

# The Engineering and Mining Journal

VOL. LXXXIV.

NEW YORK, SEPTEMBER 21, 1907.

NO. 12.

## Lead and Copper Smelting at Salt Lake—I

The Large and Diversified Ore Supply. The Smoke Problem. New Features at the United States Plant

BY WALTER RENTON INGALLS

About six years ago the JOURNAL editorially expressed the fear that the smelting capacity at Salt Lake City was being overdone. At that time the American Smelting and Refining Company was just completing its plant at Murray and the United States Mining Company its plant at Bingham Junction. The Germania, Highland Boy and Bingham Consolidated plants were in operation and it was wondered where the ore was going to come from to keep all of these works, old and new, in full operation. At this late date I may confess that I was the author of the editorial in question and I have some reason to believe that the American Smelting and Refining Company had simi-

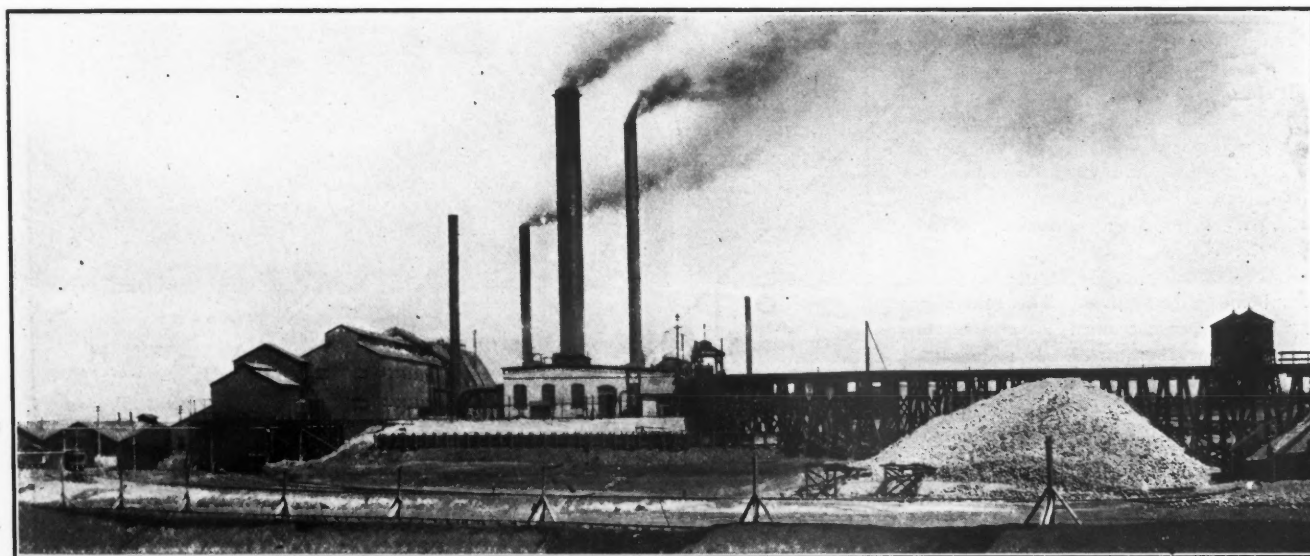
smeltries have been heaped full. The storage bins at the mines are also kept full to bursting and more smelting capacity is urgently needed to relieve the congestion.

### PRESENT SMELTING CAPACITY

At the present time the smelters of the Salt Lake Valley and their daily capacity of charge are the following:

Name	Class	Capacity, tons
Murray	Lead	1500
Garfield	Copper	1250
Bingham	Copper	1000
United States	Copper	1000
United States	Lead	1500
Yampa	Copper	500
Highland Boy	Copper	1000
Utah	Copper	250
Tintic	Lead	300
Total		8300

tic, which furnish immense supplies of ores which are capable of combination in good smelting mixtures, while the favorable position of Salt Lake as a railway center enables it to draw large supplies of ore from Idaho and Nevada, and even from California. The nature of these ore supplies is such that unlimited confidence may safely be placed in their continuance and consequently there is justification for the marvellously large outlays in smelting plants which otherwise there might not be. In commenting upon the superior construction of the Murray plant, some six years ago, to one of the metallurgists who was largely responsible for them, he replied: "We have heretofore been feeling



GENERAL VIEW OF WORKS OF UNITED STATES SMELTING COMPANY, BINGHAM JUNCTION, UTAH

lar doubts at that time. These doubts appear laughable when we view the present situation. The United States Smelting, Refining and Mining Company has added a lead smeltery of 1500 tons daily capacity; the Tintic Mining and Development Company has built the Yampa smelter of 500 tons daily capacity; and the Garfield Smelting Company has built works of 1250 tons daily capacity. In spite of these great additions, it has proved that increase in smelting capacity has not been provided with sufficient rapidity. There has lately been a veritable deluge of ore, chiefly from Bingham, and the bins at the

The capacity of the Garfield plant is being doubled. The Bingham and Highland Boy plants are both to be abandoned and replaced by new works. The plant of the Utah Smelting Company is situated near Ogden. The Tintic plant (situated in the Tintic district) is not yet completed. In addition to the above the Utah & Eastern Company has a small plant at its mine.

Salt Lake City is at present the most important smelting center in the United States. The preponderating position which it has taken in that respect is due to its proximity to three great mining districts, viz.: Bingham, Park City and Tin-

our way in the smelting business, not knowing very far ahead what our ore supplies were going to be, but now we are convinced that Salt Lake City is going to command an adequate ore supply for as far ahead as anyone needs to look, and therefore we feel safe in building this plant with a view to permanency."

### THE CHARACTER OF ORE SUPPLY

Park City and Bingham furnish galena concentrate, the former being decidedly the more important. Galena ore is also obtained from the Wood River district, Idaho, and some from the Cœur d'Alene,

but the bulk of the production of the latter goes to the Pacific Coast, to Colorado and to eastern works. More or less lead ore comes from near Hamilton, Nev., and it is believed that the old mines at Pioche will furnish considerable when the railway to that place is completed. The Tintic district of Utah contributes ore of various kinds, viz.: silicious, lead-bearing and copper-bearing. An important source of silicious ore is the new camps in southwestern Nevada, viz.: Tonopah, Goldfield, etc. Eureka, Nev., furnishes oxidized iron ore, which contains a little lead, and the Cottonwoods, Utah, are also a source of that class of ore. However, Bingham, with its copper ore, is the mainstay for basic material. Unfortunately this ore is largely fine—the concentrates being very fine—the solid sulphide being of a highly crumbly character. The Cactus mine, near Frisco, Utah, furnishes a large output of copper concentrate. Copper matte is obtained from Shasta county, Cal., from Mackay, Idaho, and elsewhere.

Thus it will be seen that the ore supply of the Utah smelters is sufficiently diversified. Indeed, it is perhaps more so than anywhere else in the United States. Consequently we find lead smelting, copper smelting in blast furnaces and copper smelting in reverberatory furnaces going on side by side, each ore being subjected to the most appropriate process. The scarcest of the essential ores is iron-bearing material for the blast-furnace work, which is felt particularly by the lead smelters, who for this reason are obliged to make slags that are high in silica and lime, the silica being about 36 per cent. and the lime from two-thirds to three-quarters of the amount of ferrous oxide. Even the copper smelters feel the shortage of iron, the Bingham sulphide not having a large excess at the best, and often being only neutral. The mill concentrates at present must, of course, be smelted in reverberatories. It is possible that an improved method of sintering may change the treatment of this material.

The method of purchase of the ore obtained by the Salt Lake smelters also gives the smelting industry of Utah a permanent character. A large part of the ore is derived from mines owned or controlled by the smelters; another large part is received under contract with a few large producers, such as the Boston Consolidated and the Newhouse Mines and Smelters; the smaller producers of the Tintic district and elsewhere deliver their ore largely under contract. The amount of ore received in small, casual lots is small.

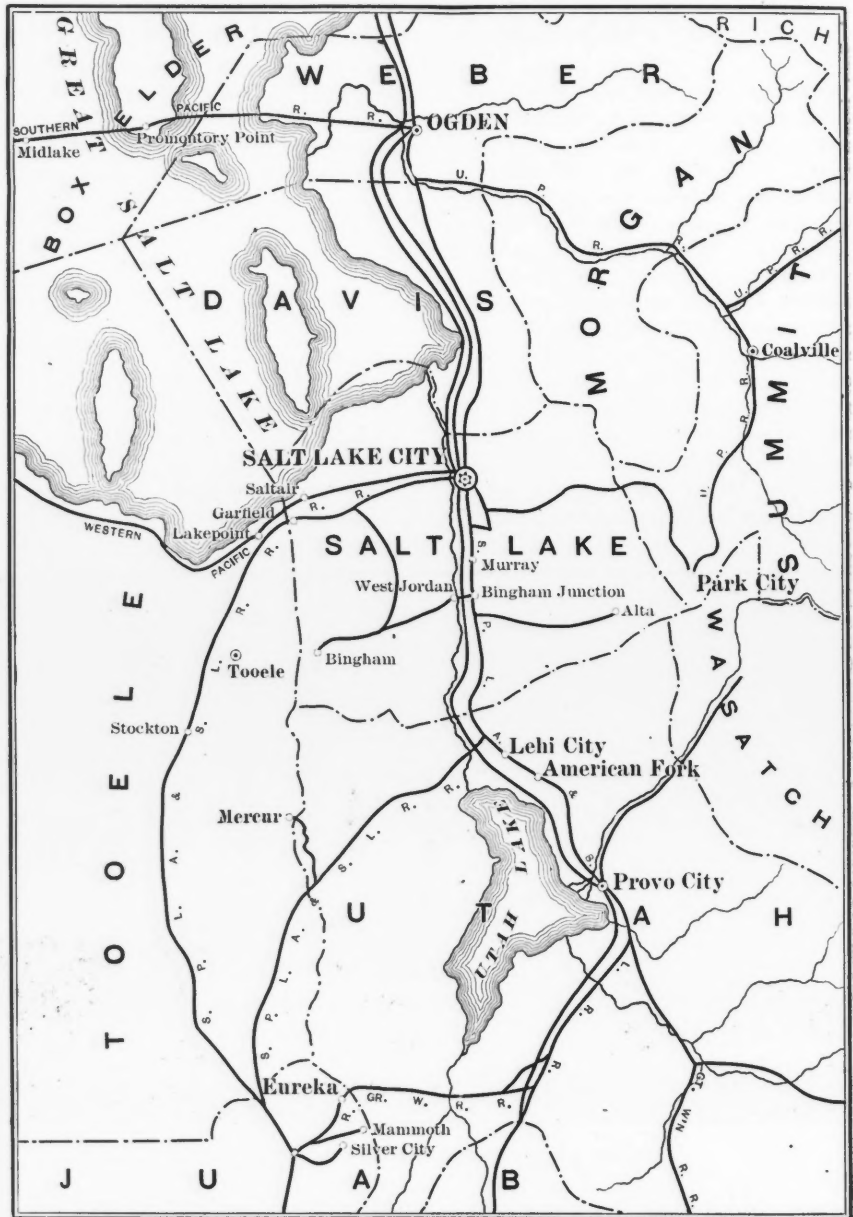
#### SMELTING METHODS

The Murray plant has blast furnaces, and hand-reverberatories, Brückners, and Huntington-Heberlein furnaces and pots for desulphurizing. The United States has blast furnaces for copper, with a reverberatory for smelting flue dust; and blast furnaces with hand-reverberatory

roasting furnaces for lead ore. The Bingham Consolidated has blast furnaces and reverberatories. The Highland Boy and Yampa have reverberatories only. The Tintic and Utah have blast furnaces only. The Garfield has blast furnaces and reverberatories, but is essentially a reverberatory plant.

