended to reduce the cost of electrical energy. This is today being produced for manufacturing operations at a cost which twenty years ago would have been considered below the limits of possibility.

Great as the electric lighting industry has become in both Europe and America, there are only a few lighting installations in either continent with a dynamo capacity equal to that of some of the larger and more important industrial undertakings of the character now under consideration.

In these electro-chemical industries, single power plants of between 2,000 and 4,000 H.P. are common; and the greater portion of the power to be developed from the numerous water-falls of both the New and Old World will undoubtedly find utilization in these comparatively new industries.

In England, owing to the lack of large natural water powers suitable for industrial development, the electrochemical development that has occurred have with two exceptions had to depend upon coal for their supply of the electric current; and two of these undertakings possess steam plants of the most modern description for generation of their electrical energy.

* The CASTNER-KELLNER Alkali Co.—Two views are given of the works of this company at Weston Point, Lancashire. The company was formed in 1856 with a capital of £140,000 and the manufacture of caustic soda and bleach by the first 1,000 M. P. installment of plant was commenced early in 1857. The results of the working of this plant have been satisfactory, and the extension of the works to the originally designed capacity of 4,000 M. P. is now proceeding. The shares of this company were quoted at a premium at the commencement of the present year, a fact that speaks well for the confidence of the investing public in the future of the undertaking. The process depends upon the decomposition of a solution of common salt by means of the electric current, mercury being used as cathode material and carbon for anodes. By a mechanical device the cells are subjected to a periodical tilting movement which brings the sodium amalgam formed at the cathode into contact with water, and whilst regenerating the mercury for use in the cathode compartment of the cell again, produces a solution of sodium hydrate practically quite free from sodium chloride. The chlorine liberated at the carbon anodes is conducted away, and is used in the ordinary manner for the manufacture of bleaching powder.

* The English Castner Kellner Company has made a deal with the "Deutsche Solvay Werke Aktien Gesellschaft" whereby the latter company has undertaken to accept delivery of the whole of the bleaching powder product at Weston Point during three years at a fixed price. This arrangement of course gives stability to the position of the Castner-Kellner Company and ensures a market for its product. Some difficulty has arisen, it is believed in the conduct of the electrolytic process, due to the impurities of the brine pumped from the Cheshire salt mines and the second 1,000 M. P.

For further details of this process, see Electricity, September 8th and 13th, 1897.
installment of plant is to be used for the production of caustic potash from Stuarts potash. It may interest some of our readers to know that this process is now at work at Nigara in the factory of the Mathieson Alkali Company, and 1,000,000 sp. is now utilized at this spot in the production of caustic alkali and chlorine products. A minimum royalty charge of $10,000 per annum is to be paid by the Mathieson Company to the Aluminum Company of Oldbury, England, who at the date of this agreement were the owners of the American rights of the Canny-Kellner process.

**CORRESPONDENCE**

**WISCONSIN.**

**WEST SUPERIOR, Wis., July 21, 1886.**

**EDITOR JOURNAL.—The North Wisconsin copper mine, of Douglas Range, 15 miles south of Superior, has arranged to continue the development work begun last fall. The 16-foot amygdaloidal vein carries 1 to 2 per cent native copper. The company has sunk 60 feet on the vein, and has drawn a shaft of drift 160 feet. Several other pits have been sunk on the property. Considerable interest is shown locally on the formation, and much prospecting has been done in the whole length of the range, which consists of many places promising outcroppings of cupricifer rock; the formation extends in an east and west direction across Douglas County, Wisconsin, and is exposed again southward from the Michigan line to Minnesota.**

**KIRK THOMAS.**

**Miscellaneous Mining News.**

**ALASKA.**

In a letter to a Southern California mining man an assayer writes: "Sunrise City is at the head of Cook's Inlet, and there are a lot of people here but few miners, and the majority are waiting to get back to the States. They can't find gold on the bushes and have to pack every ounce back in going about, and this makes calamity bowlers out of most of them pretty quick. The company I am with has bought two claims for $3,000. They are considered the best here. We have been prospecting for the past ten days and they prospect pretty well all over. I can make $5 per day and not reach bedrock. Bedrock is about 17 feet from the surface and both claims can be worked without hindrance from water."

