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The tin-plate trade in Wales, which has already suffered severely from the loss of American business, is just now further embarrassed by threatened labor troubles a general strike of the tin-plate workers being probable. They really appear to be doing their best to kill what remains of the trade.

Recent experiments in France and Germany seem to show that sulphate of aluminum is one of the best fireproofing substances for wood. It checks combustion by forming an infusible and non-conducting coating. Ammonium sulphate and ammonium phosphate, when heated, check combustion by giving out an incombustible gas.

A practical trial of the Stassano electrical process, for smelting iron ore, is to be made under the auspices of the Italian government, and a power-plant, rated at 500 h. p., is being erected in Piedmont. This will be the first trial on a large scale, and will do something toward determining the practicability of the process. After all, the main point to be settled is the cost compared with that of iron smelted with coal. As to this there is no doubt in any country, or any place, where mineral fuel can be obtained at a reasonable price. The only opportunity for the electric process is in countries where fuel is costly and water-power abundant.

RECENT REPORTS from the Cassiar speak of the discovery of some extraordinary rich placers on the headwaters of the Stickeen. The new gold-bearing region is located not far from the boundary between British Columbia and the Yukon Territory. Its nearest town is White Horse in the Yukon, and it is reported that prospectors are being rapidly drawn to the district. Comparatively little has been done in the Cassiar for two or three years past; that is, ever since attention was called to the Atlin country. It will take some time to get authentic news from the new district, and it is already too late to do very much there before winter sets in.

THE INJUNCTION obtained by the Western Union Telegraph Company against the labor-unions of Butte ends an episode which is characteristic of that union-ridden city in Montana. Half a dozen messenger boys formed a union, precipitated a strike, and waged a war against the telegraph company. The boys fought for the recognition of their union, and induced other unions to declare the Western Union company "unfair." What with the sympathy of the policeman's union, the cooks' union, the bootblacks' union and the housemaids' union, there was every incitement to disorder, and a mob of boys smashed the doors and windows of the telegraph company, which, in default of protection from the city authorities, simply had to close its offices. Notions of liberty differ; the variety exemplified by the labor-unions of Butte is epitomized by the story of the miner who decided to take a day off in order to put up a fence in front of his house. When he had begun to dig the holes for the fence posts, a walking delegate came along and tapped him on the

The rate of foreign subscription for THE ENGINEERING AND MINING JOURNAL has been increased to \$8 per annum; this is equivalent to 32 shillings and sixpence, or 32 marks, or 40 francs. It has been found necessary to make this change on account of the heavy postal dues, which have become onerous by reason of the notable growth in the size of this JOURNAL.

Some of our gas trusts in this country must envy the Paris Gas Company, whose contract is now under review after an undisturbed monopoly of fifty years. French papers say that many complaints are made concerning the illuminating value of the gas furnished, and also the presence of sulphur compounds in the gas. The municipal authorities, however, have paid no attention to this, and it is thought that no restrictions on these points will be imposed by the authorities.

Siberia has just given another proof of its mineral wealth. Russian engineers report that explorations and borings have proved the existence of petroleum over a tract of land extending along the southeast shore of Lake Baikal, from the railroad station at Kultitschnaia to the mouth of the Teremshamka River, and running back from the lake to a distance of about 50 versts.

THE EXTENT to which oil is being substituted for coal as fuel in California is shown by statement that there are now eighteen ocean-going steamers registered at the port of San Francisco which use oil; five of these steamers are over 3,000 tons register, and two exceed 5,000 tons, the others being coasting steamers of somewhat smaller size. Nearly all the steamboats plying on San Francisco bay and the adjoining water now use oil for fuel, and the same thing can be said of the steam-tugs employed in San Francisco harbor.

shoulder, saying, "No, you don't! You are not a member of the post-hole diggers' union!" And he desisted, because a peaceful life was desirable in the interests of his wife and child. Liberty is a name which is often profaned.

In long electrical transmissions of power, the alternating current system is almost exclusively in use, because of the high voltages that can be employed and the consequent saving of copper in the transmission wires. When direct current is necessary, as for the operation of an electric railway, it is obtained from the alternating current by conversion through a rotary transformer. In other kinds of central station installations, as for example in the case of a smelting or other manufacturing plant, wherein the distances to which power has to be transmitted are comparatively short, this advantage of the alternating current system is insignificant, but because of other advantages the alternating current system is gradually superseding the direct current, although many engineers are not thoroughly awake to that fact. The direct current system has been thoroughly tried out, its weaknesses determined, and most engineers are as familiar with it as they are with the operation of an ordinary steam engine. The alternating current system is newer, or rather its latest developments are newer, and there is not yet the same familiarity with it; yet it is because of the very fact of its greater reliability as compared with the direct current system, that it has now come so extensively into use. Electrical engineers are strongly in favor of installing the alternating current system in almost all cases. This tendency is due chiefly to the unquestioned excellence and reliability of the induction motor. The absence of commutator and brushes eliminates one of the most frequent causes of trouble with the direct current motor, the burning out of an armature is unknown, and in fact the machine once having been installed runs practically without concern on the part of the user. As a natural consequence the cost for repairs and renewals is greatly reduced. These advantages have their price, however, which may amount to something like 40 to 50 per cent greater first cost than for a direct current plant; also no satisfactory alternating current motion for the operation of a railroad or tram-car has yet been developed, and there are certain drawbacks to the use of induction motors for elevator service.

#### A NEW DEPARTURE.

A few days ago we were privileged to see a letter from a "gentleman" in the country to another in New York city in the course of which a "meritorious," that is, "a really good," mining proposition was offered. It was a "vein of conglomerate" which yielded "six dollars per ton." The letter referred to the fact that the "natural facilities" were good, and then went on to say: "A cañon cuts through the vein exploring it to a depth of over one hundred feet, which insures natural drainage to that depth; besides it is in a rough, wild country where inquisitive stockholders would never go."

This new notion of the value of inaccessibility scarcely needs comment; it was written in perfect good faith by a man who evidently considers the public at large merely fair game, like grouse or quail, but with no close season. In the past we have known various surroundings of a mine quoted in be-

half of its value, and among these good dumping facilities, fine scenery and a salubrious climate have had no doubt merits; but a locality "where inquisitive stockholders would never go" has even more obvious attractions. The gentleman who states the case so frankly evidently presupposes that the poor stockholders will be deprived of the right of sending a mining engineer to examine this hole-in-the-wall, eagle's nest of a proposition, and we have had our feelings touched with visions of stockholders floundering with the unfamiliar snowshoe over desolate wastes or trying vainly to pull themselves up steep cliffs in the face of falling debris, which, likely as not, is being kicked carelessly over the edge by the promoter himself, annoyed by such inquisitive people. It takes but little of that kindly touch of nature to evoke our keen sympathy for the inquiring or irate stockholders who are balked in their desire to visit the mine to which they are not expected to go. But we warn the ingenious originator of this new departure that we know mining engineers who are accustomed to skip from the Malay Peninsula to the Klondike, who climb mountains for fun and ride across creation for exercise. There are all the materials ready for a startling climax when any one of these athletic searchers after truth invades the distant fastnesses of that lonely cañon and swoops down upon that vein of conglomerate which was to yield \$6 to a ton amid the seclusion of that dreadful spot.

#### IRON AND STEEL PRODUCTION OF THE WORLD.

The statistics, which have been collected and published in relation to the iron trade in 1902, enable us at the present time to give a very full statement of the pig iron and steel production of the world in that year. In all the important countries the figures are official, and in only very few instances has it been necessary to estimate the output. The statistics for the more important countries have already been published in our columns.

The pig iron production of the world for 1901 and 1902 is shown in the following table; the figures being given in metric tons for the purposes of readier comparison:

#### PIG IRON PRODUCTION OF THE WORLD.

	(Metric Tons.)		
	1901.	1902.	Changes.
Austria-Hungary .....	1,300,000	1,335,000	I. 35,000
Belgium .....	765,420	1,102,910	I. 337,490
Canada .....	248,896	324,670	I. 75,774
France .....	2,388,823	2,427,427	I. 38,604
Germany .....	7,785,887	8,402,660	I. 616,773
Italy .....	25,000	24,500	D. 500
Russia .....	2,807,972	2,566,000	D. 241,972
Spain .....	294,118	278,000	D. 16,118
Sweden .....	528,375	524,400	D. 3,975
United Kingdom.....	7,977,459	8,653,976	I. 676,517
United States.....	16,132,408	18,003,448	I. 1,871,040
All other countries.....	635,000	615,000	D. 20,000
Total .....	40,889,358	44,557,991	I. 3,668,633

It will be seen from this table that the decreases were comparatively unimportant, and were found only in a few countries. The most striking feature is the very large gain in the United States, which amounted to over half the total increase. Our country last year produced approximately 40 per cent of all the pig iron made in the world; its total output exceeded by nearly one million tons the united production of Great Britain and Germany, which come next in order as producers. The details of the American production have been given already with full comment.

The British production shows a fair increase, about 8 per cent over the low figure reached in 1901, but it was still considerably below the maximum production of over 9,000,000 tons, which was reached in 1887. The improvement in the British trade was

largely due to a greater export business; and this may be traced to the enormous home business done in the United States. The demands of domestic consumption compelled American manufacturers to withdraw from that competition for foreign orders, which made a considerable figure in our trade two and three years ago; and also forced them to import considerable quantities of raw iron from Europe.

Germany last year also showed a decided improvement over 1901, and its production approached very closely to that of Great Britain. As in the case of the United Kingdom, the German trade was largely benefitted by an increased export demand, the improvement in home trade being very moderate only.

The following table shows the steel production of the world, which is also given in metric tons, as the most generally adopted measure.

#### STEEL PRODUCTION OF THE WORLD.

	(In Metric Tons.)		
	1901.	1902.	Changes.
Austria-Hungary .....	1,142,500	1,143,900	I. 1,400
Belgium .....	526,670	776,875	I. 250,205
Canada .....	26,501	184,950	I. 158,449
France .....	1,425,351	1,635,300	I. 209,949
Germany .....	6,394,222	7,780,682	I. 386,460
Italy .....	121,300	119,500	D. 1,800
Russia .....	1,815,000	1,739,250	D. 84,750
Spain .....	122,954	124,000	I. 1,046
Sweden .....	269,897	283,500	I. 13,603
United Kingdom.....	5,096,301	5,102,420	I. 6,119
United States.....	13,689,173	15,186,406	I. 1,497,233
All other countries.....	405,000	412,000	I. 7,000
Total .....	31,034,869	36,479,783	I. 5,444,914

Here again we find the United States easily the leader, producing more than 40 per cent of the total, and considerably more than the aggregate of its two chief rivals. Germany, however, is far ahead of Great Britain in the output of steel. This has been the case for several years, and emphasises the fact that Great Britain more than any other country has adhered to the use of puddled, or wrought, iron. Germany, on the contrary, makes steel its chief product, while the puddling furnace has long ceased to be an important factor in its trade.

It will be noticed that the increase in steel was proportionally much greater than that in pig iron. This is in large part due to the increasing use of steel in the United States for all constructive purposes; and to the substitution both here and abroad, of cast steel for cast iron in the construction of locomotive and machinery of all kinds.

While production in the United States reached last year a far higher level than was ever known before, there was also an improvement in the European trade, although the latter has not completely recovered from its depression. The world's production of iron and steel has practically doubled during the last fifteen years. It is hardly to be expected that growth will continue in quite the same ratio, and we may expect to see a much lower rate of expansion during the coming decade.

#### THE WORK OF THE SURVEY.

Our readers will be interested in noting the activity of the members of the United States Geological Survey, whose summer work is now in full swing.

The study of the north Arkansas lead and zinc district is being completed by Mr. George I. Adams, assisted by Mr. A. H. Purdue, while the lead and zinc deposits of the Mississippi valley are about to be examined systematically by Mr. H. Foster Bain. Mr. W. S. Tangier Smith will complete the reports on the lead and zinc deposits of Joplin, Missouri, and western Kentucky. Another important lead-producing region, that of the Coeur d'Alene, Idaho, will have its areal and economic geology deciphered by Mr. F. L. Ransome.

In Alaska the intrepid labors of the Survey will



be continued by several investigators. Mr. Alfred H. Brooks will visit the Tanana placer deposits and other districts, where parties of surveyors are at work. The gold placers of the Seward peninsula will be investigated by Mr. Arthur J. Collier, with a view to supplementing the reconnaissance work of previous years. Mr. F. H. Moffit will make a reconnaissance of the northwestern part of the same peninsula. A number of localities on the Yukon river will be visited by Mr. Arthur Hollick, for the purpose of making detailed stratigraphic studies, while the important coal and oil fields of Controller Bay and Cook Inlet will be examined by Mr. George C. Martin. The reports on the geology and mineral resources of the Upper Copper river region and of northern Alaska will be completed by Mr. F. C. Schrader. Mr. Arthur C. Spencer, assisted by Mr. Chas. W. Wright, will make an investigation of areal and economic geology in the Juneau district, and will reconnoiter Berners Bay and adjacent districts in southeastern Alaska.

Mr. J. E. Spurr, assisted by Mr. Leon Dominian, will complete his work in the Tonopah district of Nevada, and will revise the economic geology of the neighboring Silver Peak region.

At Cripple Creek, Colorado, Mr. Waldemar Lindgren and Mr. F. L. Ransome will make a supplementary geological report, in co-operation with the state geologist, Mr. John W. Finch.

The Appalachian region will benefit by the labors of Mr. M. R. Campbell, Mr. Chas. Butts, Mr. Arthur Keith, Mr. David White and Mr. Ralph W. Stone.

Among the reports which are awaited with the keenest interest on the part of mining men are those on the Park City district, Utah, by Mr. John M. Boutwell; on the Butte district, Montana, by Mr. W. H. Weed, and the supplementary report on Leadville, Colorado, by Mr. S. F. Emmons. In these three cases, more especially, geological knowledge is directly measurable in monetary units, and the assistance afforded by the information to be given by the able men who have deciphered the structural features of the respective districts will be eagerly welcomed by many mining engineers and mine managers.

Other well known men will be helping the economic development of the country by their labors; Mr. J. S. Diller will complete his work in the Redding quadrangle, California, and reconnoiter the geology of the Klamath Mountains; Mr. Whitman Cross will tread familiar ground in the San Juan district, of Colorado, where his name is much honored for difficult work well done; Mr. Geo. H. Eldridge will complete reports on the Florida phosphates and the California oil fields, the latter a work of the greatest value to a young and growing industry; Mr. G. K. Gilbert will carry on his studies of the glaciation of the high Sierras in California. Mr. T. A. Jaggar will go ahead with the examination of the Bradshaw Mountains, Arizona, and Mr. I. C. Russell will reconnoiter western Idaho and central Oregon.

Among the most important monographs, soon to be completed, are those on the geology of the Lake Superior region, by Mr. C. R. Van Hise, and on the Yellowstone National Park by Mr. Arnold Hague. The profound studies on metamorphism, which led Professor Van Hise to the study of ore deposits will, we understand, soon be published in book form. Students of ore deposition are awaiting with the greatest interest a work which is sure to throw some light on the difficult problems arising from the consideration of ore occurrence. The Yellowstone monograph will serve as a scientific guide, to be warmly welcomed by all those who taken an intelligent interest in the National Park, itself an area unique in its exhibition of the activity of those

natural forces which play so important a part in geologic history.

Mr. C. W. Hayes, while not among those who are scattered over the face of the country, will continue to have supervision of the investigations in non-metalliferous economic minerals, and at the same time attend to his important administrative duties.

Other names and other work are omitted only for want of space. The recital, incomplete as it is, will give our readers an idea of the tremendous area covered by the national survey, while the mention of the work being done by geologists already honored for their useful labors gives a foretaste of the material which will be shortly forthcoming at their hands.

The work of the survey extends from the Seward peninsula to that of Florida, and carried on as it is under a great diversity of climatic conditions and personal hardship, on surface and underground, it calls for the exercise of qualities such as make the pioneer and the prospector—giving both words their highest meaning. In their labors these men will encounter the most cordial goodwill of all the engineering fraternity and will, we feel sure, be met with unreserved assistance from those who direct mining enterprises. Standing as we do, between the engineers and the geologists, we put aside, with a recollection as of an amusing conversation, the controversy as to which is the more practical, and give to both the right hand of good fellowship with an earnest hope that their labors may be crowned with a success that shall be enduring.

#### MARKET CONDITIONS.

Aug. 19.

The position of copper has been materially improved this week by the better financial conditions due to the recovery on the stock exchange. An encouraging feature is the appearance in the market of consumer's orders not alone for delivery in this country but also in Europe. These circumstances have aided in advancing prices fractionally.

Tin is almost featureless and absence of demand has resulted in a reduction of  $\frac{1}{2}$  cent per lb.

Lead shows a good demand and the scarcity of spot supplies tends to strengthen prices, although they are unchanged from last week.

Interest in the proposed consolidation of the Coeur d'Alene silver-lead mines in Idaho was revived this week by the report that a company with a large capital had been incorporated. The promoters are financially interested in the principal mines in the district, and in the smelter at Everett, Wash. The Coeur d'Alene mines produced in 1902 74,732 short tons of lead from silver-lead ores, which is equivalent to about 26 per cent of the total output of the metal in the United States. In addition, the Coeur d'Alenes smelted 4,489,549 oz. silver from the same low-grade ores. While it is known that plans have been made for consolidating the leading mines, it is doubtful if they have fully matured, as the miners made a contract in September, 1902, to supply the smelter trust 12,000 tons of ore and concentrates monthly. This contract may have a bearing on the consolidation.

Spelter is very firm, as spot supplies are limited. Prices are therefore somewhat stronger.

The iron and steel trade still continues rather quiet and lower prices, for which buyers have been holding off, are partly realized by the cut made by the Southern Furnace Association, No. 3 foundry now being quoted at \$11.50 at the Alabama furnace. The market for finished material shows very little improvement, pipes and tubes and tin plate being about the only commodities in demand. Inquiries, how-

ever, are more numerous and an increase in the number of small orders is also reported.

The western coal markets continue quiet, so far as local demand is concerned. Buying for winter stocks in Chicago and in the territory west of the Mississippi is about ended, and demand for anthracite is decreasing. Local supplies of bituminous are generally good. Deliveries in the Lake trade are still low, due largely to a scarcity of cars at the mines for this trade. At Upper Lake ports coal continues to accumulate on the docks faster than the railroads can move it away. Shipments to the Northwest have been heavy, but more coal is still wanted. There is considerable complaint in the Pittsburg district about short car supply and the delay in moving trains, but these factors are of less importance to local consumers in view of the quiet iron and steel markets. Pittsburg river mines are running much nearer full time than the railroad mines. The seaboard bituminous trade is still dull and prospects of much improvement in the near future seem slight, though the season when shoal water ports lay in supplies is at hand. Consumption has been restricted by labor troubles in certain industries, by the idleness of cotton mills and by abundant water power for those mills using it.

The anthracite trade is losing its activity and becoming quiet, though buying continues liberal at points beyond Cape Cod. In the aggregate an immense tonnage is in dealers' yards or in the cellars of consumers. The accumulation of steam sizes by producers continues.

#### METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

Alluvial gold has generally a smaller proportion of silver and other metals alloyed with it than gold obtained in rocks and veins. The minds of chemical geologists are still exercised in endeavoring to account for this peculiarity.

One of the first to recognize the existence of gold in sea water was the monk Odomar, who, in 1350, stated that the salt of the sea was the mercury of the philosophers or chief ingredient to be made use of in the composition of the stone which was to turn all that it touched into gold.

One of the most valuable, and at the same time peculiar occurrences of gold ore was that discovered in the Hill End mine, in New South Wales. This rich "patch" was about 5 ft. high, and on an average 1 ft. wide and 6 ins. thick; it was full of gold in the form of threads, wires, lumps and irregularly shaped particles, and its value was about \$75,000.

Natural law is the order in which things have been observed to happen. The fact that there is order and not chance in the way things happen is one of the chief discoveries of science. It is the discovery on which all science depends, because knowledge could never be definite and accurate if it were not based on orderly phenomena. It is impossible that there can be any exception to a law of nature.

Gold is found as dust in the sea sands on the coast of California, Oregon, New Zealand and other places, and in the detritus of rivers. Some of these deposits have been of great value, but many present little or no permanence; for that which one day is visible and workable may the next be covered deep with sand or carried by currents to other localities.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

THE METHOD OF LEAST SQUARES AS APPLIED TO THE SAMPLING OF A MINE.

The Editor:

Sir.—In experimental physics it is often necessary to know how far the results are accurate after all positive corrections have been applied. The method of least squares is a mathematical process which accomplishes this by combining the limiting inaccuracies of the instruments and methods employed, and gives a figure representing the mean probable error of the final result.

In a mine only a very small portion of the ore is exposed to the sampler, and as the values are very unevenly distributed the mean probable errors are very large, as compared with those of other methods of measurement which we have to make. In a great many cases, the cost of mining and treatment being deducted, there is only a very small margin of profit left, and it is then important that the engineer should be able to represent to the owners or prospective purchasers how far the mine is a safe investment and how far a speculation.

If a block of ore is sampled and said to average A, we mean this as the nearest approach to its true average, which can be obtained by taking samples around its boundaries: the figure, A, may be somewhat too great or it may be somewhat too small. To be precise, therefore, we should say the average is  $A \pm V$ , where V is the mean probable error. Now suppose we have several blocks constituting a mine and averaging  $A_1 \pm V_1, A_2 \pm V_2, A_3 \pm V_3, \&c.$ , and weighing respectively  $M_1, M_2, M_3, \&c.$ : then by the method of mean squares the average of the whole mine will be

$$\frac{M_1 A_1 + M_2 A_2 + M_3 A_3 + \text{etc.}}{M_1 + M_2 + M_3 + \text{etc.}} \pm \frac{\sqrt{M_1^2 V_1^2 + M_2^2 V_2^2 + M_3^2 V_3^2 + \text{etc.}}}{M_1 + M_2 + M_3 + \text{etc.}}$$

which may be more conveniently written

$$\frac{\Sigma M A}{\Sigma M} \pm \frac{\sqrt{\Sigma M^2 V^2}}{\Sigma M}$$

The following is a tabulated example:

TABLE I.

	M	A ± V	M A.	M <sup>2</sup> V <sup>2</sup> .
	Tons.	Ozs. Per Ton.		
Block No. 1....	2,100	3.60 ± .32	7,560	451,594
Block No. 2....	5,800	4.50 ± .20	26,100	1,345,600
Block No. 3....	1,200	6.20 ± .55	7,440	435,600
Totals .....	9,100		41,100	2,232,794
Mean	$\frac{41,100}{9,100} \pm \frac{\sqrt{2,232,794}}{9,100}$ or 4.51 ± 0.16 ozs. per ton.			

The mean probable error involved in the usual method of sampling cannot be deduced in any very

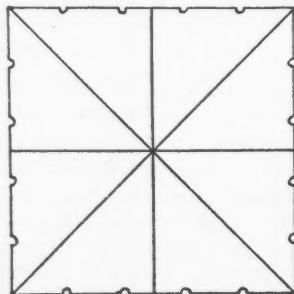


fig 1

rigorous mathematical manner, but requires certain broad assumptions. Suppose a square to be divided into eight equal triangular portions so that each presents an equal and similarly situated sampling face as shown in Fig. 1, and that two samples assaying a, and b, are taken on each such face; then we

may assume the average for the triangle, as far as can be ascertained from the face, to be

$$\frac{m_a a + m_b b}{m_a + m_b} \pm \frac{m_a a - m_b b}{m_a + m_b}$$

for each triangle; where Ma and Mb are respectively the thicknesses of the vein at a and b. The term

$\pm \frac{m_a a - m_b b}{m_a + m_b}$  represents the variation from the simple average to just the same accuracy as

$\frac{m_a a + m_b b}{m_a + m_b}$  represents that average.

If we now compound the averages of the tri-

From which we deduce

$$A = \frac{10.724 + 12.967}{19.8} = 1.197$$

and

$$V = \frac{\pm \sqrt{1.997^2 + 1.381^2}}{19.8} = 1.225$$

The law of least squares only applies strictly where V is small compared with A, but in extreme cases, such as the above, V is none the less useful as indicating the low degree of accuracy of A, and although

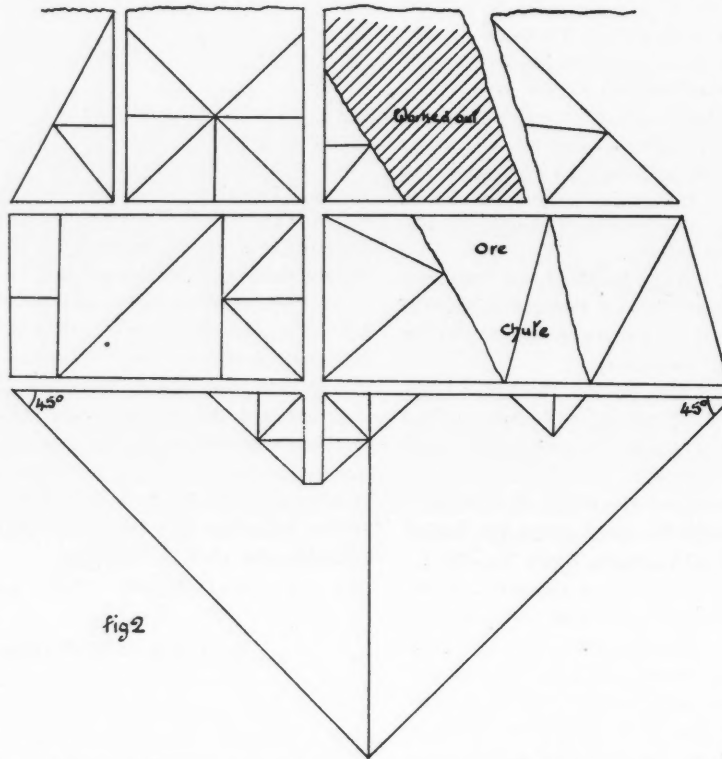


fig 2

angles by the method of least squares, we get for the whole block:

$$A \pm V = \frac{\Sigma(m_a a + m_b b)}{\Sigma(m_a + m_b)} \pm \frac{\sqrt{\Sigma(m_a a - m_b b)^2}}{\Sigma(m_a + m_b)}$$

If three samples, a, b, and c, are taken on the side of each triangle instead of two,  $m_a a$  being the largest and  $m_c c$  the smallest weight values we have

$$V = \frac{\sqrt{\Sigma(m_a a - m_c c)^2}}{\Sigma(m_a + m_b + m_c)}$$

When a block of ore is not square it may be divided in a similar manner, as shown in Fig. 2. Greater accuracy (or a smaller variation from the average) is obtained by dividing off the ore shoots separately where their boundaries are reasonably well defined; the results can afterwards be compounded with those of other blocks of pay ore.

If the one below the bottom level is divided off into two 45°, right-angled triangles, as in Fig. 2, a large value is obtained for V. This is illustrated by Table 2, which also shows the method of deducing the mean variation where more than three samples to the triangle are taken.

TABLE II.

Triangle No.	Sample No.	Width Ft. (m)	Assay ozs. per ton (a)	Oz.-Ft. per ton (ma)	Variation from simple mean of ma (5.720-1.787 &c.)
1	1.....	2.6	2.20	5.720	3.933
	2.....	1.9	2.05	3.895	2.108
	3.....	0.6	1.09	.654	1.133
	4.....	1.3	.05	.065	1.722
	5.....	1.2	.07	.084	1.703
	6.....	1.7	.18	.306	1.381
1 Totals .....				10.724	11.980
1 Means .....				1.787	1.997
2	7.....	2.0	1.22	2.440	0.279
	8.....	2.6	1.00	2.600	0.439
	9.....	2.3	0.30	.690	1.471
	10.....	1.6	0.80	1.280	0.881
	11.....	0.9	0.41	.369	1.792
	12.....	1.1	5.08	5.588	3.427
2 Totals .....				19.8	12.967
2 Means .....				1.65	2.161

$$I = \frac{\$ p q}{100} (A \pm V) - \mu$$

Where \$ is the value in money of an ounce or unit of the crude.

p is the percentage extraction.

q is the tonnage.

μ is the sum of costs of mining, machinery, treatment and bank rate of interest compounded on the time the ore is to stay in the ground.

As regards presentation to the financier, I find the word "risk" is fairly well understood on Wall Street; 5 per cent risk is an even chance of making or losing 5 per cent on the investment and 100 per cent risk means an even chance of doubling or losing the



investment. Therefore, if R represents the percentage risk, it is given by

$$R = \frac{\$ p q V}{I}$$

which becomes an appreciable figure even in the best developed mines.

Purely business men in the ordinary competition of trade do not expect to make more than bank interest on their capital and their salary as clerks without running some risk, but they make money in the long

Clearing and grading.....	Per Foot.
Construction and material.....	\$0.1511
	0.9787
Total .....	\$1.1298

The country through which this flume was built is rough and mountainous; from the preliminary survey made, I found that the average slope of the hillsides was over 23°, and that the character of the ground was in most places unsuitable for excavating the broad foundation necessary for a square flume to carry 3,000 miner's inches of water, hence the adoption

width on the bottom of 2 ft., and a depth of 4 ft., the section area of each flume being 16 sq. ft. (See Fig. 1).

Then taking Kutter's formula,  $V = C \sqrt{R} \times S$ , we have S (0.00189), the same in each case,  $R = \frac{A}{W P}$  for the square flume = 1.41, and for the semi-hexagonal flume = 1.46, and as the value of C depends upon the value of R, by formula,

$$C = \frac{41.6 + \frac{.00281}{s} + \frac{1.811}{h}}{1 + \left(41.6 + \frac{.00281}{s}\right)h} \sqrt{R}$$

We have for this square flume

$$V = 134 \sqrt{1.41 \times .00189}$$

and for this semi-hexagonal flume

$$V = 135 \sqrt{1.46 \times .00189}$$

These give respectively  $V = 6.9144$  and  $V = 7.0875$ ,

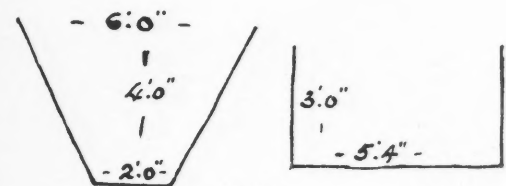
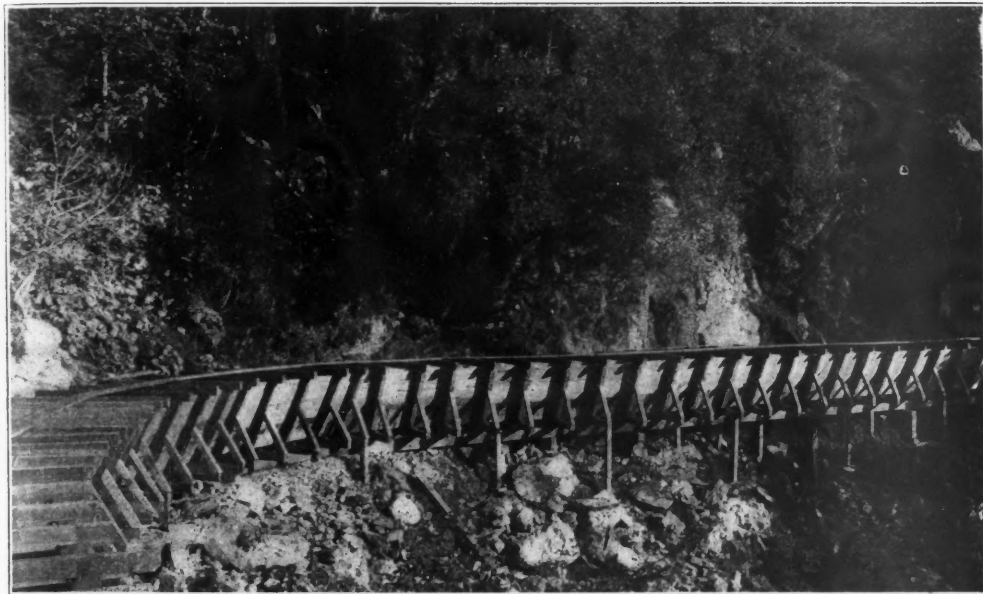


FIG. 1.

which multiplied by the sectional area, 16 sq. ft., give 110.63 cu. ft. per second, and 113.40 cu. ft. per second, showing a difference in favor of the semi-hexagonal flume of 2.77 cu. ft. per second, which is equivalent to 110.8 miner's inches.

Another feature in favor of a flume of this shape is that the loss due to evaporation is not as great as with the square flume when the supply of water is falling off, which usually occurs at the tail end of the season when the water is very valuable for cleaning up, etc. As the depth of water decreases the surface area in the square flume remains the same, while in the other it decreases as the depth decreases, thus offering less area to evaporation. In the table of costs under the heading "Clearing and Grading" will be found a column, "Extra for Rock-Cuts and Changes."



STUART'S FORK FLUME, ON SIDE-HILL.

run by sound judgment of the comparative chances of profit and loss and by seizing the opportunities for the greatest probable profit at the least risk. The engineer who does not take proper account of the high assays obtained in fair sampling is therefore a poor adviser to the financier.

The use of the compound system of averages does away with the necessity for the use of such indefinite and artificial terms as "ore in sight," "probable ore," etc.; not only do the number of sides exposed count in determining the average, but the spotty character of the ore, the size of the ore blocks, and the extent of the mine development are all properly compounded in the value V and make themselves known to the capitalist as the value R which he fully appreciates, and which ought also to be a guide to the engineer in recommending that the installment of machinery be immediate or deferred until the mine is further developed.

Just as much reliance can be placed upon V as a measure of the probability (or degree of "insightfulness") of the ore as upon A, for whereas A has its origin in values of single samples which are very variable, so V is built up of differences of values of single samples which are not much more variable quantities.

I have used these rules, with modifications to suit local conditions for over two years upon every set of samples I have come in contact with, and now place absolute confidence in the reliability of the results.

BLAMEY STEVENS.

Valdez, Alaska, July 21, 1903.

FLUME CONSTRUCTION.

The Editor:

Sir.—The interesting article by Mr. W. C. Ralston in the issue of your valuable paper for May 23 suggests that probably some more data on flume construction may be acceptable, so I beg to offer the following, taken from some work which I did in 1896-7 in Trinity County, Cal., in connection with the La Grange Hydraulic Gold Mining Company's water system. The accompanying table of costs explains itself; from this it will be found that the flume cost:

of a flume having a semi-hexagonal section. This form required only a 4-ft. flume bed, and the experience of the last five years has proved that this width did not tend to cause slides on the hillsides. Besides being the better shaped flume for a country where the ground to be built over is not of good quality, it will be found that this flume has a higher carrying capacity for its sectional area than the ordinary square flume. Take, for example, a square flume

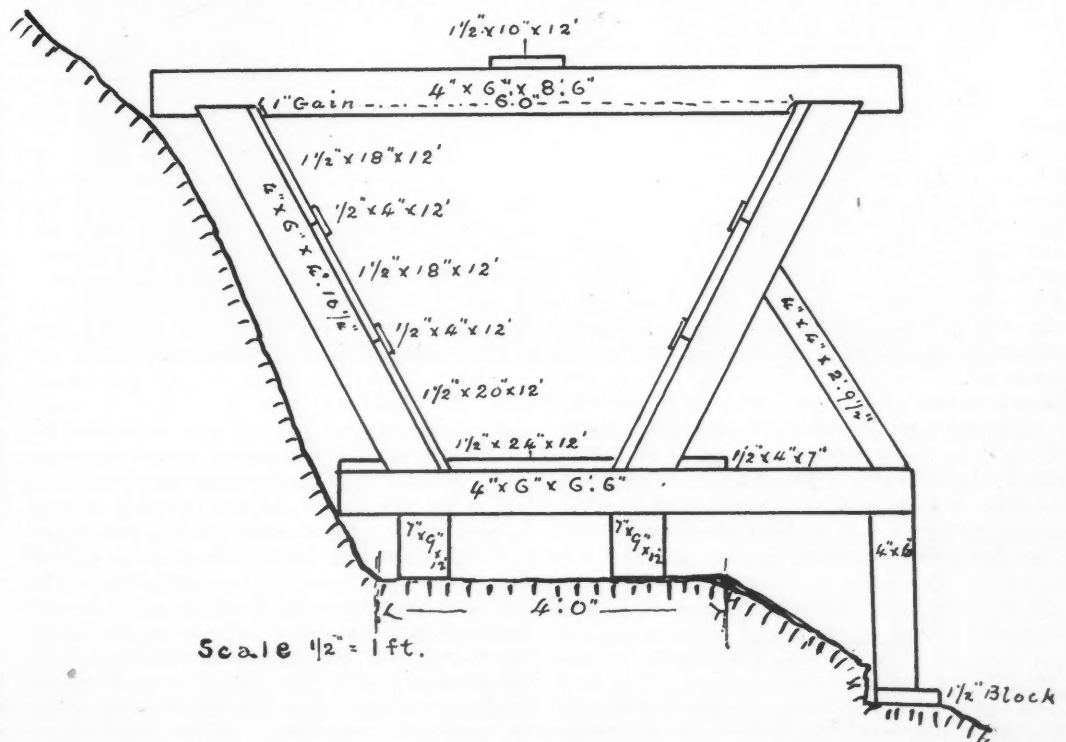


FIG. 2.

of the following dimensions, to wit: 5 ft. 4 in. in width and 3 ft. in depth, which gives about the best relation of width to depth (2 to 1), and a semi-hexagonal flume having a width on top of 6 ft., a

These rock-cuts were ditches cut in the rock in which to bury the flume, and were constructed in such places as showed indications of being subject to snowslides; the flume was here covered with slabs

from the sawmill and any snowslides would pass harmlessly over it. Among the extras covered by the total cost the following may be mentioned:

In the first mile; intake box at the head; trestles crossing Salt Creek, 276 ft. in length and 45 ft. high in the highest place; two rock-cut ditches.

In the fourth mile; trestles crossing branch of Deep Creek, 70 ft. long, 21 ft. high; bridge crossing Deep Creek, 94 ft. in length, junction of flumes in Deep Creek. In connection with this it will be seen in the table under head of "Standard Flume Bed," in the fourth mile, that there was 5,780 ft. of grading in this mile; this includes the Deep Creek side branch for bringing in the water of Deep Creek.

In the fifth mile; bridge crossing Little Deep Creek, 45 ft. in length.

In the sixth mile; trestle, 85 ft. long, 23 ft. high.

In the last section; heavy cut in loose rock in gulch near lower end, 26 ft. deep in center.

facts, which will incidentally make the corrections needed.

Above the San Miguel conglomerate there is what is often called the San Juan formation, which is andesite breccia extending up a vertical distance of nearly 4,000 ft. Above this is an overflow of rhyolite. In the andesite breccia, west of Sneffles Creek, is a fault-fissure running northwest and southeast, filled by a dike of andesite. In faulting, the foot-wall was probably pushed up several hundred feet. This andesite dike extends up to, but does not penetrate, the rhyolite. There are occasionally to be found crevices that leave the main dike at a small angle and continue until a distance of about 30 ft. is reached. They then follow parallel to the dike, in places for several hundred feet, and usually turn again away from the dike into the country rock and feather out, but in a few instances they turn toward the dike again, making what might be called a

the level of the Revenue tunnel the ore-body was particularly large and of good grade, and the stope above that level was in unusually good ore, being the best in the mine except that in the fifth level. While the ore was practically continuous, I do not mean that the ore-body was always of the same size or of the same grade. The ore-body was sometimes very narrow, and in the first and fourth levels we had ore-bodies of solid galena, practically free from quartz, that assayed less than 100 oz. in silver to the ton. These were the only bodies of low-grade galena found in the mine. On the surface and at the second, third and the lower levels we had high-grade galena and gray copper. The gray copper, when dissected out from the galena, assayed about 1,500 oz. silver. The galena, when apparently free from gray copper, assayed about 50 oz. We considered that we had good ore when shipments in car lots assayed 40 per cent lead and 300 oz. in silver.

STUART'S FORK FLUME—54,381 Feet in Length (10.3 Miles).

Section.	Clearing and Grading.				Labor, Lumber, etc., Used in Construction.				Total cost per section.		
	Standard Flume Bed four feet in width.	Extra for changes and Rock-Cuts.	Cutting dangerous trees near flume line.	Cost per section.	Standard Flume.	Tresseling and Extra Posting.	Cost per section.				
Head to 1st mile post.	4,609 ft. at 12c. per ft.—	\$553.08	\$1,001.43	9 at \$1.50—\$13.50	\$1,568.01	246,288 ft.—	\$4,925.76	17,904 ft.—	\$358.08	\$5,283.84	\$6,851.85
Second mile	5,275 " " "	633.00	.....	2 " 3.00	636.00	253,440 " "	5,068.80	1,804 " "	72.16	5,140.96	5,776.96
Third mile	5,280 " " "	633.60	.....	6 " 9.00	642.60	253,440 " "	5,068.80	1,780 " "	71.20	5,140.00	5,782.60
Fourth mile	5,780 " " "	693.60	129.99	3 " 4.50	828.09	291,191 " "	5,823.82	4,917 " "	145.14*	5,968.96	6,797.05
Fifth mile	5,259 " " "	631.08	11.94	7 " 10.50	653.52	253,433 " "	5,068.66	5,042 " "	140.80†	5,209.46	5,862.98
Sixth mile	5,120 " " "	614.40	66.33	7 " 10.50	691.23	253,647 " "	5,072.94	5,143 " "	138.16‡	5,211.10	5,902.33
Seventh mile	5,280 " " "	633.60	.....	4 " 6.00	639.60	253,408 " "	5,068.16	1,770 " "	70.80	5,138.96	5,778.56
Eighth mile	5,298 " " "	635.76	.....	1 " 1.50	637.26	253,487 " "	5,069.74	1,580 " "	63.20	5,132.94	5,770.20
Ninth mile	5,562 " " "	667.44	.....	.....	667.44	256,368 " "	5,127.36	2,146 " "	73.92	5,201.28	5,868.72
Tenth mile	5,287 " " "	634.44	.....	16 " 24.00	658.44	253,440 " "	5,068.80	1,104 " "	44.16	5,112.96	5,771.40
Tenth mile post to tunnel	670 " " "	80.40	517.77	1 " 1.50	599.67	33,964 " "	679.28	190 " "	7.60	686.88	1,286.55
	53,420 ft. at 12c. per ft.—	\$6,410.40	\$1,727.46	56 at \$1.50—\$84.00	\$8,221.86	2,602,106 ft.—	\$52,205.76	43,380 ft.—	\$1,185.22	\$53,227.34	\$61,449.20

\*Includes \$4 for iron. †Includes \$4 for iron. ‡Includes \$5.70 for iron.