At the time when the first copper smelters were erected at Salt Lake there was a difference in opinion as to the best method of smelting the Bingham sulphide.

a little in favor of the blast furnaces, and the United States adopted them. A year or two later the choice would doubtless have been in favor of reverberatories. At present metallurgists agree that the ideal plant for Salt Lake is the combined reverberatory and blast furnace of nearly equal capacity by each method. This opinion may be altered in the near future by the introduction of an improved method of sintering sulphide fines, such as are now being experimented with. It is hoped



MAP SHOWING MINING DISTRICTS OF UTAH TRIBUTARY TO SALT LAKE CITY

The Highland Boy led the way with reverberatory furnaces. The Bingham followed with a blast furnace plant. The United States was undecided which to choose. At that time, six years ago, the reverberatory furnace had not received the remarkable development which it has today, thanks to Mr. Mathewson, of Anaconda. Nevertheless, estimates did not show a great difference between the costs by the two methods. However, there was

that these will convert the ore into lump form and desulphurize it to a low degree, which will enable rapid smelting in the blast furnace and will release an increased amount of iron for fluxing purposes. I say "it is hoped," although as a matter of fact the new process is already being practically employed at Garfield, and there is but little doubt as to its success. I will not venture to predict the displacement of the reverberatory, but it is probable that

the blast furnace will come again more prominently to the front.

#### THE SMOKE QUESTION

The damage suits against the Salt Lake smelters and the injunction now hanging over them are fresh in all minds. From the passionate talk in the papers as to the damage to agriculture that had been inflicted by the smelters at Murray and Bingham Junction, I fully expected to see that vicinity a desert waste, but I must say that I did not observe anything of that kind. The fields and crops near the smelters, indeed right up to their domains, and the foliage of the trees looked quite the same as they did before there was any talk of damage, or indeed when there were only three smelters where now there are five, with an aggregate capacity three times as great. However, it is not to be denied that some damage has been done; even the smelters them-

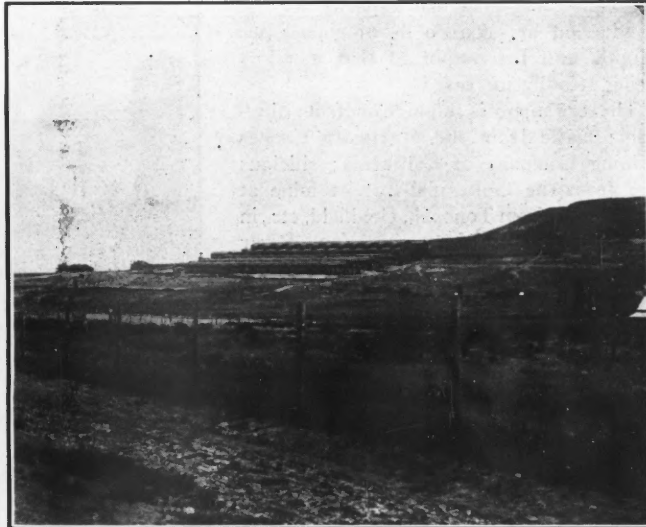
litigation and established a *modus vivendi*. The other smelters are endeavoring to secure a modification of the injunction, which will enable them to smelt a furnace charge averaging not more than 10 per cent. sulphur instead of being limited to that figure in the case of each and every ore as the injunction stands at present. Of course this request is thoroughly rational. The "ore" that the smelter smelts is the mixture that he makes in order to be able to smelt, not the components of that mixture, which alone might be unsmeltable.

Anyway, the Bingham and the Utah Consolidated have decided to abandon their present plants and rebuild out of the way of the smoke complaints, the Bingham at Lake Point, several miles beyond Garfield, on Great Salt Lake; and the Utah Consolidated in Pine Cañon, above Tooele, on the Stockton side of the range. These new plants are by no means to be

or will enable it to adjust conditions to that end. Of course there are few ores treated in the lead smelter which exceed 10 per cent. sulphur. In connection with that plant it has recently erected a bag-house. This takes the soot, arsenic and other condensibles out of the blast-furnace gas and largely ameliorates the smoke nuisance. It is claimed, with much show of reason, that the damage done by smelter smoke is largely ascribable to the compounds of sulphur, arsenic, etc., which condense on the particles of soot and settle with them to the ground; removal of the soot eliminates this danger, and for removal of the soot the bag-house is certainly efficient. Apparently the United States company relies upon the fact that it has done so much to abate its nuisance for freedom to continue smelting at Bingham Junction. Likely that will be secured, for it is said that, now that two of the smelters are really to move away, the



BOSTON MILL



UTAH MILL

THE CONCENTRATING MILLS NEAR GARFIELD

selves admit that; but it is equally certain that the damage, such as it is, has been greatly exaggerated. In fact the people in smelting districts have become hysterical over the smoke question as they will regretfully admit when the smelters have been driven away from the districts to which formerly they furnished markets for agricultural produce.

As to the present situation: The Yampa smelter in Bingham cañon, was never involved, and probably never will be; it would appear that there is nothing for it to damage. The American Smelting and Refining Company located its Garfield plant in such a way that the smoke generally draws up into the mountains (non-agricultural) and purchased a large tract of land so that it is safe against complaint. With respect to the Murray plant it has erected a bag-house and made a financial settlement with the farmers and by agreement has freed itself from the

considered as financial outlays directly induced by the smoke litigation; quite the contrary. I did not examine either the Bingham or the Highland Boy works, but both of them must be out of date, and judging by other works of contemporaneous construction and equally intense operation they may be nearly worn out, as is indeed said of them. In other words they are at, or nearly at, the end of the period during which their amortization ought to have been accomplished (which in this case is something less than 10 years) and new, modern works were required, smoke injunction or no smoke injunction.

This leaves the United States company. Its course is not yet decided, at least has not been publicly disclosed. In so far as its copper smelting is concerned, it probably hopes that the 10 per cent. sulphur limit will be extended to the average ore, which will relieve it of liability,

sentiment against smelters in general is not so strong as it was a little while ago. THE UNITED STATES SMELTING COMPANY  
The United States Smelting Company, which is one of the operating companies of the United States Smelting, Refining and Mining Company, has the plant of largest capacity in the Salt Lake valley. This is situated at Bingham Junction, a few miles south of Salt Lake City and immediately adjoins the plant of the Bingham Consolidated. Near by are the Murray plant of the American Smelting and Refining Company and the Highland Boy works of the Utah Consolidated. Begun originally, six years ago, as works to reduce the ores of the United States Mining Company, with the expansion of that company its smelting works at this place have developed into a great custom plant, which has had a far reaching effect upon the entire mining and smelting industry, not only of Utah, but also of Idaho, Ne-

vada and California, and to some extent upon that of Colorado.

#### CAPACITY—ORE SUPPLY

At present the United States smelter comprises a copper-smelting division with six blast furnaces and five stands of converters, and a lead-smelting division with 15 hand-operated reverberatory roasting furnaces and six blast furnaces. The two divisions of the works are installed side by side, and are served by a common power plant. The capacity of the lead-smelting division, when all furnaces are in blast, is about 1000 tons of charge per day; that of the copper smelting division is about 1500 tons per day. Allowing for the time when furnaces are necessarily out of blast for repairs, the annual capacity is of course at a little lower ratio. The actual ore capacity is probably somewhat upward of 80 per cent. of the charge capacity. The monthly production at present (July, 1907) is about 3500 tons of work-lead and 4,000,000 lb. of copper, but the converting plant has capacity for the production of 5,000,000 lb. of copper per month, and the output of that metal is being steadily increased.

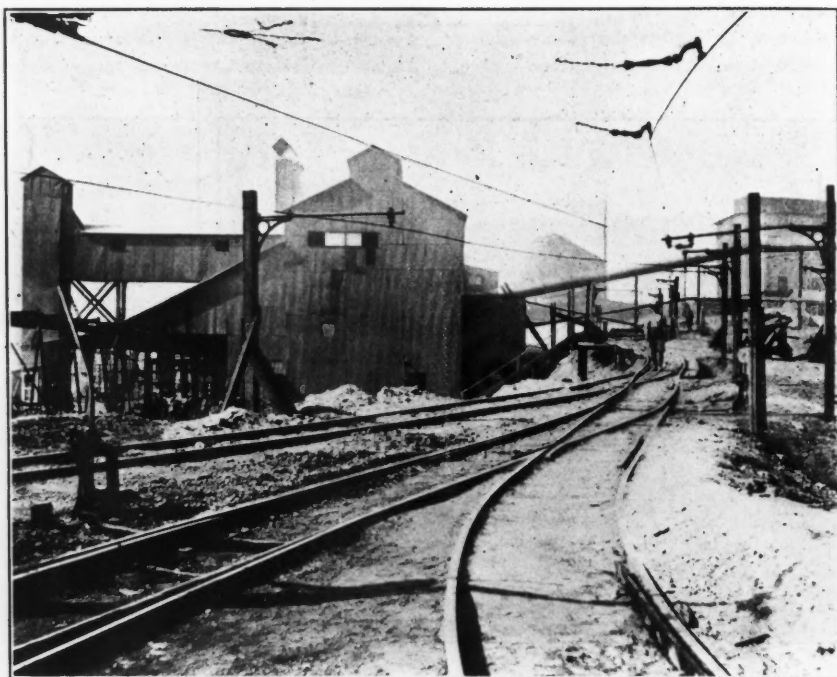
The ore supply is sulphide ore from Bingham; matte from the Mammoth Copper Mining Company of California; silicious ore from the Centennial-Eureka mine at Tintic and from Tonopah, Goldfield, etc., in Nevada; lead ore from the Wood River and Cœur d'Alene districts in Idaho, and from the mines of the United States Mining Company at Bingham, Utah; and oxidized basic ore from the Richmond-Eureka Mining Company at Eureka, Nevada. Besides these important ore supplies, the company receives miscellaneous ores from small producers in Utah, Idaho, Nevada and elsewhere. Recently it has invaded the Colorado market, the San Juan region especially being an area of active competition. The Mammoth Copper Mining Company, the Centennial-Eureka Mining Company and the United States Mining Company are, together with the United States Smelting Company, subordinate, operating companies of the United States Smelting, Refining and Mining Company. The latter owns also a large interest, nearly one-half, in the Richmond-Eureka Mining Company. The strong position, which it has been able to assume has been due largely to its possession of its own ore supplies, which comprise all of the essential ingredients of a smelting mixture, either for copper smelting or for lead smelting, although possibly not in thoroughly balanced proportions. The company has further fortified itself by providing its own refining facilities, both for copper and lead. It is, consequently, in as nearly an independent position as any general smelting company can be.