**ARIZONA.**

**From Big Bug.**

The Little Annie has stopped most of her work until an air compressor and Durlin drill can be obtained. Then the Providence Mining Co., will prospect the entire Annie mountain. This company is thinking of placing a smelter about a mile down Big Bug from their mine.

Mr. Kent and son, owners of the Lottie and Postmaster mines, are expected from the east in a few days. Mr. Kent is now having a tunnel dug through the mountain in order that the Lottie mine may be drained of its water. This tunnel is now about 400 feet long and six men are constantly at work on the east end of it.

**CALIFORNIA.**

**KERN COUNTY.**

The famous Long Tom property, near Bakersfield in Kern County, has recently sold for a Pittsburg syndicate for $160,000.

J. W. Waltham has taken a bond on the Golden Bar mine, and has already installed a gasoline hoist and very systematic prospecting work will be done. A new innovation in the methods of mining in this camp will be introduced in the shape of a female engineer. Mrs. Waltham will charge the hoist and a general supervision of the mine. As she adopts while on duty the regulation of our profession, we "Hardrockers" extend to her the glad hand and wish her luck.

The most important find in the camp so far has been the new strike of sulphur ore in the Little Butte mine. The ore body shows a five foot vein of dark, close-grained, bluish-looking quartz and mica about $25 fine gold with the sulphures worth about $80 per ton. More than anything else it shows the permanency of the ledges as for the pitch of the ore chute the same vein passes under the Kinyon and Wedge only at a greater depth. The Little Butte people are feeling mighty good over their prospects and employers take renewed courage.—*Miner.*

**LOS ANGELES COUNTY.**

The reorganization of the Red Rover Mining and Milling Company has taken place, and preparations for the commencement of active operations on the Red Rover mine at Acton have been made. The former superintendent, Mr. Gilbert, said there was a considerable quantity of ore in the bottom of the sixth level that would mill between $5,000 and $6,000 per ton. The mine is well developed and has a fine plant of milling machinery, besides an extensive water works plant, all of which has been paid for from wealth taken from the mine. The company is about to put in a still larger water works on Gleason Mountain, and expect to supply the town of Acton with water.

Frank McClan and others are about erecting a cyanide plant on Gleason Mountain, to do custom work. The whole of the Cedar Mining District is known to abound in cyaniding ores, which, with a plant to work them, will bring that section prominently to the front.

**RIVERSIDE COUNTY.**

The stamp mill at Dale City, belonging to Ingersol, lokale & Metz, is now erected and began to stamp ores this week.

H. C. Steele of the Desert Queen mine has returned to the town on account of illness. The work on the mine still continues.

The tailings of the Desert Queen mine will be cyanided in the tanks of the Old Virginia mine by Jackson Steele, who has purchased them.

**SAN BERNARDINO COUNTY.**

J. C. Littlepage and William Van Slack have returned to San Bernardino from their mine in Moreno district, where they have been doing some work. They intend to put in a five stamp mill in September.

A number of miners came down to San Diego from the Rose mine last week. They report great activity around the mines, and the discovery of a good body of ore at the seventh level, which averages $50. The mill is not running on account of the scarcity of water, but workmen are now engaged in boring a 200 foot well in search of a good supply.

**STULLMAN COUNTY.**

**The Brewer & Adams.**

One of the greatest strikes the county has seen in a long time was made the first of the week in this mine, some of the ore extracted showing a value of $15,000 per ton. The property is situated on the west side of Turnback Creek, and is an extension of the Pine Nut."

**COLORADO.**

**Idaho Springs.**

The Gold Medal mine, on the east of Seaton mountain, is running a cross-cut tunnel from the sluice-box, which fills the main shaft. This tunnel is now in ten feet, and will be driven continuously for the eighty feet which are between the breast and the Gold Medal vein. As soon as the vein is reached it will be driven on for 1,800 feet until a connection is made with the shaft. This property has produced some remarkably high-grade gold ore and can be relied on to live up to its reputation in the future. Mr. Emigh is the superintendent.