As stated above, the country passed over was rough, the line included some very heavy rock-cutting; on the 4th and 5th miles there were long distances where the line passed around bare rocks that in many places overhung, necessitating the blasting out of a shelf for the flume bed. The flume was constructed from the head down; a sawmill was first erected about two miles above the head of the flume, where all the lumber was cut to shape and size. From the sawmill it was hauled on wagons to the head of the flume and floated down. The stringers, frames, bottom boards and first side-boards being first laid, then a flotation of lumber for the next section was sent along; the water was turned out and this section laid, and so on down to the end of the flume. On the outside of the cañon, as high as 40 boxes (480 ft.) were laid in a day. For the flume on the other side of the cañon (7,725 ft.) the sawmill was moved down from the head to a place in the cañon below the end of the first flume and the lumber was hauled up from the floor of the cañon to the flume line about 1,000 ft. above on flat cars running on an inclined tramway operated by steam power. After the inverted siphon connecting the two flumes was completed, water was turned through it and was utilized in floating the lumber from the head of the incline to the lower end of the flume. The accompanying section of the flume and photographs will, I think, make all the details of construction clear. The 4 x 6 in. post shown at the end of the sill is placed only at the end of each 12-ft. box as a steady-ing post. It rests on a block which is set on solid ground or rock.

WILLIAM H. RADFORD.

San Francisco, July 30, 1903.

THE VIRGINIUS MINE.

The Editor:

Sir.—In the July 18 number of the JOURNAL, in speaking of the Virginius mine in Ouray County, Colorado, you make some slight errors that ought, perhaps, to be corrected. I had charge of the mine from the time it was opened in 1880 until two years ago. There is no one now connected with the mine who is at all acquainted with the old workings or ore-bodies. With your permission I will state the

"horse." These crevices are usually in the foot-wall and are not filled with andesite. What is known as the Virginius vein is a deposit of galena mixed with gray copper, which is a replacement (by the galena) either of part or all of the andesite dike or of the country rock immediately adjoining. In places the ore follows the side crevices above referred to. When the ore is found in the vein proper it is often perfectly solid, that is, free from quartz, but it is sometimes scattered through a gangue of quartz, making concentration necessary. When the ore is found in one of the side crevices it is usually free from quartz and is frozen to the country rock on each side of the crevice; the junction of the mineral with the country rock being sometimes marked by a line of quartz, perhaps half an inch thick. The vein in the upper levels was too narrow for a drift and contained but little gouge or soft vein-matter. In some of the levels the vein was extra wide, as much as 6 or 8 ft. between walls and the vein-filling was very soft, being an alteration of the dike or the adjacent country rock or both. Where such a condition of the vein existed there was usually neither ore nor quartz present. Whenever the vein was in this condition the ore was usually found by cross-cutting about 30 ft. to a parallel crevice, and the ore when so found was usually of extra good grade, filling the crevice and free from quartz or other gangue. The best examples of this were in the fifth and tenth levels. The discovery of the vein was made in the bed of a small creek, where the rhyolite had been scored away. The vein was opened in 1880 by a cross-cut 400 ft. long, which cut the vein at the third level. From the end of the cross-cut a shaft was afterward sunk to the fourteenth level. The shaft was sunk from 100 to 200 ft. per year and levels run from the shaft at intervals of 100 ft.; as fast as the levels were run stopes were opened, so that there is a continuous line of stopes down to the fourteenth level. The shaft was vertical. From the surface the vein dips to the east down to the sixth level, where the dip gradually turns back to the west and continues down to the lowest workings with a regular dip of about 55 degrees. Properly speaking, there was no poor zone in the mine, and taking the parallel crevices into account it is fair to say that the vein was a continuous sheet of ore. At

On the surface there was only a trace of gold in the ore, but assays showed a little increase until, below the seventh level, shipments began to show assays of one-tenth of an ounce per ton, and this later increased up to two-tenths or more. In speaking of the workings, it is customary to designate as old workings those down to the fourteenth level, while below that the workings are called Revenue tunnel workings, as the ore is mined through that level. From the surface to the fourth level there was no moisture in the workings, and in the two upper levels the ore penetrated the small cracks along the vein as if the rock and ore had been partially fused by the heat of the overflow of rhyolite. It seems probable that the vein was mineralized before the overflow of rhyolite, which came from the eastward. This overflow of rhyolite heated the rock to a depth of nearly 400 ft., and perhaps pushed the top of the mountain over, causing the change in the dip. The altitude at the mouth of the Revenue tunnel is about 10,000 ft.

H. W. REED.

Salt Lake City, August 11, 1903.

ERRATUM.—In the article on "Reverberatory Furnaces for Copper Smelting," appearing in our issue of August 1, there were two typographical errors: The third line from bottom of last column on page 164, 345½ should read 34½, and top line, first column of page 165, ten dollars (\$10) should be seventy (\$70).—EDITOR.

GERMAN IRON PRODUCTION.—The production of pig iron in Germany, for the half-year ending June 30, is reported by the German Iron and Steel Union as below in metric tons:

	1902.		1903.	
	Tons.	%	Tons.	%
Foundry iron.....	790,172	19.7	883,763	18.1
Forge iron.....	.....	.....	450,956	9.2
Steel pig.....	596,485	14.8	376,738	7.7
Bessemer pig.....	190,992	4.8	209,704	4.4
Thomas (basic) pig.....	2,436,127	60.7	2,961,110	60.6
Totals .....	4,013,776	100.0	4,882,271	100.0

The total increase this year was 868,495 tons, or 21.6 per cent. Steel pig, in the classification, includes spiegeleisen, ferro-manganese, ferro-silicon, and other alloys, which were formerly included with foreign irons.



## ACROSS THE SAN JUAN MOUNTAINS.

By T. A. RICKARD.

*(Continued from page 230.)*

As we rode along the right bank of the Animas, we passed the North Star hill, where John J. Crooke employed the old Augustin process of roasting silver ore with salt and leaching the resulting chloride with hot water, finally precipitating the silver on copper.

Further up one comes upon the Stoiber residence, "Waldheim," a 30 room house, with all modern appointments, built by the former owners of the Silver Lake mine. Just beyond, in Arrastra basin, one can see the Silver Lake mill and the tramway, which extends in swinging lines to the mine beside the lake at 12,250 ft. above sea level. One of the spans of this Bleichert tram clears a distance of 2,200 ft. In a total length of 8,400 ft., the upper section of the tram descends 2,100 ft., and has only 19 supporting towers. The lower section—from the old mill to the new mill—is 6,200 ft. long, with a fall of 659 ft. The tram from the Iowa mine climbs the neighboring bluffs, and a little further up the Animas, the North Star tram reaches the river from near the top of Sultan Mountain, a height of nearly 13,000 ft., making a descent of over 3,200 ft. Silverton itself is situated at 9,300 ft. above sea level.

The North Star tram is 2 1-3 miles long, and connects the mill on the right bank of the Animas with a loading station at the entrance of an adit at 12,900 ft. above sea level. A two-bucket tramway, having a single span of 1,950 ft., carries the ore to two large storage bins situated in a gulch 604 ft. lower down. Each of the two buckets carries 1,300 lbs. of ore, the empty one being pulled up by the descending loaded bucket. The carrying cable is 1 1/4 inch in diameter, and the traction rope, 1 1/2 inch.

The orebins, just described, serve as the terminal of a Dusedau aerial tramway which goes to the mill, two miles down the mountain, making a vertical descent of 2,600 ft. At an altitude of 12,300 ft. the tram crosses a mountain lake with a span 1,340 ft. long, and lower down there are other spans of 1,050 ft. and 1,030 ft. respectively. At the lower end, connecting with the mill, the final span is 900 ft. long, with a fall of 380 ft., crossing the Animas river at a height of 150 ft. above the water. The tension station is midway between the mill and the upper terminal. It is said that the gradient of the installation is such that 30 h. p. is developed—but this power is not utilized.

The buckets or cars are 40 in number, and each carries 600 lbs.; they are placed at intervals of 600 ft., and travel at a speed of six feet per second. Fifty towers are stationed along the line, the highest being 71 ft. Two miles of steel ropes are used for this system, the total weight of them being over 30 tons.

These numerous aerial ropes, spanning the intermountain spaces like great spiders' webs, are an important feature of mining in the San Juan region. We had already, on the previous days of our trip, seen the tramways of the American Nettie, Bright Diamond, Grand View, Camp Bird, Smuggler-Union, Columbia, Liberty Bell mines, besides others, the names of which we did not know, so that with the group of three just referred to, near Silverton, we had in the aggregate observed a good many examples of this kind of mountain engineering. Most of the recent installations belong to the Bleichert and Otto systems, in which the bucket is drawn over a thick stationary cable by means of a smaller traveling rope. The traction rope is usually from 1/2 to 3/8 in. in diameter, while the fixed cable is from 1 to 1 1/2 ins. The older Huson and Hallidie systems, with a single traveling rope, to which the small buckets are attached, are nearly obsolete except for short distances and over easy contours. The need for very frequent supports, the consequent less substantial construction, and their smaller capacity has rendered them less desirable as a means of transporting ore over a rugged country. Experience now favors the double

ropeway system in spite of a cost of installation which is 30 to 50 per cent greater than the single rope type, because this difference in first cost is soon wiped out by the cost of maintenance, which with the Hallidie type is nearly double that demanded by the Bleichert; moreover, in the matter of capacity, it may be said that the former is limited to, say, 75 tons per day of 10 hours, while the substantial construction and larger scale of the latter permits of a capacity that ordinarily reaches from 250 to 400 tons per day of 10 hours.

The first cost of a tramway of this kind depends upon the contour of the country traversed, and the distance from the manufacturer who supplies the material. In the high altitudes of the San Juan, say, 10,000 ft. or over, the cost of material for an installation having a capacity of 200 tons per day of 10

governed by the contour of the ground. In this regard the double ropeway systems with their independent fixed cable for bucket-track, permit of a comparatively more direct path and more uniform movement of buckets, because the cable can be stretched to a high tension, diminishing the deflection in the swing of the cable. In the case of the single ropeways, which both carry and propel the bucket, as a high tension leads to overstraining of the rope, it is avoided, with a consequent greater dip in the cable and the need for a larger number of supports—a decided drawback in a rugged mountain country.

The automatic feature of tramways is apt to be exaggerated. For instance, it is the opinion of certain capable managers that it is a mistake to depend too much upon gravitation, and that auxiliary steam power will permit of the exercise of better control



IOWA MINE TRAM—Men in Bucket.

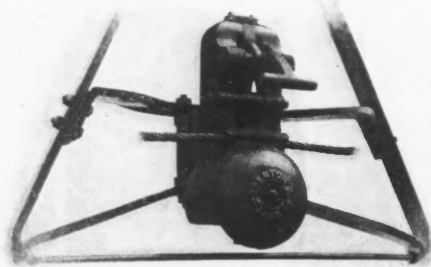
hours would be about \$2.10 per foot of tram line, and the cost of freight, plus erection, would be about \$1.15 more, so that the total cost would be about \$3.25 per foot. A tramway, one mile long, having the capacity mentioned, would entail an expenditure of about \$20,000. Actual expenditure for tramways in this district has ranged between \$2.50 and \$8 per foot; as a rule the cheap one proves the most expensive on account of the greater cost of maintenance and repairs. The Camp Bird tramway is 10,500 ft. long, and the cost, all told, was \$55,094. It is a thorough piece of engineering work. At the present time, it is worked on two 8-hour shifts, with a duty of 210 tons per diem. The operating cost is 17.6c. and the maintenance 1 1/2 c. per ton. A large amount of material is sent to the mine, as a back load, and the cost of handling this also is included in the figures just quoted.

The spacing of the supporting towers is of course

over the operation of the tram and a consequent possibility of running it at greater speed. There is no doubt that an engine acts as a useful governor, while the attempts to harness a rockbreaker to a tramway having excessive gravitation have failed, because a rockbreaker in operation is essentially a variable machine in its consumption of power. On the other hand an air compressor has not this bad feature, and if a tram worked against an air receiver it would have a self-adjusting governor of a useful kind. Most of the breakages, and much of the hard wear and tear are due to variations in speed and bad control of tram lines which have a difficult contour and heavy strains.

In this connection it is well to point out that the modern tram owes much to the better modes of attaching the bucket to the rope. The use of clips or lugs permanently fixed to the rope and employed as attachments for the bucket was found to develop

uneven wear in the cable, and this method had the further drawback of hindering a change in the spacing of the buckets whenever desired. The modern attachment grips the rope wherever desired, so that the bucket is hung at the will of the loader, and never exactly at the same spot. One of the most popular grips—to be seen on the Camp Bird, Smuggler-Union and Silver Lake trams—is the Weber, an illustration of which is given herewith. "The jaws of the grip are operated by a peculiar arrangement of toggle-jointed and self-locking levers that, when properly adjusted, bite the grip with sufficient pressure to hold securely on any grade."<sup>1</sup> There is no doubt but that devices like these do prolong the life of a cable by distributing the wear along its entire length.



WEBER GRIP.

We continued on our way up the valley of the Animas and soon passed through Howardsville, which figures largely in the early reports made by R. W. Raymond, F. M. English, and other government officials during the seventies. It is now chiefly populated by Mr. Tom Trippe. Close by is Cunningham gulch, where the andesite breccia of the San Juan formation comes down to the Algonkian schists. Several mines, such as the Highland Mary, Ureteba and Green Mountain, exhibit this contact between Tertiary and pre-Cambrian terrains. The best ore obtained from the lodes, which penetrate both formations, is said to have come from the schist just below the breccia; this was especially the case with the Green Mountain vein which had a large orebody immediately under the volcanics. The next tributary valley is Maggie gulch, where there are several young mines, one of which, the Ridgway, is of importance.<sup>2</sup>

The Animas valley swings around to the north, and the road brings the traveler into the main street of Eureka, the distributing point for the Sunnyside, Mastodon, Silver Wing, and other mines which have proved productive. Just as Tom Trippe occupies Howardsville, so Rasmus Hansen represents Eureka. These are among the very few of the pioneers who are still actively at work—strong, brave men, who have crowded the romance and vicissitudes of mining into their own lives; men with an indomitable pluck and a tireless activity like that of the torrent of the Animas which rushes past their cabin doors—sweeping with vagrant energy which heeds neither the gladness of the radiant valley nor the gloom of the savage gorge, until after many wanderings it abates its speed and hushes its voice in the still waters of the darkly flowing San Juan.

(To be Continued.)

**COAL MINING IN POLAND.**—A company has just been formed in Warsaw under French and Austrian auspices, with a capital of \$750,000, to be known as the Flora Steinkohlengesellschaft, to acquire and develop certain coal deposits in the Piotrkow and Kielce districts of Poland.

<sup>1</sup>William Hewitt. *Proceedings of The Engineers' Club of Philadelphia*. October, 1902. Page 300.

<sup>2</sup>Bulletin No. 182, U. S. Geological Survey, "A Report on the Economic Geology of the Silverton Quadrangle, Colorado," by F. L. Ransome, pp. 172-173.

### THE DESULPHURIZATION OF SLIMES BY HEAP ROASTING AT BROKEN HILL.\*

By E. J. HORWOOD.

It is well known that, owing to the intimate mixture of the constituents of the Broken Hill sulphide ores, a great deal of crushing and grinding is required to detach the particles of galena from the zinc-blende and the gangue; and it will be understood, therefore, that a considerable amount of the material is converted into a slime which consists of minute, but well defined particles of all the constituents of the ore, the relative proportions of which depend on the dual characteristics of hardness and abundance of the various constituents. An analysis of the slime shows the contents to be as follows:

Galena (PbS).....	24.00
Blende (ZnS).....	29.40
Pyrite (FeS <sub>2</sub> ).....	3.38
Ferrie Oxide (Fe <sub>2</sub> O <sub>3</sub> ).....	4.17
Ferrous Oxide (FeO) contained in garnets.....	1.03
Oxide of Manganese (MnO) contained in rhodonite and garnets.....	6.60
Alumina (Al <sub>2</sub> O <sub>3</sub> ) contained in kaolin and garnets.....	5.40
Lime (CaO) contained in garnets, etc.....	3.40
Silica (SiO <sub>2</sub> ).....	22.98
Silver (Ag).....	.06
	100.48

Galena, being the softest of these, is found in the slimes to a larger extent than in the crude ore; it is also, for the same reason, in the finest state of subdivision, as is well illustrated by the fact that the last slime to settle in water is invariably much the richest in lead, whilst the percentages of the harder constituents, zinc-blende and gangue, show a corresponding reduction in quantity, by reason of their being generally in larger sized particles and consequently settling earlier.

The fairly complete liberation of each of the constituent minerals of the ore that takes place in sliming tends, of course, to help the production of a high-grade concentrate by the use of tables and vanners, and undoubtedly a fair recovery of lead is quite possible, even with existing machines, in the treatment of fine slimes; but, owing to the great reduction in the capacity of the machines, which takes place when it is attempted to carry the vanning of the finer slimes too far, and the consequently greatly increased area of the machines that would be necessary, the operation, sooner or later, becomes unprofitable.

The extent to which the vanner treatment of slimes should be carried is, of course, less in the case of those mines owning smelters than with those which have to depend on the sale of concentrates as their sole source of profit. In the case of the Proprietary Company, all slime produced in crushing is passed over the machines after classification. A high recovery of lead in the form of concentrates is, of course, neither expected nor obtained, for reasons already explained; but the finest lead-bearing slimes are allowed to unite with the tailings, which are collected from groups of machines, and are then run into pointed boxes, where, with the aid of hydraulic classification, the fine rich slimes are washed out and carried to settling bins and tanks, where the water is stilled and allowed to deposit its slime, and pass over a wide overflow as clear water. The slime thus recovered amounts to over 1,200 tons weekly, or about 11 per cent, by weight, of the ore, and assays about 20 per cent lead, 17 per cent zinc, and 18 oz. silver, and represents, in lead value, about 11 per cent of the original lead contents of the crude ore and rather more than the percentage in silver contents. These slimes are thus a by-product of the mills, and their production is unavoidable; but as they are not chargeable with the cost of milling, they are an asset of considerable value, more especially so since it has been demonstrated that they can be desulphurized sufficiently for smelting purposes by a simple operation, and, at the same time, converted into such a physical condition as renders the material

well suited for smelting, owing to its ability to resist pressure in the furnaces.

The Broken Hill Proprietary Company has many thousands of tons of these slimes which the smelters have hitherto been unable to cope with, owing to the roasters being fully occupied with the more valuable concentrates. Moreover, the desulphurization of slimes in Ropp mechanical roasters is objectionable for various reasons, namely, owing to the large amount of dust created with such fine material, resulting injuriously to the men employed; also on account of the reduction in the capacity of the roasters, and consequent increase in working cost, owing to the lightness of the slime, especially when hot, as compared with concentrates, and the necessity for limiting the thickness of material on the bed of the roasters to a certain small maximum. Further, the desulphurization of the slimes is no more complete with the mechanical roasters than in the case of heap roasting, and the combined cost of roasting and bricking being quite three shillings (or 75 cents) per ton in excess of the cost of heap roasting, the latter possesses many advantages. These heaps are being dealt with, preparatory to roasting, by picking down the material in lumps of about 5 in. in thickness, whilst the fine dry smalls, unavoidably produced, are worked up in a pug mill with water, and dealt with in the same way as the wet slime produced from current work.

The slime, as produced by the mills, is run from bins into railway trucks in a semi-fluid condition, and shortly after being tipped alongside one of the various sidings on the mine, is in a fit condition to be cut with shovels into rough bricks, which dry fairly quickly, and when required for roasting are easily re-loaded into railway trucks. As each man can cut about 20 tons of bricks per day, the cost is small. Various other methods of lumping the slime were tried, including trucking the semi-fluid material on movable trams, alongside which were set laths, about 9 ins. apart, which enabled long slabs to be formed 9 ins. wide and 5 ins. thick, which were, after drying, picked up in suitable lumps and loaded in platform trucks, thence on railway trucks. Owing to the inferior roasting that takes place with bricks having flat sides, which are very liable to come into close contact in roasting, and to the rather high labor cost, this method was discontinued. Another method was to allow the slime to dry partially after being emptied from railway trucks, and to break it into lumps by means of picks; but this method entailed an increased amount of smalls being made, besides taking up more siding room, owing to the extra time required for drying, as compared with the method now in use. Ordinary bricking machines could, of course, be used, but when the cost of handling the slime before and after bricking is counted, the cost would be greater than with the simple method now in use; the material being in too fluid a condition for making into bricks until some time elapses for drying, a double handling would be necessitated before sending to bricking machine. If, however, the slime could be allowed time to dry sufficiently in the trucks, bricking by machinery would probably be preferable. Rather more than 10 per cent of smalls is made in handling the lumps in and out of the railway trucks, and this is, as before mentioned, worked up with water in a pug mill at the sintering works, and used partly for covering the heaps with slime to exclude an excessive amount of air. The balance is thrown out and cut into bricks as already described.

At the heaps the lumps are at present being thrown from one man to another to reach their destination in the heap, but the sidings have been laid out in duplicate with a view to enabling traveling cranes to be used on the line next the heap, the lumps to be loaded primarily into wooden skips fitting the trucks. It is probable, however, that the lumps will require to be handled out of the skips into their place in the heap, as the brittle nature of the material may be found to render automatic tipping impracticable. A considerable saving in labor would nevertheless

\*Abstract from *Transactions of the Australasian Institute of Mining Engineers*. Vol. IX., Part 1.



accompany the use of cranes, which would likewise be advantageous in loading the sintered material.

In order to reduce the inconvenience arising from fumes, length is very desirable in siding accommodation, so that heap building may be carried on at a sufficient distance from the burning kilns. It is for the same reason preferable to build in a large tonnage at one time, lighting the heaps altogether. As the heaps burn about two weeks only, long intervals intervene, during which the fumes are absent.

In the experimental stages of slime roasting, fuel, chiefly wood, was used in quantities up to 5 per cent, and was placed on the ground at the bottom of the heap, where also a number of flues, loosely built bricks, were placed for the circulation of air. The amount of fuel used has, however, been gradually reduced, until the present practice of placing no fuel whatever in the bottom was arrived at; but instead less than 1 per cent of wood is now burned in small enlargements of the flues, under the outer portion of the pile, and placed about 12 ft. apart at the centers. This is found to be sufficient to start the roasting operation within 24 hours of lighting, after which no further fuel is necessary.

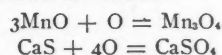
As regards the dimensions of the heaps, the width found most suitable is 22 ft. at the base, the sides sloping up rather flatter than one to one, with a flat section on top reaching about 7 ft. in height. As there is always about 6 ins. of the outer crust imperfectly roasted, it is advisable to make the length as great as possible, thus minimizing the surface exposed. The company is building heaps up to 2,000 ft. long.

During roasting care is required to regulate the air supply, the object being to avoid too fierce a roast, which tends to sinter and partially fuse the material on the outer portions of the lumps, whilst inside there is raw slime. By extending the roast over a longer period this is avoided, and a more complete desulphurization is effected. Experiments conducted by Mr. Bradford, the chief assayer, demonstrated that, at a temperature of 400° C., the sulphide slime is converted into basic sulphate, whilst at a temperature of 800° C. the material becomes sintered owing to the decomposition of the basic sulphate and the formation of fusible silicate of lead.

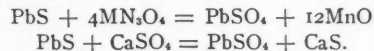
In practice, the sulphur contents of the material, which originally are about 14 per cent, become reduced to from 6.5 to 8.5 per cent, half in the form of basic sulphate and half as sulphides—much of the material sinters and becomes matted together in a fairly solid mass. The heaps are built without chimneys of any kind; a strip about 5 ft. wide along the crest of the pile is left uncovered by plastered slime, and this, together with the open way in which the lumps are built in, allows a natural draught to be set up, which can be regulated by partly closing the open ends of the flues at the base of the pile. Masonry kilns were used in the earlier stages with good results, which, however, were not so much better than those obtained by the heap method as to justify the expense of building, taking into consideration, too, the extra cost of handling the roasted material in the necessarily more confined space.

Much interest has been taken in the chemical reactions which take place in the operation of desulphurization of these slimes, it being contended, on the one hand, that the unexpectedly rapid roast which takes place may be due to the sulphide being in a very fine state of subdivision, and more or less porous, thus allowing the air ready access to the sulphur, producing sulphurous acid gas (SO<sub>2</sub>). On the other hand, others, of whom Mr. Carmichael is the chief exponent, claim that several reactions take place during the operation, connected with the rhodonite and lime compounds present in the slimes, which he describes as follows: "The temperature of the kilns having reached a dull red heat, the rhodonite (silicate of manganese) is converted into manganous oxide and silica; at a rather higher temperature the calcium compounds are also split up, with formation of calcium sulphide, the sulphur being provided by the slimes. The air permeating the mass oxidizes the manganese oxide and calcium sulphide

into manganese tetroxide and calcium sulphate respectively as shown as follows:

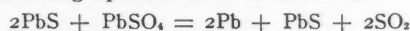


and, as such, are carriers of a form of concentrated oxygen to the sulphide slimes, with a corresponding reduction to manganous oxide and calcium sulphide, as shown by the following quotation, in the case of lead:

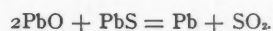


The oxidation of the manganous oxide and calcium sulphide is repeated, and these alternate reactions recur until the desulphurization ceases, or the kiln cools down to a temperature below which oxidation cannot occur. These reactions, being heat-producing, provide part of the heat necessary for desulphurization, which is brought about by the following concurrent reactions between metallic sulphates and sulphide:

"The first that probably occurs is that in which two equivalents of the metallic sulphide react on one of the metallic sulphate with reduction to the metal, metallic sulphide and sulphurous acid, as shown by the following equation in the form of lead:

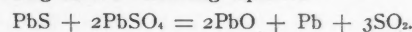


"The metal so formed, in the presence of air, is oxidized, and in this state reacts on a further portion of the metallic sulphide produced, with an increased formation of metal and evolution of sulphurous acid, according to the following equation, in the case of lead:

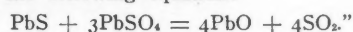


The metal so produced in this reaction is wholly re-oxidized by the oxygen of the air current, and being free to react on still further portions of the metallic sulphide, repeats the reaction, and becomes an important factor in the desulphurizing of the undecomposed portion of the material. As the desulphurization proceeds, and the sulphate of metal accumulates, reactions are set up between the metallic sulphide and different multiple proportions of the metallic sulphate, with the formation of metal, metallic oxide and evolution of sulphurous acid, as follows:

"With two equivalents of metallic sulphate to one equivalent of metallic sulphide, in the case of lead, according to the following equation:



"With three equivalents of metallic sulphate to one of metallic sulphide, in the case of lead, according to the following equation:



The volatility of sulphide of lead—especially in the presence of an inert gas such as sulphuric acid—being greater than that of the sulphate, oxide, or the metal itself, it might be thought that the conditions are conducive to a serious loss of lead. This, however, is reduced to a minimum, owing to the easily volatilized sulphide being trapped as non-volatile sulphate, by small portions of sulphuric anhydride (SO<sub>3</sub>), which is formed by a catalytic reaction set up between the hot ore, sulphuric acid, and the air which is passing through the mass. Owing to the non-volatility of the silver compounds in the slimes, the loss of this metal has been found to be inappreciable. The zinc contents of the slime are reduced appreciably, thus rendering the material more suitable for smelting. After desulphurization ceases, a few days are allowed for cooling off. On the breaking up of the mass for despatch to the smelters, as much of the lower portion of the walls is left intact as possible, so that it can be utilized for the next roast, thus avoiding the re-building of the whole of the walls.<sup>3</sup>

<sup>3</sup>In the course of subsequent discussion Mr. Horwood stated that the losses in roasting were 12½ per cent in lead and probably about 5 per cent in silver. As compared to roasting in Ropp furnaces the loss in lead was 5 to 6 per cent greater, but the difference of loss in silver was, he thought, not appreciable. Mr. Hibbard said that the Central mine had obtained similar satisfactory results with masonry kilns.—EDITOR.

## LITHOGRAPHIC STONE.

By CHARLES C. SCHNATTERBECK.

Discoveries of lithographic stone both here and in Europe have been frequent of late, and some of the deposits are extensive, promising large profits if developed by the necessary capital and improved machinery. It is very important to employ the latest methods of quarrying, as antiquated machinery will not produce the large sizes of stone that are now demanded by lithographers. In the United States it is customary to use stones 22 or 28 by 40 in., sometimes 40 by 60 in., and 3 to 3½ in. thick. Another requisite is quality, and this fixes the market value. A simple test is to break the stone; if the fracture is imperfect and conchoidal, the quality is considered fine. Good lithographic stone is fine-grained, uniform in texture, free from veins or other imperfections, and of sufficient softness to permit easy working with engraving tools. Color is not a significant feature, although the best quality stone is usually tinted gray or drab. The physical quality of a stone is given precedence to its chemical composition.

In the United States market prices vary from 2c. to 15c. per lb., the larger sizes of stone selling at \$100 to \$150 apiece, according to quality. The consumption in this country is satisfied principally by imports, free of duty, from Bavaria. The Bavarian stone is the standard on the market, and is produced chiefly at the Salsabella quarry in Solenhofen. The United States has not yet developed any large property, although Utah ships between 40 and 50 short tons per annum. Deposits of lithographic stone have also been found in other States in the south and west, but the size of the slabs cut has been difficult to market, which discouraged further development. Recently steps have been taken to interest Americans in quarries in Greece, and, judging from samples, the stone is of good quality, though somewhat smaller in size than is usually desired. It is said that the installation of later designed machinery will facilitate the production of larger stones.

**RADIO-ACTIVITY.**—We learn from a contribution of Mr. E. Fournier d'Albe to the London *Electrician* that Mr. B. J. Strutt has discovered that a radio-active gas or emanation can be obtained by drawing air over hot copper, or by bubbling it through hot or cold mercury. By repeated circulation through mercury very considerable activity of quite a different order from that of metals as ordinarily observed can be obtained. The mercury emanation deposits radio-active matter on the walls of the vessel. This deposit remains after blowing out the gas, and possesses at first, perhaps, one-sixth of the activity of the latter. This induced activity falls to half value in 20 minutes. The emanation itself decays in activity according to an exponential law, falling to half value in about three days.

**SWEDISH MINERAL OUTPUT.**—The Swedish mineral statistics for 1902 have been issued by Prof. Akerman. The iron production comprised:

	Metric tons.
Iron ore .....	2,896,616
Charcoal pig-iron .....	538,113
Blooms .....	186,076
Bessemer ingots .....	84,014
Open-hearth ingots .....	201,311
Crucible ingots .....	1,091
Bar iron and steel .....	173,521
Rods, hoop iron and steel .....	68,490
Wire rods .....	33,173
Plates .....	13,422

The number of blast furnaces in operation was 136. The coal output was 304,733 tons, or 33,224 more than in 1901. The output of fire-clay was 161,312 tons. The production also included 30,095 tons of copper ore and 48,783 tons of zinc ore. The number of workmen employed was 30,750. Of this total 10,496 were engaged in the iron mines, 1,733 in other metal mines, 2,179 in the collieries and 15,255 in the iron works.

## BOUNDARY DISTRICT OF BRITISH COLUMBIA.

By E. JACOBS.

No extended review of the progress made by individual mines of the Boundary district of British Columbia having been published in *THE ENGINEERING AND MINING JOURNAL* since March 1, 1902, the following information relative to its producing mines will probably be of interest, especially since the mining and smelting operations of the Granby Con. M. S. & P. Co., which owns the largest mines and smelting works in British Columbia, recently had the distinction of having the successful work of its mine and smelter superintendents recorded in the editorial columns of this journal.

A brief summary of the mineral production of the district in 1902, and of additions and improvements at mines and smelters, appeared in this journal on January 3 last, and in closing it the present writer observed: "On the whole, the prospects of the Boundary district for 1903 are encouraging. With the producing ability of the mines and the capacity of the smelters both on the increase, a reasonable expectation of an appreciable improvement in the price of copper, the near approach of railway competition, and the all-round better results gained by experience, there is much to incite further effort and to ensure eventual success." With the exception of railway competition, which has not yet been secured, the improved conditions anticipated as above have prevailed during the first half of the year, but, unfortunately, labor difficulties at the Crow's Nest Pass Coal Company's coal mines, upon which the district is at present entirely dependent for its fuel requirements, cut off the supply of coal and coke, with disastrous results to the Boundary. An idea of the effect of the strike of the colliery employees upon the district may in part be obtained from the following statement: The total quantity of ore treated at the B. C. Copper Company's smelter at Greenwood during the months of February, March and April—the period affected by the strike—was 7,590 tons, while with the collieries open again and a fair supply of fuel coming in, the quantity treated in May was 20,312 tons, and in June 21,060 tons. Calculating an average tonnage for the three interrupted months at a similar rate to that of these two months, it will be seen that the loss in tonnage at one smelter alone during three months was 54,468 tons. If that of the other two district smelters were added, the total loss during that brief period would be at least 160,000 tons.

**Ore Shipments.**—The following table shows the tonnage of ore shipped by individual mines during the year 1900, 1901, 1902, and six months (to July 1) of 1903. It will be seen that the aggregate tonnage for these years was 1,260,486 tons, representing practically the output of three years, shipments prior to July 1, 1900, having totaled less than 5,000 tons:

	1900. Tons.	1901. Tons.	1902. Tons.	1903. Tons.	Total Tons.
Granby mines.....	64,531	231,762	309,858	163,535	769,686
Mother Lode.....	5,564	99,548	138,997	52,953	297,062
B. C.....	19,618	47,517	14,443	13,868	95,446
Snowshoe.....	297	1,731	20,800	26,557	49,385
Emma.....	.....	.....	8,530	9,070	17,325
Sunset.....	.....	800	7,455	5,070	13,325
Golden Crown.....	2,241	.....	625	.....	2,866
Winnipeg.....	1,076	977	785	.....	2,545
Jewel.....	160	325	2,060	.....	2,000
City of Paris.....	2,000	.....	.....	30	1,780
Athelstan.....	1,200	550	.....	.....	1,197
No 7.....	.....	665	532	.....	885
Carmi.....	.....	885	.....	.....	850
King Solomon.....	.....	850	.....	.....	60
Morrison.....	.....	443	.....	60	503
R. Bell.....	.....	480	.....	.....	480
Providence.....	.....	.....	117	279	396
Sundry small shipments.....	1,150	142	158	262	1,712
Total.....	97,837	386,675	504,360	271,614	1,260,486

The comparatively insignificant proportion of the whole output contributed by about 20 properties out of 22, from which the above stated tonnage was derived, is a marked and unsatisfactory feature in the position. That after three years only two mines should have exceeded a total output of more than 100,000 tons each does not exhibit that spirit of enterprise and energy that was anticipated as the result of a better provision for transport and treatment of ores. However, several others have now settled

down to a substantial and continuous production, so that a decided improvement in this respect may be looked for in the future.

**Granby Co.'s Mines.**—The Granby Company's Old Ironsides, Knob Hill, Victoria and other mines comprising its property at Phoenix, continue far in the lead of the mines of the district, both in regard to the development and production, while their power equipment is also more complete than that of any other property on the Boundary. These mines are being worked by means of shafts and tunnels for underground operations, and by open quarries from the surface. The aggregate amount of development work done to June 30 last is 18,268 ft.—nearly 3½ miles—of which 3,652 is in sinking and raising, and 14,616 in cross-cutting and drifting. These figures leave entirely out of account numerous large open-cuts, drifts, and raises in the huge ore bodies preparatory to opening out the big surface quarries and underground stopes characteristic of these mines, which are being worked down to the 300-ft. level. One shaft is down 400 ft., and the diamond drill has shown that the ore is continuous

driven by a 45-h.p. steam engine, an electric light engine and dynamo; steam pumps, and many other appliances. To this has since been added a style B Farrel ore-crusher, with jaws opening 42 ins. by 30 ins., to crush rock to a size of 7 or 8 ins. at the rate of 150 tons per hour; a 100-h.p. type K General Electric Company's induction motor, belted to ore-crusher; a 12 by 16 in. double-cylinder second-motion winding engine; two Rand tandem compound air compressors, electrically driven and connected to motors by rope drive, high-pressure cylinders 16 by 26 ins., low-pressure cylinders 28 by 36 ins., rated capacity 6,000 ft. of free air per minute, or 60¾ ins. machine drills; two 700-h.p. type C Westinghouse induction motors, to operate compressors; 20 ¾-in. Rand machine drills; complete equipment for machine shop, including two lathes, shaper, drill-press, steam hammer, bending rolls, splitting shear, pipe-threading and cutting machine, etc.; steam shovel, for loading ore in quarry, and all other requisites necessary for a much larger ore-production whenever increased treatment capacity at the company's smelting works shall call for it.



B. C. COPPER COMPANY'S SMELTER, GREENWOOD, B. C.

down to at least twice that depth, but as yet no levels have been run below the 300-ft., there still being enormous quantities of ore available above that level. These mines commenced shipping ore in July, 1900, and their aggregate output to June 30 of the current year is 769,686 tons, or more than three-fifths of the total production of the whole district. When shipping 1,500 tons daily, which is about the present output, an average of 350 men is maintained in and about the mines. The building improvements made during the last eighteen months include the erection of a compressor building 121 by 60 ft., a machine and blacksmith shop 118 by 40 ft., and a rock-crusher building 55 by 22 ft. Additional ore-bins have been constructed; these have a capacity of 2,500 tons, and bring the total storage capacity at the mines up to about 6,000 tons; an additional 3,000 ft. of railway track was laid about the mines, and two tramways were built, one to connect No. 2 tunnel with the new ore-bins, and the other, a 2,000-ft. gravity tram, from the top quarry to the rock-crusher, this having a three-wheel brake system headworks. The machinery and plant installed prior to 1902 included two 80-h. p. steam boilers, 10-drill duplex Rand air compressors, air receivers, etc., on the Knob Hill, and a similar plant on the Old Ironsides; steam hoisting engines at the shafts on the Old Ironsides, Victoria, and Aetna, respectively; a timber-framing machine

**B. C. Copper Company's Mine.**—The Mother Lode, owned by the B. C. Copper Company, Limited, of New York, contributed nearly one-fifth of the ore-production of the district during the past six months, with an output of 52,953 tons, bringing its aggregate tonnage up to 297,062 tons—about 18,000 tons short of one-fourth of the total tonnage of the whole district. Its production was much restricted during nearly three months of this year by the coke shortage already referred to. Only about 2,000 linear ft. of development work have been done in this mine since 1901, this making the total of underground work about 8,500 ft. The reason more development was not done was that it was found there was an ample supply of ore that could be quarried out at a much lower cost than that of ordinary underground stoping and hoisting, so work below was suspended for the time. The method of mining followed here until the present system of quarrying was adopted was described by the manager, Mr. Frederic Keffer in *THE ENGINEERING AND MINING JOURNAL* of March 15, 1902. Now a main tunnel runs in about 850 ft., and this is double tracked, and horses haul 3-ton ore cars from the hoppers at the foot of raises to the rock-crusher. There are three big raises from the tunnel to ore quarries above. These raises are funnel-shaped at the top, so that the ore can fall into them when blasted down from the faces of the quarries without



handling. Large rocks are "bull-dozed" or broken up by high per cent dynamite placed on top of the rock. From the highest point at which ore outcrops on the hill down to the level of the main tunnel the depth is about 260 ft., and the width of the ore-body varies up to about 140 ft. Half a dozen quarries have been opened, those on the top of the hill giving ore with a larger percentage of sulphur, which facilitates matte-making in the smelter furnaces. Early in 1902 a 24 by 36 in. Farrell B crusher, to crush 65 to 80 tons of rock per hour to a size not exceeding 5 ins.; a Jeffrey elevating machine with a chain of 20 by 9 by 12 in. buckets, to lift the crushed ore to bins over the railway track; and a plain slide-valve engine to run crusher and elevator, were started at work. A number of large ore cars and additional machine drills were about all the new plant since purchased, the mine having previously been fully equipped, with six steam boilers—two each 60, 80 and 100 h.p.; one 10-drill straight line and one 40-drill cross-compound condensing Ingersoll-Sergeant air compressor; a big double-cylinder first-motion Jencks hoisting engine; a No. 5 Gates rock-crusher, with a 70-h.p. steam engine to run it; a Robins ore-sorting and conveying plant (not now required, no sorting being done); full equipment for machine shop; a 250-light Westinghouse dynamo with 25-h.p. engine, and other plant and machinery. With the large faces of ore easily accessible in the several quarries and the plant already installed, the Mother Lode is in a condition to increase its output largely whenever the time shall be considered by the management ripe for doubling the furnace capacity of the company's smelter, which is situated about 3 miles from the mine.