#### THE COPPER SMELTERY

The copper smelting exemplifies the standard design of its time, which is now more or less out of date, so rapid has

progress been in this art. The six furnaces are placed in line, end to end, with a forehearth in front of each, and in front of the forehearths the runway for the crane by which the matte is taken to the converting plant, situated at the south end of the same building. The crane runway is only 28 ft. wide, against the 55 or 60 ft. allowed for it in more modern practice, and the result is an excessively cramped condition, which considerably impedes operations. On the other side the furnaces discharge their smoke into a concrete dust-flue leading to the chimney. The charging of the furnace is done in the usual way; viz., by cars which dump sideways into the shaft. The charge is a mixture of pyrites, silicious ore and lime flux. The matte that is produced assays 45 to 48 per cent. copper, the latter being

furnace. Air is then turned on and the operation conducted as in the Huntington-Heberlein process. In the top of the furnace there are suitable doors for observation, tamping down blowholes, etc. When the blow is completed, the doors on both sides are opened and the cake of desulphurized ore is pushed out by a traveling ram in a manner quite similar to that whereby coke is discharged from a retort-oven. This system has not yet been tried. Its advantage is not quite obvious; it is doubtful if the battery can be handled by any fewer men than the pots worked by a crane according to the system of the American Smelting and Refining Company, while the cake will probably be as troublesome to break up as in the original Huntington-Heberlein system. Also it will be observed that this process depends



LEAD SMELTERY, UNITED STATES SMELTING COMPANY

the limit of economical smelting. The converters are of the barrel type,  $7\frac{1}{2} \times 10$  ft. in size.

#### THE LEAD SMELTERY

The lead smeltery is the more interesting part of the United States plant, being more modern and better designed than the copper-smelting division. It has 15 hand-operated roasting furnaces of the standard design, which roast 12 tons of ore per day, or 15 tons of matte. An experimental installation of what may be called blast-roasters is now being made after the design of Cyrus Robinson. These are a modification of the principle employed in the Huntington-Heberlein process. Instead of an installation of pots, however, there is a series of upright box-shape furnaces of cast iron with large doors opening on two opposite sides. The proper mixture of ore is charged in at the top, falling upon the grate in the lower part of the

upon direct blowing, as per the Savelsberg method. In short these are simple kilns with undergrate blast and a special contrivance for discharging, in which the roasting process is controlled by a suitable mixture of charge.

#### THE LEAD BLAST FURNACES

The charge is drawn from the bins and beds into a charge car, which is operated electrically. The charge car is loaded in the usual manner, viz., by dumping two-wheel buggies through an opening in the floor, corresponding to the charge-car and the top of the furnaces. From the charge house the car is run on a track which loops around in a "U" and crosses the tops of the furnace, the gage of the track corresponding to the length of the furnaces. This differs from the system at the Murray plant of the American Smelting and Refining Company in that no transfer-car is required.

There are six blast furnaces, each 45x160 in., giving 50 sq. ft. area at the tuyeres. These smelt an average of 170 tons of charge per day, or 3.4 tons per square foot of hearth, a very good figure considering the rather silicious slag and the rather large proportion of fine ore in the charge. Incidentally it may be remarked that the fine ore is one of the problems in smelting at Salt Lake, particularly the silicious fines, which appear to be more effective in slowing up a furnace than the ferruginous fines.

The matte and slag are handled from the lead furnaces in the usual way, the slag cars being pulled out to the dump by electric locomotives. The lead is ladled from the wells into cast-iron pots on two wheels, such as were formerly used for

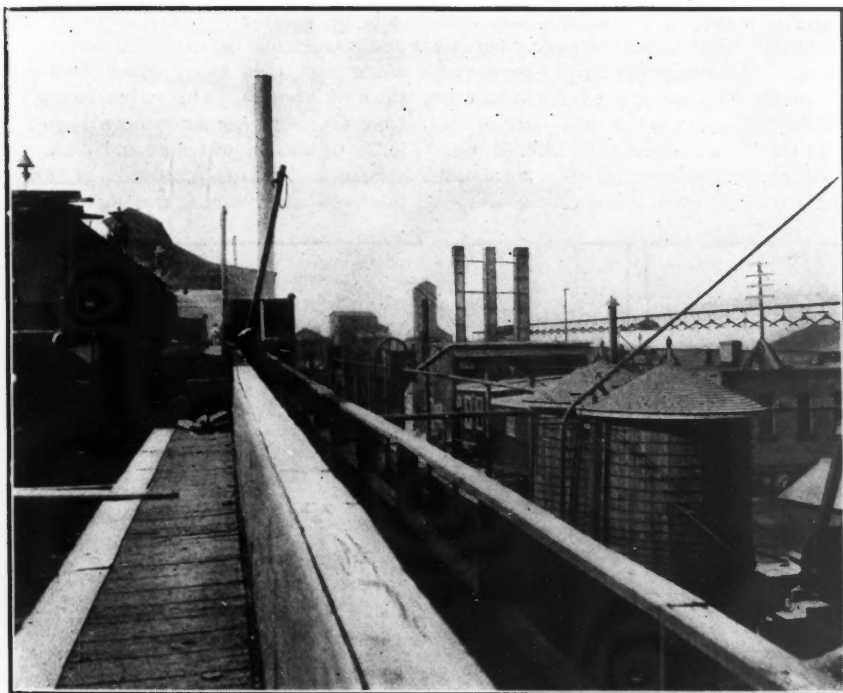
design, comprising 2200 bags, each 18 in. x 30 ft., which are arranged in five sections, each section having three dust-collecting cellars below the nipple-floor. The bag sections are arranged so that any one can be cut out for shaking the bags. The filtered gas passes into a sheet-iron flue running longitudinally on the roof of the building, which comes down at one end of the building and then connects with the chimney. Of course there is no longer any black smoke discharged from these works, except from the boiler house. It is anticipated that the burned fume collected from the bag house will amount to approximately 1 per cent. of the charge smelted in the furnaces, or 10 tons per day. The treatment of this fume has not yet been worked out. It is high in lead and also

of operation at the United States plant this appears to offer considerable lee-way. In other words there is at present more than ample filtering capacity.

#### GENERAL LAY-OUT

The plant of the United States Smelting Company appears now to have reached its limit, nearly all of the available space having been utilized. The lead-smelting division has been laid out very well, especially considering that it was not originally contemplated, although it is not so roomy as would be desirable. The transmission of air from the main power-house is rather a long one. However, the plant conveys the impression of comparatively high efficiency, which is more defective in the roasting department than anywhere else, and in that simply because the modern method of pot-roasting has not yet been installed. A commendable feature of the lead-smelting division is the neatness with which the various parts are kept up, which is more noticeable in this than in the copper-smelting division. The inferiority of the latter in this respect is doubtless due to its more cramped arrangement. This part of the plant, moreover, distinctly shows the deterioration of six years of hard operation. The power plant comprises a lot of good machinery in a very inferior building. It is worthy of remark that whereas the original installation consisted of piston-blowers, the recent additions to the plant have been rotary blowers—Connersville and Roots—direct connected with the engines. The blowers for the lead-smelting furnaces are entirely rotaries. To the south of the smelting works there is a concentrating mill, which runs on lead-bearing ore from the mines of the company at Bingham.

(To be Continued)



LOOKING TOWARD THE ROASTING FURNACES, UNITED STATES SMELTING COMPANY

handling slag, and is trammed behind the furnaces to the casting house, where it is dumped into one of three kettles in which the dross is skimmed off, the clean bullion being then siphoned into anode-molds for shipment to the electrolytic refinery of the United States Metals Refining Company at Grasse, Ind. The anodes are cast flat. The dross from the kettles is treated in a small liquating furnace and then is returned to the smelting process.

#### FUME FILTRATION

A recent installation at the works of the United States Smelting Company is a bag house, the purpose of which was primarily to abate the smoke nuisance, but which doubtless will prove an economical metallurgical addition inasmuch as the dust-settling flue system of the works was not previously a very long one. The bag house has been connected to the end of the former flue system. It is of the conventional

high in arsenic, running 30 to 35 per cent. in the latter element, the high proportion of which is probably due to the Eureka ore.

The gas entering the bag house is 175 to 180 deg. F. in temperature, which in comparison with the conditions at the Globe works at Denver is low, but is not low considering that the furnaces are open at the top. Filtering bags can be operated at a considerably lower temperature (*vide* the practice at the Murray plant of the American Smelting and Refining Company) without incurring trouble from condensation of moisture. The fan moving the gas requires 90 h.p. and works against a pressure of 1 in. of water, which varies of course with the condition of the bags as to dust accumulation, shaking, etc. The total of 2200 bags gives about 310,860 sq. ft. of filtering area, or a little over 50,000 sq. ft. per furnace or 300 sq. ft. per ton of charge smelted. Under the conditions

#### A Portable Combination Meter

The "Victor" combination meter is an instrument combining readings of volts, amperes, watts and horse-power. It was originally designed for switchboard use, but is now being manufactured for the general trade by the H. W. Johns-Manville Company, 100 William street, New York.

The meter consists of two separate and complete instruments in a single case, one recording volts and the other amperes. Watt and horse-power readings are obtained from a scale plotted on the center of the dial. The intersection of the two needles, or indicators, shows directly the power in watts or kw. on one side of the scale and in h.p. on the other.

The instrument is of great value in laboratory and field work and for testing electric cars, elevators, etc. Extra multipliers and multiple shunts are furnished if desired.

# New Caledonia and Its Minerals

Geography, Geology and Mineral Resources of a Remote but Interesting Island in the Pacific. Discovery, Exploration and Settlement

BY G. M. COLVOCORESSES\*

In the year 1845, when the South Pacific was less known than the heart of Africa is today, a British frigate skirted southeast along the coast of New Caledonia and at the land's end dropped anchor in what is now called the Canal Woodin, which separated the main island from the tiny Ile Ouen. Boats were sent ashore to obtain water, and some of the sailors noticed lumps of a peculiar bluish-black clay, which soiled their fingers purple, and took a high shiny polish when rubbed. They brought a bag full of these back to the ship and one of the officers with a scientific turn of mind preserved them, and on the return to England sent them to the great smelting works of Vivian & Co., at Swansea, where the chemists recognized the presence of co-

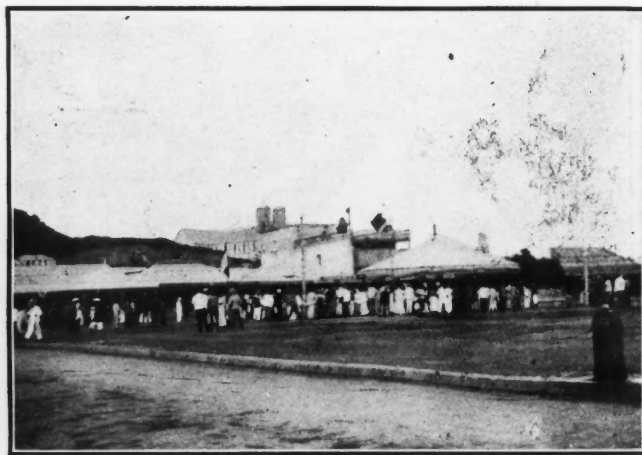
systematic excursions into all parts of the wholly uncivilized country. In constant danger from the natives, he followed up the rivers to their sources in the mountains of the Chaîne Centrale, descending to the coast to voyage to the mouth of another river and follow this up in turn, since overland travel for any distance was wholly impossible. Mr. Garnier reported the existence of huge beds of limonite of no commercial value, deposits of copper, of chrome, and, most important, of the nickeliferous magnesia silicate which bears his name—garnierite. He seems to have missed the cobalt of which nothing was known—barring always the Vivian legend—till 1876. M. Garnier's report, published in 1867, forms the first of a series of geological reports on

the Chaîne Centrale that, with a few breaks, forms the backbone of the island. Its length is 400 kilometers, and some of the peaks rise 1600 meters.