E. P. Blaisdell and Charlry Cerkett are sinking surface shaft on the Pride of Cascade lode, Ute creek, and are obtaining at grass roots quartz and liberally sprinkled with chlorites, carbonates, sulphurets and some live mineral. The indications are flattering for an old-time Ute creek surface pocket and Blaisdell feels quite elated.

**Crystal Items.**

Seven men are at work at the Burke on Mineral Point, Gutierrez, setting the new tunnel under way in good shape. Work will be carried forward vigorously, and probably a contract will be let on the tunnel to drive it to the cut.

Two men have been added to the Inez force and we trust it will only be a few days until the force in this property is doubled. The present showing in the Inez is such as to lead one to expect good things to result from a comparatively small amount of development work.

**Leadville Notes.**

The Preston Mining and Milling Company, operating a large territory on Long and Derry hills, are about to push operations with three shafts. Ore has already been opened up which samples thirty ounces silver, 15 per cent. lead and moderate values in gold. Mr. Darlington, of Kansas City, a heavy owner in the enterprise, visited the mine recently and seemed to be very pleased with the outlook.

The present lessees of the Nai Prius Consolidated Mining Company's mines, in addition to the extensive work being done on the Hall shaft, are preparing to take the water out of the Crown Point shaft so as to get at sev-
eral small streaks of very high grade ore left when their property was formerly worked. The profits from the Carbonate workings will enable the operators to operate the Crown Point shaft.

IDAHO.

The rolls for the Black Cloud concentrator, near Wallace, Idaho, arrived last week, and were taken up to the mill. They are in position. The mill is in operation for active operation and work was started on August 1st.

W. C. Squires, Talcott and E. D. Squires are the discoverers of a very promising mining claim in Lawyers' canyon, in the deep gorge about five miles from Nez Pierce City. The ore assays 83 ounces silver and 11.10 in gold. Total, $227,60.

W. R. Mix and John P. Mix, of Moscow, will leave for Florence to continue development of their property on the Red Bird and Double Standard mines in that camp. W. R. Mix, who is superintendent of the company now developing the Red Bird under bond, spent the past winter shaping a shift on the property. He also crosscuts 100 feet on the ledge which at a depth of 130 feet is two and one-half feet wide. During the present summer several hundred tons of ore from this shaft will be milled.

MICHIGAN.

The Quincy Mining Co. has declared a dividend of $5.50 per share, payable August 10, to stockholders of record on July 22. The last dividend paid was $5 per share, in February. The amount of the present dividend is $130,000, and it will bring the total paid in dividends by the company up to $612,000.

The Wolverine company last week bought eighty acres of land west of the mine owned jointly by the Sheldon, Douglas and Wolverine companies. The Kearsarge Adit dips into the land and its possession will enable the Wolverine to mine to a depth of 5,000 feet. The price paid was $35,000.

MINNESOTA.

The hearing over the reduction of iron ore freights from the Minnesota ranges to the lake ports has been in progress for a week, and so far the railroads have been ahead, except that the complainants have been asked to show that the companies are making a great profit on the present rates. The hearing will continue two weeks longer.—Engineering and Mining Journal.

Wright-Davis Mining Company.

This company, with general offices at Saginaw, Michigan, and operations in Minnesota, filed a suit of association in Saginaw recently. The capital stock of $250,000 is held by the following people: A. W. Wright, C. H. Davis, W. T. Knowlton, G. M. Stark, E. P. Stone and A. Boteille, all of Saginaw; J. E. Killorin, Russell & Vincent, Minneapolis, and George F. Reynolds, Cheboygan, Mich.

MISSOURI.

Thos. Conner, John F. Wise and Joe Aldrich have purchased 40 acres of land near Central City of Mrs. Barnes, for $4,000. The tract is on the Missouri Central company lease on the northwest. The land was purchased for its mineral value.

Bonche & Company have leased the old Hickox farm south of Shoal creek and east of Redding's house, and are working out huge chunks of lead ore from a drift six feet on the surface. Two men working two days took out 5,000 lbs. of lead ore.

On the Crown Point lease the Little Joe mine at Diembe, is producing 20,000 lbs. of lead weekly with two men in the ground.

NEVADA.

Nevada Mine Sale Suit.