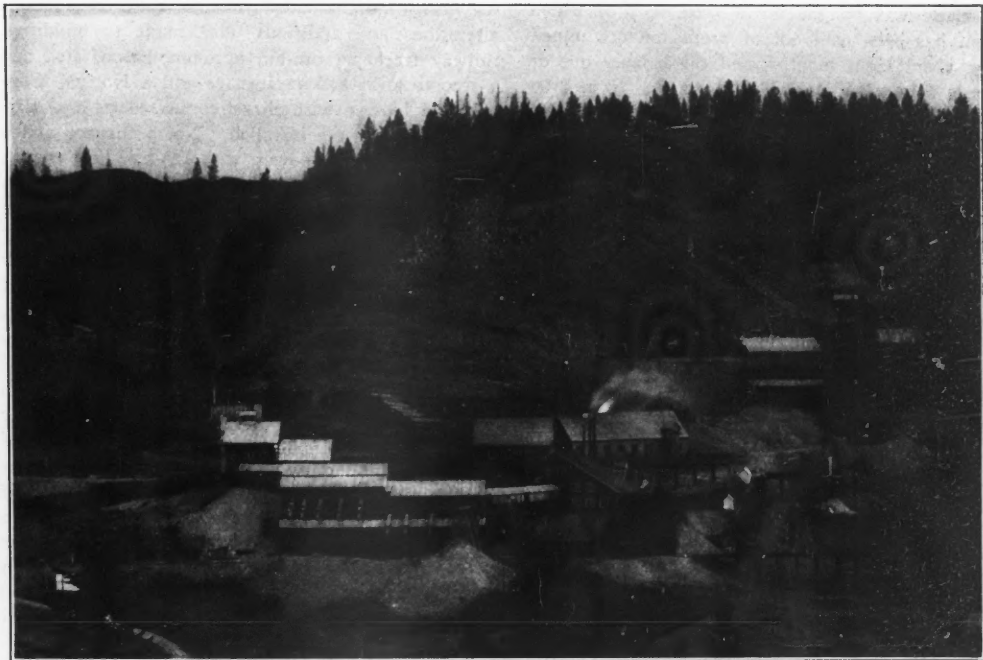
**B. C. Chartered Company's Mine.**—The total tonnage of the B. C. mine, owned by the B. C. Chartered Company, Limited, of Montreal, has now reached an aggregate of 95,446 tons. The average value of the ore produced by this mine has throughout been higher than that of the larger mines of the district. To the end of 1901 the production was 67,135 tons, having an average assay value of .015 oz. gold, 2.45 oz. silver and 5.8 per cent copper. The mine was closed during about eight months of 1902, owing to the low price of copper, the owners not caring to sell the ore at the rate then offering. Work was resumed underground in September last, and by the close of the year 14,443 tons of ore were shipped. A considerable reduction in smelter charges having been made, ore-sorting at the mine was discontinued, consequently the average value of the ore shipped fell to 1.75 oz. silver and 4.1 per cent copper for the 1902 product. No information has been received regarding the value of the output for the last six months. Not much development has been done of late in this mine, but the surface trenching to bed rock which has been carried out on adjoining claims owned by the same company has resulted in several exposures of copper ore. The power plant at the B. C. mine includes four steam boilers, together about 225-h.p.; a straight line 4-drill air compressor; half of a Class G Ingersoll-Sergeant air compressor rated at 10 drills; one large and two small hoisting engines; steam pump; electric light engine and dynamo, etc.

**Snowshoe Gold and Copper Mines, Limited.**—The Snowshoe mine, owned by the Snowshoe Gold and Copper Mines, Limited, of London, England, is now third on the list of Boundary mines as regards equipment and present output. Its tonnage to the end of June was 49,385 tons, the bulk of which was the production of about nine months. Ore is now being extracted from what is known as the Tunnel or No. 1 level, the 200-ft and 300-ft. levels, and from the different quarries opened on the property. About 7,000 linear ft. of work have been done in underground development to date, about 2,000 ft. of sinking and raising and the remainder in cross-cutting and drifting. The main shaft is down 347 ft., with ore pockets at the No. 2 and No. 3 levels, timbered complete and in running order. Two of the three compartments in the shaft are used for hoisting,

2-ton skips being run in balance. Over the shaft a head frame, designed for the automatic dumping of the skips, has been constructed, with head room sufficient for a rock crusher should it be found advisable to install one later. New ore-bins, with a holding capacity of 2,500 tons, have been constructed, and a second spur, 1,800 ft. long, has been put in from the railway. The mine buildings erected since 1901 include a large compressor and boiler house, and a house for the electric hoist. The new machinery installed consists of the high-pressure half of a 30-drill Rand Corliss air compressor, two 80-h.p. high-pressure boilers, a 150-h.p. double conical drum electric hoist, and an electric light plant. Power is supplied by the Cascade Power Company, connection with whose transmission lines was recently made. The air compressor is so constructed that it can be operated by either steam or electricity. The mine is now in condition to increase its output and produce from 500 to 700 tons per day, but the district smelters are as yet unable to take so large a tonnage of Snowshoe ore in addition to other custom ores and the product of their own companies' mines as well. However, an ample supply of coke is promised for

being worked chiefly as a big open cut, although latterly a 100-ft. drift has been run in from the bottom of the face of the quarry. A small steam power plant has been put in. The Emma ore is considered a desirable ore for smelting purposes, its constituents being favorable to rapid reduction.

**Other Copper-Gold Mines.**—The Golden Crown was operated for a while in 1902, but the returns from its output were insufficient to provide for necessary development in advance of production as well as cost of getting out the ore. The Winnipeg, besides having a similar difficulty to contend against, had its power plant destroyed by fire, but negotiations are now in progress for an early resumption of work, a very favorable treatment rate having been offered by one of the local smelters. The King Solomon exhausted the rich oxidized iron and copper ore easily accessible by means of an open cut in the side of the hill, and then closed down without prospecting underground to develop other ore bodies. On the Copper Mine claim, which adjoins the King Solomon, a deposit of similar oxidized ore, 174 ft. long and 84 ft. wide, was exposed, and in this an open cut averaging 15 ft. in width and 26 ft. deep was



GRANBY COMPANY'S MINES, GRAND FORKS, B. C.

the future, so the ore output should not be much longer restricted by lack of fuel for the smelters.

**Montreal & Boston Copper Company's Mines.**—The Sunset and Crown Silver group, owned by the Montreal & Boston Copper Company, of Montreal, has not yet become one of the larger shippers of the district, the policy of the management admittedly being to treat as much custom ore as possible at its smelter and leave the ore in its own mines for later production and treatment. Its aggregate output to June 30 was 13,325 tons, practically all from the Sunset mine. Between 7,000 and 8,000 linear ft. of work has been done in development of the Sunset and Crown Silver. There has not been much added in either buildings or plant since 1901, the properties having been adequately supplied in these respects prior to the end of that year. A large body of low-grade ore has been opened near the surface, and in this a big stope has made, connecting with the 100-ft. level by a series of chutes down which the broken ore is shot to be trammed to the main shaft and hoisted thence to the surface above the shipping bins. A cross-cut was recently started with the object of cutting this ore body at the 400-ft. level.

**Hall Mining & Smelting Company's Mine.**—The Hall Mining & Smelting Company, Limited, of Nelson, B. C., is operating the Emma mine, situate near Eholt. Shipments of ore during 1902 totaled 8,530, and in the six months ended June 30 last 9,000 tons, making an aggregate of 17,530 tons. The mine is

run for 93 ft. The ore taken out is still on the dump, awaiting facilities for transport to be provided by the extension of the railroad to a point nearer this property. The Morrison, on which about 3,000 linear feet of work has been done in underground development, opening up several ore shoots from 10 to 40 ft. wide, is also handicapped by the absence of railway connection, so no work has been done in this mine for some time past, but the ore on the dump—about 1,000 tons—is being hauled to the railway for shipment to the B. C. Copper Company's smelter at Greenwood. The Dominion Copper Company's mines—Brooklyn, Stenwinder, Idaho and Rawhide—have been idle for a couple of years, although there is known to be a considerable tonnage of ore available in the first-named, and the others are likely to become producers after further development. The Gold Drop, adjoining the Snowshoe, has been shut down for several years. Nothing has been done on the R. Bell since 1901, in which year some bunches of high-grade ore were found, but no persistent lode was discovered in the course of underground prospecting. The Oro Denoro, after years of neglect, is again receiving attention, and is shipping ore to Boundary Falls from quarries lately opened alongside the railroad. The outlook for this mine is favorable, there being an abundance of ore of a shipping grade obtainable at low cost.

**The Quartz Mines.**—The Jewel, owned by the Jewel Gold Mines, Ltd., an English company, after

sending out 2,060 tons of ore in 1902, ceased shipping, and has not since been operated. There is plenty of ore in the mine, but there appears to be some disagreement between those in control, so the mine is closed. Difficulties of transport prevent the operation of the City of Paris and Majestic properties, the cost of hauling ore about 8 miles to the smelter at Grand Forks being too high to warrant a resumption of operations. The No. 7, owned by a New York company, has a similar difficulty to contend against, yet an effort is being made to obtain money for the further development of this promising property. The Athelstan lately made a fresh start, after having been shut down more than a year, and is now sending ore to the Boundary Falls smelter. The Carmi is in an outlying part of the district, nearly 50 miles from a railway, so a waiting policy is being adopted here, as well as at half a dozen other high-grade silver-gold claims in the same neighborhood. In the immediate vicinity of the town of Greenwood are a dozen or more claims on which veins of quartz carrying good values in gold and silver are being prospected. The most prominent of these is the Providence, owned by a small company with stock held in Greenwood, Spokane and Chicago. This claim was bought for \$50,000, half of which amount has been paid out of profits on ore mined during about eight months, and the balance out of proceeds of stock sales. The ore ranges from \$100 to \$225 per ton in car-load lots. The Elkhorn, adjoining the Providence, is another payable enterprise, returns from ore shipped having provided for purchase of the claim and working expenses, and left a good margin of profit besides for the owners—two Greenwood men. The Lancashire Fraction and the E. Pluribus Unum, together known as the E. P. U. Mines, are playing well in a small way, whilst the adjoining Gold Finch has been proved to have a vein of high-grade gold quartz. Others of these quartz claims also look well, and together these small properties are giving regular employment to more than a hundred men.

**The Smelters.**—There are three smelters in the Boundary district. The Granby Company's smelter is situated at Grand Forks, the B. C. Copper Company's at Greenwood, and the Montréal & Boston Copper Company's at Boundary Falls. The quantity of ore treated at these works to July 1, 1903, is as under:

	1900. Tons.	1901. Tons.	1902. Tons.	1903. Tons.	Total Tons.
Granby Co.'s smelter	62,387	230,928	311,010	165,160	769,485
B. C. Copper Co.'s smelter	.....	117,077	148,106	61,040	326,223
Montréal & Boston Copper Co.'s smelter	.....	.....	33,433	35,480	68,913
Totals	62,387	348,005	492,549	261,680	1,164,621

A comparison with the total tonnage smelted in the district with that produced shows that only about 95,000 tons were sent to outside smelters, and the bulk of that quantity was under a contract entered into before the Granby smelter commenced operations, which it did, with a single furnace, in August, 1900. To-day the Granby works have six blast furnaces, No. 2 having been blown in during October, 1900; Nos. 3 and 4 during 1902, and Nos. 5 and 6 quite recently added. Plant and buildings were substantially enlarged in 1902, that year's additions including two furnaces 44 by 160 ins.; furnace building, 80 by 160 ft.; complete automatic ore sampler, capacity 1,000 tons per diem, with crusher and rolls; sampler building, 70 by 70 ft.; reverberatory furnace, capacity 25 tons; 2-stand converter plant, capacity 50 tons each stand; steel building for converter 60 by 160 ft.; one No. 8 Connorsville blower, blowing engine 36 by 36, and building, 48 by 56 ft.; two pumps, capacity 750,000 gallons each per diem; 250-h.p. water wheel; 250-h.p. generator; 7 electric motors of varied sizes, and a briquetting plant with a capacity of 100 tons per day. Besides adding two furnaces in 1903 the company has supplemented its power by making connection with the Cascade Power

Company's transmission lines. The output of blister copper from these works for the half year ended June 30 was 7,152,000 lbs. With a sufficient supply of fuel obtainable the Granby Company's smelter can now treat about 2,000 tons of ore a day.

The B. C. Copper Company during 1902 put in a second 42 by 150 in. furnace, extended its steel furnace building, added a second No. 7½ Connorsville blower, enlarged its ore-bin accommodation, and made other betterments to its works. Arrangements have recently been made for replacing the steel smoke stack by a 120-ft. circular brick stack, and preparations are in progress for erecting a converter building, the intention being to install a converter plant and add more furnaces. A locomotive and slag trucks have been ordered, the intention being to dump the slag hot instead of granulating it as heretofore. A similar change is to be made at the other two district smelters.

The Montréal & Boston Copper Company's smelter commenced operations in June, 1902, but a shortage of coke necessitated a shut-down for two months, so that the matte production for the half year was correspondingly smaller, totaling 1,070 tons of about 45 per cent copper, 1.5 oz. gold and 18 silver. During twelve months ended June 30, 1903, considerable alterations and additions were made to buildings, railway trackage, ore-bin accommodation, etc., and a second 40 by 176-in. furnace and a No. 7½ Connorsville blower with direct-connected 75-h.p. Erie steam engine, were installed. No. 3 furnace and a No. 8 Connorsville blower, with 125-h.p. Erie engine, have been obtained, and will shortly be put in. Trucks for dumping slag have been received and a locomotive to haul them has been ordered. Other betterments planned include the doubling of the sampling plant and the installing of a converter plant.

**Electric Power Works.**—The Granby Company has had its own electric power plant in use since the summer of 1900, and later additions were made to it as already mentioned. The Cascade Water, Power & Light Company obtained a grant of 65,000 ins. of water, a portion of which it commenced to deliver towards the close of 1902, under a working head of 156 ft. The water is conveyed from a 400-ft. dam across Kettle River through 725 ft. of open rock cut and 410 ft. of tunnel to a 7-ft. stave pipe, 1,500 ft. in length, and thence through a steel pressure pipe to three direct-connected McCormick turbines, each running one 750-k.w. 3-phase generator. These are wound for about 2,250 volts. Step-up transformers raise the current for transmission to 20,000, and down again at the Granby smelter and at the Granby and Snowshoe mines at Phoenix to 2,000. At the lowest stage of water the company will be able to generate, when the demand arises, 6,000 h.p., but the plant now in use is intended to generate 2,000 h.p., with one unit constantly in reserve. The hydraulic equipment was built by the S. Morgan Smith Company, of York, Pa., and the electrical equipment by the Westinghouse Electric & Manufacturing Company, of Pittsburg.

**NEW IRON MINES IN SPAIN.**—La Société des Mines de Molinillo is the name of a company which has been formed in Brussels, with a capital of \$500,000, to acquire and work certain iron ore mines at Hueter Sanhillan, in the Province of Grenada, Spain.

**CEMENTATION OF STEELS.**—Léon Guillet reports results of researches on the cementation of steel, which show: (1) That the rapidity of penetration of carbon into the steel depends on the temperature, the time, and the chemical reactions produced by the carbon; (2) the experiments made did not determine the solubility of the carbon in the iron, but they apparently establish the fact that there is a preliminary state of equilibrium which is destroyed by the final operation; (3) by simple cementation certain steels containing nickel acquire the same hardness as carbon steels. (*Comptes Rendus*, Vol. CXXXVI., No. 22, June 2, 1903.)

## THE AMERICAN COPPER SULPHATE TRADE.

By CHARLES C. SCHNATTERBECK.

Copper sulphate, or blue vitriol as it is frequently called, is one of the most important by-products of the mineral industry, being of great value as an insecticide and fungicide. It is also used to some extent by the Western Union Telegraph Company in its storage batteries, and by Paris green makers and others. As a by-product copper sulphate is obtained chiefly in the refining of gold and silver, but a large quantity is also made from copper matte and ore. A full description of the copper matte method has been contributed by the inventor, Mr. Ottokar Hofmann, to *The Mineral Industry*, Volume VIII.

In the table below estimates are given showing the production of copper sulphate in the United States during the past five years, in pounds.

Year.	By-Product in Refining Gold and Silver.	From Copper.	Total Production.
1898.....	28,061,501	27,057,860	55,119,361
1899.....	37,285,870	30,617,500	67,903,370
1900.....	44,368,478	33,850,000	78,218,478
1901.....	51,000,000	27,004,257	78,004,257
1902.....	35,879,212	12,884,326	48,763,538

The table shows a heavy falling off in production for 1902, amounting to 29,240,719 lbs., or 37.5 per cent., as compared with 1901, and 11.5 per cent compared with 1898. This decrease may be partly explained by the smaller consumption in this country, and the efforts of British and German competitors in export trade.

Referring to the export trade, the following table shows that although business has depreciated the quantity reported last year constituted nearly 63 per cent of the production.

Year.	Exports.	Average Value Per Lb.		
		Domestic Consumption.	Exports.	New York.
1898.....	14,529,466	40,589,895	3.21	3.41
1899.....	29,391,586	38,511,784	4.44	5.20
1900.....	43,630,621	34,587,857	4.71	4.99
1901.....	47,729,547	30,274,710	4.72	4.71
1902.....	30,462,763	18,300,775	3.99	4.48

The larger part of the exports in recent years has gone to the vineyards of Italy, Austria and France.

The figures showing the domestic consumption represent the balance of production after exports have been deducted, and do not include the imports from Great Britain which were begun in the last quarter of 1902. These imports paid a duty of ½c. per lb., which, however, did not prevent importers from underselling the American product. It is noteworthy that the quantity of domestic copper sulphate entering into consumption in the United States has fallen off to a marked extent in the past five years. Doubtless reason for this may be found in the higher prices for copper which have made it more profitable to recover the metal from the solution than to sell the sulphate at a discount in a competitive market.

In speaking of prices reference to the table above shows that export trade has not been as remunerative as the domestic, owing to keen competition with the British and German products. On an average the difference between the export and New York market price in 1902 was nearly ½c. per lb., while in 1898 it was a fraction over ¾c. A fact not to be overlooked is that with the concentration of trade in the hands of comparatively few concerns the market price of copper sulphate is now less influenced by the fluctuations in the metal than was formerly the case. Heretofore it was the custom with some sellers to fix the price of blue vitriol at about one-quarter that of copper, but last year the difference was considerably more, probably owing to the peculiar condition of the trade.

What the future prospects of the trade are can only be conjectured, as exports, if anything, are likely to continue to diminish, owing to the aggressiveness of foreign manufacturers, and the domestic consumption is only slowly recovering. Some hope, however, is centered in prices, which may possibly be strengthened by the curtailed production.



### HYDRO-THERMAL ACTIVITY IN THE VEINS AT WEDEKIND, NEVADA.

By HENRY C. MORRIS.

The first mining location was made in 1896 upon the Reno Star, by George H. Wedekind, and this property and the adjoining Desert King are, as yet, the only producing claims in the district. Although the well-traveled Spanish Springs road and the big Orr ditch parallel each other not 100 ft. from the discovery shaft, and cross the rich float scattered by the lode, so that every traveler must have kicked it aside or ground it underfoot, they failed to recognize the fact that it was rich ore; similarly the laborers upon the Orr ditch, which has been in use for 20 years or more, must have shoveled aside hundreds of dollars' worth of this rich rock without suspecting its value. That this happened in a perfectly open country, and where every man considers himself a prospector, is explained by the appearance of the ore, which hardly differs at all from the ordinary detritus of the region.

The general topography of the district is more rolling than rugged, the country having been so heavily eroded that few outcrops remain. All of these are very siliceous, and will be referred to as silicified zones, in default of an exact determination of the rock. The hill, upon the side of which the mines are located, is part of a range which skirts the northern side of the valley.

The prevailing rock of the region is a light gray, fine-grained andesite which has been so altered that it is exceedingly soft to a considerable depth. This soft material, although completely broken up by joint-cracks, stands so well that some of the shafts are sunk in it deeper than a hundred feet without any timbering. The colors of the rock vary from a pure white, when it has the appearance of infusorial earth, through the yellows and reds, to a deep purple. The comparatively unaltered gray andesite is heavily impregnated with sulphates and sulphides, and the cracks are filled with gypsum and pyrite.

The map of the mine workings shows the drifts on the general plan of the zone of impregnation, as indicated by the average dip of the ore-bodies. The elevation is simply a rough sketch on the survey line B C D E, etc.

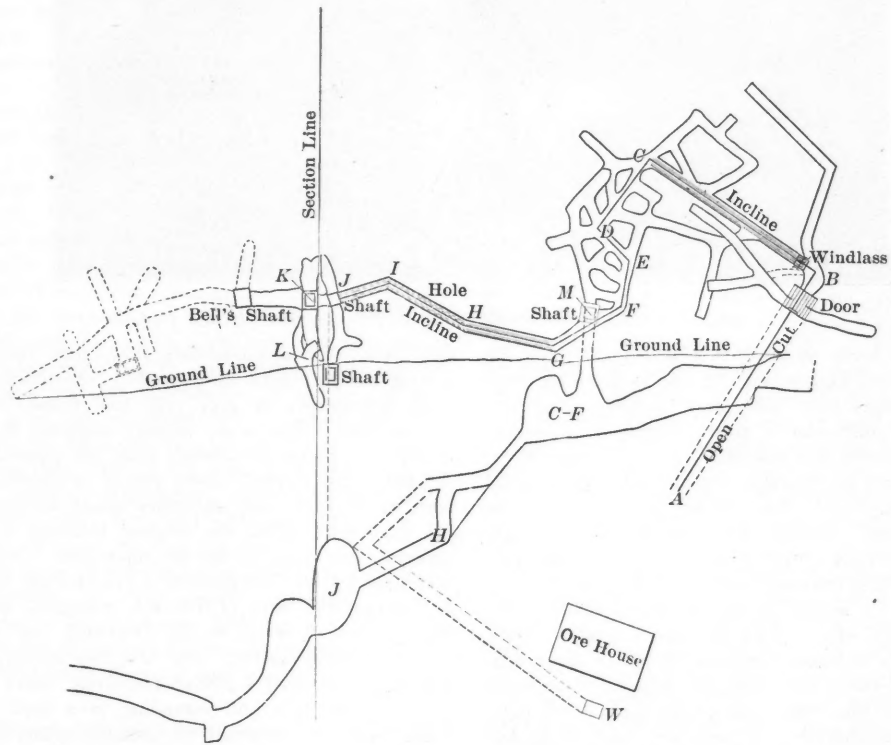
What is called the "main vein" strikes northwest into the south face of the hill, the outcrop being altogether blind. Indeed, one can hardly say that there is any outcrop, since it only comes to the grass-roots and does not project above the surface nor show any evidence of its existence except by the float. For a distance of 60 ft. between B and shaft M on an approximate east and west line the ore comes to the grass-roots; while 150 ft. to the north (not mapped) the first evidence of ore is 60 ft. deep. The covering is the ordinary altered country rock. Crossing the "main vein" with a north and south strike is a zone of, what is locally called, conglomerate. It is one of the striking features of the mine. Both of these zones or lodes dip to the west, and are approximately paralleled, both in dip and strike, by a silicified zone, which is about 500 ft. to the east.

On entering the open cut the ore appears in small yellowish streaks on the west side. Directly ahead is an arch supported by a pillar of ore to the west and of barren material to the east. Almost in the center of this arch the ore-body extends from the surface in an abrupt curve, concave to the west. All the ground immediately to the west is ore, the horn-silver showing in blotches in many of the joint cracks. The great amount of gypsum is very noticeable; the whole mass of soft rock is heavily impregnated with it. Another peculiar feature of the upper workings is the occurrence of fairly continuous streaks of sand, some times six inches wide, distinct from the attrition material of the lode. This sand is found to a depth of 40 ft. The crevices and joint-cracks often contain a network of roots which are found 50 ft. below the surface, and,

I am told, are characteristic of this region, showing at what extreme depths plants will seek for moisture. The iron stain along the levels segregates in bands, leaving the rest of the rock with a distinctly chalky appearance. Cracks a foot wide are only half-filled with breccia, and the whole ground is very open. The so-called "conglomerate" makes its first appearance in the uppermost of the large chambers C-F, shown on the profile map of the mine, and is traversed in the direction of its strike by a large sand crack. The general appearance of the ore here is that of a ferruginous-cement conglomerate, the pebbles being imperfectly rounded. From this large chamber shipments were made of ore of the same general appearance, but cemented with lead sulphides and carbonates carrying gold, with silver sulphide and chloride. Sulphides of this character now appear in thin seams, 2 or 3 ins. in thickness, which show characteristic stains of bromine.

width with occasional swells of several feet, and most of the seams are approximately horizontal. A few feet to the south, however, on this level, at L, the shoots curve over sharply and pitch abruptly to the southwest. Here a large swell occurred which yielded handsome profits. The ore is very soft and of a sandy character, with just enough clay to give it some consistency and showing heavy oxidation. The gold values in this ore are higher than in any part of the mine. Occasionally, small masses of soft bluish-gray porphyrite are encountered, which are easily recognizable as intermediate between the unaltered andesite and the decomposed material of the lode.

The Wedekind shaft W is not in ore at all, but yielded a very interesting observation in regard to the chemical agents instrumental in the general rock alteration. In sinking the shaft, hard gray or unaltered andesite was encountered at a depth of



PROFILE MAP OF DESERT KING MINE.

As depth is gained to the west, the conglomerate appears to develop a more distinct hanging wall, showing gradation, from comparatively solid wall matter through breccia to the pebble vein, within a distance of 2 ft. from wall to vein. On the same level, in a branch to the north from the incline at H, the wall fades out; the conglomerate is perfectly white, and the cement resembles the pebbles so closely that the mass looks solid at first sight. Entirely surrounded by this formation is a small pocket of little pebbles very firmly cemented with iron. On the level of chamber J the conglomerate is made up of larger pieces, often 2 or 3 ft. across, with small pebbles filling the interstices. Small nodules or irregular masses of a very dark compact quartz occur in the ore here, and the individual pebbles are coated and cemented with a thin layer of silica. This grows more noticeable as the depth increases until at the lowest levels of the Desert King, near the Bell shaft, there are continuous bands of dark quartz, which is, however, more porous than the inclusions above mentioned. Quartz bands seem to be a general accompaniment of the ore in the Desert King at this level, either underlying or blanketing the streaks of rich sands. The conglomerate is visible only at the extreme north of chamber K, and the character of the ore-body changes very rapidly, as one observes it in going by way of the steep incline, down to the bottom of the Bell shaft, which is about 85 ft. deep, as shown on the map. The shoots here are from 6 ins. to over a foot in

113 ft., and continued for 100 ft. deeper. This rock, as mentioned before, is heavily impregnated with gypsum and metallic sulphides. Thus far in the development work no great amount of water had been encountered. The ore-body in the Reno Star was absolutely dry, and there was very little water in either the Wedekind or Bell shafts. However, when the Wedekind broke through the hard rock into "gray mud," at a depth of 213 ft., there was a heavy flow of water. This flow came in between the mud and the hard wall, causing the sump to fill constantly with slime. The water was warm and heavily charged with sulphuretted hydrogen, and corroded the pumps to such an extent that many of the parts had to be replaced with bronze. The heat and offensive odor were so oppressive that many of the men working in the bottom of the shaft were overcome, and it was found so difficult to keep the ordinary plunger pump in repair that it was abandoned. A Byron-Jackson, three-series, centrifugal sinking pump, with a capacity of 150 gals. per min. to 150 ft., is now used to keep the water at the 100-ft. level. The water still gives off a strong odor of sulphuretted hydrogen when agitated.

In the Desert King the Bell shaft has been sunk 140 ft., some small but rich pockets of oxidized ore having been found. A drift run about 20 ft. to the northeast shows, in areas of 2 to 3 square yards, the soft, clayey, decomposed andesite, to which there occur segregations of very heavy antimony and lead sulphides, carrying good values in silver and some

gold. The pockets are connected by small stringers of the same material, and the surrounding clay is so impregnated with minute sulphide crystals that ore-sorting is difficult. In such ground prospecting is blind, the extremely small seams and stringers affording the only clue to possible pockets.

After such a general description of the mines we can form some idea as to the causes which formed the ore. In this discussion of the ore occurrence it

may be outlined thus: First, a slight local brecciation took place prior to the beginning of the hydro-thermal action upon the original andesite of the district. This first hot water or alterative action probably produced, in those localities affected by the brecciation, what I have described as white conglomerate, in which the matrix and pebbles are identical in appearance and material. Outside of the originally brecciated areas the alterative action

analogy is not quite complete because the Wedekind has not the usual surface deposit of sinter, etc., but in considering such deficiencies we must not fail to credit the deposit with its comparative age and the erosion and weathering due to such seniority.

A few words in regard to other proofs of past and present hydro-thermal activity in the surrounding country may be of service. The significance of the silicified zones which give ruggedness to the Wedekind neighborhood is problematical. These zones, which somewhat resemble quartzite, do not have a universal trend or strike, but outcrop in every direction. Unfortunately none of the work in the district has uncovered a contact between this rock and the gray andesite. Three miles to the northwest is an iron mine which is worked intermittently, producing ore containing about 50 per cent available FeO, and from one to three dollars per ton in gold and silver. Unmistakable marks of hot water prove



CONGLOMERATE ON DUMP.

should be borne in mind, as a general fact, that the country rock, gangue material, and even the ore itself are of apparently the same general character; the chief difference is in the degree of alteration, and, of course, mineralization, that is to say, all of it represents an impregnation of brecciated material and country rock traversed by an intricate system of fractures. Probably the best clue to the origin of the so-called conglomerate is Becker's statement\* that "A dense irregular body is acted upon (by solutions) at its salient points, and hence tends to become round, etc." This alternative action is very easily seen in many specimens in which the gradation from the soft, chalky, but still rough-cornered exterior, to the round, hard kernel of unaltered andesite is unmistakable. In such specimens, if broken across the middle, the solvent action upon the "salient points" is clearly illustrated. This action in conjunction with a primal brecciation would suffice, with the aid of very little, if any, attrition, to form the conglomerate. At all events, it is improbable that the water exerted any physical effect beyond the removal of the altered portions of the rock, thus affording fresh surfaces for the disintegrating action.

It seems most probable that the Wedekind ground has been subjected to the action of two solutions, one alterative and the other mineralizing. The strongest reasons for supposing this is the fact that, while the whole district has been deeply and very uniformly altered by hydro-thermal action, this is the only known ore deposit. Other shafts, from half a mile to a mile distant, have tapped ground similar in appearance to that of the conglomerate and carrying traces of gold and silver, but there the similarity ends. A second argument for this distinction between the solutions is that practically all the conglomerate pebbles, when broken, show the identical soft, chalky-white character of the wall-rock, thus indicating that the alterative action in time and character, was the same for both. Now, if the alterative and mineralizing solutions were one and the same we should expect to find these pebbles carrying some values themselves, especially when imbedded in a cement running up into the hundreds of ounces in silver. This, however, is not the case, for the pebbles when cleaned of all cementing material show hardly a trace of metal.

The successive events which formed the deposit

must have been comparatively slow, very likely resulting at one stage in a product resembling the local occurrences of gray clay now found in the Desert King. The newly formed sulphides present in this clay result presumably from the presence of sulphur in the thermal waters and of its combination with the ferrous salts and other metals existing in the same state, when the original elements of the andesite were released by decomposition. Such a readjustment is illustrated in a neighboring tunnel at the northern base of Peavine mountain, and, I believe, was observed in the Comstock and commented upon by Becker. The next step in the process must have been a second fracturing, more general than the first and extending in a north and south direction. Whether or not this occurred before the first flow or seepage had ceased is immaterial. At all events the second disturbance was followed by a very much stronger flow, coming from sources generously supplied with both of the precious, and some of the base metals. The conditions and forces then at work were probably analogous to those now slowly subsiding at Steamboat Springs, about 11 miles south of Reno. There the solvent and disintegrating power of the hot water is largely augmented by alkaline-sulphides, chlorine, boric and sulphuric anhydrides, and similar natural reagents with which the water is heavily charged. Such conditions, in a broad, deep, detritus-choked conduit like that at Wedekind, would be amply responsible for the ore-deposition having the characteristics to be seen in this mine. We should expect the rounding off of the individual pieces of fractured material, and a simultaneous tendency to the formation of a deposit, on the surfaces so advantageously offered, when conditions became favorable either from loss of heat, or pressure, or the escape of gases. This being granted, we can easily conceive of the gradual building up of the deposit until the whole mass became cemented. The silica, as one of the most insoluble materials in solution, would be deposited first and at the greatest depths, thus causing the siliceous incrustations previously referred to as occurring in the lower levels.

In short, it seems that the facts, as found and stated, warrant the assertion that this ground has been the seat of hot spring activity similar to that so common in Nevada to-day, and that it owes its right to distinction principally to its connection with sources unusually rich in precious metals. The



INCLINE FROM B.

its origin. Several miles to the northeast, in Spanish Springs Valley, hot water is still flowing, and recent borings on a ranch 3 miles south of Reno have developed a strong flow of hot artesian water. Eight miles further south, on the same road, is Steamboat Springs, where the water still boils and roars, and emits clouds of steam. Becker's analysis shows that the materials held in solution by these waters and deposited at the vents carry arsenic, antimony, iron, lead, copper, gold and silver; 3.403 grams of the deposit containing 0.0034 gram gold and 0.0012 gram silver. The world-renowned Comstock is some 15 miles farther to the south and east, and with that as an incentive, and the Wedekind as an encouragement, it will be strange if we do not hear of further mineral discoveries in the near future.

A train moving at 60 miles an hour on a smooth, level railway, only requires the engine to give out enough energy to overcome the resistance of the air and the rails.

\*Quicksilver Deposits of the Pacific Slops. Page 70.



## THE BRIQUETTE INDUSTRY IN FRANCE.—I.

By ED. LOZE.

A study of the briquette industry in France would involve numerous developments exceeding the limits of an article in the *ENGINEERING AND MINING JOURNAL*. We shall give here only such notes as will help the reader in forming an idea of this industry in France and in finding information useful for a more complete study. We would suggest a reference to "Les Combustibles Mineraux," by Messrs. Felix Colomer and Charles Lordier, which has already been mentioned in the *JOURNAL*.

*General.*—The briquette industry exercises a good influence on the working of coal seams of inferior and friable quality, such as some found in France and Belgium, where the waste amounts, sometimes, to 15 or 18 per cent. This slack, difficult to utilize, and consequently to sell, becomes, after being transformed into briquettes, a valuable contribution to the prosperity of the mines. At the same time the briquetting offers appreciable advantages, as, for instance, improvement of the fuel, its preservation, better form for transportation, storage, etc. In the matter of storage, it is calculated that a ton of briquettes occupies about 0.5 cubic metre (about 18 cubic ft.), while a ton of coal requires a space of more than 1 cubic metre (about 36 cubic ft.). The storage and preservation of briquettes are very interesting with respect to supplies, notably war supplies; they are much appreciated on board ship. The French navy and railways use them extensively on account of these advantages.

They burn easily in grates and good results are obtained, even with stokers of little experience. The minor industries employ them willingly, and for domestic requirements their use is being developed.

Another advantage is the possibility of making fuels of special quality by appropriate admixtures.

An exclusive use of briquettes as fuel is not, however, to be expected. Their manipulation and the added matters represent a cost of 5 to 8*fr.*, or \$1 to \$1.50 per metric ton, sometimes more; as, for example, when the price of binding matter is very high, and at times it may be more advantageous to burn the slack directly in special grates than to employ briquettes.

The advantages of this industry, for the utilization of the product of certain coal seams, may be gathered from these few words.

The industry is not new, since it is mentioned in different writings of the 16th century. In France, the process was put into practical use towards the middle of the last century, in the neighborhood of St. Etienne. The following dates are worthy of note: In 1833 efforts of Ferrand and Marsais toward the preparation of briquettes with coal-tar. In 1842, construction of the first briquetting machine in France, by Marsais. In 1843, use of solid coal-tar. In 1844, use of fatty coal-tar and later of dry coal-tar.

At present there are numerous works in France, at the mines and elsewhere, specially in various parts, which can be easily supplied with British coals, such as Dieppe, Havre, Hordfeur, Caen, St. Malo, St. Nazaire, etc. The industry is also practised at a certain number of coal mines, notably in the coal-field of the Nord and the Pas-de-Calais, at the mines of the companies at Anzin, Courrieres, Escarpelle, Flines-les-Raches, Lens, Menrchin, Ostricourt, Vicogne-Noeux; in the Loire, at Bari-la-Faverge, La Chazotte, Le Cros, La Loire, La Peronniere, Roche-la-Maliere, and Firminy, St. Etienne, and Villeboeuf; in the Gard, at Alais, Besseges, Le Grand Combe, Mokta, Portes & Senechas, Prades-Neigle-Sumene, and Rochebelle; in the Herault, at Graissessac; in the Bouches-du-Rhone, at the mines and at Valdone; in the Tarn & Aveyron, at the Acieries de France (Aubin), Albi, Campagnac, Carmaux, and Decazeville; at the mines at Blanzay; in the Bourbonnais and Auvergne, at Champagnac, Charbonnier,

Chatillon-Commentry, Commentry-Fourchambault; in the Haute Loire; at Ahun, in the Creuse, and in the Alpes, at the anthracite mines of the Murs.

Among the briquette factories besides the coal mines, the works of Brassac, Chasse, Courbessac and La Chazotte, belonging to the Paris, Lyon & Mediterranean Railway, should be mentioned.

*Fuels briquetted.*—All fuels are considered suitable for agglomeration. In France, semi-coking coals, with 12 to 20 per cent volatile matter, are chiefly employed. Dry coals, with a long flame, or coking coals, with coal-tar as a binder, give off a good deal of smoke. The amount of coal-tar requires to be reduced.

Very poor coals produce briquettes which burn slowly and with difficulty. When cold, the cohesion is satisfactory, but when burning these briquettes are rapidly reduced to dust. In order to avoid this inconvenience, a mixture of lean and rich coals is often made, resulting in briquettes which burn fairly well, without the addition of much coal-tar; but these briquettes are inferior to those produced from what are known as *demi-gras* coals, even when the composition in volatile matters is identical. Combustion is slow and much clinker is formed.

Good results cannot be obtained with lignite alone; it must be used in a mixture of, for instance, anthracite with 10 per cent of lignite and 8.5 per cent of coal-tar. Peat is also used with a mixture of anthracite and tar.

*Binders.*—The most generally employed binding materials, indeed, one might say the only ones, are crude tar, fatty coal-tar and dry coal-tar.

With crude tar, which is the least used, the mixing and compression can be done without heat, but the briquettes are soft, disintegrate gradually, and give off a great deal of smoke; this is remedied by submitting the briquettes to a sort of calcination, which hardens them and, at the same time, eliminates the most volatile components; complicated and costly apparatus and plant, and additional labor, are required, however, for this process.

Coal-tar is of more practical use and is used nearly everywhere. It offers notable advantages, such as cohesion of the briquettes, high caloric value, reduction of the amount of cinders, correction of the volatile components for poor coal, and good form in the fire.

With dry coal-tar, a better result is produced than with tar, and the necessity for calcination, mentioned above, is avoided. It is preferable to fatty coal-tar, which sometimes gives off a strong smell and much smoke. Good results are obtained also with a judicious admixture of dry coal-tar and tar.

Dry coal-tar, of good quality, is solid at an ordinary temperature; its transportation in bulk is effected without breakage or agglomeration; it is a good black in color and has a greasy aspect; its conchoidal fracture is fairly bright; it does not soil the hands; it is not adhesive; its smell resembles that of coal-tar. In water at 75° C. it stretches out in thin threads from 0.30 to 0.50 m (12 to 20 ins.) at least in length, without breaking; it melts between 100° and 120° C. Its calcination leaves 45 to 52 per cent of very hard, swollen coke; its incineration 0.5 per cent of cinders at the most.

The greater part of the coal-tar used in France comes from Great Britain. Some is obtained from the Parisian Gas Company, and the Compagnie des Asphaltes de France at Pantin, near Paris; the Paris, Lyon & Mediterranean Railroad Company produces some at Chasse. Some is obtained at Ivuy (Nord) and a few other places.

The high price of coal-tar, the development of its use and its generation of smoke, have given rise to much research for methods of briquetting without a binder, by simple compression, which would exclude very inferior coals and anthracite from the industry. A great many efforts have failed, but M. Gedard has obtained good results with his machine. According to M. Walter Spring, of Liege, a pressure of 6,000 atmospheres would give to coal dust the cohesion and the hardness of real coal. It is generally

admitted that at a high temperature the pressure might be less.

Other matters than coal-tar have been suggested, without much success, as binders. Among them are potters' clay, lime, asphalt, gum, blood, flour, starch, fats, gelatine, magnesia, lichens, alum, resin, molasses, mucilaginous roots and plants, potassium nitrate, oil, paper and wood pulp plaster or gypsum, sawdust, silicate of soda, sulphur, soap, gutta percha, etc.

As a matter of fact, coal-tar is still the only practical binder and dry coal-tar is the best. Its quality, and the proportion in which it enters in the manufacture of briquettes, constitute, with the pressure, the important elements in the value of the product.

In another article, the machinery used, the conditions required of briquettes and the net cost will be considered.

## BRICK MASONRY.

Brick masonry is frequently paid for by the cubic foot, and in making estimates it is always reckoned thus, though the result may be converted into the number of thousand brick required, since brick are purchased by the thousand. The cost of brick masonry depends upon the prices for the material and wages of labor, but also to a large extent upon its character; that is, whether laid with thick mortar joints or thin ones, with lime mortar, lime and cement mortar, or cement mortar, and the character of the workmanship in laying the brick. In massive masonry laid with mortar joints  $\frac{1}{4}$  to  $\frac{3}{8}$  in. thick, the mortar constitutes about 20 per cent of the entire mass. The effect of thicker or thinner joints upon the cost will be as the relative price per cubic yard of brick and of the kind of mortar used. The size of the brick is very important in considering the cost of masonry. The brick used in some parts of the United States measure only 60 cu. in., while those used in other parts measure 80 cu. in. Of course, a cubic foot of masonry will comprise fewer of the large brick than of the small, while the labor cost of laying a thousand will be the same in each case. Moreover, large brick sell at the kilns where they are made at prices no higher than the small brick made elsewhere. This is because the raw material is of comparatively little value and the labor in manufacture is largely determined by the number of pieces handled rather than their weight. Common brick are rarely used otherwise than locally in the districts which have their own sizes, which is probably the reason why we have no national standard. With fire-brick the case is different. However, it would appear that there might be some advantage in having some uniformity in red brick, such as a set of standard sizes, one of which might correspond with the standard fire-brick, having a volume of about 100 cu. in. Even a large brick might be desirable for some purposes. One of the advantages of the Custodis method of chimney construction is the less cost of laying the large, specially shaped brick used therein. One of the reasons for the use of small brick as compared with large ones, say 16 in. by 8 in. by 4 in., like the Mexican *adobe*, is the better bond, but in that respect we do not fancy there would be material difference between brick of 60 cu. in. and those of 100 cu. in. Another reason for the use of small brick is the thinner walls they permit, which is a matter of some consequence in the construction of buildings in cities where land is highly valuable.