Closer in one begins to see the low land at the foot of these mountains, then the coral reefs in the foreground, and at the right Armeedee island on which the lighthouse stands. Then the pilot comes on board and the reef is entered. An hour later the steamer passes between Ile Nou with its white prison and Artillery point and, traversing the little harbor, ties up along the stone quay, which fronts the town of Noumea. The harbor has quite a busy air. One corner is dotted with the hulks of ancient warships and dismantled steamers; perhaps a couple of French gunboats and several trading schooners



COCOANUT SQUARE, NOUMEA



MARKET PLACE NOUMEA, ON A HOLIDAY

balt and manganese. In fact the clay was really asbolane, the cobaltiferous manganese oxide with which for the last decade New Caledonia has been supplying the greater part of the world's cobalt demand. This is the legend of the first discovery of mineral wealth in New Caledonia, a legend preserved by the Vivians. No use was, however, made of this discovery, probably owing to the remoteness of New Caledonia, which remained no-man's land until 1853, when it was seized by a French expedition, which beat out an English one by the smallest of margins.

#### SYSTEMATIC EXPLORATION

In 1863, Jules Garnier, of the French Corps of Mining Engineers, was sent to study the geology and mineral resources of the island. For three years he made

\*Mining engineer, Noumea, New Caledonia.

New Caledonia and the discoveries which he announced led the way to the development of the mining industry, which has progressed somewhat irregularly, but up to the present on a generally increasing scale.

#### REACHING THE ISLAND

Today a person leaving Sydney, New South Wales, on one of the fine 6000-ton steamers of the Messageries Maritimes which has come from Marseilles, will find himself after a trip of just three days in the harbor of Noumea, quite as beautiful if not as large as Port Jackson. Far out at sea he begins to discern a range of mountains in appearance not unlike the Sierras as one approaches California, but of a different color and with sharper points. The mountains grow, and the line of their summits becomes more plain till they seem like huge saw-teeth rising straight from the water. This is

will be anchored in the roadstead, while along the quay may lie one or two big square-rigged ships and several of the dirtiest little coasting and trading steamers to be found anywhere in the world. Noumea itself shows absolutely no sign of mining activity, unless it might be a few piles of cobalt or chrome ore in bags, brought down by one of the coasting boats and stocked on the quay to be sent to Europe by the returning mail steamer.

#### THE TOWN OF NOUMEA

But for other reasons Noumea is one of the most curious and interesting of towns to be found anywhere. It is all white and green, with the bluest of blue skies overhead, and the tropical sun is reflected from the sheet-iron roofs and seems actually to shine up from the limestone pavements, so that the continual glare is most trying on the eyes. Yet a cool breeze almost always blows, and

water from the reservoir on the hill trickles pleasantly down on either side of the streets, and the cocoa-palms and flamboyants (a species of locust tree with brilliant red flowers) lend shade and color. Its population is about 8000, and on the streets one sees the most motley crowd of people, especially on Sundays when all are out in the square to listen to the music, patronize the Italian bazaars and cake-stalls or risk their money on the "petits-chevaux." French officers and business men, English and Australians of all classes, Austrian and French laborers, traders, beach-combers and ex-convicts, make up the European element. Next the Arab convicts and exiles from Algeria. Then come all shades of color—Japanese, Chinese, Tonquinese, Annamites, Javanese, Singalese, Malabars, Hindoos, Polynesians from the Loyalty islands and the Malaysian race of islanders from the New Hebrides, Solomons and New Caledonia itself. Each nationality clings largely to its national costumes and talks its own language with "pidgin-French" or "Bech-

stay he had accumulated a very fine collection of mineral specimens which were carefully labeled and arranged on his table. On his return to Noumea from his final excursion into the bush he found all his baggage had been moved into a tiny stuffy room across the hall, and his collection dumped pell-mell into a packing case. Furious, he rushed to complain to the landlady, who greeted him with a calm superiority. "Yes, it was true that Monsieur's quarters had been changed, but what of that? While Monsieur was away Capt. C— (another mining engineer) had arrived and he had fancied the room, so she had given it to him; of course because the Captain was a great deal better client than Monsieur—why, he drank fully three times as much whisky daily!"

#### TRAVELING IN NEW CALEDONIA

To reach any of the mines one must leave Noumea and journey by boat up either the east or the west coast. Mining centers are located up both coasts to the very north end, which, though only 400

ways beautiful, and yet it is best not to dwell too long on one of these voyages, for they are always painful subjects with those who have experienced them.

On the other hand, one may travel overland up country, and if the roads are not too wet and the mosquitoes are not too bad which means if one does not have to travel between December and May it is the more interesting if a bit the slower method. There is a very good metal road running up the west coast for 136 km. from Noumea, and this was formerly traversed by a two-horse mail-coach doing that distance in 15 hours. It was fortunate for the proprietors that the S.P.C.A. had no branch in New Caledonia, else the stage line would have been ruined by daily fines and the drivers spent most of their time in prison. But today this has been replaced by a line of 24-h.p. automobiles, which are supposed to do the trip in ten hours and which seat 12 persons—provided each person is not too large. After this first day's ride in style, one must forsake all wheeled vehicles and travel on



JAPANESE AND KANAKAS AT COOK CAMP



THE OVERLAND MAIL

de-mer" as a means of communication between all. The square on Sunday is truly a babel.

Though tucked away in a remote corner of the world, it is a poor year for New Caledonia when it is not visited by several mining engineers, and many are the pleasant remembrances they carry away of the delicious meals at the hospitable Noumea Club and the rides and drives around that pretty town. There are other memories which certainly are not so agreeable. For instance, the hotels leave much to be desired. I recollect a story told me by one of the ENGINEERING AND MINING JOURNAL'S most faithful contributors. Some years ago he came over to examine several mining properties, and was comfortably installed in a very pleasant room at the best hotel, which was then kept by an elderly Frenchwoman who had a cute way of sizing up her guests and treating them accordingly. During his

km. from Noumea, is a five days' trip on the boats, and these days are anything but blissful. The steamers are small, badly equipped and dirty. They travel about seven knots per hour, but spend all the night and the greater part of the days anchored in the coast harbors loading or unloading freight. Part of the voyage is made between the barrier reef and the mainland, but anyway it is rare to have bad weather along the coast except in the hurricane season. All the time one gazes on the mountains of the Chaîne Centrale, which on the west coast stop some way inland, giving place to a band of low rolling country about 15 km. wide between them and the sea, and on the east coast tumble abruptly into the ocean, except where the rivers have formed alluvial flats and deltas and run through valleys, at the mouth a few kilometers in width, but shutting in like a funnel at about 5 km. from the coast. The scenery is al-

horseback, for the road from here on is in places only a bridle-path, and as one goes farther north it is at times very difficult to distinguish it from one of the many cattle tracks which cross it in different directions.

#### MINERALS AND GEOLOGY

Nickel, chrome and cobalt ores have long been the chief mineral exports of New Caledonia, and the mines are pretty well distributed over all parts of the island, except the northern half of the east coast. These ores are always found in the serpentine formation, serpentine resulting from the decomposition of the peridotite which covered about one-third the surface of the island.

The geology of New Caledonia is very interesting and complicated, and has been but little studied, owing to the difficulties of travel. Nevertheless, Messrs. Garnier, Herteau, Levat, Peletan, Piroutel and

Glaser, all French engineers, and F. Danvers Power of Sydney, N. S. W., have made successive tours of the island and contributed to the knowledge of its geology.

Sedimentary formations occupy about two-thirds of the surface. In the north are found mica and chlorite schists which are of doubtful age, but probably belong to the latter Paleozoic. Following on these are the sandstone schists, which have generally been considered Triassic; though M. Glaser very reasonably observes that their great resemblance to the Silurian schists of New South Wales would lead one to believe that they belonged to that era also. Throughout the length of the island, especially on the east coast, are found long bands of limestone, attributed to the Carboniferous.

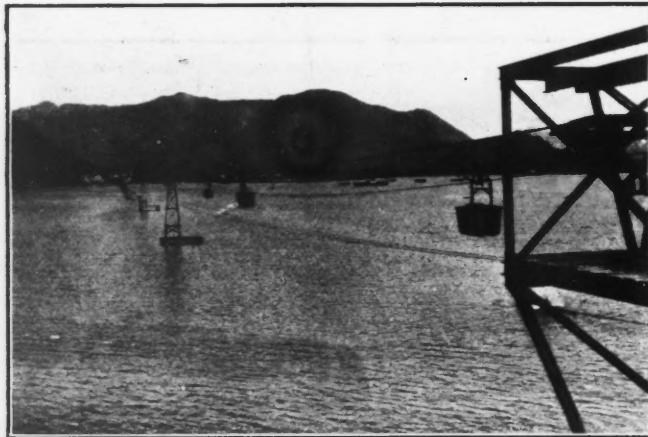
Then comes another series of schists most prominent in the south, formed during the Triassic and Cretaceous, and it is in these last that the coal seams are found. Lastly there are the recent quaternary

doubtful, for I have never seen any diorites except occurring as dikes in the serpentine. This is a quartz hypersthene diorite associated with gabbro and seems to belong to a much later era. I note that M. Glaser makes a similar observation.