Suit has been brought in the Utah United States court against Philo T. Farnsworth of Salt Lake City for the recovery of $110,751 alleged to have been withheld through fraudulent misrepresentations as the price paid for mining and other property in Tine, Nye county, purchased for a Nevada company.

There were two transactions alleged as fraudulent in the complaint. The first alleges that the company furnished Farnsworth $50,000 to purchase a stock of merchandise and other property at Tine for which he paid less than $20,000. The second charge is that Farnsworth purchased the Nevada Gold Mining Company's property for which he paid only $80,000, withholding the balance of the money advanced in both transactions.

The Nevada company, or rather its board of directors, also operate the Nevada Central railway, which runs from Battle Mountain to Austin. The company's mining property is principally situated in the Austin mining district in Lander county.

OREGON.

Mines of Cracker Creek.

It is stated that the many prominent mining districts of Eastern Oregon, Cracker creek may be classed among the first. The Horseshoe and Columbia, E. & B. have given Cracker Creek wide fame, and now comes the Golconda, which promises even better than the older mines. The Golconda is off the market, and is in the hands of people who have money to develop it without taking out a pound of ore. Enough is known to safely assert that an ore body of unusual richness has been brought up, and large orders have been given, and men put to work to further develop the property and to put in a big mill, which it is asserted can be kept busy for an indefinite time on ore already uncovered.

The E. & B. is working about sixty men.
SOUTH DAKOTA.

D. C. Boley has let a contract to run a 50-foot tunnel about 25 yards from the shaft in Blacktail gulch, to D. H. McDonald and N. S. Peck.

The Keystone mill is being enlarged at present by the addition of 20 more stamps. Ed. Major, who has been Kildoon, and the St. Elmo, is superintending the work.

Chas. H. Lockie and Chas. Graham have purchased the lease formerly held by Thomas Adams on part of the Dakota Maid. The new owners intend to put a force of men at work sinking on both shafts.

Work is progressing as rapidly as possible on the chlorination works at Rapid City. The boilers were tested last week and the familiar sound of the steam whistle brought a hearty cheer from the citizens of Rapid. Colonel Day thinks everything will be in readiness for the reception of ore in three or four weeks. —Black Hills Mining Review.

UTAH.

The Mining Reporter, of Denver, has a very interesting article from one of its correspondents, in the La Sal mountains of Utah, from which we take the following extract:

There is probably no mining section in the western country of which there is so little known as the La Sal district, bordering on the western part of Colorado. Many contend that this promising section of country belongs in a greater part to Utah, but as yet no Utah men have shown a disposition to develop its various resources. In fact, there are no class of miners and prospectors developing and exploring this section but Colorado men.

The La Sal range proper is divided into what is known as the north and south divisions, separated by a low pass called Geyser Pass.

Very little prospecting has been done in the south division, yet one of the biggest copper mines of the country is being developed there, the Big Indian property, recently purchased by Ed. Loose and others, of Provo and Salt Lake, from Capt. May and S. N. King, two well known San Juan, Colorado, mining men. There is a big country between Geyser Pass and the south end of the mountain, and from reports, some rich gold and copper veins are being discovered. —Bot. Mining Critic.

LOWER CALIFORNIA.

The Trinidad Mining Company, owning the Trinidad group in the Jalcatillos district, which includes the Buena Vista, which contains the extensive development of its property and will probably commence work within a fortnight. All these evidences of renewed activity, taken in connection with the two new prospecting claims for the Sorcorro district to the south, and a marked revival of the industry at Calirmingham, give Peninsula mining a more promising outlook than it has enjoyed for a couple of years past.

MEXICO.

Zacatecas.

The San Cristobal Gold Mining Company, a New York concern, has recently put in a large thirty-stamp mill, and it is reported that the Richmond and Zacatecas Gold Mining Company will soon put in at their Australia mine and Anexas a large and modern milling plant. The mine is situated within 2,000 yards of the town of Zacatecas, and it has a large and well-defined vein of fairly good ore. Owing to one cause or another, however, the mine has never been handled to advantage, but the operators are now beginning to hope for better things.

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Colton, CALIFORNIA
## INCORPORATED MINES PAYING DIVIDENDS.

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