The chemist Sonstadt made experiments, in 1872, to determine the amount of gold in sea water, and stated subsequently that the amount present was "less than one grain per ton." This has been quoted repeatedly in chemical-geological literature as "one grain per ton." Many striking calculations of the aggregate total of gold in the ocean have been made on this mistaken basis.

### USE OF MINERAL OIL IN ROAD IMPROVEMENT.\*

By JAMES W. ABBOTT.†

Public attention was first called to the utility of crude petroleum oil in road-betterment through experiments made by the county of Los Angeles in California in 1898, where six miles of road were oiled in that year under the direction of the supervisors. The sole purpose of this work was to lay the dust, which, churned beneath the wheels of yearly increasing travel during the long dry seasons in that region, had become a most serious nuisance.

The following year this mileage was a little more than doubled in that county, and other counties in California also began experiments along the same line.

From the very first the results obtained were so astonishingly successful that the practice rapidly increased. It spread through every county in southern California, and then began to work north. Now, after five seasons, it has extended from near the Mexican line, on the south, to Durham, in Butte County, on the north, a stretch covering sections of quite widely differing climatic conditions, with an aggregate of about 750 miles of county roads and city streets oiled for one or more years. Oil has been used on the principal driveways of Golden Gate Park, San Francisco. The mountain stage road into the Yosemite National Park has been oiled for a distance of thirty miles, from its initial terminus at Raymond to eight miles above Wawona.

In California it has now passed the experimental stage. More than twenty-five counties in that State have already used it, and others are preparing to do so during the season of 1903.

Thus far California is the only State which has actually adopted the practice. It has been tried to a very limited extent in Texas, and a few isolated experiments have been made in Pennsylvania, New Jersey, Indiana, Colorado, and the District of Columbia. Within the past year also a few experiments have been reported from England, France and Switzerland.

As already stated, the original motive for the use of crude oil on roads was to lay the dust. Wherever oil has been tried this purpose has invariably been accomplished, regardless of the methods adopted or variety of oil used. On all kinds of roads where it has been applied the dust has ceased absolutely for at least an entire season after its application, and if renewed a second year it has been abated for that year also and the following, whether then treated or not. In Southern California all unite in saying that the great bane of life—dust—passed away wherever the first application of oil was made. The dust raised by passing travel no longer comes in at windows or destroys the products of field and orchard for considerable widths on each side of the road, as it formerly did. The report of its effectiveness as a dust layer is just as positive and enthusiastic from all sections which have made the experiments.

In California it was soon learned that, incalculably valuable as it was, the laying of dust was not the only or even the most extraordinary result obtained. It was found that when oil was applied it immediately began to bind together all the loose particles constituting the road surface, whether clay, sandy loam, loose sand, gravel, or the fine material on the top of macadam. A tough stratum was formed, resembling an asphalt pavement. Roads built on drifting sand or clayey dust, no matter how deep, where trotting with a buggy was impossible and for a pair of strong horses to pull a ton was a very laborious process, became indurated, resilient, and firm, so that driving teams could trot with ease and the same pair of horses pull  $2\frac{1}{4}$  tons more comfortably than they formerly did the 1 ton. Of course, these results were not fully obtained immediately, but they never failed to follow persistent treatment with oil.

At first, while this oiled surface stratum was thin, it was often broken through, especially in wet weather, but proper repairs and subsequent applications of oil thickened and strengthened it until it would at all times effectually withstand the heaviest and most continuous travel.

Running south from the railroad track in the town of Chino, San Bernardino County, Cal., is a piece of road over which every season nearly 40,000 tons of sugar beets are hauled on their way to the factory, often averaging 750 tons a day. The foundation of this road is a loose sand, and it has been surfaced with a material containing some clay. Formerly the loaded wagons often stalled and had to be dug out. Now, after three seasons of treatment with oil, the road is as easy to drive over as a good city street, and effectually sustains the heavy travel, although the majority of the wagons used on it have narrow tires. The benefits of the oil were experienced immediately after the first application was made, but the surface stratum under successive treatments grew thicker and firmer until the road has become virtually perfect.

In another place in the same county, several miles distant from the one just described, the road runs over drifting sand just like the worst to be found on Cape Cod, in Massachusetts. It has been treated for two seasons with oil, and is now equally as good as the other. Both pieces of road were visited and carefully examined by the writer, who can testify to the almost incredibly satisfactory results obtained.

*Quantity of Oil Required.*—In California, where the aim is to always use an oil containing as much asphalt as possible, the amount of oil required for a 16-foot roadway varies between 250 and 400 barrels of 42 gallons each to the mile. This depends upon the thickness of the oil crust made, the porosity of the material, and the percentage of asphalt in the oil.

The quicker this oil crust is made the better. If two applications are made to a porous material and the oil properly stirred in each time, the crust will be finished. If the hard material is a clay, it should have at least two treatments. One will be sufficient for macadam. A dusty clay will require some gravel added for the first application. On the second application the crust which has begun to form should not be disturbed, but after all the oil sinks in that will do so, a layer of sand should be sprinkled on top. In this oiled crust the bottom will be made from the clay dust and the top mostly from the added sand, while the middle will be a mixture of the two.

In the first experiments a part of the oil was generally put on the first year, and the crust was completed the second or third year. The first year the thin crust was often broken through and a hole was left in the road.

After the oiled crust has once been properly formed all the oil required will not exceed 25 barrels to the mile for repairs in each subsequent year.

*Repairs to Oiled Roads.*—With an oiled road, as with macadam of any other kind, it is the constant vigilance and the stitch in time that accomplishes the best results in maintenance. It requires persistent attention. If the crust gets broken it should be repaired at once. For winter repairs it is well to mix in the fall a lot of sharp sand or fine gravel with oil, stirring it all up with a hoe in a mortar box as mortar is mixed, and being careful not to put on much oil so that any will run away when the mixture is left standing. When a hole starts, clean it out thoroughly with a hoe or brush broom, fill the hole to a little above the adjoining surface with some of the oil and sand mixture, and thoroughly ram it.

Most of the distributors which are now made have a short hose attachment, with gate and nozzle and shut-off valve for use in repairs. When a patch appears to have too little oil, or a hole needs repairs and no oil mixture is at hand, a little oil can be put, with this hose, just where most needed, and with a rake, hoe, shovel, and rammer the difficulty is quickly remedied. In making repairs when fresh material is required, care should be exercised not to use any which has been subjected to travel and has refuse in it.

It frequently happens that travel follows the same track, and the narrow tires and feet of the horses wear depressions. It is important to correct these and reshape the road at least once a year. It has been found that an ordinary blade road-grader will not do this successfully, but will tear up the oiled crust and destroy it. The White smoother is a device for shaving off elevations and filling up depressions in an oiled crust. It consists of a pair of runners 16 feet long and 4 feet apart. Between them, at the front end, are set on a slant backward obliquely to the left three rows of three-quarter-inch steel harrow teeth, so adjusted that they shave along lines just 1 inch apart. As their edges get dull the teeth can receive a quarter or half turn and their height from the ground can be regulated. There is also a blade set obliquely which scrapes off the shavings made by the harrow teeth. These shavings, confined by the two runners and the blade, naturally seek the depressions. In the left-hand runner is an opening, through which any surplus shavings are forced out toward the center of the road, thus tending to raise the crown. There are wheels on the sides upon which the machine, with runners raised from the ground, travels when being moved from one place to another, and a steering gear by means of which the operator readily controls its direction. A road reshaped with this machine, treated with a light sprinkling of oil and a thin sheet of sand and rolled, resembles a city asphalt street when first laid.

### ORE DRESSING IN THE IGLESIAS DISTRICT, SARDINIA.\*

Previous to 1878 the zinc ores in the Iglesias district were dressed only by hand sorting, occasionally with the aid of hand jiggling, which sufficed so long as the general run of ore was high grade and the poorer stuff could be neglected, but about that time it appeared that the lean ore ought not to be disregarded, and experiments in mechanical concentration led to the erection in 1886 of a large plant at Monteponi, under the direction of Erminio Ferraris, then as now the enterprising manager of the Societa di Monteponi. This led to the erection of other plants, and at present about 60,000 tons of zinc ore per annum, which is upward of 50 per cent of the total production of the district, are turned out by the dressing works. The calcined product averages about 44 per cent zinc.

The crude ore runs about 12 per cent in zinc, as little as 10 per cent being rated good workable material. More than to any one else the improvements in the ore dressing practice of the district have been due to Signor Ferraris, whose genius has led to the development of numerous novel appliances.

A characteristic feature in the practice of the district is the substitution of swinging sieves for the ordinary trommel. These are long, horizontal sieves supported upon beechwood legs, inclined at an angle of 60°, in such a way that a to and fro motion can be imparted by means of an eccentric. They require less height than trommels do, and have large capacity. They were first introduced at Monteponi in 1898, and are now in general use throughout the district. At Monteponi a sieve 60 cm. wide sifts 10 cu. m. of stuff per hour. The sieve sizes at Monteponi are 30, 20, 14, 10, 7 and 5 mm. For less than 5 mm. the swinging sieve could not well be used, because of the clogging of the holes. Signor Sanna, director of the Malfidano dressing works, obviated this difficulty by reversing the support of the sieve, causing it to be suspended by the legs and arranging it so that at each stroke it struck a surface of water. In this way it was possible to sift through 0.5 mm. holes, but the sieves of this type at Monteponi are only 3 and 1.9 mm. On the coarsest sieve hand sorting is sometimes practised; sometimes a portion of the surface is left non-perforated to facilitate this.

\*Abstract from "Yearbook" of Department of Agriculture, 1902.

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\*Notes from a paper by Bergreferendar Duenkel in *Zeitschrift f. d. Berg-Hütten u. Salinenwesen im Preussischen Staate*, L, iii, 622.



A good deal of hand sorting is done in the Sardinian dressing works, labor being cheap.

According to Signor Ferraris (in *Oesterrische Zeitschrift*, May 5, 1900) the swinging sieve is caused to vibrate about 350 times per minute, with a throw of 25 to 30 mm. A sieve 600 mm. wide and 4 m. long, of which half the length has 14 mm. holes and the other two quarters have 20 and 30 mm. holes respectively, together with a second sieve arranged in the same way, but with holes 5, 7 and 10 mm. in diameter, has a capacity for sifting 10 cu. m. of stuff per hour. The peculiar obliquely upward movement of the sieves and the sharp vibrations convey the material forward at a rapid rate.

The finer sands and slimes are sorted by means of an hydraulic classifier, also devised by Signor Ferraris. This is a pipe for conveying the pulp, containing crosses in which the heavier particles settle against a rising current of water.

For washing the fine sands and slimes the Ferraris belt and shaking table are used at Monteponi. The former consists of a rubber belt 70 cm. wide, which passes over two drums, 4 m. apart, center to center. The belt is speeded 6 m. per minute. The pulp is fed by a pipe in the direction of the belt movement, and the heavy minerals which cling are washed off by jets of water at five places, giving two finished products, two middle products and tailings. This machine is used for dressing ore under 1.5 m. size, containing galena, cerussite and calamine, and treats 3,000 kg. of stuff (dry weight) in 11 hours. The belt has no shake, and works the better the quieter is its movement. The shaking table has the form of a right-angle triangle of smoothly planed pine wood, to which a shaking movement is imparted by means of an eccentric. Two of these machines are used at Monteponi for washing zinc and lead slimes, each treating 6,000 to 7,000 kg. in 11 hours.

Another peculiarity in the Sardinian ore-dressing practice is the bedding of the jigs with the little dots of iron which are made in punching sheets. They wear a long time and have seldom to be renewed.

#### PROFESSOR R. S. WOODWARD ON EDUCATION.

In the best sense of the word, education is a process which should begin in infancy and end only in advanced age. Science has demonstrated that man is a part of, and not apart from, the universe in which we live; and education in the comprehensive meaning of the word is the process of development which fits us to play well our parts in the infinite variety of phenomena which mold us and which we in turn help to mold. Hence the question of education is a many-sided and a far-reaching one, to the larger aspects of which we even who are engaged with some of its formal details can only point the way. Schools and colleges serve only to give the student a start, whence he enters the "University of the Universe," from which there are no graduates. Each may choose his own field, and if he would be a master in it he must become a specialist. Of course there are those who decry the present as an age of specialists and speak and write ruefully of former times when the more learned minds were able to compass the entire domain of accepted learning. But those were times when accepted learning was mostly of the kind called "polite," times when the rapidly rising sciences and their devotees were referred to with anything but terms of politeness. The change from this not very remote past is irrevocable, however, and it is plainly our duty to make the best of the new conditions, full as they are of novelties and perplexities. The recent great increase in the quantity of indispensable knowledge forces us to a hitherto unheard of division of labor in the educational field. The specialist is, therefore, a necessity, though there never was a time when the qualifications of a specialist were so numerous and so exacting. In fact, it may be truly said that one's training now must be broadly liberal in order that it may be minutely special.

#### MINING DEVELOPMENTS IN THE SOUTHWEST.

BY AN OCCASIONAL CORRESPONDENT.

In the early part of July I made a reconnaissance of the prominent mining camps of Arizona, visiting first the gold and copper camps of the Bradshaw Mountain district near Prescott and next the copper field in the southern part of the territory.

Jerome seems to have completely recovered from the disastrous fire of last year, and both mines and smelters are in operation with renewed activity. The Iron Queen and Treadwell, near Mayer, are also mining copper extensively, but smelting facilities are not yet completed, although large piles of sulphides are being roasted.

The gold camps in the vicinity of the Bradshaws all seem active, although most of the larger mines are devoting their entire attention to development, awaiting the perfection of processes whereby a greater saving may be made in the treatment, 30 per cent of the values being lost by present processes of treatment. In this connection it is interesting to note that a well-known firm of Denver metallurgists is erecting at Mayer a plant, with a capacity of 100 tons daily, for the treatment of the refractory ores of the Bradshaw district by volatilization. The plant is nearly completed, and will be ready for commercial work early in September.

One of the most interesting operations in this field is the long tunnel of the Poland Mining Company; 5,000 ft. of the 8,000 ft. contemplated have been completed. When finished, this tunnel will not only open up several important veins within the mountain but give exit to the now inaccessible mines in an adjacent valley.

From Prescott I went to Congress, where it was a pleasure to see a model mine and reduction works running like clock-work, producing regular dividends for its owners and keeping up development work far ahead of production. The cyanide plant at this camp is of historic interest as having been the first to be installed in this country, and owing to the fact that, under proper management, it has worked continuously and successfully ever since.

In the southern copper field I was surprised to find an atmosphere of renewed activity and hopefulness far beyond what I had anticipated. The writer habitually visits this region every six months, and usually leaves it with the impression that it has reached its limitations, only to find upon returning that it still has many surprises in store, not only in the nature of persistence and renewed activity in old camps, but in new discoveries. Unless greatly deceived the Arizona-Sonora copper-field in a few years will be one of the leading, if not the leading, copper region in the world. Present activities are largely those of preparation for production, but many of these preparations are approaching completion. The Phelps Dodge Company, for instance, is now producing at Clifton, Morenci, Bisbee and Nacosari, after the expenditure of fully \$20,000,000 in preparation, including the investment of \$10,000,000 in railroads alone. The Green people have been quietly improving their plant, although the smelters at Cananea have recently excelled the best daily record of any American mine. The Aurora Copper Company has two large producers, at Metcalf and Morenci, respectively. The Old Dominion, at Globe, is just completing one of the most modern and perfect smelting plants in the territory, while the Shannon people at Clifton are now producing at a lively gait and operating a new field and first-class plant.

Meanwhile new camps are coming to the fore quite rapidly. I visited, for instance, a mine near Red Rock station, the property of the Imperial Copper Company, where a large quantity of ore is blocked out, affording even fairer prospects than the others mentioned of soon becoming a great copper camp. El Tigre, which is 75 miles south of Bisbee, is another new mine which was recently sold for \$650,000, its promoters being strong in the belief that the district has the indications of becoming another Cananea. Verdi Visti is still another promising new

copper camp near Nacoziari. Still further south in the Horcasitas and Yaqui districts there are great copper "blowouts" (excuse the miner's descriptive term for these remarkable copper deposits of the Cananea type) which are going through the preliminary stages of mine making. The largest of these, concerning which we have no scientific data however, is the Yaqui, but judging from the amount of machinery moving down that way along the Sonora railway, its owners apparently have something more than unbounded faith.

Douglas, a new town, has grown up like a mushroom within the past year, and bids fair to become the copper metropolis of this new country, to which ores will be transported to central smelters.

When all this copper activity is seen one may well ask what will be the end of it all? That question cannot be answered, for I personally know that the field extends down the Pacific Mexican coast as far as Acapulco, and reconnaissance will yet add largely to its number of possible producing localities.

#### A NEW CEMENT PLANT.

The new plant of the Hudson Portland Cement Company, at Hudson, N. Y., is rapidly approaching completion. It consists of a mill of capacity for producing 2,000 bbl. per day. Upon its completion a duplicate mill of the same capacity is to be erected immediately, and the plans of the company contemplate the ultimate erection of six 2,000-bbl. mills. The crushing of the limestone, clay and shale is to be done by a series of rotary crushers, ball mills of the Krupp type, and tube mills, while the crushing of the clinker is also to be done by ball mills and tube mills. The use of this type of machinery is in conformity with the latest practice in cement manufacture, wherein the ball mills for doing the medium fine grinding, and the tube mills for doing the finest grinding have been found very efficient. The mixture of clay, shale and cement, which is to be done mechanically, with the aid of automatic machines to weigh out the proper proportion of each constituent, is to be burned in rotary kilns, of which the plant comprises 10, each one 60 ft. in length and 6 ft. in diameter, driven by a  $7\frac{1}{2}$  h. p. electric motor. The kilns are heated by the combustion of coal dust, blown in by a current of air, which is preheated by passing over the hot clinker discharged from the kilns. Each pair of kilns discharges into a rotary cooler, through which air is blown into the front end. The handling of the material throughout the plant is to be done mechanically, belt-elevators, belt-conveyors, and screw-conveyors being extensively used. The construction of the stock house, which is divided into 60 bins with an aggregate capacity for 200,000 bbl. of ground cement, is interesting. The house comprises three groups of rectangular bins, each group being divided into 20 pockets, 4 pockets in width and 5 pockets in length. The pockets, which in sectional plan are about 21 by 21 ft., are constructed with walls of solid timber, being built up with 2 by 10 in. and 2 by 8 in. plank, laid flat and spiked together. Extending over the pockets there are two belt-conveyors 24 in. wide and 342 ft. in length, which are arranged to discharge the ground cement into any one of the 60 pockets. The power for the plant is furnished by a system of Heine safety boilers with an aggregate capacity of 2,500 h. p., equipped with fuel economizers and Sturtevant induced draft system, and three cross-compound Murray-Corliss engines, each of 900 h. p., directly connected with generators of 500-kw. capacity. The erection of a large plant like that of the Hudson Company shows conclusively the great expansion in the cement industry in this country.

Our senses are windows of knowledge through which alone information enters the mind, and through which alone we are able to study the things outside us.

**A LARGE AMERICAN BLOWING ENGINE.**

The accompanying illustration represents one of four large blowing engines built by the Allis-Chalmers Company, of Milwaukee, Wis., for the new blast furnaces of the Buffalo & Susquehanna Iron Company. It will be interesting to compare this with the engine of another American type, recently built in England, and illustrated in the JOURNAL for August 15.

The engine shown herewith is one of four, which are now being erected. They are vertical, cross-compound non-condensing engines, the steam cylinders being 42 and 80 by 60 in., while the two air

**RUBBLE CONCRETE.**

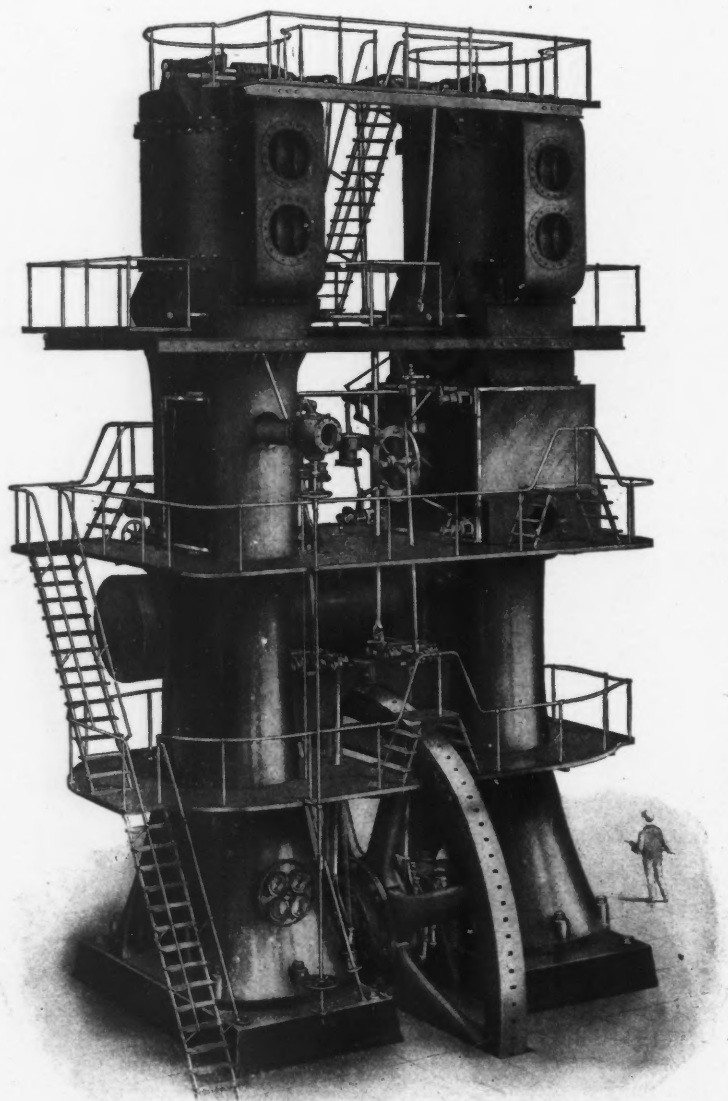
The merits of rubble concrete were discussed in the *Engineering News* of July 16, 1903. This is a type of masonry that has developed within the last few years, concerning which little has yet been printed. The term covers two classes of masonry, one being concrete in which large stones are imbedded, and the other being rubble masonry, in which concrete replaces ordinary mortar. Concrete in which stones are imbedded is usually mixed very wet and deposited in a layer into which large spalls, or even one-man stones, are rammed in. Where the spalls are flat bedded, a dry mixed concrete is sometimes

saving of labor, that of stone cutters being eliminated and a less skilled class of labor being required for laying it, which advantages are partially offset by the necessity for crushing the stone, the necessity usually of providing frames or molds, and the requirement of more cement per cubic yard than in other classes of masonry. The saving is most in comparison with cut-stone masonry. In making comparison between concrete and rubble masonry, the conditions are different.

Second-class retaining walls on the Erie Canal required about 0.6 barrel of Portland cement per cubic yard of masonry, the mortar being 1:2, whereas a 1:2:5 concrete (packed measure) required 1.1 barrel of cement per cubic yard. With cement at \$1.60 per barrel, this makes a difference of about 80 cents per cubic yard in favor of the rubble, in addition to which there is a saving of about 50 cents per cubic yard in the item of forms and 30 cents a cubic yard in the item of stone crushing, making a total of \$1.60 in favor of the rubble. The cost of laying the rubble was about 80 cents per cubic yard, using high priced masons, as against 60 cents for mixing and laying concrete by hand, or 40 cents by mechanical mixers. These costs of laying indicate clearly that ordinary rubble masonry costs very little more to lay than does concrete. If rubble concrete be used no skilled masons need be employed, so that this slight advantage of concrete over rubble disappears. *Engineering News* argues, therefore, that in localities where stone exists concrete has ordinarily no economic advantage over stone masonry, except in places where cut stone would be used, and is at a positive disadvantage as a backing where appearance is of no consequence.

With respect to the two varieties of rubble concrete, for small retaining walls and for comparatively thin foundations, the method of ramming large spalls into wet mixed concrete is doubtless to be chosen. In massive masonry where the quarries yield large blocks of stone, the blocks should be bedded in soft concrete and the vertical joints filled with soft concrete into which spalls may be rammed. Where stone comes from the quarry with natural flat beds, common mortar may well continue to be used in the bed-joints, the vertical joints being filled with concrete, which will avoid dressing the stone at all. Where stone comes in slabs easily broken by a hammer, or where retaining walls are too thin to permit the use of large blocks, a soft concrete into which the small stones are rammed may be used. Where stones come out in large, tough, irregular blocks a true rubble concrete is probably the cheapest, since even with the employment of skilled masons the cost of laying is but slightly greater than mixing and laying concrete with common labor.

As between ordinary concrete and rubble concrete, if for any reason great strength is required, the latter still has the advantage, since if the cement saved by imbedding large stones in the concrete be used to make a richer mortar, the rubble concrete will be superior in strength to the ordinary concrete, the latter having the weaker mortar. The writer concludes his argument with the statement that a dollar will buy either more rubble concrete than ordinary concrete; or will buy a stronger masonry.



REYNOLDS VERTICAL CROSS-COMPOUND BLOWING ENGINE.

cylinders are each 87 by 60 in. Through the center of each of these air cylinders extends a 22-in. Kennedy valve, which permits the inlet of air, while 18-in. Reynolds' valves are placed in the heads for the discharge. The flywheel is 24 ft. in diameter and weighs approximately 100,000 lb. The main shaft which carries this wheel is 26 in. in diameter.

The height of the engine, over all, is approximately 47 ft. from the floor line, and it is planned to deliver about 30,000 cu. ft. of air per minute. These engines are of the largest class built for blast furnace service, and illustrate the latest practice with a large furnace by blast pressure.

used, the spalls being laid on their flat faces and concrete rammed into the vertical joints. From the last mentioned method it is but a step to the kind of masonry in which large irregular stones are deposited in the walls by means of a derrick, the joints between them being afterward filled with concrete, preferably wet mixture. The advantage of this kind of masonry is, of course, its economy, a portion of the concrete being replaced by stone, which is cheap, the saving varying according to the proportion of cement used in the concrete.

One of the greatest advantages of ordinary concrete masonry over ordinary stone masonry is the

**THE ELECTRIC FURNACE IN IRON AND STEEL METALLURGY.**

In a paper read before the Iron and Steel Institute, at the spring meeting, this year, A. Keller described some applications of electric furnaces in modern metallurgical work, referring especially to the metallurgy of iron and steel. He stated that the furnaces used for the production of calcium carbide are adaptable, with slight modifications to the production of ferro-chromium, in which as much as 7 or 8 per cent of carbon is admissible. In the production of this alloy, the electric process has been an important step in advance, and it has now entirely superseded the old method of smelting in a



cupola furnace, in which difficulties were frequently experienced because of the "hanging up" of the charge. Because of the high temperature in the electric furnace, this difficulty is not met with therein. Similar alloys of iron with tungsten, titanium, molybdenum, vanadium and other rare metals can be produced in the electric furnace.

The electric furnace is also useful in producing ferro-silicon, which can be obtained with a much higher silicon content than when produced in the blast furnace, even when the electric furnace is worked at a moderate temperature. Ferro-silicon made in the electric furnace is noteworthy for its high degree of purity, which in general is the greater, the higher the content of silicon. The silicon content may be as high as 80 per cent. A ferro-silicon containing 50 per cent silicon, contained only 0.02 per cent of phosphorus and traces of sulphur and carbon. The production of 2,240 lb. of ferro-silicon, containing 30 per cent silicon, requires the expenditure of 3,500 kilowatt hours, but the manufacture can be economically carried out only by means of a large installation of powerful electric furnaces of the resistance type, as raw materials, quartz, scrap iron and coke are preferably used.

Keller considers that the electrical production of pig iron can be effected economically only for the production of special grades, from pure ore obtainable on favorable terms, and in cases where cheap power is available in the immediate neighborhood of ore of good quality. The production of 2,240 lb. of pig iron suitable for steel making, requires the consumption of 0.25 kw. of energy for one year, and in general the electrical production of pig iron would be practicable only if the cost of a kilowatt year did not exceed 25s. 6d. (\$6.20). This figure is much below the cost of electrical power in the largest existing installations, such as those at Niagara Falls and Lake Superior.

The conditions requisite for the successful reduction of iron ore are sufficient power for treating a large quantity of ore and continuous working. Keller meets these conditions by the use of vertical, adjustable electrodes, so arranged that the heating can be focussed at several points; also, several electrodes are placed in parallel, so that any one of them can be renewed without interrupting the working of the furnace or altering its conditions. Each furnace contains at least two groups of two electrodes each, the electrodes being arranged in parallel, and the groups in series. The four electrodes project through walls of refractory material. Each electrode can be raised or lowered independently. An electromotive force of 25 to 30 volts for each focus is employed. The hearth of the furnace is constructed in the same manner as that of an open hearth steel furnace. The smelting chamber is surmounted by a shaft of brick work containing the ore, fuel and flux, which are charged in from the top. The reduction of the ore at first takes place only on the hearth, but after a time the action extends throughout the whole shaft, which is kept constantly full.

In the smelting and fining of 2,240 lb. of steel, by the fusion of scrap iron and steel, about 1.10 kilowatt years are required. The method of heating the fining furnace is similar to that of the furnace for ore smelting, but the fining furnace contains only molten metal, with the addition of such substances as are necessary for eliminating the non-metals. The surface of the metal is kept at a sufficiently low level to allow the samples being taken during the operation. An electromotive force of 50 to 75 volts is employed for each focus. It is important to prevent the electrodes from coming into contact with the slag.

Keller estimates that in a works with turbines of 10,000 h. p., tons of steel could be produced daily (50 tons from the reduction of 55 per cent ore, and 10 tons from the smelting of scrap in the finishing furnaces) at a cost of \$17.50 to \$19.50 per 2,240 lb. of ingot steel produced, the cost of a kilowatt per year of 8,400 hours being reckoned at \$9.72, including amortization.

#### ABSTRACTS OF OFFICIAL REPORTS.

##### *Arizona Copper Company, Limited.*

The latest report of this company covers the six months ending March 31, 1903. The profits received from the mines at Graham were £147,598, while the net returns from the company's railroad were £24,656; from this is to be deducted £8,691 for expenses in Scotland, taxes, etc., leaving available for the half-year a total of £163,562. Interest and dividends on preferred stock required £27,244, leaving a surplus of £136,318. From this the directors propose to pay dividends of 5s. 6d. per share; this will leave a balance forward of £47,686. Expenditures for improvements, chiefly for bessemer plant and for new repair shops, amounted to £15,824.

The manager's report shows that in the smelting department 50,283 tons of ore and 1,647,787 lb. copper from the leaching plant were smelted, resulting in a gross yield of 15,312,544 lb. copper. This does not include 2,505 lb. of copper produced in the form of sulphate. In the concentration plant 210,717 tons of ore were treated, yielding 28,226 tons of concentrates. This shows a product of 1 ton to 7.46 tons raw ore. The concentrating ore was partly sulphide ores from the Humboldt and the Yavapai and partly oxide ores from Metcalf. The leaching plant treated 41,358 tons of tailings, producing 1,661,939 lb. of copper and 5.01 tons of copper sulphate. The acid plant turned out 1,920 tons of sulphuric acid.

The usual amount of development work was done in the mines with good results, and the quantity of ore in sight at the close of the half-year exceeded that shown in the beginning. Manager Colquhoun's report sums up the work of the year as follows:

"The results for the half-year show a gross output of 7,664.6 tons of copper. This was produced from 233,905 tons of copper ores, of which 90 per cent were concentrating ores. The yield was 3.28 per cent.; that of the previous term was 3.39 per cent. The slight reduction in grade is accounted for by the new system of mining, which draws more heavily on the leaner ores.

"The improvements on Longfellow incline were completed in time to meet the improved demand from our various mills. The 5-ton cars work admirably, but we need at least twenty more cars to handle the business, and these have been ordered. The machine shops and carpenter shop have been completed, and as they are equipped with the latest and most up-to-date machinery they are proving of great value.

"The half-year just passed has witnessed steady and persistent progress towards a better condition of affairs. On our railroads, at our works, and at our mines, the story is the same. We have worked for higher efficiency in every department, and substantial progress has been made. Our concentrating plants at Clifton and at Longfellow have been very sensibly improved, especially in point of capacity. The Longfellow concentrator has been brought to a condition which insures more and better work in the future. Our Humboldt mines have been drawn nearer to a more economical system of haulage, towards which much has been done by straightening out and enlarging the main roads. Ore, which formerly was mostly taken from the center and richest portion of the hill, is now largely extracted from our borders and from points remote from our main roads. This effectually guards against the very serious evils which too often arise from greedy and indiscreet mining. At the same time, prospecting work has been pushed vigorously and successfully in the Fairplay, in the North Extension of the Longfellow, in the Coronado, and in the Clay Mountain.

"In the Fairplay, in virgin ground, an ore-body 120 ft. in width by 170 ft. in length, so far as developed, has been placed in sight. This ore-body is probably the continuation of our second ore-body, which we expected would be found in this territory. If so, it probably continues to the south

side-line of the Eighty-nine mine. It may also extend as far in the opposite direction as the southerly end line of the Fairplay, which is 800 ft. south of the stope. The ore is not as rich as that found in the centre of the hill, but it is all pay ore of fair grade. In the North Extension of the Longfellow the ore-body previously referred to was cross-cut, showing a width of 46 ft. A large drift has been pushed through and along the strike of the vein for a distance of 300 ft. in ore all the way. The ore is of good concentrating grade. It exists at a depth of 185 ft. below our workings, which have been conducted from the first level of the Longfellow incline shaft. At the greater depth the ore-body is leaner, but probably wider. A drift is now being pushed from the bottom of the Longfellow mine to intercept the vein at that depth. The opening up of this fine ore-body comes in time to revive the drooping fortunes of the old Longfellow.

"At the Coronado progress has been equally satisfactory, the main drift having been driven 502 ft. since the last report was made. At no point was the drift out of touch with the ore-body, which in this part of the property is quite continuous. Another pleasing feature was the improved grade of ore found at this low level. We know that this same vein exists at a point 500 feet further west, and we are pushing towards this point as rapidly as possible. At the same time we are sinking from 300-ft. level to the 500-ft. level, in order to test the vein at the lower level.

#### BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail price. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

*Seventh Census of Western Australia. Taken for the Night of March 31, 1901. Volume II.—Detailed Tables.* Perth, W. A.; Government Printer.

*Geological Survey of Canada. Catalogue of Canadian Birds.* Part II. By John Macoun. Ottawa, Can.; Government Printer. Pages, 413. Price, 10c.

*Traitement des Feux de Mines par l'acide carbonique liquide.* By J. Camus. Rive-de-Gier, France; Bajard, Berthon & Co. Pamphlet. Pages, 15; illustrated.

*Grundriss der reinen und angewandten Elektrochemie.* By P. Ferchland. Hall-a-S., Germany; Wilhelm Knapp. Pages, 271; illustration. Price, in New York, \$1.75.

*Map of Peru.* 1903. Published under the authority of Don Eugenio Larrabure y Unanue, Minister of Foreign Affairs. Southampton, Eng.; Eduardo Higginson, Consul of Peru.

*New York State Museum; Twenty-first Report of the State Geologist.* 1901. Frederick J. H. Merrill, Director and State Geologist. Albany, N. Y.; printed by the University of the State of New York. Pages, 199, with illustrations and maps. Price, 40c.

#### BOOKS REVIEWED.

*Map of the San Juan Triangle, Colorado. Ouray, Telluride, Silverton.* Denver, Colo.; Geo. S. Clason. Pocket map, 28x34 inches, \$2; wall map, 5x6 feet, mounted on linen with spring roller, \$25.

To those interested in the San Juan region of Colorado this map will prove most useful. It gives the position of all the important mining claims in the territory covered, and affords a good idea of the relative situation of the principal mining districts. At a time when the region is the scene of much activity, the publication of this map is distinctly opportune.

## CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

*Mining Prospects in Georgia.*

Sir:—Townsend county and Rabun county, in north-eastern Georgia, and the contiguous county of Clay, in North Carolina, are virgin ground for the prospector. A little scratching has been done along the surface, but no mining has been attempted. This region abounds in surface indications of copper, nickel, iron and corundum. The formation is regular, and all the veins have a distinct trend from the northeast to southwest. The country rock is granitic, with bands of hornblende syenite, varied with serpentine. The corundum is found, as a rule, in a chlorite matrix; this mineral, corundum, invariably follows one of the serpentine bands, and can be traced through the country for nearly fifty miles. Most writers on the subject declare that corundum is not found in veins, but in small pockety deposits. Such a description could not apply to this locality, for here it clearly occurs in veins. These veins appear to be of regular width and permanence, while the seam bearing the corundum widens and pinches, similarly with certain classes of lead ores. The country is very wet, and pumping is needed as a rule in less than 20 ft. Hence corundum mining cannot be carried on by poor prospectors. On the Behr Bros.' property, on Shorting Creek, in North Carolina, a shaft was sunk for 140 ft., and the pay-streak increased in value with every foot gained. This property is now in the hands of the American Abrasive Trust and is not being worked.

There are boundless opportunities in this section for enterprising prospectors with a little financial backing. At present the main drawback is a lack of transportation facilities. But I have been authoritatively informed by the vice-president of the Tennessee, Georgia & South Carolina Railway Company that his road will be in running order through this district by October 1, 1904. In that case look for another Birmingham to spring up in this neighborhood, for the iron deposits are enormous. Ten miles to the north, and running parallel with the corundum belt, is the marble and talc formation, many quarries being now worked by the Georgia Marble Company. There is room for plenty of others. There are two gold-belts running through this section, but the ore is only low grade. Like all other undeveloped countries, this district is studded with deserted mills, monuments to the ignorance of investors and fraud on the part of promoters. These mills have been built by eastern companies before they knew whether they had mines or not. But in every mining State there was a period when the same conditions obtained, especially in Idaho and Montana, before mining had been brought into line with legitimate business.

There are in this section to-day dozens of good corundum prospects awaiting development. So long as North Carolina corundum commands the highest price of all abrasives (as the present quotations show), there will always be a market for the mineral. The best method of preparing the mineral for the market is by means of an ordinary concentrator. As a rule the corundum is coated with albite or some other feldspathic compound, and after being crushed it is necessary to rub it well in some centrifugal mulling mill and then pass it on to the tables, which separate the corundum from foreign matter. When garnet is found in connection with corundum it is almost useless to attempt to separate the minerals by means of the ordinary concentrating methods. In this district there is plenty of garnet, but it is seldom found in the same ore as the corundum. As all the ground in these two States is owned, some difficulties naturally arise in gaining control of land. The laws of

North Carolina and Georgia were not passed in the interest of the mining industry. In fact, no one in this neighborhood appears to know the meaning of the word "mine." The farmers here own the mountains, and, as a rule, every man who farms twenty acres of ground owns about 600 acres of mountain land. Many tracts of land have been sold for farming purposes, and the original owner has retained the mineral interests. This necessitates an entanglement at the start. As soon as a prospector mentions the subject of mineral a land-owner immediately imagines himself a millionaire and puts up his price accordingly. None of the natives try to find mineral on their own land, but they want a prospector to pay them for the privilege of looking for it. If they would lay off their land into mining claims and offer a good interest to any man who would develop a mining claim they would succeed far better. There is another drawback, and that is the moment a prospector appears in the district a lot of schemers go around among the farmers and secure options on the lands and then hold them at exorbitant figures, expecting to make fortunes without working for them. But the eyes of the natives appear to be opening, and it will only be a short time before they see the matter in its proper light. Nevertheless, with all the drawbacks, it will pay any first-class consulting engineer to make a visit to this section. I will gladly extend all courtesies and take time to ride over the country with any such man who will visit this neighborhood.

From a mining point of view this section is less known than the most isolated district in the West, and there are surely great possibilities of development here along the line of industrial minerals. With the completion of the railroad above referred to direct communication with the seaboard will have been attained and a market furnished for all the copper, nickel, marble, talc, iron, chromate of iron, kaolin, garnet and corundum with which the country abounds. The district is covered with dense virgin forests of chestnut, poplar (tulips), hemlock, hickory, oak and a scattering of cherry, walnut and other valuable woods. The timber rights to these lands can be bought at a reasonable figure, from \$1 to \$3.50 per acre. In many cases great tracts of these lands can be bought outright at the same figures. With the completion of the straight road from Chattanooga to the coast line all this timber will have a value in the market. A Milwaukee tannery concern has just bought up 60,000 acres along the Blue Ridge Mountains and is about to erect some large tannic acid factories and saw-mills. At present timber is a drug in the market, and land-owners burn up the finest trees in order to clear land for farming. It is shameful to note the wholesale destruction of these magnificent forests. The State governments ought to interfere, and, if necessary, proclaim the right of eminent domain in order to preserve the timber for industrial purposes. No wonder the Southern States are poor.

In connection with the corundum deposits, rubies and sapphires have been found of marketable size. In one place in particular a prospector mined for rubies several years ago and made it pay him well. As soon as he struck solid rock and water he quit. The property was sold for \$20,000, and afterwards for \$40,000, and since then no work has been done, and I believe it has been sold since for taxes. This kind of business will give a black-eye to any district, but does not disprove the existence of minerals in paying quantities any more than the deserted mills do.

A. M. GRAHAME.

Hiawassee, Ga., Aug. 6, 1903.

If a piece of soft gold, which can be easily bent and amalgamated freely, is hammered on a perfectly bright anvil with a bright hammer until it becomes hard, it will remain in contact with mercury without being affected by the latter. The hammering increases the density of the gold and closes the pores, so that absorption of mercury does not occur.

## QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

*Peck's Centrifugal Elevator.*—Having read the interesting description of Mr. Walter Peck's new tailings elevator by Mr. F. Danvers Power in the JOURNAL for May 23, 1903, I venture to ask for further details. What I wish to know is what power would be required for an elevator of this type for a dredge treating 3,000 yards in 20 hours and stacking the tailings to a height of 30 ft., its weight and cost?—M. A. S.

*Answer.*—The indicated horse-power required for a Peck elevator, such as you inquire about, would be between six and seven; its weight about 2.5 tons, and its cost in New South Wales or New Zealand complete with casing, etc., very nearly \$1,000 apart from patent royalty. For America a royalty of \$500 per elevator would be asked, and for this sum also the inventor would supply the working drawings so that the elevator could be manufactured in the United States. The patent rights in New Zealand have been sold to Mr. Payne. The wear and tear on similar dredges in New South Wales and New Zealand costs \$1.20 per week, as it is confined to the occasional replacement of beater bars, about two new bars being required every six weeks (not two new sets of bars). It is also authoritatively stated that the Peck centrifugal elevator is replacing the bucket type of elevator in New South Wales, as it is cheaper in first cost, cheaper in up-keep, and stacks the tailings better.

*Corundum.*—1. In view of the fact that North Carolina corundum is quoted at higher figures than any other abrasive, how is it that the report is circulated that the artificial product has entirely taken the place of corundum in the mechanical arts? 2. I am informed by six of the largest manufacturers of abrasives that they have no use for North Carolina corundum. In view of this, why have these same people, members of the American Abrasive & Emery Wheel Company, bought up all the known productive deposits of corundum in North Carolina, and why is a large concentrator being erected at Buck Creek, N. C., to-day for the purpose of milling corundum? 3. Can you give me the names of any prominent dealers and manufacturers of abrasives in Great Britain?—M. G. A.

*Answer.*—To say that artificial corundum has entirely replaced the natural product cannot be reconciled with the fact that the North Carolina mines are still producing and new deposits have been opened in Montana. Besides, a good part of the American consumption is being satisfied by imports from Canada. It cannot be denied, however, that artificial corundum is gaining in production, although the industry was started only in 1901, when the Norton Emery Wheel Company erected a plant at Niagara Falls and manufactured two or three car-loads by an electric process from bauxite. Artificial corundum compares favorably with the best natural product for making wheels, etc. A disadvantage with natural corundum is its high price. 2. Explanation may be found in the consolidation of the various interests which control property in different States. Probably the Buck Creek concentrator will also be used for preparing emery for market, as this is an important branch of the company. 3. Greenwood & Batley, 16 Great George street, Westminster, London, S. W., England; C. J. Edwards & Son, 32 Great Sutton street, London, E. C., England; London Emery Works, 10 Vine street, Clerkenwell, London, E. C., England.



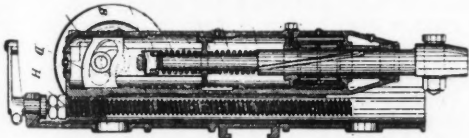
## PATENTS RELATING TO MINING AND METALLURGY.

## UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared:

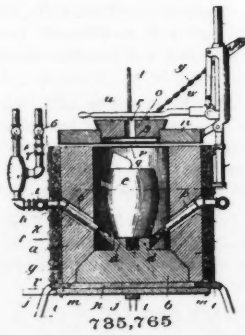
Week Ending August 12, 1903.

- 735,690. MEANS FOR ALIGNING PUMP SHAFTS IN WELL-CASINGS.—John W. Alvord, Chicago, Ill. The combination with a well-casing, of a straight rotary pump-shaft therein, and a plurality of independent, automatic adjusting devices situated between the shaft and the casing.
- 735,691. HIGH-SPEED ROTARY PUMP.—John W. Alvord, Chicago, Ill. Combination with an upright axially-movable shaft, of a balancing piston secured thereto and having its under side exposed to the pressure of the water column, a stationary casing containing a chamber above the piston, and means controlled by the axial movement of the shaft for permitting the escape of water from the chamber to the suction side of the pump, and thus regulating the pressure in the chamber.
- 735,694. WELL DRILLING MACHINE. Isaac S. Ausherman and David S. Ausherman, Zion City, Ill., assignors of one-third to John J. Moore, Fredonia, Kan. The combination of a supporting frame, a main driving shaft, a rock shaft, a rock frame mounted on the rock shaft, a pulley supporting frame pivotally mounted on the rock-frame, a pulley journaled in the frame, and driving connections between the main driving shaft and the rock shaft.
- 735,717. ROCK DRILL.—Henry A. Dalmas, Linden, Va. In a rock drill, a reciprocating cross-head, a piston provided with an opening therein, a collar encircling the piston, a spring seated between the collar and the cross-head and a key adapted to enter the opening comprising a shank and oppositely-disposed shoulders adapted to engage the collar and a plunger adapted to engage the collar and the key whereby the collar is removably locked on the piston.



735,717.

- 735,739. FLUID-PRESSURE ENGINE.—Matthias N. Forney, New York, N. Y. The combinations of two reciprocating members, two primary oscillating levers, each coupled at one end to one of the reciprocating members and having a movable fulcrum at its opposite end, a secondary oscillating lever journaled between its ends in a fixed bearing and coupled at its ends to the primary levers, and a rod connecting the oscillating-lever to a crank.
- 735,748. COMPOUND FOR USE IN STEEL MAKING.—William A. Givens, Pittsburg, Pa. The soaking bath is comprised of salt and borax each forty-four parts, by weight, and charcoal twelve parts.
- 735,765. GAS FURNACE.—Paul S. Harvey, Chicago, Ill. Assignor to the Acme Gas Co., Chicago, Ill., a corporation of Illinois. Combination of means for supporting the crucible with a chamber immediately below it, and one or more fuel-pipes having nozzles situated at the side of the crucible and pointed inwardly toward the chamber.



735,765

- 735,767. ROCK DRILL.—Pattillo Higgins, Beaumont, Tex. Combination of a drill-barrel having a plug within and provided with a guide and intercommunicating openings, a drill slidably mounted within the barrel and having a shank fitted in the guide opening of the plug, and stops at the ends of the shank for engagement with opposite ends of the plug in alternation, the distance between the stops being regulable to vary the sliding movement between the drill and drill barrel.

- 735,768. HYDRAULIC DRILL.—Pattillo Higgins, Beaumont, Tex. A drill for artesian and oil wells, having its end enlarged and comprising a parallel-sided terminal portion circular in cross-section and a tapering portion of like cross-sectional outline intermediate of the body of the drill and parallel-sided portion, the drill and point having a longitudinal opening to convey the water to the bottom of the bore.

- 735,769. HYDRAULIC DRILL.—Pattillo Higgins, Beaumont, Tex. A drill for deep-well boring having an enlarged point and provided with a longitudinal opening terminating a distance from the point and having lateral ducts extended outward from the lower end of the opening through the sides of the drill in rear of the enlarged point.

- 735,770. REAMER FOR DEEP WELLS.—Pattillo Higgins, Beaumont, Tex. A reamer comprising a series of annular cutting edges separable from one another and having a progressive arrangement from the point to the body.

- 735,795. MECHANISM FOR STRIPPING INGOTS FROM MOLDS.—William H. Morse, Worcester, Mass. The combination of a car, an ingot mold mounted thereon in vertical position, means for raising the ingot in the mold and means for holding the ingot in its raised position after the withdrawal of the elevating means.

- 735,808. COMPOSITION OF MATTER FOR BATTERY ELECTROLYTES.—William Peto and James W. T. Cadett, Ashlead, England. As a semi-solid plastic electrolyte for electric accumulators a composition of matter consisting of powdered sulphate of lead moistened with dilute sulphuric acid and thoroughly mixed together, the strength of the acid being varied within ordinary limits according to the purpose for which the accumulator is to be used, while the exact proportions of the ingredients are regulated by the quality of the sulphate of lead employed.

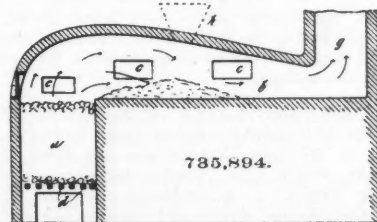
- 735,813. ORE SEPARATOR.—Oscar F. Pira and Carl F. Salomonson, Oakland, Cal. Combination with a rotatable cylinder, of a centrally-arranged distributing table, a series of riffles arranged on the inner face of the rotatable cylinder, means for imparting rotary motion to the cylinder and the distributing table, an air supply conduit discharging into the cylinder, means for bodily adjusting the distributing table whereby the table constitutes a valve for the air supply conduit, and a feed tube arranged within the cylinder and through which the material to be treated is delivered onto the revolving distributing table.

- 735,819. ALLOY AND PROCESS OF MAKING SAME.—Alonzo Ramsdell, Chicago, Ill. The composition of matter, which consists of cast iron, lead, antimony and aluminum in proportions substantially of 100 pounds cast-iron to from 9 to 15 ozs. lead, 2 to 8 ozs. antimony, and 4 to 10 ozs. aluminum, the ingredients to be mixed and stirred while in a molten condition.

- 735,820. METHOD OF TREATING LEAD PLATES FOR USE IN SECONDARY BATTERIES.—Charles J. Reed, Philadelphia, Pa. Assignor to Security Investment Company, a Corporation of Pennsylvania. The process of converting metallic lead into lead chloride, subjecting it to the action of hydrochloric acid gas.

- 735,855. CLASSIFYING APPARATUS FOR COAL OR OTHER MATERIALS.—François Blanc, Chambon, France. A classifying apparatus, comprising a chamber, a wheel therein provided with blades, a projection on the inner surface of each blade and at a determined angle thereto and a hollow recess beyond the projection in connection with a deposit-chamber.

- 735,894. TREATMENT OF ZINC OR OTHER ORES.—William B. Middleton, London, England. The process consists in first heating the ore by means of the fuel gases, then volatilizing the zinc in the form of zinc fumes by transferring such ore directly onto the fuel, and then condensing and recovering the fumes.



735,894.

- 735,898. WELL DRILLING MACHINE.—Ransom D. Patterson, Okemah, Ind. Ter., Assignor of one-half to John D. Richards, Okemah, Ind. Ter. Combination with a suitable base of a rotatable platform carrying mechanism for reciprocating a drill, a winding drum also rotatable on the base, and clutches for locking the drum to the base or to the platform at will.

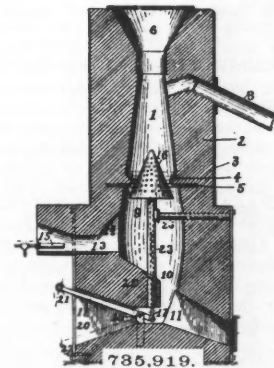
- 735,901. CENTRIFUGAL PUMP.—Joachim H. C. Petersen, Hamburg, Germany. A revolving suction head seated on the end of the suction pipe and having an upright flange, a double cone-shaped part carried within the head spaced therefrom, and co-operating with the head to form a suction channel diminishing in section toward its end and to

form a chamber at the end, an inverted cup having an internal thread screwed on the flange to form a spiral discharge passage between the threads and flange.

- 735,902. METHOD OF TREATING ZINC ORES.—Carl V. Petraeus, Iola, Kans. The method consists in mixing the ores with carbon, subjecting the mixture to high heat with exclusion of air to smelt and volatilize the greater portion of the zinc, recovering the volatilized zinc by condensation, subjecting the unvolatilized residue, consisting of coke and ore, to heat in an oxidizing atmosphere to oxidize the zinc, and any lead therein, and drive them off as a fume, recovering the fume by screening the furnace gases, and finally subjecting the recovered fume to a temperature indicated by a red heat, to whiten it.

- 735,903. METHOD OF MANUFACTURING SPELTER FROM ZINC ORES.—Oliver H. Picher, Joplin, Mo. The method consists in first eliminating the lead contents of the ore by heating it in contact with air to a temperature sufficient to sublime the lead, then desulphurizing the residue and finally treating the desulphurized zinc in admixture with carbon in retorts to reduce and volatilize the zinc.

- 735,919. QUICKSILVER FURNACE.—Alfonso A. Tregidgo, San Francisco, Cal. In a quicksilver furnace, a shaft in the upper part of the shell, having a contracted base formed with a conical seat, a heat chamber below the base and an underlying discharge in the lower part of the shell, a vertically-movable hollow perforated cone co-operating with the conical seat to close and open the base of the shaft to support and to drop the ore, an opening through the shell from the exterior communicating with the heat-chamber below the cone, the opening having its upper wall at its inner end inclining upwardly toward the cone, and a burner in the opening.



- 735,921. CONVEYER.—Alfred J. Webster, Columbus, Ohio, Assignor to Joseph A. Jeffrey, Columbus, Ohio. The combination with a conveyor provided with swinging buckets, of the dumping mechanism having the initially-acting, swinging, trip-bar, adapted to engage with the buckets successively to start their tilting action, and a stationary tripper adapted to engage with each bucket.

- 735,933. MINE TIMBER FRAMING MACHINE.—Charles K. Barnes and Andrew Y. Smith, Pearce, Ariz. The combination with a tenoning-head, of a work-support, and means for giving a proper travel for cutting purposes to such support past the head in a substantially straight line forward and backward, and means for giving another such travel at an angle to the first-mentioned travel and for maintaining the positions of the support obtained by one travel in either direction during the other travel, so that the two travels may be combined in succession to constitute a circuit about the tenoning-head.

- 735,941. COMPOUND FOR USE IN TINNING BATHS.—Arthur W. Burwell, Cleveland, Ohio. Assignor to Elmer A. Sperry, agent, Cleveland, Ohio. A combined fluxing and luster oil for tinning baths, consisting of non-drying ingredients comprising a mineral oil having a boiling point above the temperature of molten tin and palmitic, stearic and free oleic acids.

- 735,942. ASSAYER'S ORE CRUSHER.—Albert C. Calkins, Los Angeles, Cal. Assignor to the Calkins Company, Los Angeles, Cal., a corporation of California. An ore crusher, comprising a main casing, a movable jaw, a relatively stationary jaw having side pieces to form a crushing chamber, the pieces being hinged to the casing so as to be turned outwardly and up over the other jaw.

- 735,948. PROCESS OF MAKING CARBON TETRACHLORIDE.—Charles Combes, Paris, France. A process by heating carbon with sulphur chloride in an atmosphere of chlorine and condensing and separating the products in such a manner that sulphur chloride is continuously returned to the system.

- 735,960. METAL EXTRACTING AND ORE LIXIVIATING APPARATUS.—George S. Foster, St. Louis, and Stephen A. D. Stringer, St. Clair, Mo. Assignors to the Ore Reduction and Smelting Company, St. Louis, Mo. Combination of a solution supply tank, a series of intercommunicating leaching tanks adapted to receive solution

from the supply tank, a water tank having fume conducting connection with the leaching tanks, and a gas conducting pipe leading from the water tank to the solution supply tank.

735,965. COAL HOIST.—George Gillfof, Whatcheer, Iowa. Combination, with a framework, having guides, the upper ends of which curve forward and adapted for tilting the platform pivoted to the shaft, the outer ends of which project through guide blocks; the guide blocks lie and move in the raceways, studs situated upon the upper ends of the uprights and which lie and move in the raceway in such a manner that upon elevating the hoisting frame they press against the upper sides of the upper curved portions of the raceway, thereby tilting the platform, and means for raising and lowering the hoisting cage.

736,008. TREATMENT OF ZINC ORES.—Carl V. Petraeus, Iola, Kan. The method consists in mixing such ores with carbon, subjecting the mixture to high heat with exclusion of air, condensing the distilled metal, recovering the zinc fumes, mixing the fumes with the carbonaceous and metal-bearing residue of the distilling process, treating the mixture to reduce and oxidize the metals in order to drive off metallic contents as a fume, and recovering the fume by screening the furnace gases.

736,009. TREATMENT OF ORES CONTAINING ZINC OR OTHER METALS. Carl V. Petraeus, Iola, Kan. The method consists in mixing the ores with carbonaceous material, smelting and volatilizing a large portion of the zinc by heating the mixture in with exclusion of air, recovering the volatilized zinc by condensation, treating the metal-bearing residue of the distillation process in admixture with carbon, to drive off the zinc as an oxide fume and at the same time cinder together the residue, containing the other valuable metals, by heating the mixture to a sufficient temperature in an oxidizing atmosphere, and then smelting the cindered residue, to recover its contained metals.

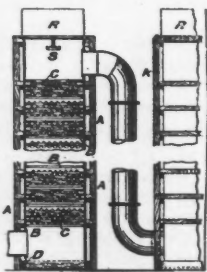
736,010. METHOD OF SMELTING ZINC OXIDE.—Carl V. Petraeus, Iola, Kan. The method consists in first heating the oxide to a red heat to eliminate sulphur and condense the zinc oxide, then intimately mixing the densified oxide with carbon and finally smelting the mixture in retort furnaces.

736,020. APPARATUS FOR THE ELECTROLYSIS OF FUSED SUBSTANCES.—Charles W. Roepper, Philadelphia, Pa. Combination of a fusion vessel; a supporting structure provided with recessed portions, and a removable heating plate, the edges of which are held between the sides of the fusion vessel and the corresponding recessed portions of the supporting structure.

736,036. APPARATUS FOR THE RECOVERY OF PRECIOUS METALS.—Henry L. Sulman and Hugh F. Kirkpatrick-Picard, London, England. Combination of a vessel having an inner amalgamated surface, a body having its outer surface amalgamated disposed with the vessel and forming therewith a narrow interspace, a body of mercury charged with an electropositive metal in the interspace, an apparatus for charging the mercury with the electropositive metal, an inlet conduit for mercury from this apparatus to the top of the interspace, and an outlet conduit at the bottom, and means for forcing the solution carrying the values upward through the interspace.

736,083. PROCESS OF MANUFACTURING ARTIFICIAL FUEL.—Herbert C. B. Forester, Sketty, England. The process of treating the fuel material by feeding the same through a confined heating region, collecting the gases given off, superheating the same, and circulating the superheated gases through the heated material as it is fed through the heating region for assisting to heat the material.

736,087. APPARATUS FOR MAKING SULPHURIC OR OTHER ACIDS.—John G. Graham, Bramhall, Stockport, England. Combination with a chamber and means for passing a current of acid gases therethrough, of contact pieces trough-shaped in cross-section arranged transversely in and extending entirely across the chamber, the hollow sides of the contact pieces being corrugated and disposed toward the inflowing gases.



736,087.

736,115. COKE CONVEYER.—Ernest G. B. Korting, Berlin, Germany. A coke handling plant, comprising an elevated structure, a crushing apparatus in the upper part of the structure, a conveyor leading to the upper end of the

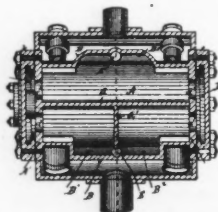
structure, spouts at the upper end of the conveyer, and into which the conveyer discharges, one of the spouts discharging into the crushing apparatus, and a valve for controlling the passage of the coke through the spouts.

736,131. PROCESS OF PRODUCING UNIFORMITY OF QUALITY IN MOLTEN METAL.—Richard G. G. Moldenke, Pittsburg, Pa. The process consists in bringing the metal at the top of the furnace to a desirable temperature and quality, then tapping the same a short distance below the plane of the metal and pouring therefrom until the metal varies in temperature and quality from that required, then suspending the pouring a short time until the metal at the top, which is at a lower level than before, again attains the temperature and quality previously secured, then tapping the metal below the point of the previous tapping, and pouring therefrom, and these steps continued until the heat or molten metal has been withdrawn.

736,204. REDUCTION OF NITRO AND AZO COMPOUNDS.—Max Buchner, Mannheim, Germany. Assignor to C. F. Boehringer & Soehne, Mannheim-Waldhof, Baden, Germany, a firm. This continuous process consists in mixing such compounds with tin and hydrochloric acid in such proportions that stannous chloride is formed, and then electrolytically separating the tin from the bath.

736,258. AIR COMPRESSOR GOVERNOR.—James H. Herron, Erie, Pa. Assignor to Herron & Bury Manufacturing Company, Erie, Pa., a corporation of Pennsylvania. The combination, with a compressed air receiver, and plunger cylinders provided with plungers for raising the valves of an air compressor; of a governor valve case, a pipe between the valve case and receiver, pipes between the valve case and cylinders, a valve shell secured in the case and provided with holes arranged in pairs and a loaded governor valve slidable inside the valve shell and normally connecting the cylinders with the atmosphere,

736,254. AIR COMPRESSOR CYLINDER WATER JACKET.—James H. Herron, Erie, Pa. Assignor to Herron & Bury Manufacturing Company, Erie, Pa., a corporation of Pennsylvania. Combination of radially projecting flanges on the ends of the compressor cylinder having openings therein, chambered cylinder heads secured to the flanges and communicating with the openings therein, a water jacket having water inlet and water outlet openings therein surrounding the cylinder and secured to the peripheries of the flanges thereon, longitudinal and annular ribs between the cylinder and water jacket whereby the water entering the inlet opening of the water jacket is compelled to travel predetermined paths along the cylinder and through the cylinder heads before passing out of the outlet opening in the water jacket.



736,254.

736,267. APPARATUS FOR DRILLING WELLS.—Henry Kelly, Los Angeles, Cal. Assignor to the Kelly and Taneyhill Company, a corporation of Iowa. An apparatus provided with a walking beam, an arm pivoted near one end of the beam, and in the longitudinal center thereof and adapted to be swung horizontally when not in use.

736,281. COKE OVEN DOOR.—George D. Macdougall, Buffalo, N. Y. Combination of the door casing having the packing, the buckstays having the beveled vertical edge flanges, the door having the returned flange engaging the packing, the exterior rotary latch levers pivoted to the door and having the beveled end rabbets engaging the beveled flanges of the buckstays to press the door flange against the packing.

736,294. APPARATUS FOR CONDENSING SMOKE, FUMES AND GASES.—Robert Ogle, Pueblo, Colo. Assignor to The Smoke Exterminator and Fume Condenser Company, Pueblo, Colo. Combination with a stack and a damper therein, of a condensing chamber, two mesh diaphragms located therein and suitably separated, means for introducing a spray of water into the chamber, a conduit leading from the stack and communicating with the condensing chamber below the damper for discharging the products of combustion thereinto below the lower diaphragm, the condensing chamber being largest at the bottom and having curved walls, its upper extremity projecting into an opening formed in the stack above the damper.

736,308. METHOD OF FREEZING THE GROUND.—Charles Soysmith, New York, N. Y.—The method consists in, first, excavating in the earth a chamber of sufficient size to permit excavation from within; second, lining the excavation with hollow communicating sections; third, circulating a freezing agent in the sections.

736,315. CONVEYER APRON.—Solomon G. Touchstone, Greenwood, S. C. A conveyer apron comprising two parallel flexible spaced belts, each provided with an attaching portion and an extended pulley-engaging portion, transverse slats bearing on and secured to the attaching portions of the belts, and a sprocket chain disposed intermediately of the belts and secured to the slats.

736,331. APPARATUS FOR THE GENERATION AND APPLICATION OF ELECTRIC CURRENTS FOR ELECTROLYSIS.—Francis E. Elmore, London, England. An apparatus comprising two sets of nested electrodes spaced from each other, and an electrical conductor transmitting motion to one set of the electrodes.

## GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending July 18, 1903.

6,132 of 1902. SILICON PRODUCTION.—C. H. Homan, Christiania, Norway. Producing silicon from silicate of alumina by heating with metallic aluminum, afterward recovering the latter from the oxide.

15,121 of 1902. COAL MINING MACHINE.—E. Peters and E. Dickinson, Sheffield. A double-handled ratchet coal-hoisting machine, constructed with a hare screw, the end of which is formed square to receive a handle.

17,322 of 1902. CYANIDE VAT.—W. A. Mercer and J. B. de Alzugary, London. Improved form of vat, with stirrers, for treating gold ores with cyanide and gaseous chlorine or bromine and air.

17,616 of 1902. TIN ORE TREATMENT.—H. Mennicke, Höchst-am-Main, Germany. A process for recovering silver, lead, himuth, tungsten and copper from tin ores by roasting, grinding, moistening with water and then immersing in a bath of molten sodium hisulphate, all the metals but tin being transformed into sulphates, which can be removed.

18,443 of 1902. CRUSHER.—G. Dalton, Leeds. Improvements in Blake crushers to obtain the rocking motion more efficiently.

26,279 of 1902. TREATING SULPHIDE ORES.—G. D. Delprat, Broken Hill, N. S. W. Separating sulphides from gangue by immersing the finely ground ore in a hot solution of hisulphate of soda, the sulphides thereon rising to the surface and the gangue falling to the bottom.

4,820 of 1903. CALCINING SULPHATE OF ALUMINA.—A. E. Cummer, Cleveland, Ohio, U. S. A. Improved plant for calcining sulphate of alumina by means of a series of operations.

10,210 of 1903. DUST-LAYING IN MINES.—L. S. Westrum, Berlin, Germany. Using an emulsion of petroleum or other oil in water for the purpose of laying dust in mines, the moisture having the advantage of not evaporating so rapidly as plain water.

10,233 of 1903. COATING METAL SHEETS.—J. M. Anderson, Pittsburg, Pa., U. S. A. In making a sheet of metal faced with a thin coating of another, placing the hillet of the former close to but not in contact with the sheet of coating metal, then making a metallic deposit between the two, and afterwards rolling the compound plate into sheets.

Week Ending July 25, 1903.

14,124 of 1902. LOCATING ORE-DEPOSITS BY ELECTRICITY.—L. Daft and A. Williams, London. Electrical apparatus for detecting and locating metallic lodes in the earth.

8,466 of 1903. IRON SOLDER.—G. Huth, London. A solder for cast iron, consisting of iron powder, copper powder, borax or other flux and paraffin, the metals being intended to extract the carbon from the surfaces to be joined and the paraffin to prevent the surfaces from oxidizing.

9,042 of 1903. COAL CUTTER.—H. Hirst, Deushury. In coal cutting machines dividing the carriage into three separate portions, so as to facilitate the movement of the machine along the face.

9,651 of 1903. MINE-CAR COUPLER.—L. Coomhs, Aberystychan. Improved coupler for mine cars, so that the shackle pin shall not be jolted out.

10,884 of 1903. SAFETY-STOP FOR MINE CAGES.—W. B. Stevenson, Johannesburg, S. A. Improved catches for suspending mine cages when the haulage rope breaks.

11,637 of 1903. ROCK-DRILL CHUCK.—J. C. Manion, Johannesburg, S. A. In rock drill chucks a spring medium between the keys for the purpose of expanding the keys when they are forced forward to release the drill.



## TO TRAVELING ENGINEERS.

A room for the exclusive use of visiting engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library at Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

## PERSONAL.

Mining and metallurgical engineers are invited to keep THE JOURNAL informed of their movements and appointments.

Mr. Philip Argall is in New York.  
 Mr. J. E. Spurr is now at Silver Peak, Nev.  
 Mr. Walter C. Adams is at the Bath Hotel, Montreal.  
 Dr. J. C. Purdy, of Dahlonega, Ga., is in New York city.  
 Mr. Andre P. Griffiths is spending the summer at Dieppe, France.  
 Mr. J. B. Guinn, of Joplin, Mo., is in New York for a few days.  
 Mr. H. Dickman is at Lamoura, in the Congo Region, Africa.  
 Mr. Louis Noble, of Denver, is examining mines at Guanajuato, Mex.  
 Capt. E. Stores Tice, of New York, has been visiting Houghton, Mich.  
 Mr. T. Trafford Wynne is expected in London from Minas Geraes, Brazil.  
 Mr. C. E. Alexander, of Denver, has moved to 1653 Welton street, Denver.  
 Mr. William Thompson, of Rossland, B. C., is on a trip to Durango, Mex.  
 Mr. Simon Guggenheim has returned to New York from Colorado and Utah.  
 Mr. J. A. McShane, of Omaha, Neb., has been visiting mines at Ocampo, Mex.  
 Mr. Avery C. Moore has been in the Camp Howard district on Salmon river, Idaho.  
 Dr. Oscar Dykerhoff, the German mining expert, has left Butte for Salt Lake City.  
 Mr. Frank L. Sizer, of Helena, Mont., is now in California on professional work.  
 Baron Gildheim, of Berlin, Germany, has been inspecting Cripple Creek properties.  
 Mr. Hartwig A. Cohen has opened an office at 210 Crocker Building, San Francisco.  
 Mr. Arthur C. Brinker is cyanide mill foreman at the Camp Bird mill, Ouray, Colo.  
 Mr. Barclay Bonthron passed through New York last week on his way to London.  
 Mr. Frank D. Pagliuchi, engaged in mining in Cuba, has been visiting New York.  
 Mr. Mason T. Adams is engineer to the Buck Run Coal Company, at Minersville, Pa.  
 Mr. N. F. Leopold, of Chicago, was in the Lake Superior copper district last week.  
 Gen. Benjamin F. Tracy, of New York, spent last week in the Birmingham, Ala., district.  
 Mr. Geo. W. Bryant, of Guanajuato, Mex., left New York, on his way home, on August 19.  
 Mr. Frank Oldfield sailed for Colon, en route to Ecuador, by steamer *Saratoga* on August 18.  
 Mr. Henry V. Maxwell, of Dahlonega, Ga., is installing a gold mining plant at Essex, N. C.  
 Mr. H. Lipson Hancock is general manager of the Wallaroo & Monita Mines, South Australia.  
 Mr. John N. Curtis, of Tucson, Ariz., manager of the Imperial Copper Company, is in New York.  
 Mr. Austin G. B. Wilbraham is superintendent at the San Domingos mine, at Mertola, Portugal.  
 Mr. Samuel Newhouse, of the Boston Consolidated, recently left Salt Lake City for Bar Harbor, Me.  
 Mr. Edward Halse is manager of the Columbian Mines Corporation near Puerto Berrio, Colombia.  
 Mr. Frank H. Probert, of Los Angeles, Cal., has returned from professional work in Sonora, Mex.  
 Mr. L. A. Womble is assistant consulting engineer to the Witwatersrand Deep, Limited, at Johannesburg.

Captain J. E. Stern, president of the Tintic Company has arrived at Salt Lake City from New York.

Mr. Gilbert Ross, superintendent of the Ophir Gold and Silver Mining Company, in Nevada, has resigned.

Mr. Jas. McClurg, of Denver, has returned from a journey around the world and is now in New York City.

Mr. W. K. Masters is superintendent of the United States Smelting Company's plant at West Jordan, Utah.

Mr. J. D. Irving, of the United States Geological Survey, has returned to Washington from his work at Leadville.

Mr. John J. Reilly, of Denver, has gone to Summit county, Colo., to install machinery for a large tunnel company.

Mr. Walter E. Burlingame has become junior partner in the firm of E. E. Burlingame & Co., assayers, at Denver.

Mr. C. J. Devereaux, of Boston, a director of the Quiney Mining Company, was in the Lake copper region last week.

Mr. Horace F. Collins is general superintendent of the Coalbula Coal and Oil Development Company at Hermanas, Mex.

Mr. E. P. Dargin, superintendent of the Frontal mines at Santiago, in Tepic, Mex., passed through Denver last week.

Baron Robert de Rothschild, of Paris, has left Butte, Mont., for Seattle. He has been inspecting mines and smelters.

Mr. George A. Laird is general manager of the La Victoria y Anexas mines at Cerro de San Pedro, San Luis Potosi, Mex.

Mr. S. Strap is in British Columbia from Paris to report on the Britannia and South Valley mines' Howe Sound, for a French syndicate.

Mr. Lewis Searing, manager of the Denver Engineering Works, has gone from Denver to New York, to be absent about three weeks.

Mr. Elmer H. Lawall, of Scranton, Pa., has been on a visit to the Town Topics Gold Mining Company's properties in Gilpin county, Colo.

Mr. George F. Shurtleff, general manager of the Crown King Mines Company, of Crown King, Ariz., has been in New York and Boston.

Mr. S. Shafer, of Reynoldsville, W. Va., has been elected president and general manager of the East Jellieo Coal Company, Coalport, Ky.

Mr. Shinji Harada, superintending engineer to the Mitsui Bishi Company, has reached Tokyo, Japan, after a pleasant visit to this country.

Mr. Joseph Leiter and Mr. C. B. Flynn, who have been making an examination of the properties of the Hidalgo Mining Company, have returned.

Dr. O. G. Youngquist, of Marquette, Mich., accompanied by Mr. Alex. P. Mead, has been looking at the Granby mines, in the Boundary district, B. C.

Mr. H. F. Porter, formerly of the Bethlehem Steel Company, is now in charge of the publishing department of the Westinghouse interests at Pittsburg.

Mr. Wynne Meredith, consulting engineer to the Vancouver Power Company, has returned to Vancouver, B. C., from a visit to San Francisco, Cal.

Mr. Matt Quinn, formerly mine foreman for the Cowles Mining Company in Montana, is to assume charge of the plant of an English mining company at Nelson, B. C.

Mr. James S. Wyatt, former manager of the Mountain Lion mine, at Republic, Wash., is at Bourne, Baker county, Ore., to take charge of the Eureka & Excelsior mines.

Mr. Don H. Bacon, president of the Tennessee Coal, Iron and Railroad Company, is in the Birmingham, Ala., district watching the proceedings before the Board of Arbitration.

Mr. Carroll D. Wright has been appointed by Judge George Gray as umpire of the Conciliation Board representing the miners and operators in the Pennsylvania anthracite field.

Mr. D. E. Heller, who has resigned the superintendency of the Calumet & Arizona smelters, has been succeeded by Mr. John Woods, who was with the Copper Queen Company.

Mr. Frederick Hobart, associate editor of THE ENGINEERING AND MINING JOURNAL has been at Ishpeming, Mich., attending the meeting of the Lake Superior Mining Institute.

Mr. J. L. Jerome, third vice-president and treasurer of the Colorado Fuel and Iron Company, has resigned, effective at once. Mr. A. A. Miller has been appointed assistant treasurer.

Mr. Jesse Scooby has resigned as general manager of the Pride of the West Mining and Milling Company, and will have offices in Denver after September 1 as consulting mining engineer.

Mr. T. J. Jones, who has been consulting mining engineer for the Stokes interests, at Austin and Berlin, Nev., is now superintendent of the mines of the Mountain Copper Company, at Iron Mountain, Cal.

Mr. Charles P. Neill, professor of political economy at Georgetown University, Georgetown, D. C., is acting recorder to the Board of Arbitration, which is considering differences between coal operators and miners in Alabama.

Mr. H. E. Nelson, formerly with the American Smelting and Refining Company, and Mr. G. W. Bagwill, formerly with the United States Reduction and Refining Company, have been added to the staff of the Utah Copper Company at Salt Lake City.

Mr. William Busby, of South McAlester, has been appointed Commissioner in charge of the coal exhibit of the Indian Territory at the World's Fair. Mr. Busby owns a controlling interest in the Great Western Coal and Coke Company and the Osage Coal and Mining Company.

Mr. R. E. Gosnell, secretary of the British Columbia Bureau of Provincial Information, has prepared for distribution a bulletin embracing a general review of mining in British Columbia. These bulletins do not cover the same ground as the Minister of Mines' annual report, but are intended to give a popular description of mining conditions in the province as a whole.

Sir James Hector, distinguished as a geologist and scientist, who in 1857 was attached to the Canadian Rocky Mountain expedition during 1857-1860 as surgeon and who, whilst exploring the Rockies found the pass by which the Canadian Pacific Railway now crosses the mountains, is revisiting British Columbia after an absence of 43 years. Whilst examining the pass Sir James met with an accident which afterwards led to the naming of the pass and river the "Kicking Horse." A horse carrying his instruments broke away and crossed the river. Sir James swam over, caught the horse and brought it back. Whilst engaged in tying it up another horse kicked the explorer, breaking three of his ribs and rendering him unconscious. His Indian guides after trying in vain to resuscitate him concluded he was dead and dug a grave, but just as they were about to bury him, he recovered consciousness. Now, he facetiously remarks, he is about to visit his own grave, during the proposed trip in the Rocky mountains. Sir James has been in New Zealand since 1861, having gone there after completing his exploration work in the Rockies. For several years, until recently, he held the position of director-general of the Geological Survey of New Zealand. At present he is chancellor of the New Zealand University, director of the Colonial museum and observatory and of the New Zealand Institute. He proposes returning to New Zealand, leaving Vancouver on September 18.

## INDUSTRIAL.

James Cochran Sons & Company have completed and fired 10 new ovens at the Spring Grove coke plant near Dawson, Pa.

The new foundry building and machine shop of the Nixon Mining Drill Company at Chattanooga, Tenn., in course of erection for several months, is about completed.

The Allis-Chalmers Company has received contracts for the Utah Copper Company's Bingham concentrator, as follows: 18 Frue vanners, two tables and a Janney mill.

The Iguaran Copper Mining Company, it is said, will erect a large water power plant at Mater de Platan, Mex., for the purpose of generating energy for transmission to the mine, about 6½ miles distant. The available head is 930 ft.

The White-Blakeslee Manufacturing Company, Birmingham, Ala., has absorbed the Blakeslee Manufacturing Company, builders of gas and gasoline engines, power pumps, well drilling machinery, etc. The officers are: C. B. White, president; Jas. Boyron, vice-president; J. B. Scully, secretary, and R. E. Lockett, treasurer.

The Edna Smelting and Refining Company, of Cincinnati, has erected a new shop, 100 by 280 ft., for the production of a line of injectors, lubricators, valves, etc., in addition to its other specialties. A new Babbitt metal and spelter department has just been completed and an oil fuel system for smelting furnaces will be installed.

The Penberthy Injector Company, of Detroit, Mich., has placed the number 300,000 on one of its Penberthy automatic injectors, having completed this number of injectors in a little over 16 years. The company put on the market a few years ago its auto-positive hot-water, high-pressure, restarting injector, which, the company states, surpasses the Penberthy.

The Preston Smelting and Refining Machinery Company has been incorporated with a capitalization of \$5,000,000 to manufacture mining and milling ma-

chinery. Denver is to be the principal place of business. The nine directors in control are Frederick L. Preston, Russell B. Sigajoo, Robert M. Boyd, Milton M. Green, E. T. Frankhauser, Francis H. Brown, James E. Bush, Joel B. Dow and James Wilson.

F. W. Thompson, of Denver, Colo., manufacturer of the Smith & Thompson assay balances, has lately become so crowded for room that to keep up with his orders, he has been obliged to make arrangements for about three times as much space as he formerly occupied. The factory is now at 1717 Arapahoe street, where all machinery will be moved by electrical power and where he hopes to be able to fill the orders as fast as they come in.

#### TRADE CATALOGUES.

Folder No. 4,019, sent out by the Westinghouse Electric and Manufacturing Company, of Pittsburg, Pa., is entitled "Some Facts about Meters and Transformers," and discusses the results obtained at a central power station by the installation of Westinghouse wattmeters.

The Rand Drill Company, of New York City, sends out a card on which is an illustration of its exhibit of rock drills, air compressors, and Imperial pneumatic tools at the conventions of the Railroad Master Mechanics' and Master Car Builders' associations, at Saratoga, last June.

The Joseph Dixon Crucible Company, of Jersey City, N. J., issues a color sheet showing colors of and giving specifications for Dixon's silica-graphite paint. The company states that Dixon's flake graphite as a paint pigment, being inert, forms with oil an elastic instead of a hard and brittle coating; will not crack nor blister, and is suited to all climates. It has been used on public buildings, mills, power-plants, railway viaducts, etc.

Catalogue No. 43, a 168-page pamphlet published by the Ingersoll-Sergeant Drill Company, of New York City, describes that company's line of rock drills, mining and quarry machinery. The catalogue is printed on heavy paper and finely illustrated with striking underground views. The company's works are situated at Easton, Pa., but to accommodate an increasing output the company recently acquired 190 acres nearby at Phillipsburg, N. J., where it is erecting what will be, it says, the most extensive works of their kind in the world. The rock-drills made by the company comprise the Eclipse drill, with independent spool-valve; the New Ingersoll drill, with an improved independent spool valve; the Arc Valve tappet drill, having a slide valve moved by the piston, and the Sergeant auxiliary valve drill, having a spool-valve controlled by a small auxiliary valve, this latter drill being expressly intended for hard service and fast work. The general features of these drills and their particular points of excellence are described in detail, and the pamphlet gives information on the economy of power-drills in shaft sinking or drifting, the selection of a drill, etc. The company furnishes blacksmith's tools for sharpening drills, air and steam hose, flexible pipe joints for air and steam lines about quarries and mines and other drill accessories. For quarry work the company makes track channeled in four styles for working marble, sandstone, slate or other quarries for getting out dimensioned stone; also undercutting channeled and gadders. For submarine work the company makes drills using drill steels 30 to 60 ft. long, and states that these drills are based on experience gained in work at New York Harbor, on the Great Lakes, in England, Cuba and elsewhere.

#### SPECIAL CORRESPONDENCE.

Butte. Aug. 15.

(From Our Special Correspondent.)

Granite county and Deer Lodge county have in office some officials who seem to delight in placing as many burdens as possible on the leading industrial enterprises. The Granite-Bimetallic Mining Company, whose operations are at Phillipsburg and vicinity, has been for years the mainstay of the town, employing several hundred miners and other employees. This company has kept its mines and mill in operation with but small margin in sight on the present price of silver. The county assessor has taxed old, worn-out milling plants, fit only for the scrap pile, at full value, or several times what they are worth. Deer Lodge county elected a socialist for assessor last fall. His prey was the Anaconda Copper Mining Company, the one industrial enterprise of any magnitude in the county. The old works, abandoned and dismantled, were taxed for several hundred thousand dollars more than they would be worth if in full operation.

Rumors of new smelting plants for three or four different parts of the State are now in the air, and some of the local papers are very enthusiastic over

these, but the opinion of your correspondent is that they will remain where they are now—in the air. The old Georgetown district, in Deer Lodge county, is showing new life. Several of the properties which were on the producing list some years ago are being worked with good results. The old Cable mine has been reopened, and the mill is running on a good grade of gold ore. The Gold Coin mine, which was exploited in the East some years ago to the tune of \$850,000, most of which went into the pockets of the promoters, has been taken hold of by the people who held the bonds, and they will endeavor to place the property on its feet. The Southern Cross is also on the producing list, shipping three cars of ore a week at present to the Butte smelters. A good deal of development work is being done on some of the large bodies of magnetic iron ore which shows in a number of the prospects in that district.