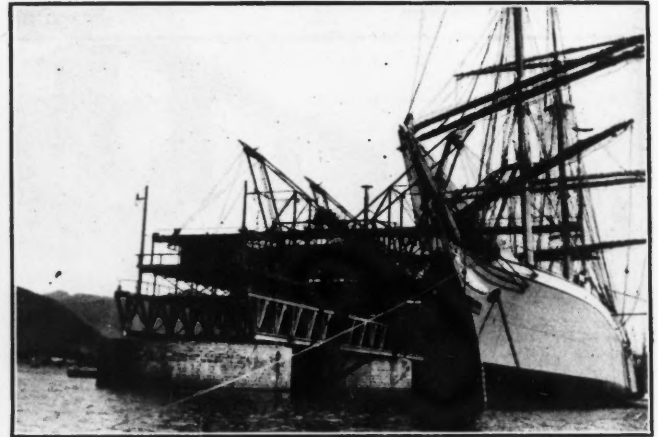
#### THE SERPENTINE ROCKS AND THE ORE-DEPOSITS

The most important rocks are the serpentines, which are derived from the peridotites and cover an area of about 600,000 hectares. Formations of this rock are to be found all over the colony except in the extreme northeastern part. Practically all the peridotite is more or less altered, shadowing gradually into a serpentine asbestos talc, iron clay and pistolitic and oolitic iron as products of its decomposition. To the microscope or the eye, this peridotite has a most varied aspect, and it is rare that two samples look anything alike. This is partly due to its varying state of serpentinization and con-

these deposits has been a much disputed point. Messrs. Levat and Peletan held that the serpentine had been decomposed into clay by these superheated waters, charged with iron and cobaltiferous manganese, which were deposited on or near the surface. Other authorities, including M. Glaser and Mr. Power, hold that there are no evidences of this hydrothermal action, but that the deposits are purely due to atmospheric decomposition and alteration of the peridotite, which contained the grains of chromite and the nickel in the olivine. The percolating surface waters would then have had a chance to take the nickel in solution from these zones of decay, and precipitate it in pockets and crevices. This is the manner in which the nickel silicate deposits in Oregon, and probably those in North Carolina, are believed to have originated. While admitting that there is no direct evidence of recent volcanic action nor of thermal springs, to me it still seems reasonable to suppose that at some time such



ROPEWAY TO WHARF AT THIO



LOADING ORE AT THIO

alluvions and clays, mostly in the river valleys, and the coral reefs, dead and living, which form a fringe about all the coast, and on the west make up a barrier reef, which in size is only surpassed by the great barrier of Australia.

The eruptive rocks have been arranged by M. Peletan in five groups:

1. Very old greenish basic rocks highly metamorphosed, and containing much chlorite. Some of these rocks are norites and in connection with them are found the copper and lead-zinc deposits. These rocks are confined wholly to the north of the island, which is much the oldest part.
2. Diorites.
3. Melaphyrique rocks, probably derived from the same originals as (1), but of very doubtful age and origin.
4. Porphyries proper, generally associated with the coal-bearing strata and in places underlying the serpentine and peridotites.
5. Serpentine.

Some doubts have been cast on this classification by latter writers and the placing of the diorites seems to me very

sequent hydration, and partly due to the varying proportion of its principal constituents, silica, protoxide of iron, magnesia and in places oxide of nickel and cobalt. It contains generally a large proportion of enstatite which when decomposed passes into talc, and grains of chromite and picotite which are nearly always visible under a lens.

The nickel, chrome and cobalt deposits all occur in this serpentine and seem to be largely products of the decomposition. The deposits generally occur on the points or sides of spurs where the rock has been the most exposed to splitting and atmospheric influences, and at the same time the capping of limonite and the iron clay seem to have served to protect these deposits from erosion; it is therefore the rule to find the principal deposits under a rather heavy over-burden of iron, this being especially true in the case of cobalt, which seems to occur only where the greatest amount of decomposition has taken place.

Whether or not thermal springs and ascending waters have aided in forming

agencies did aid in the decomposition of the serpentine, for the percentage of nickel and cobalt together in the unaltered peridotite is very small, often less than 0.01 per cent. with only traces of manganese and cobalt and never over 0.3 per cent. in the olivine itself—often less than 0.01 per cent. It is difficult to understand how purely atmospheric and surface agencies could have effected the concentration of the nickel deposits, some of them containing over 100,000 tons of 7 per cent. ore, and the rich masses of cobalt and manganese.

More recently it is certain that lateral secretion has altered the form of many of the deposits and has left the nickel silicate in veins and cracks in the rock, so that, as Mr. Power very justly observes, the ore as found at present appears to have been wholly deposited from above. If the theory of ascending mineral waters is to be wholly discarded, it is again very difficult to account for the fact that spurs of the same form composed of the same peridotite, and which have been subject to practically the same atmospheric



agencies and equally protected from erosion, should in some cases present such large deposits of ore and in other cases present only sterile clay, although the serpentinization of the rock may have progressed to the same stage.

#### CHROME, COBALT AND NICKEL ORES

The chrome ore may easily be simply the product of decomposition of the rock due to atmospheric agencies, for the grains of chromite are constantly found in all the peridotite on the island, disseminated through it in grains of some tenths of a millimeter in diameter, which have often been agglomerated into small lumps of rock, even where a deposit does not occur. The ore has the formula  $\text{FeCr}_2\text{O}_4$  and has a theoretical composition of 68 per cent. sesquioxide of chromium. As found, the grade varies from 45 to 58 per cent.  $\text{Cr}_2\text{O}_3$ , and it is intimately associated with serpentine rock in some cases, while elsewhere it is a thin coating of impure iron oxide resembling rust, and seeming to be the remnant of the original basic gangue. This last ore is known as red chrome and because of its high grade is much sought for.

Although there is always some cobalt, say about 0.2 per cent., associated with the nickel ores and some nickel, say 0.8 per cent., associated with the cobalt ores, yet the workable deposits of these two metals are always found separately, often long distances apart. Like the nickel and chrome, the cobalt is the product of decomposition, but, whereas the nickel seems to have had an affinity for the magnesia and to have been carried by that metal, the cobalt associated itself with the manganese to form the cobaltiferous manganese wad, carrying from 2 to 9 per cent.  $\text{CoO}$ .

#### OTHER METALS AND MINERALS

Aside from the working nickel, cobalt and chrome mines on the island, there are a great many prospects showing other metals, and some mines once worked, but now closed down for one reason or another. The metals and minerals that have been produced in the past are gold, silver, lead, zinc, copper, iron, antimony, coal, limestone and gypsum. Besides these the following have been found: Quicksilver, graphite, petroleum, tungsten (as scheelite), titanium, manganese, molybdenum, magnesia, tin, bismuth, cadmium, boron (in datolite), barium, asbestos (fibrous serpentine), talc and arsenic. Platinum was once reported, but later investigation failed to establish its existence.

The list is formidable enough and aside from any question of commercial value shows what a very large and interesting variety of ores is found in this little island, comprising only 18,000 square kilometers.

At one time considerable copper and gold and a small amount of lead, zinc and silver were produced; in fact the copper

and gold industry flourished in the north of New Caledonia 20 years ago when the nickel was still mined on a very small scale. The coal mines, for a long time abandoned, have recently been the object of considerable development work, and borings for petroleum are shortly to be undertaken.

### Iron Smelting in Australia

Australia possesses extensive deposits of iron ore. They are widely dispersed throughout the continent, and on the numerous surrounding islands. The most noteworthy deposits are in New South Wales, Queensland, South Australia and Tasmania. Several of the larger ones are well suited for working, being close to water, and to coal and limestone deposits. For these reasons many attempts have been made to develop iron- and steel-making industries. The first important iron smelter in Australia was built at Fitzroy, near Mittagong, in New South Wales, in 1852. In that district there are numerous deposits of limonite ore overlying the coal measures and in proximity to large deposits of limestone suitable for flux. Smelting operations were carried on intermittently between 1852 and 1855, and a quantity of pig iron was produced. The undertaking proved unprofitable in 1855 on account of the small demand for pig iron in Australia, and the keenness of the European sellers in the Oriental markets.

In 1864 the smelter plant was acquired by a new company, and smelting was resumed with the view of supplying the iron needed in some large railroad contracts. The works were enlarged and a foundry was established for the manufacture of large castings such as water pipes, gas pipes, retorts, etc. This plant changed hands in 1875, when it was acquired by the Bessemer Steel and Hematite Iron and Coal Company, an English corporation. After producing about 3500 tons of pig iron this company found the capacity of the local market too limited, and abandoned the property.

The next blast furnace was built at Eskbank, near Lithgow, in New South Wales, in 1875. These works produced 22,000 tons of pig iron from Lithgow ore, when the management found that there was a greater demand for steel than pig iron, and converted the works into a steel rolling mill for re-working scrap steel. To date these works have produced iron and steel valued at about \$8,000,000.

The latest smelters were erected at Lithgow, New South Wales, in May last by an English company, under the management of William Sandford. The plant consists of a modern blast furnace and three hot-blast stoves. The furnace is 75 ft. in height, having a 9-ft. bosh. The furnace is supplied with a Parsons turbo

blower plant, with a delivering capacity of 20,000 cu. ft. of air per min. against a blast main pressure of 10 lb. per sq. m. when running at a speed of 3000 r.p.m. The turbo-blower is directly driven by a Parsons steam turbine. By this combination the blast pressure is maintained at an almost even point. It supplies a steady and continuous blast, which, however, by reason of the facility with which the speed of the blower can be regulated between 2000 and 3800 r.p.m., can be reduced or increased at will to meet all the demands of the furnace.

The plant is running satisfactorily and its output averages 600 tons of pig iron per week. The smelting costs are \$7.50 per ton.

It would appear that the new smelter is experiencing similar troubles to those which overwhelmed its predecessors. In a recent interview Mr. Sandford stated that:

"The company cannot get rid of its pig iron quickly enough. Merchants will not buy on a falling market except to supply their immediate necessities, and the iron market at the present time is a falling one. In three weeks there has been a drop of 3s. per ton. Beside this, there are good stocks on hand in most places, and we shall have to wait until these are worked off. But we are encouraged by letters we receive showing that we have been very successful in pleasing our customers, although in one or two lines we have some difficulty. For making steel for our own requirements we have never had anything better than the pig iron from our own furnace.

"Our trouble with regard to the other States, however, is the freight. Ships will bring the pig iron from England to Australia for less than we have to pay to send it from one State to another. They will bring it out practically as ballast, but our interstate lines charge full price. We had an inquiry from Western Australia not long ago for a quotation. We could give the quotation, but the cost of sending the pig to western Australia put us out of the market."

The value of the iron and steel imported into Australia in 1906 was as follows: Bar, rod, angle and tee iron, \$2,500,000; iron and steel wire, \$10,000,000; galvanized iron, plate and sheet, \$5,300,000; pig and scrap iron, \$2,000,000; and railroad material, \$2,000,000, making a total of \$21,800,000.

These figures show there is a substantial business in iron done between Europe and Australia; but for the reasons given by Mr. Sandford above the local works are hampered in the competition with foreign firms. Steps are being taken to equalize matters by tariff readjustment, but it is doubtful whether this will be effective.

# Flow of Water Carrying Sand in Suspension

Experimental Study of Factors Which Influence the Relation Between the Velocity Required and the Proportion of Sand in Suspension

B Y F . K . B L U E \*

During the months of March and April, 1906, I conducted a series of experiments on the flow of sand and water in a launder. The purpose of these experiments was primarily to determine the conditions as to grade and velocity under which the sand, in a mixture of sand and water, would fall to the bottom of the launder and fill it up so that the material would run over, more exact information of this nature being desirable in designing a large stamp mill covering considerable area and located on nearly flat ground. It was desired also to know what effect the sand in suspension has on the coefficient of fluid friction of water running in a launder.

## EXPERIMENTAL LAUNDRER

The apparatus employed consisted essentially of a small launder in which a continuous and constant flow of material could be maintained by a centrifugal pump which returned the material from the receiving tank under the lower end of the launder to a delivering tank situated above the upper end. The quantity of material flowing in the launder was regulated by a gate in the bottom of the delivering tank. Since the quantity delivered by the centrifugal pump was practically constant, a by-pass trough was arranged to carry the surplus from the delivering tank directly to the receiving tank without passing it through the launder. On account of the tendency of the sand to settle, any form of weir measurement was impossible, and for the same reason it was found impractical to make any definite mixture of sand and water and run it continuously through the launder. The apparatus was, therefore, arranged with a deflector at the discharge end of the launder, by which the material ordinarily running into the receiving tank could be suddenly deflected into a measuring tank, and then again diverted into the receiving tank when any desired quantity had been allowed to run into the measuring tank. Thus, by allowing the water to run off gradually after the sand had settled, the exact proportion of sand and water that had been running in the launder at the time could be easily ascertained. The quantity of flow was determined by noting the time required to fill the measuring tank up to a certain mark.

The launder was made of sheet iron in 30-in. lengths formed to a U-shaped section, riveted and soldered. It was about

50 ft. long, 5 in. deep and 4 in. wide, the bottom being a semicircle of 2-in. radius. The depth of the material flowing in the launder was measured to within 1/16 in., so that by dividing the quantity of flow by the area of cross section the velocity was determined with a fair degree of accuracy. On account of the disturbance of the surface of the water, however, the measurements for the higher velocities could not be made as accurately as for the lower.

## ADJUSTMENT AND MATERIAL

The launder was mounted on a trussed frame hinged at the upper end and suspended by a tackle fastened near the lower end so that it could easily be set at any grade from zero to about 12 per cent. All the observations given in the table and diagram were made just when the slope of the launder was reduced so that the least perceptible quantity of sand just began to fall to the bottom. The difference between the slope at which the mixture ran indefinitely entirely free from falling sand, and the slope at which a perceptible quantity fell to the bottom was not over 1/10 per cent., and the difference between running free and falling sufficiently to bank up and run over was 3/10 to 1 per cent. of slope.

The apparatus was located on the beach of San Francisco bay and the first set of experiments was made with a mixture of the beach sand and water. Of this sand 77 per cent. passes a 40-mesh screen and rests on an 80-mesh screen; 1 per cent. passes 100-mesh cloth. The average is about 60-mesh sand.

The second set of experiments was made with sharp quartz sand containing a varying proportion of clayey slime from a stamp mill. In most of the experiments the proportions of slime and sand were about 10 and 90 per cent., but occasionally the proportion of slime would become somewhat less. About 90 per cent. of this sand passes a 40-mesh screen, and 10 per cent. passes a 200-mesh screen. The average is about 80-mesh sand. The slime is not included in the figures giving the percentage of sand passing the various sized screens.

## INFLUENCE OF SLOPE

By a little experimenting with the results of the observation it was discovered that the quantity with which the proportion of sand in suspension bears the most well defined relation is the slope of the launder. Plotting the proportion of sand

to the hydraulic mean radius leads to no result whatever. Plotting the proportion of sand to the velocity indicates an apparent relationship of the proportion of sand of about the sixth power of the velocity, but with a very considerable probable error. But when the quantity of sand in suspension is plotted as a function of the slope of the launder a well defined relation between the two quantities appears. Plotting these values on a logarithmic chart the points appear grouped in the general direction of a straight line, which shows that an exponential formula will give an approximate expression for this relation.

The equation between  $S$ , the grade of the launder, and  $q$ , the proportionate quantity of sand or sand and slime held in suspension, may then be written  $S = kq^m$ , in which  $k$  and  $m$  are coefficients to be determined approximately from the experiments. By writing an observation equation for each experiment and applying the method of least squares the most probable value of both of these coefficients could be determined in one operation. This would, however, involve an amount of work in computation not warranted by the possible slight gain in accuracy of the coefficients that might be so obtained. So a much simpler method is here employed. Drawing on the diagram a straight line which appears to be in the same general direction as the points plotted from the first set of observations, it is found that the tangent of the angle it makes with a horizontal line is about 0.5. Now, it is a property of a logarithmic chart that the tangent of the angle formed by a straight line and an axis of coordinates is the exponent of the variable quantity that the line represents a function of. That is, if the values of  $kq^m$  be plotted on a logarithmic chart, a line drawn through the points so plotted will be a straight line, and the tangent of the angle which this straight line makes with the axis of  $q$  will equal the exponent  $m$ .

Then, taking 0.5 as a plausible value for the exponent  $m$  we have  $S = kq^{0.5} = k\sqrt{q}$ . Transposing this to find the value of the other coefficient,  $k$ , we have  $k = \frac{S}{\sqrt{q}}$ .

An approximate value of this coefficient could be found by substituting in this equation, values of  $q$  and  $S$  taken from the diagram for any point in the straight line drawn to give a plausible representation of the probable equation indicated by the general direction and position of the points plotted from the observations. But

\*Mechanical engineer, San Francisco, Cal.

a much closer approximation; that is, the most probable value of this coefficient when the exponent  $m$  is assumed, can be found arithmetically without great computation in the following manner.

SIMPLIFIED SOLUTION

Find the value of  $k$  in the equation  $k = \frac{S}{\sqrt{q}}$  for each of the 23 observations given in the table. Adding these values together and dividing by 23 would give an arithmetical mean value for the coefficient  $k$ . But if the terms of the equation be transposed so that it reads

$$q = \left(\frac{1}{k}\right)^{\frac{1}{m}} S^{\frac{1}{m}}$$

This gives the most probable value of the logarithm of  $k$  as 1.2693, and therefore the most probable value of the coefficient  $k$  is 0.186. Taking the difference between 1.2693 and the value of  $\log. k$  given by each observation, and adding the values thus obtained, which amounts to 0.9892, multiplying this sum by 0.8453 and dividing this product by the square root of the product of the number of observations, 23, multiplied by the number of observations less one, 22, gives

$$\frac{0.8763 \times \sum v}{\sqrt{23 \times 22}} = 0.0372$$

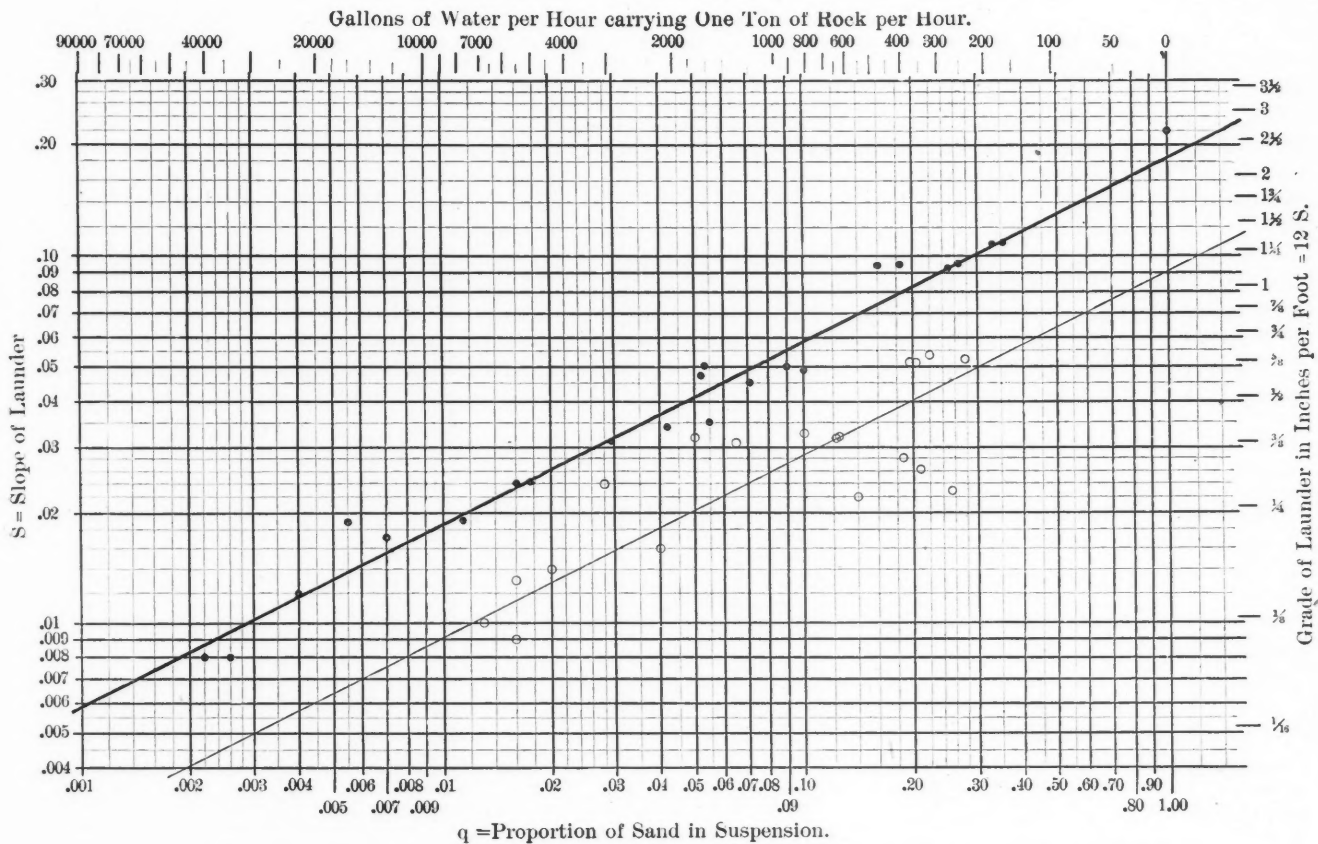
as the probable error of  $\log. k$  for each single observation. Dividing this by the square root of the number of observa-

Our formula showing the grade or slope of the launder at which in a mixture of sand and water a given proportion of sand will just be held in suspension will then be  $S = 0.186 \sqrt{q}$ .

Transposing this, the equation showing the proportionate quantity of sand which will just be held in suspension when running in a launder at any given grade will be  $q = 29S^2$ .

EFFECT OF SLIME

In plotting the set of observations for the mixture of both sand and slime in water the points do not fall so closely to a line as in the case of the sand and water alone, due no doubt to the variation in the proportion of slime in the mixture, but



The dots show the set of experiments with sand in suspension. The equation of the heavy line is  $S = 0.186\sqrt{q}$   
 The circles show those with sand and slime in suspension. The equation of the light line is  $S = 0.0910\sqrt{q}$

and the values of  $\left(\frac{1}{k}\right)^{\frac{1}{m}}$  be found for each observation from the equation

$$\left(\frac{1}{k}\right)^{\frac{1}{m}} = \frac{q}{S^{\frac{1}{m}}}$$

the arithmetical mean of these values

of  $\left(\frac{1}{k}\right)^{\frac{1}{m}}$  will not give the same value for the coefficient  $k$ . In order that these two values for  $k$  shall agree, the geometrical mean of the 23 values of  $k$  must be taken, or what is the same thing, the value of  $k$  corresponding to the arithmetical mean value of the logarithms of  $k$  for each of the 23 observations must be taken.

tions,  $\sqrt{23}$  we have 0.00772 as the probable error of 1.2693 when taken as the true value of the logarithm of the coefficient  $k$ ; that is, it is an even wager that the true value of  $\log. k$  differs less than 0.00772 from the value 1.2693. The value of the logarithm of this coefficient may then be written  $\log. k = 1.2693 \pm 0.0072$ .