There is but little change among the Butte mines. None of the Amalgamated properties which were closed owing to repairs at the Washoe smelter has started up yet, but the talk is that some will go in operation again soon. The Pittsburg & Montana Copper Company is sinking a shaft on the Evening Star mine in the Cataract district, about 6 miles above Basin. The company is going ahead with work on its Butte properties and is constantly adding heavier machinery to its mine equipment. The Western Mining Company has a small matting furnace in operation on the Indian Queen mine in Beaverhead County, which is claimed to be working satisfactorily. The matte sent to the Montana Ore Purchasing Company for converting contains upward of 60 per cent copper, and is made from a carbonate ore. Nothing is going on at the copper mines at the old camp of Copperopolis in Meagher County. The development so far has not been satisfactory. On Bloody Dick Creek, in the southern part of Beaverhead county, a number of copper prospects are showing an encouraging amount of ore, some of which is rich in native gold.

Denver. Aug. 15.

(From Our Special Correspondent.)

The mine labor situation grows more unsatisfactory and the situation is due more or less to the fact that prior to the last state election, both political parties introduced an 8-hour law amendment in their campaign platforms, and the amendment was carried at the polls by a large majority. The Legislature last winter, however, failed to pass an 8-hour law and the question was not brought up at all at a special session recently held. This has furnished acceptable material for the professional agitators and fanatical socialists who dominate the Western Federation of Miners and whose policy apparently is rule or ruin. At the last annual convention the miners' unions, by resolution, fatuously placed themselves, as to strikes, under the absolute domination of the president and executive committee of the Federation.

The mining situation in the Cripple Creek district recently has been promising, as in a short time the greater part of the Stratton Estate would have been in operation and events indicated opportunities to something over 1,500 additional workers under leases.

The mines of the Cripple Creek district like nearly all the mines of the state—the principal exceptions being Leadville, Aspen, Clear Creek and Gilpin—are operated on an 8-hour basis; as is the Economic mill near Victor, while the Portland mill and the Telluride mill at Colorado City run on 8 hours in all departments, except the samplers, where the shift is 10 hours. A change of the sampling department to 8 hours means an addition of several men in each mill. In the plants of the United States Reduction and Refining Company, of Colorado City and Florence, and in the plants of the American Smelting and Refining Company, the men are required to work usually 10 or 12 hours. The demand on the United States Reduction and Refining Company is not only for an 8-hour day, but also for an increase of the minimum wage from \$1.80 to \$2.25, which is the minimum pay at the Portland mill.

Nominally, it is to enforce the demand for an 8-hour day in the above mentioned smelters and mills that over 3,000 miners have been called out in the Cripple Creek district, by the Western Federation of Miners, although such miners have no grievance and are satisfied with their wages and the hours of work. They have an 8-hour day, the minimum wage is \$3, and the average wage in the district is \$3.40. An aggregate pay-roll of \$10,000 per day has therefore ceased. The storekeepers of the district have stopped giving credit and insist on cash for all purchases. The impression seems to be well grounded that the miners in other Colorado districts will also be called out, if it is deemed necessary, in order to stop the ore supply of the plants on which the fight is made.

While the leaders of the Western Federation of Miners say that the purpose of the strike at Cripple Creek is to establish an 8-hour day in mills and smelters, as well as in mines in every part of the State, the Federation also proposes to unionize every

mine and ore treatment plant and the underlying issue of the present struggle is therefore whether the handful of personally irresponsible agitators constituting the officers and executive committee of the Western Federation of Miners shall arbitrarily dominate the entire metalliferous mining industry of Colorado.

The Portland Mine ships its ore to its own mill at Colorado City, where conditions are satisfactory to the mill men. At the Portland and other mines no discrimination has been made between union and non-union men. Any competent workman has been given employment and no questions asked regarding his affiliations. The Western Federation of Miners now requires recognition of its organization and proposes to allow none but union men to work. James Burus, president of the Portland Gold Mining Company, who has been persistently friendly to organized labor, resisted this demand and ordered the mine buildings boarded up. The executive committee of the miners called out 55 men at work on the important drainage tunnel because the management of the tunnel would not discharge non-union men.

The mine owners of the district, at a meeting at Victor on August 13th, issued a proclamation stating that at the time the strike was called, and ever since the settlement of the labor difficulties of 1894, entire harmony and good will have prevailed between employers and the employed in the district. Since the heads of the Western Federation have seen fit to compel a cessation of all labor for reasons entirely beyond the mine owners' control, the mine operators have but one alternative, and that is to resume under former conditions, preference being given to former employees; all men applying for work will be protected to the last degree.

The question arises as to how long miners, having no complaint whatever to make on their own account, will permit themselves to be persuaded or intimidated by "walking delegates" and other agitators, to quit work in sympathy with other wage earners in another part of the State.

In Clear Creek county matters are entering another stage. Judge de France of the local district court being unfortunately absent in California on account of sickness, his place has been temporarily taken by Judge Frank Owers, of Leadville, noted for his radical views. Judge Owers has, after remarks showing unmistakable bias, granted an injunction against the Citizens' Protective League of Idaho Springs to restrain it from in any way preventing the return of the members of the Idaho Springs Miners' Union recently expelled and issued warrants for the arrest of the members of the Citizens' Protective League, a number of whom were arrested, taken before him and released under bond for trial in December. Several of the expelled miners who returned were jailed, charged with complicity in the dynamiting at the Sun & Moon mine, and were subsequently released, under bond, for hearing later.

San Francisco. Aug. 12.

(From Our Special Correspondent.)

The region around Oroville is to have three more new dredges, contracts for which have been let. There are now about 25 machines there working day and night.

In reopening the old Stockton Hill gravel mine near Mokelumne Hill, Calaveras county, the men in running a tunnel above the mine to tap a spring, found a new channel of gravel which prospects well. An old shaft there made by early day miners has since been a butt of ridicule by experienced (?) miners, but had those pioneers sunk a few feet deeper they would have struck the channel now found. The local papers consider that this upper channel is a continuation of the French and Nigget Hill channel. It continues down the full length of the ridge above other known channels. Many years ago three Mexicans gathered dirt near this point, carried it in sacks to the ditch and panned it in bateas.

This instance is another example of the fact that even experienced miners do not know all about the gravel channels in our mountain and foothill regions.

No work by the United States Geological Survey would benefit the miners of this State more than a careful investigation of these "buried rivers" of California. No general systematic investigation has ever been made since the work of J. D. Whitney, though certain localities have been studied, as for instance part of the Forest Hill divide by Ross E. Browne, whose article in the Report of the State Mining Bureau is about the only recent printed information available on the subject.

The closing of the Lincoln mine at Sutter Creek, Amador County, after several years' work, and the expenditure of upward of \$200,000 shows how expensive prospecting is on the Mother Lode. The Western, or Baliol mine, at the same place not long since closed after extensive prospecting, without ever getting any pay. Work at the Lincoln was done systematically, and a deep shaft sunk. The property will now remain idle.



Around Nevada City and Grass Valley, Nevada county, there is much activity and prosperity. The older mines are paying well and many new propositions are being developed. This part of Nevada county is by far the greatest gold producing section of California, and is really the state center of quartz mining. The best practice in both mining and milling may be seen. At Grass Valley are the Empire, Maryland-Idaho, Allison Ranch, North Star, Rocky Bar, Brunswick, W. Y. O. D., Pennsylvania, Gold Hill, Bullion, Omaha, Menlo, Conlon, Franklin, Slate Ledge, Coe, Union Hill, Golden Gate, Norambega and others. In Nevada City district close by, are the Champion group, Mountaineer, Banner, Pittsburg, California, Pennsylvania, Canada Hill, Murchie, Home, Reward, Gold Flat, Merrimac, Sierra Queen, New Hope, Summit, Posey, Mayflower, Texas, Spanish and others. The hydraulic mines in this county include the famous North Bloomfield.

In some of the mountain counties the snow supplies are beginning to fail and ditches carry less water. It will not be many weeks before a number of mines will have to close temporarily, especially gravel mines needing a large supply. Along the lines of the larger ditches, fed by extensive reservoirs, there is no shortage of water as yet.

Quartz miners are discussing the recent Montana Supreme Court decision that until the discovery of a vein one prospector has no right to exclude another prospector from public mineral land even though a notice of location has been posted. This is doubtless as it should be, for unless mineral has been found there can be no location, and hence no exclusive mining rights.

Large amounts of gold are now coming to the San Francisco mine from the Klondike and Alaskan points. It is expected that the Klondike yield will be much larger than last year, as will that of Nome, whence comes complaint of a scarcity of mine labor. The Yukon river this year ran low rather early in the season, and the navigation of the lower river has been thus retarded. Most of the steamers are making not more than one round trip.

Los Angeles points with pride to having the names of 324 mining companies in the city directory, but apparently forgets that many companies are prospecting operations and that hundreds of incorporated companies never have the luck to produce a ton of rock or a bar of bullion.

Victoria, B. C.

Aug. 15.

*(From Our Special Correspondent.)*

The condition of the coal mining industry has decidedly improved during the past few weeks, and the outlook is decidedly promising. The Extension mines, on Vancouver Island, are now producing at the rate of over 1,100 tons a day, and it is expected that the daily output will soon reach 1,600 tons. At Nanaimo shipments are steadily maintained. The output from the Crow's Nest Pass mines in July was the best yet, the aggregate tonnage from the three collieries being 71,462 tons, of which Coal Creek was responsible for 24,793 tons, Michel for 28,569 tons, and Morrisey for 18,100 tons. This month the shipment of coke from the new Morrisey ovens will start, 60 of the 250 under construction being ready. The manager of the British Columbia Copper Company, at Greenwood, says that the coke shortage will very shortly cease to restrict smelting in the Boundary, as the supply of fuel is beginning to keep pace with the demand.

Mr. Cronin, manager of the St. Eugene mine, at Moyie, has said that the lead bonus after all was not so considerable as might appear. He said that when the London price of lead advances over £12 10s. a ton, the amount received from the bounty will decrease correspondingly. Lead at £12 10s. is equal to about \$2.67 per 100 lb., which, plus the bounty of 75c. per 100 lb., makes a quotation of \$3.42 per 100 lb., and, therefore, \$3.42 is the highest price which the lead producer can receive for lead under the benefits of the bounty, and as the home smelters make an arbitrary charge of \$1 per 100 lb. from the London quotations, to cover any alleged expenses in exporting the lead, all the producer hopes to realize is \$2.42 per 100 lb., while the American miners receive 3½c. per lb. With London lead about £11 6s., as at present, the local settlement, including the bounty on ores, is approximately \$2.20.

Favorable reports continue to come from the new Poplar creek district. The region, allowing for exaggerated statements, undoubtedly promises well. As yet, however, little more than prospect surface work has been attempted, but it is fairly certain that in no other section of British Columbia have surface ores given such high assay results, or the indications been more favorable for permanence. Speculation in claims has begun, and a number of sales have been recorded at relatively high figures. It is said that platinum has been found in the ores of the district. Platinum in quartz was found some time ago in the Similkameen district, and also in the Burnt Basin, but no

attempt has been made to turn the discoveries to commercial account.

The recently reported new finds in the Yukon, not far distant from Whitehorse, appear to warrant further investigation. It is stated that the gold fields are farther from Whitehorse than at first supposed, the distance by the route taken by miners being over 200 miles. There are three ways of entering the new country. One is from Pyramid Harbor via Dalton's trail, the other from Carmack's Post on the Yukon, and the shortest from Whitehorse by steamer up the Tahkeena River to Gardner's Falls, thence overland, crossing the Mendenhall, Kakawash and Jarvis rivers. A syndicate engaged in hydraulic mining on Thibet creek, in the Cassiar district, reports a first clean-up, after a 20 days' run, of 780 oz., valued at \$13,000. The syndicate is chiefly composed of men who were formerly connected with the Cassiar Central Railway scheme. The property runs about two miles along Thibet creek, east from the junction of Thibet and Berry creeks. Thibet creek empties into the head of Dease river. Along the two miles of hydraulic leases the miners are said to have a plentiful supply of water, that from Berry creek giving 330 ft. head. At present 28 men are employed, and three monitors are in use. In Atlin, activity continues, reports from Spruce creek being particularly encouraging. On this creek several miles of ditches are under construction, while at Pine creek three 6-ton hydraulic derricks have been installed recently. Dredging on Gold Run is to start shortly, the machinery having arrived. It is reported that dredging on the Stewart river in the Yukon is to be conducted on a still larger scale next season, the Ogilvie Company proposing to operate eight bucket dredges on its river leases. The company has operated a prospecting dredge this season. The new dredges are each to have a capacity of 900 cu. yds. in 10 hours.

The reported strike at the Silver King mine at Nelson turns out to have been exaggerated. The Juno, at Nelson, continues to yield well. The rest of the concentrator buildings for the Le Roi No. 2 concentrator at Rossland will be completed within a week. Three carloads of machinery for the Elmore process have been installed, and the crushing plant just received from San Francisco is being set up. The company has a car containing 6,000 gal. of heavy oil.

The Crofton smelter shipped 7 carloads of copper matte last week, making 10 25-ton carloads of matte since the smelter blew in after the shut down on July 5.

Representatives of Eastern men have recently visited iron ore bodies on the west coast of Vancouver Island. Meanwhile another small furnace of 55 tons capacity is to be built at Irondale.

San Luis Potosi.

Aug. 11.

*(From Our Special Correspondent.)*

The report of the Mining Committee of the Mexican Monetary Commission, just made public, shows that the annual production of Mexican mines amounts to \$130,000,000 Mexican currency, principally gold and silver, but including also copper, lead, iron, mercury, zinc, antimony, etc. Exports are: Silver, \$70,000,000; gold, \$23,000,000; copper, \$19,000,000; lead, \$6,000,000; and antimony, \$500,000, Mexican. The present annual production of coal is 1,000,000 tons, but it is estimated that by 1905 it will reach 2,000,000 tons. The number of laborers in mines is given as 130,000, and in metallurgical work as 45,000, making with those in higher positions some 200,000 engaged in mining and metallurgy; who, with their families, make 1,000,000 inhabitants, or about one-tenth of the total population of the Republic, directly dependent on the mines.

The greater part of the 1,000,000 tons of coal estimated in the committee's report is from the Sabinas Valley, Coahuila, where in 1885 Mr. L. M. Johnson opened the Fuentes coal mine, and where later were opened the Hondo and the Esperanza, the latter now the best and largest, with a daily production of 1,200 tons, about equal to the combined production of the other two. Attention is being directed to Michoacan, and it is understood that coal has been discovered at La Cofradia, Jiquilpan district, and that a company is being organized for developing it. But the most important in the state at present are the fields at Agustitan, and the Guggenheims have already the same pioneer, Johnson, in the fields examining and negotiating.

In Guerrero, the governor, Agustin Mora, is doing everything in his power to encourage mining. Some 25 miles from the Iguala station of the Cuernavaca branch of the Mexican Central Railroad at Huitzaco, the quicksilver mines, La Cruz y Anexas, containing 568 pertinencias, have been sold to New York people. It is said that the new company will put in 6 furnaces with condensers and build a 6-mile tram from the mines to the smelter. A deal is also on for the San Rafael mine near Taxco, between Frederico Escalante and an American company at \$1,000,000 Mexican.

Two more companies have been organized for El Oro district; La Venus with \$300,000, Mexican, capital

and Pedro Requeno y Ahrew, president, to operate in Talpujahuá; and La Presa Nueva, with \$30,000 Mexican, capital and Richard Hillman as president, to operate 25 pertinencias in El Oro. St. Louis people have offered \$400,000 Mexican for La Concepcion y Anexas, Talpujahuá, of which W. W. Graham is president. It is understood that the mill of Luz de Borda, El Oro, is to be doubled to handle the new find, and that additions will also have to be made to the San Rafael mill. The people that are behind the Guanajuato Power and Electric Company are figuring on a plant of 10,000 h.p. on Rio del Valle, to transmit the power 50 miles to El Oro.

In the state of Hidalgo, the old Spanish gold camp of San Jose del Oro, now having railroad facilities, is coming to the front. An American company has taken an option on the gold-copper property of W. R. Vacher.

The Soledad y Anexas is a new company with a capital of \$300,000 Mexican, which will mine in the Etla district of Oaxaca. The deal for the Natividad, of Taviche district, which has been pending for the last 6 months between the company and Frank Peterson, of New York, has just been declared off. Mr. Peterson states that the property has been badly robbed in the working, while the company states that Mr. Peterson's offer is too small.

The labor troubles at the smelter of the Mexican Metallurgical Company, at San Luis Potosi, over wages, company store, and the refusal of the company to continue selling wood to the workmen, culminated in a strike, and the smelter has been practically closed for 10 days, with only a couple of furnaces running and hundreds of cars of ore in the yards. The men are now working again to better advantage under the moral suasion of the Rurales (government troops). Some 60 miles from San Luis Potosi, on the Tampico branch of the Mexican Central Railroad at Cerritos, the Sulphur Mining and Railway Company has a concession for building a railroad to its sulphur mines for the better development of the properties, which are under the management of J. P. Jones, and at Ebano the Mexican Petroleum Company continues drilling, having already several producing wells. At Catorce the antimony properties of Maurice Saunders are being put in shape to work, and it is expected that the next month will see them shipping. The Tiro General Mining Company, which bought in August, 1902, for \$400,000, Mexican, 6 old properties, containing 65 pertinencias at Charcas, also haciendas, machinery, etc., paying \$200,000 cash, with \$100,000 to be paid September 15, 1903, and \$100,000 September 5, 1904, has paid the first \$100,000. The company has \$53,718 in the bank, with some \$10,000 to \$15,000 worth of ore at the smelters or in transit and no debts. The old Tiro General shaft has been retimbered 260 meters, unwatering by hauling has begun, and as soon as the lower level is reached the new pump will be put in. The 20,000 tons already shipped show, it is stated, that there are in the old dumps over 62,000 tons of ore, besides some 60,000 tons of a lower grade. The company, which has been paying \$2 per ton for hauling from mine to railroad, has decided to put in a tram at a cost of \$55,000. It will have animal traction, 16 lb. rails, 5-ton cars, 24-in. gauge, and bids will be asked this month. The principal work now is on the Tiro General vein. G. Stadelmann has resigned as superintendent to give his time to professional engineering work in the city of Mexico, though he is retained as consulting engineer. W. Ernest Franks is now superintendent; J. G. Creveling, Jr., of Aguas Calientes, is president and general manager.

Exchange on New York continues to fall, selling August 8 at 226. In mining stocks El Oro district is still the chief attraction, Dos Estrellas reaching \$36, Victoria brought \$430; Union, \$145; Progreso, \$45; Chihuahua, \$48; Aldebaran, \$180; Noche Buena, \$60; Colon, \$23; Antares, \$90; Luz de Borda, \$195; Aurora, \$50. Of other stocks Monterey Iron and Steel brought \$108; Cinco Senores, \$210; La Paz, Matehuala, \$720; Providencia, Guanajuato, \$155; San Rafael, \$1,440; Santa Gertrudis, \$91.50; Augustias, of Pozos, \$112; and Sorpresa, Pachuca, \$330.

London.

Aug. 8.

*(From Our Special Correspondent.)*

Your editorial remarks in the issue of July 25 on the wrong use of consulting mining engineers' reports by the promoters of companies and the offer of your columns for the vindication of such engineers have been received with great interest in London. A consulting mining engineer is apt to be subservient to, or at any rate agreeable with, the promoter, for it is to him that he looks for his remuneration. The public never pecuniarily rewards him for warning it of dangers. Though his conscience may trouble him, he usually allows the misuse of his reports to pass without public protest, though he takes care to right himself in his own circle. A notable case of a mining engineer publicly withdrawing his favorable report occurred some four years ago when a Mexican property



was introduced to the public. The proposed capital was far too great, in the judgment of the engineer, and he promptly cabled his opinion to that effect, after the prospectus had been issued. When he had originally handed in his report he never imagined that the capital would be fixed at such a high figure, and he had, in fact, never been consulted as to the figure to be fixed. It was not until the prospectus appeared that he was enlightened on the subject. His cable had the effect of quashing the flotation altogether, for the promoters withdrew the prospectus and never went to allotment.

There are other ways in which an engineer may be wronged over his report in addition to those you mention. When a mine or metallurgical process is to be floated it often happens that the announcement is made with a flourish of trumpets that Mr. So and So, the well-known "expert," is to be sent out to investigate and report. When his report comes in, it may be unfavorable, so it is at once pigeon-holed and another engineer found who will be more amenable to the desires of the promoter. When the inevitable collapse takes place, the first engineer suffers in the estimation of the public. It had been widely advertised that he had reported on the property, but the nature of his report never divulged. A shareholder who has suffered loss does not stop to think, and the outside public has no particular reason to think; so an indistinct impression remains that Mr. So and So is an unreliable man, and his reputation is hurt. Similar cases have come to my knowledge where engineers have reported favorably on properties which would, in their opinion, pay if developed on certain lines. After the properties have been acquired the manager in charge, or the directors, saw fit to handle them in a different way. If a collapse comes the consulting engineer's name is inevitably dragged in and the blame thrown on him. It goes without saying that English mining men will be glad to take advantage of your columns for the purpose of explaining their exact position when incidents of this kind occur.

We have Mr. Whitaker Wright once more among us, he having found Ludlow Street jail not the pleasantest place of residence while his lawyers quibbled about details of the extradition laws. His examination before the magistrates of the city of London will occupy considerable time, perhaps two months, after which, if there is any case found against him, another month will elapse before he appears at the Central Criminal Court. I am sorry to say that the cheaper type of London newspaper is already trying and condemning him in the style of the yellow press of America; the very papers that extolled him in the days of his prosperity are his open enemies now. After having had my fling at Mr. Whitaker Wright for the last six years, I am content now to allow the law to take its course, but it is galling to see these newspapers that formerly sat still or sided with him now hailing themselves as prophets of unusual perspicacity.

The Etruscan Copper Estates has issued another of its characteristic circulars, an excuse from giving the results of the working of the lead dressing plant, which had been promised two months ago. The circular also says that the development in the copper workings prove that the lode increases in richness with depth, and promises that the regular sales of the copper, lead and zinc output will begin early in the autumn. I look forward with considerable interest to the fulfillment of this promise, and by the end of October perhaps we may get an exact statement of returns instead of vague generalities; but I doubt it. This week we have had the tedium of the dead mining market relieved by the appearance of letters in the *Financial News* written by Mr. J. E. Scantlebury, in which the position and history of this company are very fully discussed. Mr. Scantlebury will be remembered as the contributor to the *Sydney Bulletin* some years ago when his mordant wit created quite a panic among wildcat mongers. In the present case, however, his arraignment of those responsible for the Etruscan Copper Estate management and direction is somewhat superfluous, for Mr. Moreing did the same thing most effectively a year ago. The value of Mr. Scantlebury's indictment was also considerably reduced by the fact that his letters were reprinted and extensively circulated by some unknown person. This action pointed to spite on the part of somebody and was readily seized by the directors and their friends as a proof that this adverse agitation was due to a bear raid. They alleged that Mr. Moreing's adverse report was due to the desire to "bear" the shares, but they had absolutely no ground for such allegations. The unwise circulation of Mr. Scantlebury's letters gave them the opportunity they desired and they made the most of it.

#### GENERAL MINING NEWS.

**Chesapeake & Ohio Railway Company.**—Shipments of coal and coke in June and for the fiscal year ending June 30 are officially reported as below, in short tons of 2,000 lbs.:

Coal:	June.	Year.
New River.....	193,103	2,324,941
Kanawha.....	147,848	1,284,186
Kentucky.....	10,439	128,289
Total.....	351,390	3,737,416
From connections.....	12,959	171,857
Total, coal.....	364,349	3,909,273
Total, 1902.....	180,041	5,497,513
Coke:		
New River.....	33,934	334,558
Kanawha.....	6,809	86,582
Total.....	40,743	421,140
From connections.....	.....	5,318
Total coke.....	21,137	475,154
Total, 1902.....	21,137	475,154

The comparison for June is very favorable, but for the year it is discouraging, owing chiefly to smaller tidewater shipments of coal and western movement of coke.

#### ALASKA.

The rush to the new fields 170 miles northwest of Whitehorse continues, over 300 claims having been located. The surface dirt is said to pay from 2 to 5c. per pan.

**Kasaan Bay Mining Company.**—A temporary receiver has been appointed on account, it is said, of unpaid bills for supplies. The company was incorporated in 1898 with a capitalization of \$1,000,000. The mines are at Kasaan Bay.

#### PRINCE OF WALES ISLAND.

**Brown-Alaska Company.**—A 400-ton smelter is going up at the Mamie mine, opened about a year ago, and 70 men are at work.

#### ARIZONA.

##### GILA COUNTY.

**Black Warrior.**—The 100-ton blast furnace is to be delivered September 1. Richard Fleming is superintendent.

(From Our Special Correspondent.)

**Denison Company.**—Both the mine and reduction works are again working to the limit of capacity.

##### GRAHAM COUNTY.

**Arizona Copper Company Limited.**—The production for July was equivalent to 1,255 short tons of copper.

**San Jose.**—An injunction against the Standard Copper Company has been granted to prevent its taking any ore from this mine.

##### MARICOPA COUNTY.

(From Our Special Correspondent.)

**Hazworth Copper Company.**—The 25 claims belonging to this company at Agua Caliente are reported sold.

**Vulture.**—Another company, it is said, has taken a lease on the tailings of this old mine, near Wickenburg, and will erect reduction works, using an improved cyanide process.

##### SANTA CRUZ COUNTY.

(From Our Special Correspondent.)

**Arizona Gold and Copper Company.**—The concentrating mill is nearly completed, but requires some additional piping and more water. It is equipped with a crusher and a set of coarse and fine rolls, a Bartlett and a Wildley table. Heavy argentiferous lead ore is being taken to this mill by burro trains from the Georgia claim, an extension of the Trenton.

**Duquesne Mining and Milling Company.**—This property remains idle. It has no mill or smelter. The greatest depth reached is 635 ft., and there is not much water. The ores consist chiefly of yellow copper ore, zinc blende, galena and iron pyrites, and appear to be from contact deposits between limestone and a granitic rock, and are associated with massive garnet. The property is well equipped with a large two-cylinder round cable-hoist, and a powerful air-compressor for mine drills.

**Eureka-Mabel.**—The shoot of rich silver and copper ore has been followed continuously in the drift for over 100 ft.

**Hermosa.**—The sale of this property at Harsham to Oklahoma men is reported. The ore is a soft ochreous looking mixture, but is full of seams and little nodules of horn silver, from which the metal is easily extracted by milling. The mine is noted for its past large production of silver at low cost. The ore can be milled without sorting, and it is said that there are large ore-bodies about the mines. The deepest shaft is not over 600 ft. The new company is the Hermosa Mining and Milling Company, with principal places of business at Guthrie, Okla., and Patagonia, Ariz.; capital stock, \$400,000.

**Mowry.**—It is reported that this historic property is to be reopened and worked. It is on the contact between limestone and a granitic rock, and has yielded an enormous amount of lead ore, a portion of which was smelted to supply the Confederate army with bullets. The upper workings are caving in. The

old adobe smelters, about a mile south of the mine, are in ruins, and the piles of slag and litharge are partly washed away.

**Pride of the West Mining and Milling Company.**—The mine and mill of this company at Washington remain closed, and the camp is almost deserted. The few remaining oracles of the place differ as to the causes of the suspension; some say that the ore resources were worked out without any dead work or prospecting ahead, and that all that is necessary is judicious development. A depth of only some 300 ft. has been reached. Others assert that there is an abundance of ore within reach. The piles of tailings, largely zinc sulphide, show that an enormous amount of work has been done. The plant is a most interesting one, having several series of the Wetherill magnetic separators, which were used to separate the copper sulphide, the associated garnet and the zinc sulphide and the galena. The copper ore so obtained was mixed with the oxidized copper ores and smelted to matte; the lead ore was sent to the smelters and some of the zinc was shipped to Belgium.

**World's Fair.**—Mr. and Mrs. Frank Powers are developing this property and extracting and shipping ore at their convenience. A recent strike of copper sulphide in the lower level adds variety and value to this mine, from which high-grade silver ore has been shipped for years.

#### YAVAPAI COUNTY.

**United Verde.**—The fire is reported still burning on the 500-ft. level.

(From Our Special Correspondent.)

**Blake Group.**—E. L. Shampneck is having a 20-stamp mill erected on this mine on Groom Creek. Values are said to go from \$7 to \$10 in gold per ton.

**Hillside Group.**—Ore of good grade is reported found in one of the claims of this group, 50 miles west of Prescott. The mine has a mill and a cyanide plant.

**Iron King.**—The new 6-stamp mill and cyanide plant of this mine, near Val Verde, has a capacity of 30 tons daily. Exploration is continued with diamond drills. B. Blanchard is superintendent.

**Monte Cristo.**—Manager H. Blauvelt is unwatering this mine in Hassayampa district, near Prescott.

**Octave.**—This mine, in Weaver district, is producing 4,000 tons of ore a month, which is handled at the 40-stamp mill. Clean-ups are said to show a value of from \$9 to \$13 a ton for the ore. The shaft is down 1,200 ft., with 12 levels. A 30-drill compressor and a cyanide plant are in use.

#### YUMA COUNTY.

**Socorro.**—This mine at Harrisburg has shut down indefinitely and the 80 men employed discharged. Labor troubles are given as the cause.

#### CALIFORNIA.

##### AMADOR COUNTY.

(From Our Special Correspondent.)

**Fremont Consolidated Mining Company.**—This company is erecting on its property near Amador county a 90-ft. gallow frame, a 14 by 18 geared double hoist, about 1,500 ft. of tramway and a 40-stamp mill. The company expects to have all its plant in running order by October 1. Arthur Goodall is manager.

**Lincoln Mining Company.**—This mine at Sutter Creek, E. C. Voorheis, president, being closed, the machinery, etc., is to be sold. The plant when sold will pay for the few outstanding bills.

##### BUTTE COUNTY.

It is reported in Oroville that W. P. Hammon has let the contracts for three more large dredges, each to cost about \$60,000. Two are to be used at Oroville and the other at Bear River.

**Bonham.**—A. D. Bonham, who recently found a small quartz cropping about 30 miles from Chico, has taken out a couple of tons, which yielded about 75c. per lb. The ore has to be packed on men's backs for about two miles, and then carried on mules. The pocket is not yet worked out. The ledge is about 1 ft. wide.

##### CALAVERAS COUNTY.

A miners' union has been organized at Mokelumne Hill, with 35 members. Several unions have been organized in this and neighboring counties recently.

**Kenross Free Gold Mining Company.**—Thirty men are now at work in this mine near Mokelumne Hill, Captain J. T. Thompson, manager, driving four shafts and five tunnels. A stamp mill is being erected. The company owns both quartz and placer mines, and the new ditch will furnish water for both.

**Lava Bed.**—Operations have started at this mine, near Railroad Flat, Don M. Palmer, superintendent. The property, owned by O. Lampson, is under bond to a St. Louis company.



**Rooney.**—A Hendy three-stamp mill is being put up at this gravel mine, near Chile Gulch; also a rock breaker, which is something new in gravel mines. Electric power will be used.

**Stockton Hill.**—A new 80-h.p. boiler has been hauled to this placer mine near Mokelumne Hill, Colonel Robinson, superintendent. It is owned by a Chicago company. The machinery building is nearly complete.

**Woodhouse.**—At this mine, 4 miles from West Point, a new hoist is being put up, and other machinery is on the ground. The shaft is now down about 100 ft.

## EL DORADO COUNTY.

**River Hill Mining Company.**—At this mine, formerly the Gentle Annie, near Placerville, Thomas Clark, manager, the big tunnel is about done. A 5-ft. ledge was cut, and drifting on this will soon start. This is one of half a dozen ledges encountered in the tunnel. The tunnel will give good ventilation and drainage.

## FRESNO COUNTY.

**Apache.**—Another hundred feet of tunnel will have to be run in this mine, near Selma, before the ledge is struck.

## KERN COUNTY.

**Copper Basin.**—James Worham and A. E. Redstone are running a tunnel on this claim, in the Mohave desert.

**Mohave District.**—The water is flowing through the pipe for the Karma, Echo and Thompson & Boyle claims. The new dry process roller mill of the latter company has been proven satisfactory by test. The grading for the new 20-stamp mill of the Karma is nearly done.

## NEVADA COUNTY.

**Grass Valley Consolidated.**—The company operating under this title at Grass Valley has quit work, and a new company has taken the mine and called it the Green Mountain.

**Grizzly Ridge.**—This mine near Columbia Hill, C. J. Schuster, superintendent, is yielding some specimen rock.

**Home.**—New machinery is being installed at this mine, D. McFall, superintendent.

**Lecompton.**—In this mine at Nevada City, recently fitted with new machinery, pumping has been renewed; the new plant is the heaviest in the district.

**Norton.**—On the property owned by William Norton at Willow Valley, near Nevada City, Messrs. William Young and R. W. Martin, leasers, have made a rich strike of free gold ore.

**Peckham Hill.**—In this gravel mine at Spring Garden, on the Forest Hill Divide, George McAuley, superintendent, a large body of rich gravel has been struck. The mine belongs to Albert C. Burrage, of Boston, Mass.

**Zeibright.**—The company operating this property at Bear Valley, Fred Zeitler, superintendent, has made a strike of good ore. The ledge now worked is about 20 ft. wide.

## ORANGE COUNTY.

The Board of Equalization has reduced the assessment of the Mariposa Land and Commercial Company on the 486 acres, including the town of Mariposa, from \$115,000 to \$65,000, and that part containing the Princeton system of quartz mines, including the Ludwig, from \$501,440 to \$100,000. The Merced Mining Company also got a considerable reduction on its assessment, as did Mrs. Mary McCrellich for the Midas, Adelaide, Abderson, Crown Lead and Crown Peak mines.

**Colorado Steel and Iron Company.**—The furnaces to be installed at Santa Ana are expected to be ready for operation by November 1.

**Dunn.**—A crushing from this mine on Guadalupe Mountain, worked by Pelton & Stolder, showed a mill yield of \$50 per ton.

**Organita Mining Company.**—An attachment suit for miner's wages has been filed against this property at Hornitos, which belongs to a Los Angeles company. The mine is closed for the present.

**Simpson.**—A crushing from this mine at Grizzly Gulch, Heiser & Boldt, owners, yielded \$18 per ton.

**Zeller.**—John Ludwig, formerly a superintendent on the Mariposa grant, has taken charge of the mine on Little Bear Creek, and is to do some work with a view to purchase.

## PLUMAS COUNTY.

**Colonial Mining Company.**—This company at Quincy will build a mill of 100 tons daily capacity.

**Genessee.**—Mr. J. Grusse, owner of this property at Genessee, will shortly enlarge his quartz mill.

## SAN BENITO COUNTY.

**Aurora.**—Messrs. A. Johnson and W. E. Stuart have been examining this quicksilver mine near New Idria, with a view to bonding and working it.

## SAN BERNARDINO COUNTY.

**Giant Ledge Mining Company.**—This company, operating in the New York Mountains, west of Manvel, has 20 men at work. A railroad will be built from the mines to the trunk line.

**Pacific Coast Borax Company.**—This company, F. M. Smith, president, is building a traction engine road from Ivanpah station to its new borax beds at Ash Meadows, where the deposits are said to be very large.

## SAN DIEGO COUNTY.

**Helvetia.**—It is reported that telluride ore has been struck in this mine at Julian, one of the first discovered at the camp.

## SANTA CLARA COUNTY.

**Santa Teresa.**—The 50-ton Scott furnace for this quicksilver property, near San Jose, is completed. Superintendent Harper now has 45 men at work, and will increase this force.

## SHASTA COUNTY.

**Afterthought.**—A deed recently placed on record shows that the price of this mine to the Great Western Gold Company was \$150,000, and that \$20,000 was paid down; \$90,000 to be paid September 20 this year and the balance March 22, 1904. The deed is in escrow in the National Bank of Commerce, St. Louis, Mo. Mr. E. F. Adams is expected to release his attachment shortly on the smelter machinery.

**Gladstone.**—At this mine at French Gulch, where miners get the same wages as at other mines in the county, the miners, after several meetings of the unions, have decided to continue work.

## SIERRA COUNTY.

**Eleanor.**—In this mine at Ladies' Canyon, near Downville, a 2-ft. ledge of good ore has been found by George McGee, the owner.

**Empire.**—Preparations are being made to unwater this mine at Gold Valley. The machinery is being repaired.

**Poker Flat Mining Company.**—A Lane slow-feed mill is being put on at the mine at Poker Flat.

**Willoughby.**—F. P. Reddy and others are reopening this mine at Gold Valley. John B. Lassiat is superintendent.

## SISKIYOU COUNTY.

**McKinley-New Discovery.**—The Milwaukee company which bought these and the Mountain Lily mines on Humbug creek, has bonded Golden Jubilee and other ledges near by. It has 15 men at work on the McKinley. A mill will be put up when developments warrant.

**Mount Vernon.**—From this mine, near Yreka, G. V. Gray, superintendent, a crushing of 110 tons gave a yield of \$68 per ton.

## TRINITY COUNTY.

**Drinkwater.**—At this gravel mine, at Hayfork, M. B. Parlin, superintendent, there are 20 men employed. A dam for storing water is to be built.

**Fairview.**—This mine, Minersville, Joe Porter, superintendent, is to have a cyanide plant.

## TULARE COUNTY.

A quartz mill is to be built on the mine on Mrs. Miller's ranch at Fountain Springs, about 15 miles from Porterville.

**Lucky Four.**—A tunnel is being run into this property to develop it. The ore is expected to run from \$8 to \$12 per ton.

## TUOLUMNE COUNTY.

**Arbona.**—This mine at Tuttleton, owned by the Equitable Mining Company, of Stockton, F. E. Potter, secretary, is to resume shortly. The shaft is down 620 ft.

**Goldwin.**—Superintendent J. L. Partz states that sinking will soon be resumed on this property at Carters.

## VENTURA COUNTY.

**Mount Alamo Mining Company.**—This mica mining company, 60 miles from Lancaster, is putting up works to make mica pulp, mica board and insulating specialties.

## YUBA COUNTY.

**Yuba River.**—W. P. Hammon has reached an agreement with the Government engineers as to what grounds he may dredge on the Yuba. The barriers and settling basin being built near Daguerre Point by the Federal and State Governments are in charge of the Federal engineers.

## COLORADO.

## BOULDER COUNTY.

**Montgomery Mining and Smelting Company.**—The capacity of the cyanide mill is to be increased to 50 tons. Development has reached a depth of 240 ft.

## CUSTER COUNTY.

**Bassick.**—Operations, suspended on account of the cave-in, have been resumed. The mill is running 24 hours a day turning out concentrates.

## EL PASO COUNTY.

**United States Reduction and Refining Company.**—The plants owned by this company at Colorado City and Florence are closed, owing to lack of ore due to the strike. About 500 men are affected.

## FREMONT COUNTY.

**King of the Carbonates.**—A small plant has been installed at this group to unwater the mines. J. P. H. Callahan and R. E. Meyers have taken a bond and lease on the property. Plenty of low grade ore is in sight.

**Rocky Mountain.**—A board of appraisers has been appointed to appraise the property of this smelter south of Florence. The plant has been closed for a year and a half, but it is said it is the intention of the Rocky Mountain people to buy back the plant and operate it.

## GILPIN COUNTY.

(From Our Special Correspondent.)

**Lillian.**—Denver and local men have leased this property to F. X. Banner, of Idaho Springs, and machinery is to be installed. The shaft, down 200 ft., will be sunk 100 ft. deeper. The property has been worked under lease, and the last shipment gave values of \$85 per ton for smelting ore and \$50 per ton for the concentrates.

**London Properties, Limited.**—This English company, operating the Pierce mine on Nevada street, has opened smelting ore in the shaft carrying values of 7 ozs. gold to the ton and a good sized body of milling ore. A recent shipment to the sampling works gave values of 18 ozs. gold, or about \$400 to the ton. The shipments of milling ores carry average values. E. M. Messiter, Central City, is manager.

**Pine District.**—A new 800-ft. cable has been ordered for the Old Ann Mine, up Silver Creek, and some nice-looking mineral is being opened in the 280 west level. New York men will try the Hiatt group on Michigan Hill, the consideration to be \$150,000, with \$5,000 paid down this month, the balance inside of one year. The Evergreen copper property of six claims, owned by Mississippi men, has been sold to W. T. McCormick, of Denver, the consideration being \$25,000. Ore running as high as 40 per cent in copper has been taken out. Development will be carried on through the tunnel workings. Chicago men are interested in the Pet group and the Golden Rod Mining and Milling Company, and have received returns from a shipment to the Argo plant which gave values of \$57.55 per ton for the lot. They intend to install machinery. The 15-ton Tetrault concentrator has been completed at the junction of Elk and Pine creeks and tests made on the Mackey and Sarah Jane ores were very satisfactory. The mill was erected by C. S. Palmer, of Kansas City, and L. J. Mountz, of Apex, and 10 rapid drop stamps have been ordered from McFarlane & Co., of Black Hawk. The Ideal Gold Mining Company has resumed work on its Ideal property on Tip Top Mountain, and is crosscutting to the vein. It expects to install machinery. George E. Waite, Apex, is in charge.

**Roderick Dhu Gold Mines Company.**—In sinking the shaft a crevice was cut, exposing a body of milling ore the full width of the shaft, with the foot wall not reached to date. With this there is a smelting streak carrying values of 7.24 ozs. gold, 21.8 ozs. silver and 9.6 per cent in copper, a total value of \$168 to the ton. Shipments are being made to the mills. John C. Fleschutz, of Central City, is in charge.

**Russell Mining Company.**—At nearly 200 ft. a drift opened a crevice 8 ft. wide with only one wall found, the smelting streak being from 6 to 12 ins. wide and carrying values of 6.4 ozs. gold, or a total value of \$130 per ton. Joplin, Mo., men are the owners and Armond Thompson, of Central City, is in charge.