Coming back, then, to natural numbers we have  $k = 0.186 \pm 0.0033$ . That is, it is an even wager that this value of the coefficient  $k$  is the true value within 2 per cent. (for this set of observations under the assumed condition that the exponent  $m = 0.5$ ), or it is a wager of 100 to 1 that this value is correct within 7 per cent.

the general trend of these values runs parallel with those for sand and water and at a very decided distance away. This shows that the presence of a small proportion of slime produces a very marked reduction in the fluid frictional resistances occurring in the launder.

Treating the values of these observations in the same manner as for sand and water, and assuming 0.5 to be the most probable value of the exponent of  $q$  as before, we find that the most probable value of the logarithm of the coefficient  $k$  will be 1.9589. For this as the true value of  $\log. k$  the probable error is 0.0215. The value of the logarithm of this coefficient for a mixture of sand, water, and slime

may then be written  $\log k = 1.9589 \pm 0.0215$ .

Coming back to natural numbers we have  $k = 0.0910 \pm 0.0045$ , showing that it is an even wager that the coefficient is within 5 per cent. of the real value, or 100 to 1 that it is within 18 per cent.

The formula showing the grade or slope of the launder at which in a mixture of sand, slime, and water a given proportion of sand with 10 per cent. of slime will just be held in suspension will then be  $S = 0.0910 \sqrt{q}$ .

This equation transposed to show the proportionate quantity of sand and 10 per cent. slime which will just be held in suspension when running in a launder at any given grade, will then be  $q = 121 S^2$ .

EFFECT OF SAND IN SUSPENSION

Referring to the diagram, there is one point to which there attaches a special interest though no great practical value. For  $q = 1$  there is shown a point for  $S$  having a value of 0.22. This is the average slope at which the sand will lie when it is flushed with water and scraped up quickly to one side of a box and allowed to settle and find its own grade as the little surplus of water runs out. This observation is of interest because this mixture while flowing is practically 100 per cent. sand, and the corresponding value of the slope  $S$  falls close to the straight line which represents the equation for the slope at which a given percentage of sand will just remain in suspension when flowing in the launder.

A formula showing the effect of the sand in suspension on the velocity of flow may be deduced in the following manner:

The coefficient  $C$  in the Chezy formula for the flow of water in channels

$$(V = C \sqrt{RS})$$

is found for each observation. Then from a diagram of Kutter's formula the corresponding value of the coefficient  $n$  may be found for each case. Plotting these values of  $n$  to the corresponding values of the relative quantity of sand in suspension,  $q$ , on a logarithmic chart, it will be seen that the value of  $n$ , and hence the loss of head by friction, increases as the quantity of sand held in suspension increases. This increase is not very great, but the plotted points will be found to fall fairly well to a straight line. Finding the equation of this line in the same manner as before we will have  $n = 0.0125q^{0.055}$  approximately. This value of  $n$  may be used in Kutter's formula for the flow of water in channels, or, by substituting it in a formula proposed by Wm. E. Foss in the *Journal of the Association of Engineering Societies* for June, 1894, we may write

$$V = \left( \frac{11,600 R^{1/3} S}{9^{0.11}} \right)^{0.11}$$

for the velocity of the water in a riveted

iron launder when holding sand in suspension.

VELOCITY OF FLOW

When the values of  $n$  for the flow of water with sand and slime in suspension are plotted, the position of the line for an average value of the coefficients is not quite as plainly indicated as for sand alone in suspension, but it is quite apparent that the value of  $n$  will be a little less, so the equation for the coefficient of roughness for sand and slime in suspension may be written  $n = 0.0105q^{0.02}$ . For the velocity of flow in the launder when the water holds sand and slime in suspension we may write

$$V = \left( \frac{16,500 R^{1/3} S}{9^{0.04}} \right)^{0.11}$$

It will probably be noticed that these

experiments with sand and slime the relation is not defined well enough for any approximation. In the experiments with sand, although the relation is not as well defined as desirable, a formula may be developed which has a reasonable degree of probability.

CONCENTRATION AND VELOCITY

Plotting on a logarithmic chart the observations of  $V$ , the velocity of flow in the launder in terms of  $q$ , the proportion of sand held in suspension, it will be seen that the exponent  $m$  in the assumed equation  $V = kq^m$  is equal to 1/6 approximately. Assuming this as the value of the exponent of  $q$ , and taking the geometrical mean of all the values of  $k$  deduced according to this assumption, it will be found that  $k = 8.148 \pm 0.352$ . It is an even wager that this is correct within 5 per cent., or it

VALUE OF FACTORS, BEACH SAND JUST CARRIED IN SUSPENSION.

D	Q	S	q	$\frac{S}{\sqrt{q}}$ k	log k	v	A	$\sqrt{R}$	$\frac{Q}{A}$ V	$\frac{V}{\sqrt{RS}}$ C	n
2	0.365	0.107	0.350	0.181	1.2577	0.0116	0.0435	0.288	8.38	88.8	0.0115
2	0.328	0.107	0.330	0.186	1.2695	0.0002	0.0435	0.288	7.53	79.8	0.0123
3/4	0.0656	0.095	0.265	0.185	1.2672	0.0021	0.0141	0.209	4.65	72.2	0.0120
3/4	0.0675	0.093	0.250	0.186	1.2695	0.0002	0.0141	0.209	4.80	75.3	0.0118
3/4	0.0375	0.095	0.182	0.223	1.3483	0.0790	0.0087	0.180	4.30	77.5	0.0110
1 1/4	0.172	0.095	0.160	0.238	1.3766	0.1073	0.0265	0.252	6.49	83.5	0.0118
2 1/4	0.393	0.049	0.100	0.155	1.1903	0.0790	0.054	0.303	7.28	108.4	0.0111
1 1/2	0.182	0.050	0.090	0.167	1.2227	0.0466	0.036	0.273	5.06	82.8	0.0119
2 1/4	0.328	0.045	0.071	0.169	1.2279	0.0414	0.0505	0.299	6.50	102.0	0.0103
1 1/4	0.062	0.045	0.060	0.184	1.2648	0.0045	0.0127	0.047	4.88	49.0	0.0110
1 1/4	0.176	0.035	0.065	0.149	1.1732	0.0961	0.040	0.282	4.40	83.4	0.0118
1 1/4	0.197	0.050	0.053	0.217	1.3365	0.0672	0.030	0.262	6.56	112.0	0.0094
1 1/4	0.0458	0.047	0.052	0.206	1.3139	0.0446	0.0127	0.202	3.61	82.5	0.0111
2 1/4	0.307	0.034	0.042	0.166	1.2201	0.0492	0.056	0.305	5.49	97.6	0.0109
2 1/4	0.328	0.031	0.0295	0.180	1.2553	0.0140	0.0575	0.307	5.70	105.0	0.0103
3/4	0.0346	0.024	0.0174	0.182	1.2601	0.0092	0.0141	0.209	2.45	75.7	0.0115
2 1/4	0.328	0.024	0.016	0.190	1.2787	0.0094	0.063	0.315	5.22	107.0	0.0101
3/4	0.0402	0.019	0.0115	0.177	1.2480	0.0213	0.0141	0.209	2.85	99.0	0.0097
1 1/4	0.164	0.017	0.007	0.203	1.3075	0.0382	0.040	0.282	4.10	111.5	0.0095
2 1/4	0.394	0.019	0.0055	0.256	1.4082	0.1489	0.068	0.318	5.80	132.0	0.0080
1	0.0364	0.012	0.004	0.190	1.2788	0.0095	0.017	0.220	2.14	88.8	0.0107
2 1/4	0.164	0.008	0.0026	0.157	1.1959	0.0734	0.052	0.301	3.16	117.0	0.0095
3 1/4	0.378	0.008	0.0022	0.171	1.2330	0.0363	0.0925	0.337	4.08	135.0	0.0088

equations cannot be true for all values of  $q$ , because for clear water  $q$  would be zero, and then  $n$  would become zero according to the equation, which is not true. So these equations must be considered as expressing a fair approximation of the true conditions only when the quantity of material in suspension has an appreciable value, say two parts in a thousand of the mixture.

The fact must also not be lost sight of that the value of  $n$  given above cannot be substituted for Kutter's  $n$  for all conditions of roughness of the channel. It can only be substituted without modification when the roughness of the channel is about the same as that of a riveted iron pipe, or when Kutter's  $n$  would be equal to 0.011.

As stated before, the relation between the proportion of sand in suspension and the velocity of flow is not well defined in the experiments, and in the case of the

is a wager of 100 to 1 that it expresses the real value within 15 per cent.

An equation showing the velocity  $V$  in a launder, which will just be required to carry a given proportion of sand  $q$  in suspension may then be written  $V = 8.148 \sqrt{q}$ .

$D$  = depth in inches of mixture flowing in the launder.

$Q$  = quantity of mixture flowing in the launder in cu.ft., per sec.

$S$  = slope of the launder, or the ratio of the difference in height of the launder at any two points to the length of the launder between these points.

$q$  = ratio of the volume of wet sand or sand and slime to the total volume of the mixture flowing in the launder.

$A$  = area of cross section of the mixture flowing in the launder in square feet.

$R$  = hydraulic mean radius of flowing mixture in feet.

$V$  = average velocity of flowing mixture in feet per second =  $Q/A$ .

$C$  = coefficient in Chezy's formula for flow of water in channels =  $V \sqrt{RS}$ .

$n$  = coefficient of roughness in Kutter's formula for the flow of water in channels.

$m$  = exponent of  $q$  in the empirical formulas for deducing an approximate value of  $S$  and  $V$ , found by inspection of graph of plotted observations.

$k$  = coefficient in the empirical formulas for deducing an approximate value of  $S$  and  $V$ , determined by taking the geometrical mean of the values calculated from the observations when the value of the exponent  $m$  is assumed.

$v$  = difference between the arithmetical mean value of  $\log k$  and a value

the foot would then be just about sufficient to keep this proportion of sand and slime in suspension. So it would be reasonably safe to lay this launder or flume on a grade of  $\frac{3}{4}$  in. to the foot with a few feet at say  $1\frac{1}{4}$  in. to the foot at the start. It might be added that the flume should be made much deeper than that required for normal flow in order to take care of any irregularities and banking up of the sand which might occur during a temporary reduction in the proportion of water.

If there were no slime in this mixture, the velocity necessary to carry this proportion of sand in suspension would be  $V = 8.15 \sqrt{0.25} = 6\frac{1}{2}$  ft. per sec. Since the given mixture contains slime the required velocity will be a little less.

A simple test for the soundness of cement is to add to 2  $\frac{1}{12}$  oz. of cement,  $\frac{5}{12}$  oz. of water, mix for five minutes. If the cement is fresh it may be necessary

### Mining Laws in Colombia

On May 14, the National Assembly of Colombia published several decrees relating to mining and mineral claims, from which the following abstracts are taken.

The Government is to have a monopoly of the export and sale to foreigners of platinum, palladium, iridium, osmium and ruthenium, as well as of all radio-active minerals.