**Town Topics Gold Mining Company.**—This company intends sinking its East Notaway mine, now 666 ft. down, several hundred feet. A larger plant of machinery was recently added. The usual force of tributers are at work. Marshall D. Draper, of Central City, is superintendent.

**Yankee and Vermilion Districts.**—The chief work is by the Yankee Consolidated Company, a new 15-stamp rapid drop mill being erected at a total cost of \$20,000 by the Colorado Iron Works, of Denver. The company has about 1,000 acres in all, and has opened lots of ore in its Lombard property. The new mill has a capacity of 50 to 60 tons every 24 hours. The company will install its own electric plant, erect new buildings and expects to be operating soon on a large scale. Henry I. Seemann, Lombard, is manager, the offices of the company being at 803 Equitable Building, Denver. The 94 Tunnel Company is adding to

its dry process mill new rolls and Jeffreys screens, the latter being something new for dry screening roasted ores. It has also made improvements in the Waugh pneumatic dry process tables. The daily capacity will be 50 tons. The company claims a saving of 75 to 90 per cent of the values and expects to have the mill completed by Sept. 1. G. W. Possell, Yankee, Colo., is manager, and Omaha and La Porte men are interested. The Oro Verde Company, with G. P. Goodier, Yankee, manager, is figuring on an air compressor plant and is talking of a mill of its own. The building of the Denver, Yankee Hill and Western road from Central City will give outlet for the ores of the camp and remove the handicap of high shipping charges.

## LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

**Alma Placer.**—This property has cleaned up \$50,000 for two months' work and may realize the same amount when the final clean-up for the season is made. The placer and lode claims of the Alma district are attracting the attention of outside capital and it is probable that the district will receive considerable notice next year.

**Caribou.**—The excellent lead carbonates recently opened hold out and daily shipments are made; in addition over 100 tons of iron are shipped daily.

**Coronado.**—The diamond drill has cut a 60-ft. body of sulphides below the oxidized iron. The shoot where cut is highly siliceous and not pay ore. The strike is important, as it settles the question of a sulphide shoot in the down town section.

**Fairview.**—This mine is producing 30 tons daily of a very good grade of iron which finds a ready market at the different smelting plants.

**Golden Fleece Group.**—This property at Twin Lakes has opened a large vein of quartz that in places is 40 ft. wide and of good milling grade. A tunnel started 400 ft. down the hill, will be driven on the vein. A mill will be erected to treat 150 tons daily.

**Green Mountain Boy.**—This mine in Iowa gulch is again in commission. The shaft is being retimbered and when completed sinking will be resumed.

**Little Chief.**—This property, operated by lessees is producing a good grade of lead carbonate from the old workings.

**Reliance Mining Company.**—This company has taken over the leases in Iowa gulch formerly operated by the Reno Mining Company. Prospecting at a depth of 450 ft. will be carried on.

**Republic Smelter.**—The work of the carpenters and masons is nearly completed and all that keeps the new plant from blowing in is the non-arrival of machinery.

**Resurrection.**—This property has been temporarily closed for repairs. The mill also is being overhauled.

## PITKIN COUNTY.

**Smuggler.**—The fire has forced the closing of this Aspen mine, and the company will only work the Molly Gibson at present.

**Ruby.**—A strike of rich ore is reported at this mine in Lincoln gulch, and 20 tons have been shipped to Leadville.

## SAN MIGUEL COUNTY.

**Smuggler-Union Mining Company.**—The two mills at Pandora are treating 350 tons of ore a day. The new 60-stamp mill is treating over 200 tons, and the old mill, dropping 30 stamps, 120 tons a day. The company is utilizing its own power from Bridal Veil Falls. Bulkeley Wells is manager.

## TELLER COUNTY—CRIPPLE CREEK.

(From Our Special Correspondent.)

**Miners' Strike.**—Practically all of the miners in this district are idle, having been called out by the leaders of the Western Federation of Miners. It was generally understood at first that the strike was called in order to cut off the ore supply from the mills of the United States Reduction and Refining Company at Colorado City, which has been declared "unfair" by the Federation, but mines not shipping to the mills under the ban are closed. Apparently the object of the Federation was to unionize the entire country. The miners on the drainage tunnel were called out, but the management says that work will be resumed immediately. No ore whatever is being mined in the tunnel, which is being run solely for drainage. The properties controlled by the Woods Investment Company are still working a few men, and quite a number of small leasers are still at work. The Federation officials scout the idea that any of the men will return to work. The men apparently came out readily when ordered, but it is known that a great number were opposed to the strike. Probably about 3,000 are idle. The situation is deplorable, as the men had no grievances at all and the best of relations prevailed between them and the mine owners. At present it is very hard to tell when the strike will end. No talk of compromise is heard and it appears to be the opinion of everybody that it is a

fight to the finish. A recent statement issued by the labor leaders says that the Dorcas mill at Florence has been declared "fair," the management having agreed that 8 hours will constitute a day's work, with a minimum wage of \$2.25 per day and that only union men will be employed. The union will allow no mines to ship until they have made satisfactory arrangements with it. It is reported that the C. K. & N. and the Old Gold will resume work soon, as they have shipping to the Dorcas mill. The sheriff has ordered that all places where liquor is sold be closed at midnight. Quite a number of idle miners have left the district.

**Portland Gold Mining Company.**—An announcement has been made that an option on 1,900,000 shares of the stock of this company has been given to W. K. Ryan, of New York. The option has not been taken up but it is understood that the deal has as good as gone through. The stock includes that of J. F. Burns, F. G. Peck, Thos. Burns and others. Just how long the option has to run and the price given have been kept secret. It is reported, however, that the price is something over \$2 per share. It is also stated that the management of the property will remain the same.

## BY TELEGRAPH.

The situation is unchanged; very little work is being done though the men will probably be busy soon in the drainage tunnel. There is no talk of compromise. The mine owners are organized and continue to stand together.

## IDAHO.

## ELMORE COUNTY.

**Franklin.**—These mines at Pine are reported sold to Loomis & Goode, of Salt Lake, acting for Eastern men.

## IDAHO COUNTY.

**Crackerjack.**—This company operating at Buffalo Hump has contracted for a 200-h. p. electric plant. Five stamps have been added, making a 10-stamp mill. Water power from Lake Creek, 3 miles away, will be used.

## SHOSHONE COUNTY.

The board of county commissioners has given the mining companies until November 1 to pay that portion of their delinquent assessment agreed on by the board as full payment of the taxes for 1902. The reason for this action by the board is that the suits now pending in the circuit court of the United States and the district court against assessor Hooper to restrain him from selling the mines of the companies for delinquent taxes cannot be dismissed until October.

F. W. Bradley, of San Francisco, has stated that the action of Judge Gilbert, of Portland, in denying the application for an injunction against the extralateral rights of the Bunker Hill and Sullivan Company, made by the Last Chance claim, controlled by the Empire State Mining Company, clears the way for the Bunker Hill. It means that the additional crew in the Kellogg tunnel will remain at work and that the crew will be increased as rapidly as room can be made for men. Forty men are now at work in the tunnel. The new stopes are being prepared as rapidly as possible.

**Wonder Mining Company.**—Five claims near Gem are to be developed by this newly incorporated company. The incorporators include Messrs. Stewart and Howard, of Spokane; James F. Howarth and Paul Lucia, of Idaho; W. A. Hostetter, J. E. Thompson, S. R. Cooper and F. P. Greene. The capital stock is \$150,000 in 10-cent shares.

## MICHIGAN.

## BAY COUNTY.

**Copper Shipments.**—The metal is moving forward steadily, and there is practically no copper on hand at the local smelters.

**Handy Brothers Mining Company.**—This entire property including mines having a capacity of 1,500 tons daily, leases on 25,000 acres of coal lands and the Huron & Western Railroad, 11 miles long, connecting the mines with all railroads entering Bay City, has been sold to the Saginaw Coal Company, et al. The deal approximates \$500,000.

## COPPER—HOUGHTON COUNTY.

(From Our Special Correspondent.)

**Arcadian.**—The stamp mill at Grosse Point has closed, rock shipments from the Trimountain mine having stopped.

**Baltic.**—The new hoist at No. 4 shaft has gone into commission and rock shipments to the stamp mill have increased.

**Calumet & Hecla.**—This company is preparing to open the Kearsarge amygdaloid lode. A shaft will be sunk about 1,200 ft. south of shaft A of the Centennial mine. The amygdaloid was found at two different points by crosscuts from openings on the

Osceola lode. The Calumet & Hecla property carries the outcrop of the Kearsarge amygdaloid nearly its entire length.

**Centennial.**—Timber for the new rock house at shaft A is arriving. The foundations are ready and work on the superstructure will begin at once.

**Champion.**—A carload of mass and barrel copper was shipped to the Portage Lake smelters this week. The stamp mill is treating 1,600 tons of rock daily.

**Franklin.**—Sinking in No. 2 shaft, recently started at the Junior branch, is progressing steadily. Drifts south at the seventh and fourteenth levels have reached the line of the new No. 2 shaft, and sinking and raising will start to meet sinking from surface. No. 1 shaft is sinking to the eighteenth level.

**Globe.**—John Stanton, owner of this tract, says no exploratory work is planned.

**Isle Royale Consolidated.**—The July production was 150 tons of refined copper.

**Osceola Consolidated.**—The July product was 700 tons of fine copper. The new stamp mill at South Lake Linden is reported treating 2,750 tons of rock daily, 900 tons from the old Osceola mine and the remainder from the North and South Kearsarge branches.

**Quincy.**—James Moore, master mechanic, has resigned, and is succeeded by John Funkey.

**St. Mary's Mineral Land Company.**—The ledge has been cut at a depth of 60 ft. at the diamond drill hole on section 25, near the Winona mine. Explorations are to locate the Winona amygdaloid lode.

**Tamarack.**—This mine produced 500 tons of refined copper in July.

**Trimountain.**—The production in July was 450 tons of refined copper. Rock shipments to the Arcadian stamp mill have been discontinued, and all four stamps are now running at the Trimountain mill. The output remains 1,800 tons of rock daily.

## COPPER—ONTONAGON COUNTY.

(From Our Special Correspondent.)

**Adventure Consolidated.**—The July output was 112½ tons of fine copper.

**Mass Consolidated.**—The mine is operating 32 power drills and employing 275 men. The July product was 125 tons of ingot copper.

## IRON—MARQUETTE RANGE.

**Taylor.**—This old mine 5 miles from L'Anse has been reopened and a body of iron ore found.

## MINNESOTA.

## IRON—MESABI RANGE.

(From Our Special Correspondent.)

A considerable body of excellent ore has been found by Geary and others in the southeast quarter of the northwest quarter of section 25, T. 58, R. 17, adjoining the Howe mine of the Republic Iron and Steel Company. It is still being explored and there may be several million tons in the deposit.

The Republic Iron and Steel Company's shipments for the season to date have been: Republic group and Pettit, 80,000 tons; half Union mine, 25,000; Kinney, 15,000. From Negaunee mines about 50,000 tons. For the season this company's Mesabi mines will ship more than 225,000 tons, exclusive of about 50,000 from its half interest in Union.

Piekands, Mather & Company's mines on the east end of the Mesabi have made shipments to date of 140,000 tons, including Sparta, Malta, Minorca, Elba, Corsica and Troy. The latter is a new property, shipping for the first month. Their west Mesabi mines, including Albany and Utica, are commencing to ship in quantity.

**Adams-Morrison.**—This find, made some weeks ago, on lands in section 15, T. 59, R. 14, belonging to the Wentworths, is proving larger than expected. One hole is down 50 ft. in ore and 10 pits are from 10 to 16 ft. in ore, all of good quality. The find is two miles east of any railway line, and can be reached only by the Duluth & Iron Range. The ore is in a portion of the range that has not been considered of much account, and where previous explorations have found the ore thin and often not clean.

**Biwabik.**—This mine has shipped to date 450,000 gross tons, and is forwarding about 6,500 tons a day. If the mine continues to the close of season, as now expected, it will make a total of 1,050,000 tons, about the mark that has been set. The crusher and four shovels are all busy in ore.

**Boulder Mountain Iron Company.**—This company is working in the southwest corner of section 31, T. 59, R. 18, northwest of Mountain Iron, with a hardened shot drill, taking out a 2½-in. core. The drill has been in taconite and indications are said to be good for the discovery of ore.

**East Biwabik Iron Company.**—This company is still working near Biwabik, with four drills, but is not finding more than encouraging indications. The



company has 12 forties to explore and may yet meet with success. It has spent some \$60,000 so far.

**Fayal.**—Up to August 1 this mine had shipped more than 900,000 tons, which would indicate a production for the season of more than 1,750,000 gross tons, but unless new orders are received late in the season, the year's output will not be so much as indicated, the company not expecting to mine much over 1,500,000 tons. No. 4 shaft is going down fast.

**La Belle Iron Company.**—This company has shipped 20,000 tons from its mine in section 24, T. 58, R. 17, and has stopped for the present, but underground development may continue. The mine may make a small additional shipment before the close of navigation. It will be pushed next year.

**Mesabi Exploration Company.**—This company has been organized with \$100,000 capital, to explore on the Mesabi Range. Its incorporators are: H. Smith and E. Wenzel, Duluth, and F. B. Rossom, Virginia, Minn. The company owns some churn drills and will do its own work.

**Monroe.**—Three shafts will be sunk at this mine, in section 25, T. 58, R. 20. Two will be for an open pit that is to be milled, the third for an underground mine. The stripping contract for the open job will be let shortly. This will be one of the really great mines of the range. It is a 25c. lease and some years ago belonged to Corrigan, McKinney & Co. Its ore is excellent.

**Silverman.**—All the Silverman lands in the northeast corner of T. 59, R. 14, except 80 acres, leased some two weeks ago, have now been optioned to explorers and some will perhaps be explored this fall. The formation is narrow at that point and not enough work has ever been done to determine just what geological change takes place in the taconite there. These explorations, if carried far enough, may have important results.

## MONTANA.

### FERGUS COUNTY.

**New Mines Syndicate.**—Mining at the sapphire mines has been temporarily suspended to permit sluicing of the matrix. A hoisting plant is on the property and two dams have been constructed to retain the tailings from the sluice boxes.

### LEWIS & CLARKE COUNTY.

**Jay Gould.**—The Standard Ore Company of Helena has bonded this group of mines in Canyon Creek, 20 miles north of Helena. No work has been done recently.

### MADISON COUNTY.

**Garnet Mining Company.**—The electric drill recently installed is reported a success. The 20-stamp mill will start shortly on custom ore from the Bozeman and other adjacent mines.

### MISSOULA COUNTY.

**Bitter Root Copper Mining Company.**—This company, owning the Monitor mine near Saltese, has been reorganized. Another 100 ft. will be sunk on the Monitor.

### PARK COUNTY.

**Kimberly-Montana Company.**—This company is treating about 180 tons of ore per day and about 100 men are working in the mine. The capacity of the mill is soon to be enlarged from 40 to 80 stamps. Besides running the Revenue mine at Jardine, the company has acquired adjoining claims on which it is doing considerable development.

### SILVER BOW COUNTY.

**Minnie Healy.**—F. A. Heinze has taken steps to put this property in operation. The injunction against the property secured by the Boston & Montana was removed by the recent decision of the State Supreme Court.

## NEVADA.

### NYE COUNTY.

(From Our Special Correspondent.)

The decision of United States Circuit Court Judge Hawley, at Carson, in the suit between the Tonopah Mining Company and the Tonopah & Salt Lake Mining Company, was given recently. In the former company J. L. Butler, the discoverer of Tonopah, is the heaviest stockholder, and his interests won the decision. The suit was brought upon an adverse claim and a protest entered in the Land Office against the application of the Tonopah Company for a patent to a consolidated claim embracing eight locations, the complainants alleging that two of the Butler claims overlapped several of theirs. There was much conflicting evidence as to boundaries, location notices and stakes, it being alleged that some of Butler's stakes could not be found, and that his amended notice varied from that first placed by him in a rusty tomato can on the ridge. To this argument the Judge had the following to say:

"When a valid location of a mining claim is once made it vests in the locator and his successors in interest the right of possession thereto, which right cannot be divested by the obligation or removal, without the fault of the locator or his successor in interest, of the stakes and monuments marking its boundaries, or of the obliteration or removal from the claim of the location notices posted thereon. The right of the original locators to change their original location so long as such change does not interfere with the existing rights of others acquired previous to such change is unquestioned. The amended certificate of location, when made, becomes the completed location of the discoverer and is just as valid as if it had been made in the first instance."

### STOREY COUNTY.

**Como Eureka.**—This mine and mill, near Virginia City, are now crushing 30 tons of ore daily. Electric power is transmitted from the company's plant at Dayton, which has a reserve of 1,000 h.p.

## NEW YORK.

### ULSTER COUNTY.

**Ellenville Zinc Mining Company.**—Machinery for the mine at Ellenville has arrived. The foundations were already in.

## NORTH CAROLINA.

### ROWAN COUNTY.

**Gold Hill Copper Company.**—B. B. Miller, of Salisbury, has been appointed temporary receiver of this company upon application of Salisbury and Gold Hill creditors.

## OREGON.

(From Our Special Correspondent.)

A Mines Protective Association has been organized in Eastern Oregon for the purpose of aiding mine operators against the encroachments of sheepmen. Owing to the ravages of sheep there is no provender left even for a single horse, the sheep eating everything to the roots.

### BAKER COUNTY.

**Golconda.**—The management is to install 5 more vanners. The increased power will be taken from the powerhouse at the Columbia mine.

**Virtue.**—A 2,000-ft. hoist and a 20-stamp mill are being erected at this mine near Baker City. The machinery is from the Cumberland mine at Silver City, Idaho.

## PENNSYLVANIA.

**Pennsylvania Railroad Company.**—Coal and coke shipments originating on this company's lines east of Pittsburg and Erie, for the week ending August 8, and year, since January, are officially reported as below, in short tons:

Anthracite .....	79,809	2,771,190
Bituminous .....	534,905	16,566,659
Total coal .....	614,714	19,337,849
Coke .....	182,331	6,003,888
Total .....	797,045	25,341,737

Compared with last year the shipments since January show an increase of 2,203,043 tons coal, and 87,412 tons coke; a total of 2,290,455 tons, or nearly 10 per cent.

### ANTHRACITE COAL.

M. W. O'Boyle and John H. Foy, of Pittston; W. W. Jackson, of Dushore; Richard J. Walsh, of Wilkes-Barre, and associates have organized a company with a capital of \$160,000, which will erect a breaker, develop and operate a coal property in the Bernice field. The company expects to start shipments January, 1904, and have an annual tonnage of about 150,000 tons. The quality of the coal is the same as that produced by the Connell Anthracite Mining Company.

**Crescent Mining Company.**—This company, of Lititz, is preparing to mine coal on its property at Elstonsville. The coal is of the Lykens valley quality.

**Lehigh & Wilkes-Barre Company.**—This company's Hollenbeck mine at Wilkes-Barre, has suspended operations temporarily for repairs.

### BITUMINOUS COAL.

George and Augustus Ingham, of the Consolidated Stone and Mining Company, of New Castle, have purchased 60 acres of coal land near Rock Point, and will develop at once.

**Erie Coal and Coke Company.**—Black & Baird have sold the Keystone coal works near Hilliard, on the Bessemer & Lake Erie Railroad, to this company, a newly formed corporation, for \$50,000. The plant is being equipped with rope haulage and considerable new machinery. The output of the plant is about 300 tons per day, but this will be increased to 1,000 tons.

## UTAH.

### BEAVER COUNTY.

(From Our Special Correspondent.)

**Blue Acre Copper.**—The annual report of managing director Henry M. Crowther shows that during the year preceding July 1 the company expended something over \$42,000 in development work.

**Majestic Copper.**—The management expects to have the smelter in readiness to be blown in by the last week in August. The matter of building railway spurs to the various mines of the corporation has not been fully settled.

**Newhouse Mines and Smelters Company.**—Forty men are at work digging trenches and reservoirs for the waterworks system, which will supply the mills, smelter and town of Newhouse, to be built in the near future, near the Cactus mine.

**Royal Copper.**—Two Fairbanks, Morse & Company's gasoline engines have been delivered for use at the Montreal group.

### JOELE COUNTY.

(From Our Special Correspondent.)

**Eureka-Ophir.**—This Dry Canyon property is shipping. Two carloads were marketed this week. One of them averaged 19.2 per cent copper, 12 oz. silver, and 12 per cent lead.

### JUAB COUNTY.

(From Our Special Correspondent.)

**Mammoth.**—The management is endeavoring to secure a rate of \$6.50 for transportation and smelter charges.

**Yankee Consolidated.**—At the annual meeting on August 3 the old board of directors was re-elected and organized as follows: President, John E. Dubois; vice-president, J. E. Frick; secretary and treasurer, L. E. Amsden; C. Edwards and J. E. Merrill, directors. The company ended the fiscal year with a cash balance on hand of over \$20,000 while at the beginning there was an overdraft of a little over \$1,000. During the year preceding July 1 there were marketed 5,373 tons of first class ore, at an average of \$16.66 per ton net, bringing \$89,322.23. During the year 3,059 tons of second class ore were marketed, for \$13,885, or \$4.28 per ton net. The superintendent's report indicated that the physical condition of the mine has improved.

### SALT LAKE COUNTY.

(From Our Special Correspondent.)

**Bingham Consolidated Smelter.**—The copper bullion shipments for the week ending August 7 amounted to four cars, 240,100 lbs.

**Utah Consolidated Smelter.**—Shipments of copper bullion for the week ending August 7 amounted to four cars, 24,000 lbs.

**Utah Copper Company.**—Ground has been broken for the new concentrator at Bingham.

**United States Smelter.**—Copper bullion shipments for the week ending August 7 aggregated three cars, 180,100 lbs.

### SUMMIT COUNTY.

(From Our Special Correspondent.)

**Ontario.**—This company is excavating for its new mill. The exact capacity of the plant, according to superintendent C. L. Rood, of Salt Lake, has not been determined, but at first will probably be 250 tons daily. The plant will be patterned after some of the other successful mills in Park City.

## WASHINGTON.

(From Our Special Correspondent.)

At the Spokane Indian reservation, in Washington, many prospectors located claims against the wish of the Indian Agent, and the United States Circuit Court has now upheld him in expelling the miners who had contended they could locate claims previous to the President's proclamation withdrawing the land.

### FERRY COUNTY.

(From Our Special Correspondent.)

During the week ending August 8, 990 tons of ore were shipped from the mines of Republic to the smelters, as follows: Lone Pine Surprise, 150 tons; Trade Dollar, 120 tons both to the Hall Mines smelter, Nelson, B. C.; Quip to Tacoma smelter, 420 tons. The Zala M. at Sheridan shipped to Crofton, B. C., smelter of the Northwestern Smelting Company, 150 tons.

**Belcher.**—The No. 3 tunnel is in over 200 ft. H. W. Warrington, superintendent of the Republic & Kettle River Railway, and W. A. Williams, assistant superintendent of the Granby smelter, report the ore to be a very large deposit of compact sulphide ore. It carries copper and gold.

**Little Chester.**—This claim has been bonded by A. E. Patrick, a former owner, who is the organizer of a joint stock company. The mine is at Sheridan camp.

**Lone Pine-Surprise Consolidated Gold Mining Company.**—Work is suspended, and an effort is being made to reorganize the company on an assessment basis, 1c. per share to be paid in first thing. The Lone Pine workings are exhausted above the adit level, after having yielded about 6,000 tons of marketable ore, which was sold at the smelters. There seems no alternative but to sink deeper, and machinery will be needed.

**Mountain Lion Gold Mining Company.**—It is believed that the control of this company has passed into the hands of a Canadian syndicate, through the instrumentality of A. E. Palmer, of Spokane. A. S. Miner, president of the Granby Smelting Company, is mentioned as having succeeded Johnathan Bourne, of Portland, Ore., as president of the company, and it is stated that the Mountain Lion ore will be sent to the Granby smelter, there being about 18,000 tons broken down in the mine and lying on the dump.

**Tom Thumb Gold Mining Company.**—The management has changed, and there is reason to believe that work will be shortly resumed.

**Zala M.**—The winze below the 300-ft. level is down 40 ft. and shows a 3½-ft. streak of good ore.

## OKANOGAN COUNTY.

(From Our Special Correspondent.)

**Bodie.**—Work has been resumed at Bodie after a short idleness.

**Night Hawk.**—Myron J. Church, superintendent, after a two months' vacation has returned, accompanied by his father, J. S. Church, of Milwaukee, the president of the company.

## WEST VIRGINIA.

## LOGAN COUNTY.

**United States Coal and Oil Company.**—This company is developing its Island Creek coal mines and constructing a complete modern plant, on its 30,000 acres. A saw mill and planing mill are in operation. A 7-ft. vein of coal is said to underlie the entire property.

## FOREIGN MINING NEWS.

## CANADA.

## BRITISH COLUMBIA—BOUNDARY DISTRICT.

**Granby Smelter.**—The close-down of the smelter, for the purpose of connecting the two new furnaces, will occur about September 1 for ten days.

## BRITISH COLUMBIA—ROSSLAND DISTRICT.

**Rossland Ore Shipments.**—Ore shipments for the week ending August 15 are larger than for some time, as follows: Le Roi, 4,830; Centre Star, 1,680; War Eagle, 1,410; Kootenay, 300; Le Roi No. 2, 330; Jumbo, 150; Giant, 20; Iron Horse, 40. Week, 8,750. Year to date, 233,967. The Iron Horse shipped for the first time since 1897. The consignment is a smelter test.

## BRITISH COLUMBIA—VANCOUVER ISLAND.

**Northwestern Smelting and Refining Company.**—This company is reported operating the Leonora mine, on Mount Sicker. Gold, silver and copper ores are received from Alaska for the smelter at Crofton.

## MINING STOCKS.

(Full quotations are given on pages 298 and 299.)

New York. Aug. 18.

The stock market has made an upward turn, and the movement of prices shows that some investment orders are coming in. Who the buyers are cannot be conjectured by the sales, although the daily transactions are larger than they have been. In the copper group a better feeling is manifest, and a certain faction which has heretofore been bullish is again leading these securities hopefully. Amalgamated copper gained 5½ points to \$50 on August 14, when over 90,000 shares were reported sold. Three days later the transactions were lessened by fully 27,000 shares, but the price was strengthened to \$50½, and on August 18 \$52¾ was quoted. Anaconda was sympathetically strong, advancing from \$19 to \$20½. On curb the coppers were moderately dealt in, owing to the absence on vacation of the coterie that usually supports this group. Greene Consolidated was disheartened one day by the rumor that it had been officially decided to declare no more dividends this year. On August 14 the stock sold at \$18.50, but a contradiction of this report raised the price again to \$19. Tennessee shows very small sales, as the holders are mostly insiders who receive good dividends on their stock. Sales this week have been made at \$28.75@29.50. United, of Montana, is almost featureless at \$16¼@16½. British Columbia is another silent stock, because \$3¼ has been the basis for small sales for several days past.

Gold and silver stocks are anything but active; in fact, prices are low, especially for the Cripple Creeks.

owing to the miners' strike there. Portland, of Cripple Creek, control of which, it is reported, has passed into the hands of Eastern people, is quoted at \$1.15, while Elkton hangs around 40c. The Comstocks, with their new crop of assessments, look feeble. Consolidated California & Virginia sold at \$1.50@1.40; Ophir, \$1.60@1.50; Best & Belcher, \$1.70, and Caledonia at \$1.40.

A surprise was sprung on the market this week by the declaration of a \$5 quarterly dividend on Standard Oil stock. This dividend is \$2 less than was paid in the quarter for June, but it is the same as a year ago. Thus far this year the company has announced 32 per cent, and supposing the dividend for the next quarter will be the same as the present, \$5, the total for 1903 will be 37 per cent, or 8 per cent less than 1902 and 11 per cent less than 1901 and 1900. Consequently the value of Standard Oil shares has weakened around \$600.

An auction sale of 1,000 shares Yaqui Copper Company, par \$10, was recently reported at \$5 per share.

Colorado Springs. Aug. 14.

(From Our Special Correspondent.)

Strange as it may seem, the market was exceptionally good all week, but to-day everything went to pieces owing to the miners' strike. C. K. & N. opened at 19¼ c., but closed in bad form to-day with 17c. bid and 19c. asked. Elkton sold at 40½@40c., closing to-day soft at 39¾c. bid and no sales. El Paso sold the first of the week at 58½c., but slumped to 54c., recovering to 55c. to-day. Anaconda sold at 11½@11¼c., closing at 10½c. Isabella brought 11c@10½c., closing at 10c. bid and 10¾c. asked. Moon Anchor sold at 8½@9c. and back to 8¾c., closing at 8½c. bid and 9c. asked. Portland changed hands at \$1.21, then slumped violently to \$1.16 bid, and \$1.25 asked, closing at \$1.20@1.29. Concerning the press reports of the sale of the control of this stock this week to a New York syndicate, the facts are that an option has been given to the Eastern parties at a figure under \$2 a share, as President Burns has had his entire holdings up as collateral for a bond of \$500,000 which was demanded by the district court of Iowa in the Doyle-Burus suit. Two leading bankers of this city went on his security down to \$1.25 a share; this point was touched several times recently and the bankers threatened to sell. The deal on the option will be practically a forced sale, which accounts for the low figure.

Salt Lake City. Aug. 15.

(From Our Special Correspondent.)

The total sales made on the stock exchange during the week ending August 15 aggregated \$49,278, the equivalent of 122,785 shares. The market has been slow; earlier in the year a \$50,000 business in a day would have been considered poor. The trading has been confined mostly to local buyers and none of the investment stocks participated to any great extent. Considerable New York Bonanza was transferred and for a day or two there was quite a stiff demand for it on the strength of a reported strike. Ore was found on the 300-ft. level, but it failed to hold out. Altogether 22,900 shares were sold. There was an unloading of California, 18,000 shares, occasioned by the closing down of the property. Consolidated Mercur held firm all through the week. Daly-West had little call; the dividend of \$108,000 was distributed to-day. Lower Mammoth closed lower after the transfer of 4,300 shares. Sacramento stiffened during the week, but lost all that it gained; the same can be said of Daly-Judge.

San Francisco. Aug. 15.

(From Our Special Correspondent.)

Moderate sales and easy prices this week indicated that speculation has been quiet in the Comstock shares.

Some quotations noted near the close were: Consolidated California and Virginia, \$1.30; Ophir, \$1.60; Mexican, \$1.15; Caledonia, \$1.30; Best & Belcher, \$1.85, and Confidence, \$1.05.

The sworn statements of the mining companies, as filed in their office this week in compliance with law, show cash on hand August 1 as follows, with all expenses paid, unless otherwise mentioned: Alta, \$199.80, with indebtedness of \$1,479.50; Alpha Consolidated, \$3,529.96; Andes, \$510; Belcher, \$6,857, with indebtedness of \$1,000 and mine expenses for July partly paid; Best & Belcher, \$8,805, with bills payable for \$5,000; Bullion, \$1,000; Caledonia (Gold Hill), \$5,614, with mine expenses for July unpaid; Consolidated California & Virginia, \$428, with two railroad carloads of ore in process of settlement and an indebtedness at the bank of \$10,500; Crown Point, \$2,353, with mine expenses for July partly paid; Challenge Consolidated, \$806; Consolidated Imperial, \$1,211; Chollar, \$305; Confidence, \$2,854, with mine expenses for July unpaid; Consolidated New York,

\$4,535, with balance of an assessment to be collected; Exchequer, \$315; Gould & Curry, \$4,617, with bills receivable of \$5,000; Hale & Norcross, \$136, with an indebtedness of \$3,230; Justice, \$6,480; Lady Washington, \$110, with indebtedness of \$510; Mexican, \$1,357; Overman, \$229, with an indebtedness to the treasurer of \$1,067 and mine expenses for July unpaid; Potosi, \$861; Savage, \$110, with an indebtedness of \$2,186; Seg. Belcher, \$3,901; Silver Hill, \$19,123, with bullion valued at \$3,006 in transit; Sierra Nevada, \$204.64; Standard Consolidated, \$100,708, with July expenses at the mine and bullion clean-up to be accounted for; Syndicate, \$2,635; Union Consolidated, \$3,028; Utah Consolidated, \$283, with balance of assessment to be collected. The Ophir Mining Company had an indebtedness of \$879.

Assessments are being collected by the following companies: Alta, 5c.; Andes, 10c.; Consolidated California and Virginia, 25c.; Exchequer, 3c.; Hale & Norcross, 10c.; Lady Washington, 5c.; Overman, 10c.; Potosi, 10c.; Savage, 10c.; Segregated Belcher & Mides, 5c.; Sierra Nevada, 10c.

Business on the San Francisco and Tonopah Exchange has been active. Among the sales made were: Montana-Tonopah, at \$1.07½@1.15; Tonopah North Star, 50@52c., and Tonopah-California, at 37c.

Oil shares were almost featureless, Home selling around \$2.80, Pittsburg 40c., Independence 17c., and Occidental 19c.

## COAL TRADE REVIEW

New York, Aug. 20.

## ANTHRACITE.

The anthracite coal trade has lost much of its activity, though the output from the mines continues heavy, and all, or nearly all, the output except for steam sizes is going into the hands of dealers and consumers. The mines continue to work about full time. The appointment of Mr. Carroll D. Wright as umpire for the Conciliation Committee of miners and operators removes any cause for complaint that the miners had at delay in the settlement of disputes submitted to the committee.

There were many rumors of transfers of holdings of anthracite securities during the recent semi-panic on the Stock Exchange. The reliability of most of the rumors was open to doubt, but it is undoubtedly true that control of the Reading Company has passed to the Baltimore & Ohio Railroad, representing the Pennsylvania Railroad, and to the Lake Shore, representing the Vanderbilts. As is well known, Kuhn & Loeb & Co. purchased almost a controlling interest in Reading last year, and their purchase was divided between the Baltimore & Ohio and the Lake Shore. The recent prices of Reading stock no doubt induced the two roads to make their control certain.

In the West the movement of coal to Upper Lake ports continues liberal. Supplies have accumulated on the docks at the head of the lakes, though there is yet a good demand from country yards. In Chicago territory the anthracite market is quieter than last week. Receipts by lake are still heavy. Dealers are doing their best to get consumers to purchase immediately, but reports indicate that those consumers who might buy now have, as a rule, already good supplies. Along the Lower Lakes and in Canadian territory, anthracite is arriving freely, and those dealers who duplicated orders some time ago in fear of an interruption of shipments from the mines are now getting coal faster than they can conveniently handle it. In the line trade quietness prevails. Along the Atlantic seaboard demand varies. At New York harbor points and at Philadelphia the market remains dull, particularly for the steam sizes. At points beyond Cape Cod, however, buying is still of good volume, and sales agents report that business from that territory will be good for a month. It is probably safe to say, taking all anthracite consuming territory, that there is now in the possession of actual consumers twice as much coal as on the corresponding date of any year in the history of the trade. With prices at their winter basis on September, trade in a wholesale way during September may be quiet, with little improvement until cold weather comes.

## BITUMINOUS.

There is little, if any, improvement in demand in the Atlantic seaboard bituminous trade, and the ordinary grades of Clearfield continue to sell at about \$2.60, f. o. b. New York harbor shipping port. The labor troubles in various industries, the closing of many cotton mills, and abundant water power for those manufacturing plants using it, all combine to restrict consumption. The movement of coal from the mines is still hampered by the car supply. The producers of the higher grades of coal feel the shortage most, as producers of the lower grades are able to get forward all that the market needs. Producers of the higher grades, who are in some cases behind on contract shipments, have been making strenuous efforts to get the railroads to give some relief, realizing that



worse conditions as to car supply will probably prevail this fall, and that it is necessary to get as much coal forward as possible upon contracts to prevent worse trouble later.

Trade in the far East is better than in any other territory, in spite of liberal purchases early in the season. The shoal water ports will soon have to make sure that they have coal enough to carry them through the winter. Along Long Island Sound trade is still quiet, but demand shows a slight increase.

At New York harbor points there is little doing, though the amount of coal received in a regular way continues up to the average. The plentiful supply of the small sizes of anthracite affects New York harbor much more than points eastward. In the all-rail trade conditions are unchanged. Consumers are not taking quite the full amounts called for by their contracts, and there are reports of coal being offered at low mine prices.

Car supply at the mines continues very variable, ranging around 35 or 40 per cent. Transportations from the mines to tide-water continues good, with coal running through in five or six days. In the coastwise vessel market vessels are now in fair supply, both large and small craft. Freight rates are as last week. We quote, from Philadelphia: Boston, Salem and Portland, 90 to 95c.; Providence, New Bedford and Long Island Sound, 75c. Rates from the lower ports are 5c. higher. From New York harbor rates for larger vessels are 80c. and 85c. to Boston, Salem and Portland, and 65c. to Providence, New Bedford and Long Island Sound, while for smaller craft rates are \$1.10 and \$1.15 to Boston, Salem and Portland.

**Birmingham.** Aug. 17.

(From Our Special Correspondent.)

Coal production in Alabama is improving slowly but steadily. There is demand for every ton mined. Shipments to Pensacola and Mobile have been heavy and steady.

The Board of Arbitration, which is considering the differences between the operators and the miners, has been at work for a week. Judge George Gray, of Delaware, is chairman. The miners introduced but few witnesses, but submitted formal demands for a 5c. advancing in mining wages, a corresponding increase in the day laborers' pay, a semi-monthly pay day and an 8-hour day and attacked the company store or commissary system. The operators ask that the board decide a complaint as to differentials on pick and machine mining, the differentials as to Pratt mines and other mines in the State, minimum days to be worked in each month, prices to be paid for dead or narrow work and a readjustment of the day labor wage. During the investigation it was shown by the operators that the miners as a whole did not work 20 days a month, the men laying off at every opportunity, but where a miner was thrifty and worked steadily, he could earn nearly \$100 per month. Tables of earnings at several mines were introduced.

Announcement is made that the Lancaster Coal and Iron Company of Pennsylvania, has purchased the properties of the Palos Coal and Coke Company about 20 miles west of Birmingham on the Frisco System. There are 2,000 acres of land and 2 mines are in full operation. The deal involved a cash transaction of \$100,000. The new company will increase the output.

**Chicago.** Aug. 17.

(From Our Special Correspondent.)

The anthracite market is now quiet and steady; dullness has not set in, but the rush is apparently over for good. Stocks have accumulated in the bins of consumers and the yards of dealers and trading is down to a normal basis once more, with the results of the great strike a thing of the past, so far as western territory is concerned. There is much activity on the part of many dealers to sell anthracite, and efforts are being made through retailers to urge consumers who have not laid in supplies to do so at once. Country trade, however, seems hardly likely to be revived by this means, as reports indicate that consumers generally have supplies universally laid in. In the cities public confidence in the ability to get uninterrupted supplies is strong to all appearances. It is the judgment of leading wholesalers that there will be few fluctuations of the anthracite business from now until cold weather.

Bituminous trade is also quiet, except in the case of Hocking, which advanced 25c. at the end of last week, and for which there was a brisk demand in the closing days of the old prices. This advance will divert some trade in Hocking, but not a great deal, in the opinion of dealers in bituminous. Hocking is probably the steadiest of all grades in the Chicago market. Youghiogbeny continues at \$3.50@3.70, with a fair demand. Indiana hock has advanced to \$3.00@3.25, and Indiana and Illinois lump to \$2.25@2.75; screenings are at \$1.00@1.40. The demand for western bituminous, though far from brisk, is increasing

and is clearing the tracks of demurrage coal. Smokeless is as dull as last week and is selling at \$3.40@3.60; its popularity does not advance, despite stringent city regulations concerning smoke and the fact that last winter it gained many thousands of new users.

**Cleveland.** Aug. 18.

(From Our Special Correspondent.)

In this territory the steam coal market is extremely weak due to slack demand and the readiness with which the railroads move coal. Buying for the fall is beginning, however, and stocks are being laid in against the time of shorter supply. This buying while a material aid to the market has not strengthened quotations yet. The movement is still very free. Domestic buying has taken a spurt of late and is beginning to be very heavy, with prices inclined upward. The Massillon district is leading this increase in prices.

The lake situation is steady with a movement heavier than it has ever been. The conservative policy of the shippers during the summer has done much to improve conditions. Instead of fighting vessel owners on the question of rates, that question has been laid aside and the swift movement of coal is considered more important than the temporary gain of a few cents a ton in the cost of transportation. This is expected to reduce the price at which coal is carried in the fall by leaving the shippers a less volume to move then. Such a policy will also act on the general situation, giving the domestic consumer a greater quantity of coal and therefore easing up prices here. Lake rates continue to be 50c. from Ohio ports to Milwaukee and 40c. from Ohio to Lake Superior.

**Pittsburg.** Aug. 18.

(From Our Special Correspondent.)

Coal.—The only change in the coal market is a cut in the price of slack which is now offered at 70c. while the contract price is 90c. This is due to the closing of a large number of iron and steel mills in this district for repairs and from other causes. The prices established on April 1 for all grades of lump coal are firmly held. Many mines are still idle or operating but one or two days a week owing to the shortage of railroad cars. Shipments to the lakes for the northwestern trade are being seriously retarded on this account. All the river coal mines are in full operation.

Connellsville Coke.—Production continues to drop and it is estimated that the tonnage this week will not reach 240,000 tons. Furnace coke, the standard Connellsville grade, is firm at \$3, while foundry is a trifle weaker, being quoted at \$3.25@3.50. The Courier in its last report gives the production for the previous week of standard coke at 245,965 tons, a falling off of nearly 10,000 tons in one week. The shipments aggregated 11,321 cars distributed as follows: To Pittsburg and river tipples, 4,100 cars; to points west of Pittsburg, 5,122 cars; to points east of Connellsville, 1,692 cars. This was a decrease of 976 cars compared with the shipments of the previous week. In the lower Connellsville region the production was 51,900 tons and the shipments were 2,221 cars.

**San Francisco.** Aug. 11.

(From Our Special Correspondent.)

Trading is quiet, owing to the continued warm weather, and the extended use of oil as fuel.

Yard prices for Pacific Coast coal to dealers in large lots are as follows: Wellington and New Wellington, \$8; Richmond, \$7.50; Roslyn, \$7; Seattle, \$6.50; Bryant, \$6.50; Coos Bay, \$5.50; Rocky Mountain coals in large lots, ex-car, are quoted at \$14 for Colorado anthracite and \$8.50 for Utah and Wyoming coals. Eastern coal is scarce, but quotations remain nominally at \$14 for Pennsylvania anthracite and \$13 for Cumberland in cargo lots. Foreign coal sells in large lots as follows: Welsh anthracite, \$13; cannel, \$8.50; Brymho and Wallsend, \$7.50.

**Foreign Coal Trade.** Aug. 19.

Several circumstances have affected the foreign coal market rather favorably. According to a press dispatch efforts are being made to create a market for Pittsburgh coal in Europe and something may be done there. Of late, the export trade of the United States has been curtailed by local strikes and the heavy home consumption. What effect this new Pittsburgh trade may have on the situation can not be conjectured at this time, as it is said there are not enough tow-boats in the service of miners to afford sufficient transportation facilities for export in the quantity reported.

Exports of fuel from Germany for the half-year ending June 30 were as below, in metric tons:

	1902.	1903.	Changes.
Coal .....	7,147,393	8,187,421	I. 1,040,028
Brown coal.....	10,177	12,593	I. 2,416
Coke .....	925,780	1,253,224	I. 327,444
Totals .....	8,083,350	9,453,238	I. 1,369,888

The only exports to the United States this year were 11,045 tons of coke.

Imports of fuel into Germany for the half-year ending June 30 were, in metric tons:

	1902.	1903.	Changes.
Coal .....	2,826,384	3,087,147	I. 260,763
Brown coal.....	3,834,806	3,881,188	I. 46,382
Coke .....	177,933	206,934	I. 29,001
Totals .....	6,839,123	7,175,269	I. 336,146

No coal was received from the United States this year, and only 151 tons last year.

Messrs. Hull, Blyth & Co., of Cardiff and London, report under date of August 8 that the general tone of the Welsh coal market is quiet but firm. Best smalls are slightly better. Prices are: Best Welsh coal, \$3.90@3.96; seconds, \$3.78; thirds, \$3.60; dry coals, \$3.30; best Monmouthshire semi-bituminous, \$3.36@3.48; seconds, \$3.30; best small steam coal, \$2.22; seconds, \$2.10; other sorts, \$1.92.

The above prices for Cardiff coal are all f. o. b., Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days less 2½ per cent discount.

The outward freight market remains very quiet with little business passing at recent rates. Some rates are: Marseilles, \$1.20; Genoa, \$1.14; Naples, \$1.14; Las Palmas, \$1.38; St. Vincent, \$1.30; Rio Janeiro, \$2.28; Santos, \$2.52; Buenos Ayres, \$1.92.

**IRON TRADE REVIEW.**

NEW YORK, Aug. 19.

Nothing has occurred during the week to disturb the quiet that prevails in most branches of the iron and steel industry, and there are no indications of immediate improvement in prices. Buyers of pig iron and billets and of nearly all finished products are still inclined to delay placing orders, hoping for price concessions, and a cut in pig iron prices of \$1.50 by the Southern furnaces indicates a possibility of lower prices in other markets. The poor demand for scrap is of interest. In the Lake ore trade indications multiply that there will be less activity at the mines this fall than at the corresponding period in several years.

Many mills are idle in the Pittsburg district, most of them because of needed repairs. Conditions last year were exceptional and some mills have now been running full capacity for two years. Consequently a lot of machinery must be overhauled, while employees are not averse to a short vacation.

In finished products, pipes and tubes and tin plates are in best demand. Labor troubles in the building trades still affect the eastern demand for structural material.

Exports of pig iron from Germany for the six months ending June 30 were 248,428 metric tons, against 136,651 tons in the first half of 1902; an increase of 111,777 tons this year. The increase was chiefly due to sales made in the United States. Exports of all kinds of iron and steel, other than pig iron, were 1,582,373 metric tons, against 1,367,090 tons in the first half of 1902; an increase of 215,483 tons, or 15.8 per cent.

**Birmingham.** August 17.

(From Our Special Correspondent.)

There is a slight improvement in the pig iron market in Alabama, but orders are still in small lots. The prices fixed at Chicago several weeks since are maintained. There are rumors that No. 2 foundry, at \$12, can be had, but efforts to locate the sale of any quantity of iron at this price have been fruitless.

The blowing in of the new furnace of the Central Coal and Iron Company at Holten, in Tuscaloosa County has added to the daily output. The Woodward Iron Company is again manufacturing iron and during this week the Alabama Consolidated Coal and Iron Company will begin operating its new furnace at Gadsden. It is expected that the daily production will be something like 250 tons. The Republic Iron and Steel Company will soon blow in its No. 2 furnace at Thomas, just repaired. The furnace plant at Thomas has been equipped with skip hoists, making four furnaces in the State so equipped.

There is quite a large amount of iron in the yards. Probably not less than 150,000 tons could be secured with ease about the Birmingham district. One company estimates its accumulation at 80,000 tons.

The following quotations are given: No. 1, foundry, \$14; No. 2, \$13.50; No. 3, \$13; No. 4, \$12.50; gray forge, \$12; No. 1, soft, \$14; No. 2, \$13.50.

The Bessemer rolling mills owned and operated by the Tennessee Coal, Iron and Railroad Company.



are working, after five weeks' idleness. The rolling mills of the Weller Foundry and Forge Company at Anniston have also resumed. There is not a brisk demand for finished iron and steel, and prices are not very strong. The steel plant of the Tennessee Coal, Iron and Railroad Company at Ensley, and the improvements about the steel mill, including the converter, is being pushed.

BY TELEGRAPH.

The Southern Furnace Association has cut pig iron prices \$1.50 per ton. No. 3 foundry is now quoted at \$11.50 per ton at the furnace.

Chicago. Aug. 17.

(From Our Special Correspondent.)

The slight increase in the pig iron sales last week has continued, but does not seem inclined to grow; it is better than no increase, agents say, and the general outlook seems better than a month ago, but prices have not advanced. Though the nominal quotation of \$13.50 for Southern No. 2 continues, sales have been made at as low as \$12 Birmingham, or \$16.35 Chicago, within the week. Inquiries are more numerous than they have been for two months or more, and in this there is ground for optimism, but neither furnaces nor foundries live on inquiries that do not result in orders. Users of iron seem inclined to stick to their policy of buying on short delivery; on the larger orders now coming in the demand is for delivery as soon as possible. The probability is, from all signs, that as soon as users realize that the bottom of the market has been found—which will happen as soon as the rise from the bottom becomes decided—there will be a general rush for the band-wagon, and prices will mount rapidly.

Coke continues in good supply, at \$5.50@6 for first class foundry.

Cleveland. Aug. 18.

(From Our Special Correspondent.)

**Iron Ore.**—Nothing has been done toward further sales. The indication is that the movement will be much lighter than last year because of the small engagements of the furnace people with ore companies. The price has not changed from \$4.50 for bessemer old range and \$4 for bessemer Mesabi. The lake freight situation is unchanged and steady, wild rates holding firm at old figures, 80c. from Duluth; 72½c. from Marquette; and 60c. from Escanaba, most all of the wild ore having been moved from the latter port.

**Pig Iron.**—Selling of foundry for spot delivery is the only activity and even that is slight. The price holds firm, however, despite efforts to lower the quotation. No. 2 foundry sells at \$17 in the Valley. Until the southern furnaces settle their price controversy, it will hardly be possible to fix prices definitely in the north and no big sales are expected in the meantime. Bessemer pig is quiet at present. There have been reports of sales for fourth quarter delivery, but these have not materialized or have been of very small moment. Meanwhile the market holds steady at old prices. The nominal quotation is \$18 in the Valleys. Nothing is being done in basic and the market is easy.

The production of pig iron in the Valley is heavy, only a few of the furnaces being out for re-lining. The coke supply is good, but is threatened by a ear shortage.

**Finished Material.**—The finished material market is not at all lively. Prices continue to sag and mills are looking for business, some even suspending operations because of lack of orders. Sheets have been in fair demand only, with many of the mills out of service, and others able to make immediate delivery on all contracts presented. The run of orders is comparatively heavy nevertheless, and prices hold at the old basis of 3.05c. for No. 27 black sheets out of stock, and 2.75c. for the same gauge at the mill in ear lots. Plates are weak, with all mills looking for orders. The price holds steady, as it has been previously quoted, at 1.60c., Pittsburg, from the mills. The demand for structural is still light. The buying is entirely from the mill and former prices prevail, namely 1.60c., Pittsburg, from the mill, and 2.15c. out of stock. Bar iron sales are beginning to be a little heavier and the market is firmer. Mills are meeting local conditions nevertheless, and the price sags. The general quotation is 1.60c., Cleveland, but competition is being met on the basis of 1.55c. at the mill. Bar steel prices hold steady, although frequent efforts have been made to break them. They are 1.60c., Pittsburg, for bessemer, and 1.70c., Pittsburg, for open hearth. Buying is light. There has been some talk of a reduction in billet prices through competition. This is unfounded. The market is steady but inactive.

**Old Material.**—The market has been weak and sagging, because no business is in sight. Prices have steadily declined for months and it does not seem possible that bottom has been reached. Nothing is done to make new quotations possible.

New York. Aug. 19.

**Pig Iron.**—Buying continues of a band-to-mouth order, and is nearly all in small lots. For Northern iron at tidewater we quote: No. 1X foundry, \$17.25 @ \$17.75; No. 2X, \$16.50 @ \$17, while No. 2 plain can be had for 50c. less; gray forge, \$15.50 @ \$16. For Southern iron, on dock, quotations are: No. 1 foundry, \$17; No. 2, \$16.25; No. 3, \$15.75.

**Plates.**—The financial difficulties of certain shipyards and more labor troubles have combined to keep down local buying, and the market is quiet. Sheared plates are quoted as follows: Tank, ¼-in. and heavier, 1.80 @ 2c.; flange, 2 @ 2.05c.; marine, 2.10 @ 2.20c.

**Bar Iron and Steel.**—There is little change. Prices for large lots on dock remain: Refined bars, 1.80 @ 1.90c.; soft steel bars, 1.75 @ 1.90c. Trade is chiefly of a retail order.

**Steel Rails.**—The quotations remains \$28 for standard sections, f. o. b. mills; light rails, \$33 @ \$36, according to weight. Relaying rails are \$28 @ \$33 for heavy sections and \$33 @ \$38 for light sections.

**Structural Material.**—The building trades are still suffering from labor troubles, and demand locally is light. For large lots at tidewater, nominal quotations continue 1.75 @ 2c. for beams, angles, channels and tees. The usual advance is asked for small lots out of stock.

Philadelphia. Aug. 19.

(From Our Special Correspondent.)

**Pig Iron.**—Reports from points in eastern and middle Pennsylvania show that there is more pig iron selling, although very few of the individual purchases are large. Prices are still shaded, notwithstanding statements to the contrary, as some pig iron makers are snapping up offers for iron at prices which strictly interpreted, gives the market a declining tendency. On the other hand, there are a number of big, strong concerns holding iron for certain prices and refusing business that need not be transacted at the asking price. A fair amount of forge iron has been purchased and quite a number of mills are now in the market. No. 2 foundry is inquired for more than any other kind and sales have been made at \$16.75, although there are irons which could not be had at any such figure. No. 1 foundry is quoted at \$18 and as high as \$18.50; No. 2 plain, \$16.25 @ 16.50; standard mill iron \$16.50 @ 16.25; basic, \$16.

**Steel Billets.**—More business is reported in steel billets this week than for some time, but careful inquiry fails to bring the rumors down to actual figures and transactions. Some of the buying that has been reported has been rather by neither buyers or sellers being willing to speak of transactions. A fair quotation for billets is \$28 f. o. b. mill.

**Merchant Bar.**—The market does not improve, in fact is dragging; four or five mills are pretty well loaded up, but it is believed they secured their big orders by very sharp concessions. Bars are quoted at from 1.55 @ 1.70c. for car lots and 1.80 @ 1.90c. in small lots. Steel bars in large lots are quoted at 1.75c. and in small lots 2c.

**Sheets.**—There is a fair business in sheet iron and manufacturers and store officials say they have nothing to complain about. Prices are steady.

**Skelp Iron.**—Two or three inquiries for skelp iron were taken at concessions and hurried off to the mills.

**Merchant Steel.**—Only a small amount of business can be discovered this week. Mill agents say there is more inquiry and more disposition to buy.

**Pipes and Tubes.**—Tubes are very strong and active and more business is coming in than is promptly placed. Many buyers are insisting on very early deliveries and they are having difficulty in obtaining the satisfaction. Pipes are very strong and a good business is in sight.

**Plates.**—There is nothing new, although a fair tonnage made up of small orders is being placed. There is a rumor that the rush for steel ear building is not as great as it has been and that within two or three months the plate iron market will feel the effects but there are no concessions heard of though buyers intimate there will be as soon as the large orders which will surely come in September, are submitted.

**Structural Material.**—Beams, angles and channels are quoted at 1.73½ @ 1.80c. There is very little new business, but the usual statements are made that the outlook is all right. Mills are working full time and appear to have places for all the material they can turn out.

**Steel Rails.**—The only business mentioned in steel rails since the last report is the placing of a fair number of orders for light sections. These quotations range as high as \$40.

**Old Rails.**—Old steel rails have dropped to \$18 and old iron rails to \$19.50.

**Scrap.**—The scrap market is very dull. No heavy steel scrap has been sold and sales of small lots of cast borings, wrought turnings and No. 2 light scrap

only have been heard of. Heavy steel scrap is quoted at \$18; low phosphorus, \$26.50; choice railroad scrap, \$17.50 @ 18.

Pittsburg. Aug. 18.

(From Our Special Correspondent.)

There is little change in the iron and steel market, but there is nothing to indicate weakness. While the United States Steel Corporation decided not to make any purchase of pig iron at present the failure to buy did not have a depressing effect and higher prices are expected later in the year. There has been some buying of forge and foundry iron, about 15,000 tons having been sold during the week. Bessemer sales were light, not more than 2,000 tons in small lots having been reported. The production of pig iron in the Pittsburg and Valley districts in August will be less than in any month so far this year. To-day 13 blast furnaces are out for repairs, but under present conditions the market can stand the curtailment of production. Gray forge is at the lowest point in a long period, the bulk of the sales having been made at \$16, delivered at Pittsburg. A report that sales were made at a lower rate was not confirmed. Foundry No. 2 is down to \$17.50, but some sales were made at a higher figure. It is not likely that the Steel Corporation will need any outside iron for the third quarter as since the last purchase was made in May it has acquired a half interest in the Clairton Steel Company. No iron will likely be bought for the remaining months in the year until it is absolutely needed. It is reported that the Valley furnaces are well sold up for the fourth quarter and an extensive purchase, or even the buying of from 75,000 to 100,000 tons by the Steel Corporation, will prevent any further decline and establish prices for the rest of the year on a higher basis than has been indicated in the sales of the past few weeks.

More mills are idle in this district than in the corresponding period last year, but no more than were out of operation in previous years in mid-summer. In 1902, however, conditions were unusual and the present shutting down of mills is in most instances for necessary repairs. The greatest dullness has been in structural material and plates, labor troubles being responsible. The slackness in merchant steel bars is caused by the agricultural implement manufacturers delaying the placing of orders in hopes of getting price concessions. Buying will soon begin and there is no reason to believe that the established price will be shaded. The billet agreement is working smoothly, although the consumption is not equal to the production and there seems to be an opinion in some quarters that an accumulation of billets will result in breaking the price agreement. The tin plate market is in excellent shape. While there has not been much new business this week, many of the mills are two months behind in deliveries. The American Tin Plate Company is keeping all of its mills in full operation and most of the independents are running with orders on the books that will keep them going until October 1. There is no shading from the official price of \$3.80 a box, but in many instances premiums are paid. The Amalgamated Association of Iron, Steel and Tin Workers has not yet declared off the strike at the Port Vue plant of the McKeesport Tin Plate Company. The non-union men at work have not been interfered with during the week and the company is operating its 10 mills in full on three turns.

**Pig Iron.**—The general tone of the pig iron market seems a trifle better. Sales during the week aggregate nearly 15,000 tons, most of which was gray forge, the price being \$16 @ 16.25, Pittsburg. Several thousand tons of foundry No. 2 were sold the minimum price being \$17.50, Pittsburg, some lots bringing \$18 and higher. Sales of bessemer in lots of 200 to 500 tons were made amounting to about 2,000 tons, at \$17.50 @ 18, valley furnaces.

**Steel.**—The demand for bessemer billets is not equal to the supply, but the price of \$27 is firmly maintained. Buying of merchant steel bars is expected to begin soon, the leading barvester interest having failed to get a price concession. Bars are firmly held at 1.60c.

**Sheets.**—There is but little change in the market. Consumers and jobbers are not buying any distance ahead, but some new business was booked during the week. No. 28 gauge black sheets are quoted at 2.75c. and galvanized at 3.85c. but in some cases this rate is shaded to 3.80c.

**Ferro-Manganese.**—English ferro is still quoted at \$49 in larger lots and small lots range from \$51 to \$52.

Cartagena, Spain. Aug. 1.

(Special Report of Barrington & Holt.)

**Iron and Manganiferous Ores.**—Shipments for the week were 7,400 tons dry ore, of which 3,600 tons went to Philadelphia. The ore trade is very flat with little demand for prompt or forward delivery.



except at prices that leave no margin for business. However, some merchants continue to buy poor ores at high prices. Some miners are reducing their output rather than mine at a loss. Mediterranean ore freights are stiffening, and it does not look as if much ore will be shipped during the summer months.

Prices are firm at 6@7s. per ton, f. o. b. shipping port, for ordinary 50 per cent ore; 7s. 3d. @ 7s. 6d. for special low phosphorous; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. 6d. for lump and 9s. 6d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron to 9s. 9d. for 12 manganese and 35 iron.

**CHEMICALS AND MINERALS.**

(See also Prices-Current, Page 300.)

New York, Aug. 19.

A slightly better demand for the important chemicals is noted. Prices, however, are still unsettled by competition. Raw materials continue in their unique position, nitrate of soda having become firmer, while brimstone is unsettled. The question of 1904 contract prices for bleaching powder, and some of the other heavy chemicals that have been selling at a rather low margin of profit, have not yet been decided upon. Apparently manufacturers are determined to rehabilitate the market by holding for better prices on future deliveries.

**Cyanide of Potassium.**—This market is still unsettled, because foreign manufacturers are compelled to sell at rather low prices to secure the little business offered. Recent exports from Great Britain to New York and Montreal have been made around 17c. f. o. b. British ports. Of course, sales in Great Britain have been made at less, probably at 16½c. At New York importers continue to quote 20c.

**Bleaching Powder.**—This may be classed as one of the unfortunate chemicals, being influenced adversely by over-production and demoralization in prices. Formerly it was not a difficult task to form an agreement among the various manufacturers for the purpose of regulating the market, but since the electrolytic works started up the situation has changed. Momentarily good high-test bleaching powder can be had at \$1.05@1.10 100 lbs. for foreign f. o. b. New York and at 87½c. @ \$1 for domestic f. o. b. works. Large consumers can doubtless shade these prices for prompt deliveries, but on future business they may be obliged to pay more.

**Copper Sulphate.**—The principal feature of the present market is the uncertainty shown by sellers when quoting prices. Doubtless the appearance of better prices for copper has encouraged holders of sulphate to ask more money. Recently these quotations have been \$4.62½@4.65 per 100 lbs. f. o. b. New York, and in one or two instances \$4.70 has been named.

**Acids.**—The trade is very quiet, not even the weakness of oxalic acid having caused any particular disturbance. Deliveries are seasonably moderate, while prices are practically unchanged.

We quote as below, per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°.....	\$1.50	Oxalic, Com'l.....	\$5.00@5.12½
Muriatic, 20°.....	1.00	Sulphuric, 50°.....	
Muriatic, 22°.....	1.75	"    "    "    "    "    "	13.50@14.50
Nitric, 36°.....	4.37½	Sulphuric, 60°.....	1.05
Nitric, 38°.....	4.75	Sulphuric, 60°.....	
Nitric, 40°.....	5.00	"    "    "    "    "    "	18.00@20.00
Nitric, 42°.....	5.37½	Sulphuric, 66°.....	1.20
		"    "    "    "    "    "	21.00@23.00

**Brimstone.**—There is a slightly better feeling for spot supplies. Best unmixed seconds on spot are quoted at \$22.50@22.75 per long ton, and shipments at \$22@22.25. Best thirds are nominally \$1 less than seconds. Importers begin to show some uneasiness at the increasing supply of domestic sulphur, particularly from the Louisiana mines. Heretofore the output of these mines has been too small to receive attention, but within the past year the developments have been pushed energetically, and it is said large shipments are being made to the Western market. This brimstone must be sold at rather low prices to compete with the sulphur recovered from sulphide ores. The freight rate from the Louisiana mines to Denver or other important consuming point is rather high, which will likely cut profits to a minimum, especially as the method of production by the Frasch process is costly.

**Pyrites.**—Fertilizer acid manufacturers are buying fair quantities of pyrites. Importations are not as frequent as they have been, although the market in Spain is easier and freight rates are about normal. We quote: Domestic pyrites, \$5 per ton for lump ore, f. o. b. Atlantic coast mines, and 10c. per unit for fines; sulphur content varies from 42@44 per cent. Spanish pyrites, carrying from 46@52 per cent sul-

phur, are quoted at 11@12c. per unit for lump and 10 @10½c. for fines delivered at Atlantic ports.

**Nitrate of Soda.**—The scarcity of spot supplies, coupled with the likelihood that there will be few arrivals next month, has strengthened the market to \$2.15@2.20 per 100 lbs., ex-store. Shipments are quoted at \$2.02½@2.05, according to position. Simultaneously reports from abroad state that the market there has also assumed strength. The visible supply in Europe on August 1 was estimated at 269,640 long tons. This, while it is the largest quantity reported since May, cannot compare with the large supplies a year ago. Deliveries to European consumers in July amounted to 60,940 tons, making a total of \$97,740 tons for the seven months, which is an increase of 99,260 tons, or about 12 per cent over last year. This increase is nearly double the decrease that was shown in 1902 from 1901, which is an encouraging feature.

**Sulphate of Ammonia.**—Shipments are firmer. Good gas liquor is quoted at \$3.05@3.07½ per 100 lbs.

**Phosphates.**—In another month European superphosphate manufacturers will be in the market for their raw material. Recent quotations indicate that exporters are still unwavering in their views as regards the value of phosphates, and are not willing to take any large contracts at a discount. This is particularly the case with the hard rock miners. The domestic market shows larger shipments and pretty firm prices.

Phosphates.	Per ton. F o. b.	United Kingdom or European ports.	
		Unit.	Long ton.
*Fla. hard rock (77@80%)..	\$7.00@7.50	6½@7½d.	\$10.34@11.70
*Fla. land pb. (68@73%)..	3.50@3.75	5½@5¾d.	7.70@ 8.05
†Tenn. (78@82%) export..	4.00@4.25	6½@7d.	10.40@ 8.05
†Tenn. 78% domestic.....	3.75@ 4.00	.....	.....
†Tenn. 75% domestic.....	3.50	.....	.....
†Tenn. 73@74% domestic..	2.95@ 3.20	.....	.....
†Tenn. 70@72% domestic..	2.70@ 2.95	.....	.....
‡So. Car. land rock.....	.....@ 3.25	.....	.....
‡So. Car. riv. r'k (55@60%)	2.75@ 3.00	4½@5½d.	5.55@ 6.60
Algerian (63@70%).....	.....	5½@6¾d.	7.37@ 8.38
Algerian (58@63%).....	.....	4½@5¾d.	5.55@ 6.60
Gafsa (Tunis).....	.....	5½@6d.	6.30@ 7.20
Christmas Isl. (80@85%)..	.....	7¼@7¾d.	12.04@12.87

\*Fernandina, Tampa, Brunswick, Savannah or Port Ingris. †Mt. Pleasant. ‡On vessels, Ashley River.

Liverpool. Aug. 5.

(Special Report of Joseph P. Brunner & Co.)

The market is very steady, and there is a firmer tone in bleaching powder for 1904 delivery.

**Soda Ash.**—For tierces, the nearest values are about as follows: Leblanc ash, 48 per cent, £5 10s. @ £5 15s.; 58 per cent, £6 @ £6 5s. per ton, net cash. Ammonia ash, 48 per cent, £4 5s. @ £4 10s.; 48 per cent, £4 10s. @ £4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces.

**Soda Crystals** are in request at generally £3 7s. 6d. per ton, less 5 per cent for barrels, or 7s. less for bags, with special terms for a few favored markets.

**Caustic Soda** is firm, as follows: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 76@77 per cent, £10 10s. per ton, net cash.

**Bleaching Powder** is dull on spot, buyers being full up, and hardwood is quoted at £3 10s. @ £4 per ton, net cash. For 1904 delivery, makers are inclined to hold aloof, and prices are firmer in consequence.

**Chlorate of Potash** is quiet, at about 2¼d. @ 2½d. per lb. for English make.

**Bicarbonate of Soda** is selling at £6 15s. per ton, less 2½ per cent, for the finest quality in 1-cwt. kegs, with usual allowances for larger packages. Also special terms for a few favored markets.

**Sulphate of Ammonia** is unchanged and quiet at £12 10s. @ £12 12s. 6d. per ton, less 2½ per cent, for good gray 24@25 per cent, in double bags, f. o. b. here.

**Nitrate of Soda** is scarce on spot, and sellers hold for £10 @ £10 5s. per ton, less 2½ per cent for double bags, f. o. b. here as to quality.

**METAL MARKET.**

New York, Aug. 20.

**Gold and Silver Exports and Imports,**

At all United States Ports in July and Year.

Metal	July.		Year.	
	1902.	1903.	1902.	1903.
Gold: Exports.....	\$7,884,339	\$9,117,758	\$28,190,578	\$40,453,999
Imports.....	1,594,421	4,631,217	14,781,765	18,607,271
Excess	E. \$6,289,918	E. \$4,486,541	E. \$13,378,811	E. 21,846,728
Silver: Exports.....	\$3,671,814	\$3,015,426	\$29,199,848	\$20,520,765
Imports.....	2,276,480	2,564,217	14,497,218	12,545,511
Excess	E. \$1,395,334	E. \$451,209	E. \$11,702,630	\$7,975,254

These exports and imports cover the totals from all United States ports. The figures are furnished by the Bureau of Statistics of the Treasury Department.

**Gold and Silver Exports and Imports, New York.**

For the week ending August 19, and for the years from January 1:

Period.	Gold.		Silver.		Total Excess, Exports or Imports.
	Exports.	Imports.	Exports.	Imports.	
Week.....		\$7,318	\$3,625,625	\$8,414	E. \$27,193
1903.....	2,162,749	3,635,600	12,927,273	1,639,944	E. 9,794,478
1902.....	24,004,088	1,521,145	15,739,324	807,944	E. 37,414,313
1901.....	25,733,318	1,819,822	20,029,894	2,466,262	E. 41,557,128

Gold exports were small; imports were chiefly from the West Indies, silver exports were to London; imports were from Central and South America.

General business is necessarily quiet during vacation time, but judging from reports from the industrial centers, fall prospects are good. In the speculative markets there has been quite a recovery, but conditions are not yet favorable for a so-called boom in stocks. It appears as if the speculative element is lying low until the time is more propitious for a rapid advance in stock values.

The statement of the New York banks, including the 56 banks represented in the Clearing House, for the week ending August 15, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts.....	\$884,810,300	\$929,148,000	\$908,345,600
Deposits.....	964,629,200	960,246,000	903,335,300
Circulation.....	29,039,000	32,105,100	43,930,300
Specie.....	181,711,100	170,838,000	170,630,900
Legal tenders.....	77,868,100	76,350,100	76,766,500
Total reserve.....	\$259,579,200	\$247,188,100	\$247,397,400
Legal requirements.....	241,157,300	240,061,500	225,833,825
Balance surplus.....	\$18,421,900	\$7,126,600	\$21,563,575

Changes for the week, this year, were an increase of \$13,400 in circulation, and decreases of \$4,351,500 in loans and discounts, \$8,937,200 in deposits, \$1,211,000 in specie, \$1,046,800 in legal tenders, and \$23,500 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparisons made with the holdings at the corresponding date last year.

	—1902.—		—1903.—	
	Gold.	Silver.	Gold.	Silver.
N. Y. Ass'd.....	\$170,838,000	.....	\$170,630,900	.....
England.....	184,503,815	.....	176,362,570	.....
France.....	523,989,150	\$224,435,080	510,713,665	\$224,866,005
Germany.....	185,160,000	68,485,000	171,345,000	60,205,000
Spain.....	71,070,000	97,265,000	73,020,000	100,500,000
Netherl'ds.....	24,472,500	33,208,500	19,703,500	32,334,500
Belgium.....	15,683,335	7,841,665	15,060,000	7,530,000
Italy.....	80,725,000	10,138,000	95,160,000	11,520,000
Russia.....	368,180,000	44,300,000	412,385,000	44,700,000
Austria-Hung.	222,485,000	62,870,000	227,730,000	64,555,000

The returns of the Associated Banks of New York are of date August 15 and the others August 13, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Silver has continued steady at unchanged figures, but closes lower on falling off of Indian orders.

The United States Assay Office in New York reports receipts of 81,000 oz. silver for the week.

The Mint special report on Philippine coinage states that up to August 1 the total purchases of silver on that account were 9,711,507 ozs., for which there was paid \$5,145,763, an average of 52.88c. per ounce. The new Philippine peso is redeemable at 50c. in gold; the value of the silver contained is slightly under 42c. The seignorage accruing will be credited to the redemption fund of the debt certificates issued for purchase of the silver.

Shipments of silver from London to the East for the year up to August 6 are reported by Messrs. Pixley & Abell's circular as follows:

	1902.	1903.	Changes.
India.....	£3,925,445	£3,618,525	D. £306,920
China.....	112,380	256,499	I. 144,119
Straits.....	70,550	577,779	I. 507,229
Total.....	£4,108,375	£4,452,803	I. £344,428

Receipts for the week were £137,000 in bar silver from New York, £35,000 from the West Indies, £4,000 from Australia, and £2,000 from Chile; total, £178,000. Shipments were £30,000 in bar silver to Bombay and £1,000 to Calcutta; total, £40,000.

**Prices of Foreign Coins.**

	Bid.	Asked.
Mexican dollars.....	\$0.43	\$0.45
Peruvian soles and Chinese pesos.....	.39	.44
Victoria sovereigns.....	4.86	4.88
Twenty francs.....	3.85	4.88
Spanish 25 pesetas.....	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

Table with columns for Silver, Copper, and Spelter. Rows include months from August to December with prices in various currencies and units.

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's.

Copper has been very active throughout the week. The improvement in the financial markets has brought about a complete change of sentiment, and consumers, both here and abroad, have bought freely for spot as well as future delivery.

The market for standard copper in London, which closed last week at £57 15s., opened on Monday at £69 10s., and the closing quotations on Wednesday are cabled as £59 12s. 6d. to £59 15s. for spot.

Exports and imports of copper at New York, Philadelphia and Baltimore in the week of August 18 and for the year to date were, in long tons.

Table showing exports and imports of copper for various countries (Australia, Belgium, France, Germany, Holland, Italy, United Kingdom, etc.) with weekly and yearly figures.

Imports and exports of copper in Germany for the half-year ending June 30 were, in metric tons:

Table with columns for 1902, 1903, and Changes. Rows for Imports and Exports.

Imports of copper ore were 5,823 tons, against 2,040 tons in 1902. Exports of ore were 8,293 tons, against 8,755 tons last year.

Tin has been rather dull throughout the week, and nothing of interest has transpired. The closing quotations are given as 28@28 1/4c. for spot, 27 1/4c. for September, 27 1/4c. for October.

The foreign market, which closed last week at £128, opened on Monday at £129, declined on Tuesday to £128, and the closing quotations on Wednesday are cabled as £127 2s. 6d. to £127 5s. for spot.

Lead is firm, with a very good demand, especially for early shipment. The ruling quotations are 4 1/2@4.02 1/2c. St. Louis, 4.05@4.10c. New York.

The foreign market is steady. Spanish lead being quoted at £11 5s. to £11 6s. 3d.; English, £11 7s. 6d. to £11 8s. 9d.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs under date of August 19 that lead is firm at 4.10c. for both immediate and forward delivery.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of August 1, that the price of silver during the week has been 13.50 reales per oz. Exchange has gone down 19 centimos, making it 34.35 pesetas to £1. The local quotation for pig lead on wharf has been 63 reales per qtl., which on above exchange is equivalent to £10 5s. 4d. per long ton, f. o. b., Cartagena.

The exports of pig lead for the week were 898,926 kg. to Marseilles, 715,465 kg. to Newcastle, 500,000 kg. to London, and 500,000 to Liverpool.

Spelter has developed considerable strength, spot metal remaining scarce and commanding a premium. Inquiry on the part of consumers is reported as very satisfactory. The closing quotations are given as 5.65@5.70c. St. Louis, 5.82 1/2@5.87 1/2c. New York.

The foreign market is firm, good ordinaries being quoted at £20 12s. 6d.; specials, £20 17s. 6d.

Exports and imports of spelter in Germany for the six months ending June 30 are reported as below, in metric tons:

Table with columns for 1902, 1903, and Changes. Rows for Exports and Imports.

This shows a serious decline in the sales of silver and spelter abroad.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs under date of August 19 that spelter is strong at 5.55c. for prompt, and 5.50c. for forward delivery.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Catagena, Spain, under date of August 1, that many mines are holding their stocks hoping for a recovery in spelter prices, but it is difficult to see on what the hopes are based.

Antimony is dull and neglected. We quote Cookson's at 7@7 1/4c.; Hallett's, 6 3/8c.; Hungarian, United States, Italian, French and Japanese at 6 1/8c.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Prices of nickel anodes are as follows: 80 to 82 per cent nickel, 45@50c. per lb.; 82 to 84 per cent, 52@57c.; 95 to 97 per cent nickel, 54@59c. The lower price, in each case, is for lots of 500 lb. or over; the highest for lots of 100 lb. or less.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings \$19 per oz. in New York.

Quicksilver.—The New York price is unchanged at \$47.50 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotations are still \$44.50@46 per flask for domestic orders and \$42@43 for export. The London price is £8 12s. per flask, with the same quotation asked by second hands.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Table listing prices for various metals and alloys including Aluminum, Ferro-Tungsten, Magnesium, Manganese Cop., Molybdenum, Phosphorus, and Tungsten.

Missouri Zinc Ore Market. Aug. 15.

(From Our Special Correspondent.)

With less competition for fancy ore, the highest price of zinc for the week dropped back to \$40 per ton, the price at which it has remained so steadily since the middle of May. It amounted to a decline of \$1.50, yet the assay basis was unaffected, and is quoted at \$35@37 per ton for 60 per cent zinc. A shortage of powder, which agents of the powder companies intimate may continue, is affecting mining operations.

Sales for the week were:

Table with columns for Zinc, Lead, and Total value. Rows list various locations like Joplin, Webb City, Galena-Empire, etc.

Zinc value, the week, \$168,280; 33 weeks, \$5,337,675. Lead value, the week, \$28,795; 33 weeks, \$987,070.

Average Prices of Metals per lb., New York.

Table with columns for Month, Tin, Lead, and Spelter. Rows include months from January to December with prices for 1903 and 1902.

NOTE.—The average price of spelter in St. Louis for the month of January, 1903, was 4.65c. per lb.; for February, 4.68c.; for March, 5.17c.; for April, 5.37c.; for May, 5.45c.; for June, 5.53c.; for July, 5.50c.

Average Prices of Copper.

Table with columns for Month, New York (Electrolytic, Lake), and London (Standard). Rows include months from January to December with prices for 1903 and 1902.

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs. standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Table with columns for Month, 1903, 1902, 1901. Rows include months from January to December with prices for London, N. Y., and other locations.

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

ASSESSMENTS.

Table with columns for Name of Company, Location, Delinq., Sale, Amt. Rows list various companies like Andes, Con. Cal. & Va., Exchequer, etc.

DIVIDENDS.

Table with columns for Name of Company, Date, Per Share, Total, Total to Date. Rows list companies like Alaska-Mexican, Bartolome de Medina, Camp Bird, etc.

\*Monthly. †Quarterly. §Semi-annual.



STOCK QUOTATIONS

NEW YORK.

Table of stock quotations for New York, listing companies like Acacia, Amalgamated, Anaconda, etc., with columns for par value, shares listed, and prices for various dates from Aug. 12 to Aug. 18.

COAL, IRON AND INDUSTRIAL STOCKS.\*

Table of stock quotations for Coal, Iron and Industrial Stocks, listing companies like Allis-Chalmers, Am. Agr. Chem., etc., with columns for par value, shares issued, and prices for various dates from Aug. 12 to Aug. 18.

\*New York Stock Exchange. †Pittsburg Stock Exchange. ‡Ex-dividend. Total sales 406,495 shares.

Total sales 420,207 shares. †Ex-Dividend

BOSTON, MASS.\*

Table of stock quotations for Boston, Mass., listing companies like Adventure Con., Amalgamated, Am. Gold Dredging, etc., with columns for par value, shares listed, and prices for various dates from Aug. 12 to Aug. 18.

\*Boston Stock Exchange. †Ex-Dividend. ‡Assessment Paid. §First installment paid. Total sales, 238,383 shares.

SAN FRANCISCO.\*

Table of stock quotations for San Francisco, listing companies like Central Eureka, Esplanade, Gipsy Queen, etc., with columns for location, capitalization, and prices for various dates from Aug. 7 to Aug. 13.

\*San Francisco & Tonopah Mining Exchange. Total sales 692,225 shares.

COLORADO SPRINGS, COLO.\*

Table of stock quotations for Colorado Springs, Colo., listing companies like Acacia, Am. Con., Anaconda, etc., with columns for par value, shares listed, and prices for various dates from Aug. 8 to Aug. 14.

\*Colo. Springs Mining Stock Exchange. All mines are in Colorado. Total sales 127,500 shares.

COLORADO SPRINGS (By Telegraph).

Table of telegraph stock quotations for Colorado Springs, listing companies like Isabella, Jack Pot, Keystone, etc., with columns for par value, shares listed, and prices for Aug. 17 and Aug. 18.

SAN FRANCISCO (By Telegraph).

Table of telegraph stock quotations for San Francisco, listing companies like Belcher, Best & Belcher, Caledonia, etc., with columns for shares issued and prices for August 17 and August 18.

STOCK QUOTATIONS

MEXICO\*

Aug. 7

Table with columns: Name of Company, Shares Issued, Last div'd, Prices (Bid, Ask). Includes Durango, Guanajuato, Guerrero, Hidalgo, and various mining companies.

Mexico:

Table with columns: Name of Company, Shares Issued, Last div'd, Prices (Bid, Ask). Includes companies like Alacran, Aldebarren, Buen Despacho, etc.

\*Values are in Mexican currency.

LONDON.

Aug. 7

Table with columns: Name and Country of Company, Shares Issued, Par value, Latest dividend (Amt, Date), Quotations (Buyers, Sellers). Includes Alaska-Treadwell, Anaconda, Arizona, etc.

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver. Ex-Dividend.

SALT LAKE CITY.\*

Aug. 15.

Table with columns: Name of Company, Par Val, Shares, High, Low, Sales. Includes Ajax, Butcher-Liberal, Carisa, etc.

\*By our Special Correspondent. All mines are in Utah. Total sales, 101,285 shares.

LONDON (By Cable)\*

Table with columns: Name of Company, August 11, August 18, Name of Company, August 11, August 18. Includes Anaconda, British South Africa, Camp Bird, etc.

\*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

ST. LOUIS, MO.

Aug. 15

Table with columns: Name, Par Val, Shares, Prices (Bid, Ask). Includes Am.-Nettie, Catherine Lead, Central Coal, etc.

\*By our Special Correspondent.

PARIS.

July 30.

Table with columns: Name of Company, Country, Product, Capital Stock, Par value, Latest divs., Prices (Openinr., Closing). Includes Boleo, Fraserville, Huanchaca, etc.

PHILADELPHIA, PA.\*

Table with columns: Name and Location of Co., Par val., Aug. 12, Aug. 13, Aug. 14, Aug. 15, Aug. 17, Aug. 18, Sales. Includes Am. Alkali, Am. Cement, Cambria Iron, etc.

\*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 11,362 shares.

TORONTO, ONT.\*

Aug. 17.

Table with columns: Name of Company, Par val., Prices (High, Low), Sales, Name of Company, Par val., Prices (High, Low), Sales. Includes Black Tail, Cariboo, Center Star, etc.

\*Standard Stock and Mining Exchange. Total sales, 25 shares.



DIVIDENDS.

GOLD, SILVER, COPPER, LEAD, QUICKSILVER AND ZINC COMPANIES.—UNITED STATES.

COAL, IRON AND INDUSTRIALS

Table listing dividends for Gold, Silver, Copper, Lead, Quicksilver and Zinc companies in the United States. Columns include Name and Location of Company, Authorized Capital Stock, Shares Issued, Par Val, Paid 1903, Total to Date, and Latest Date/Amt.

Table listing dividends for Coal, Iron and Industrial companies. Columns include Name and Location of Company, Authorized Capital Stock, Shares Issued, Par Val, Paid 1903, Total to Date, and Latest Date/Amt.

CANADA, CENTRAL AND SOUTH AMERICA, MEXICO.

Table listing dividends for companies in Canada, Central and South America, and Mexico. Columns include Name and Location of Company, Authorized Capital Stock, Shares Issued, Par Val, Paid 1903, Total to Date, and Latest Date/Amt.

Note—These dividends are published gratuitously. Readers are invited to send any additions or corrections which they think necessary to complete our list.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

Table with multiple columns listing various chemical and mineral products (e.g., ABRASIVES, BARYTES, BARIUM, GRAPHITE, PAINTS AND COLORS) and their current wholesale prices. Includes sub-headers like 'Cust. Meas.' and 'Price' for each item.

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.