The executive is directed to refuse permission for the sale by auction of mines in which platinum is the principal metal, and to require new concessions for river dredging where platinum is to be found. It is provided that a suitable bounty shall be paid to persons who discover deposits of platinum. The Government is authorized to undertake the exploitation of platinum deposits, also of any deposits of that metal where active working has been suspended.

Whenever it is considered opportune, the Government is permitted to substitute, for the present tax upon emerald mining, a duty of 10 per cent. of the value of the rough products which are exported, either by companies or by individuals, and is to maintain a strict inspection of each emerald mine in order that the Government's interests may be properly protected.

Copper mines have come under the provisions of the decree of 1837, so that they can now be denounced, as well as mines of gold and silver. Persons owning copper mines upon their own private lands are allowed a period of one year to obtain new titles in conformity with the general mining regulations.

### Electric Current vs. Compressed Air in Colliery Haulage

An interesting example of the change from compressed air to electricity for power purposes in collieries is found in the case of the Clifton colliery at Nottingham, England. The underground haulage used to be effected by compressed-air engines at the bottom of the pit. These engines worked an endless rope gear hauling 1500 tons per day of 7 $\frac{1}{2}$  hours, along a road 595 yd. long up a gradient of 6 in. to the yard. The compressed air worked at 70 lb. pressure and was supplied by engines at the surface which developed 578 i.h.p. In making the change to electricity the compressors were removed and a 300-kw. dynamo was coupled to the engine shaft. Two motors, one of 125 h.p. at the bottom of the shaft and one of 60 h.p. at the bottom of the incline, were installed instead of the compressed-air engine. The actual duty of the engine which drives the dynamo is 166 h.p. as compared with 578 h.p. when it drove the air compressors. This leaves a large margin of power available for other purposes.

VALUE OF FACTORS, SLIME AND SHARP SAND JUST CARRIED IN SUSPENSION.

D	Q	S	q	$\frac{S}{\sqrt{q}}$ k	log k	v	A	$\sqrt{R}$	$\frac{Q}{A}$ V	$\frac{V}{\sqrt{RS}}$ C	n
$\frac{1}{8}$	0.0318	0.052	0.277	0.0988	2.9948	0.0359	0.0087	0.180	3.66	89.2	0.0100
$\frac{1}{4}$	0.290	0.023	0.256	0.0455	2.6580	0.3009	0.0575	0.307	5.04	108.0	0.0100
$\frac{3}{8}$	0.0256	0.054	0.220	0.115	1.0607	0.1018	0.0087	0.180	2.93	70.0	0.0118
$\frac{1}{2}$	0.328	0.026	0.208	0.037	2.7559	0.2090	0.057	0.305	5.76	117.0	0.0090
$\frac{3}{4}$	0.0419	0.052	0.203	0.1152	1.0615	0.1026	0.0113	0.195	3.71	83.4	0.0107
$\frac{1}{2}$	0.0328	0.052	0.196	0.1173	1.0693	0.1104	0.0087	0.180	3.77	91.8	0.0098
$\frac{1}{4}$	0.282	0.028	0.188	0.0646	2.8102	0.1487	0.0575	0.307	4.90	95.4	0.0110
$\frac{1}{8}$	0.164	0.022	0.140	0.0588	2.7694	0.1895	0.036	0.273	4.56	113.0	0.0095
$\frac{1}{4}$	0.273	0.032	0.125	0.0905	2.9567	0.0022	0.049	0.297	5.58	105.0	0.0102
$\frac{3}{8}$	0.303	0.032	0.122	0.0916	2.9619	0.0030	0.052	0.301	5.82	108.0	0.0101
$\frac{1}{2}$	0.282	0.033	0.100	0.1043	1.0183	0.0594	0.049	0.297	5.76	106.6	0.0100
$\frac{1}{8}$	0.0895	0.031	0.065	0.1216	1.0849	0.1260	0.0232	0.243	3.87	90.4	0.0109
		0.032	0.050	0.143	1.1553	0.1964					
$\frac{3}{8}$	0.394	0.016	0.040	0.080	2.9031	0.0558	0.077	0.328	5.12	123.0	0.0095
$\frac{1}{4}$	0.219	0.024	0.028	0.1433	1.1563	0.1974	0.049	0.297	4.47	97.2	0.0109
$\frac{3}{8}$	0.394	0.014	0.020	0.099	2.9956	0.0367	0.081	0.330	4.87	125.0	0.0092
$\frac{1}{2}$	0.226	0.013	0.016	0.1028	1.0120	0.0531	0.0575	0.307	3.92	112.0	0.0098
$\frac{1}{8}$	0.0657	0.009	0.016	0.0712	2.8525	0.1064	0.030	0.262	2.19	88.0	0.0113
$\frac{3}{8}$	0.394	0.010	0.013	0.0877	2.9430	0.0159	0.0925	0.337	4.31	128.0	0.0092

of  $\log k$  calculated from the individual observations.

$$S = 0.186 \sqrt{q} \quad q = 29 S^2$$

$$V = \left( \frac{11,600 R^{4/3} S}{9^{0.11}} \right)^{0.11}$$

for sand and water.

$$S = 0.0910 \sqrt{q} \quad q = 121 S^2$$

$$V = \left( \frac{16,500 R^{4/3} S}{9^{0.11}} \right)^{0.11}$$

for sand, slime and water.

$$V = 8.15 \sqrt{q} \quad \text{for sand and water.}$$

#### EXAMPLE

It is desired to find the grade of a launder that will be required to carry 25 per cent. of sand by volume, including a little slime, and hold it in suspension in the water while flowing. Substituting in the formula, we have

$$S = 0.0910 \sqrt{0.25} = 0.045.$$

A grade of about 5 per cent. or  $\frac{5}{8}$  in. to

to use a little more water, but never use more than  $\frac{1}{2}$  oz. Make a cake of the mixed cement about 3 in. in diameter,  $\frac{1}{2}$  in. thick in the center and tapering to a thin edge. Place the cake in a damp place or cover for 24 hours with a wet cloth, then place it on a rack and cover with water, slowly heat the water up to the boiling point and maintain this temperature for six hours. Allow the cake to cool in the water, and if it warps, twists, cracks or shows expansion it should not be used in any important structure. All cements should be tested for soundness. All first class cements should be able to pass the above test.

The direct application of jets of dry steam to a gravel bank, through the agency of driven pipes, has been found to be an efficient method for thawing frozen gravel.

## Electric Reel Hoists

The hoists shown in the accompanying illustrations are two of twelve reel hoists of various sizes designed and built by the Wellman-Seaver-Morgan Company, Cleveland, Ohio, for the Compañía de Real del Monte, Pachuca, Mexico.

The hoist illustrated in Fig. 1 is operated by means of a double reduction of gears by an alternating-current motor and is de-

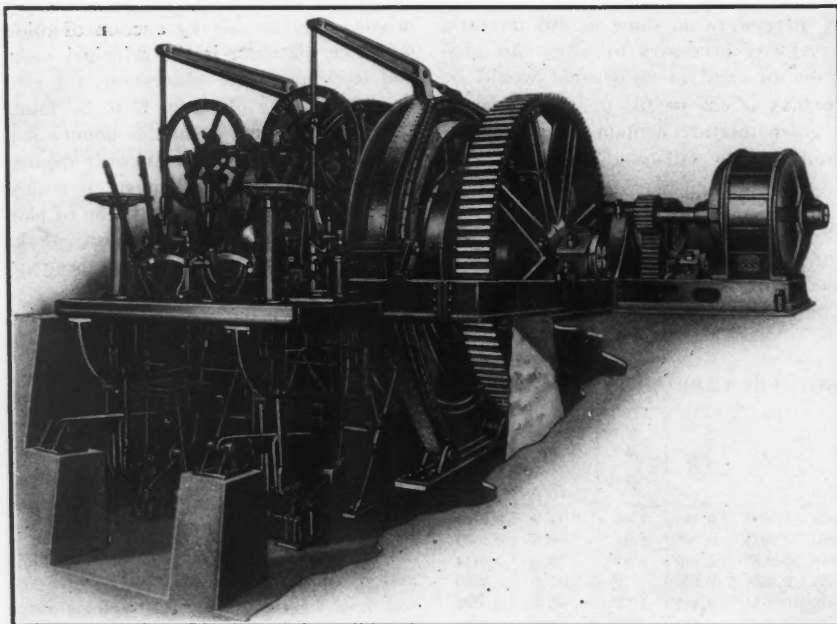


FIG. 1. ELECTRICALLY OPERATED REEL HOIST

signed to handle a load consisting of 4000 lb. ore, double-deck cages weighing 4000 lb., and cars weighing 1200 lb., from a depth of 2400 ft., at a speed of 1000 ft. per min., the ascending load being balanced by the descending cages. The hoist is supported on a cast-iron bed plate of the inverted-U type, hollow in section and surrounding the entire machine.

The reel shaft rests in adjustable babbitted bearings. Each reel has a capacity of 2400 ft. of  $4\frac{1}{2} \times \frac{3}{8}$ -in. rope and is fitted with a friction clutch and post brake. The reel hubs are lined with removable bronze bushings, which have a projected area giving a pressure of not over 80 lb. per sq. in. for the maximum load to which each is subjected. The friction clutches are of the Webstér, Camp & Lane type. The post brakes are built of plates and angles and are provided with suitable adjustments. The brakes are lined with basswood blocks, which under the maximum loads are subjected to a pressure not exceeding 20 lb. per sq. in. Both clutches and brakes are operated by compressed air, the operating cylinders being fitted with a floating valve gear, so arranged that the pistons follow the movement of the controlling levers. The brakes are set by gravity and released by air pressure. In addition to the power-operated brakes there are brakes controlled by hand wheels,

to be used in case the air pressure fails. The hoist is fitted with a safety device operated from the indicator and so arranged that if the cages are hoisted beyond a given point the clutches are automatically thrown out and the brakes are set. This automatic device is also connected to the hand-operated mechanism. Each reel is fitted with an indicator driven from the reel hub by bicycle chain and sprockets. All gears on the hoist have cut teeth of the short involute type.

There are six running points, enabling the operator to run the hoist at several speeds continuously. The resistances are of the standard iron-grid type, the grids being assembled on skeleton frames and are air-cooled. They are designed for balanced hoisting only.

The hoist shown in Fig. 2 is designed to handle a load consisting of 2000 lb. of ore in a skip weighing 2000 lb. from a depth of 1200 ft. at a speed of 500 ft. per min. The electrical equipment consists of a type I, 10-pole, 60-h.p., 600-r.p.m., 1040-volt, 50-cycle, three-phase motor, having a full-load efficiency of 86 per cent. The full-load torque of the motor is 525 lb. at 1-ft. radius.

## Talc Deposits in Brazil

United States Consul-General G. E. Anderson, at Rio de Janeiro, advises that considerable interest is being shown in the talc deposits of Brazil by both American and European manufacturers. He states: "Apparently the Brazilian deposits are inexhaustible. The price depends upon labor and transportation rather than upon the supply. Practically all of the principal deposits now being worked are in the State of Sao Paulo, in the mountains near the city of Sao Paulo, notably near Loreno. Three qualities are produced, the quality depending upon the color. The crude talc ready for crushing is being

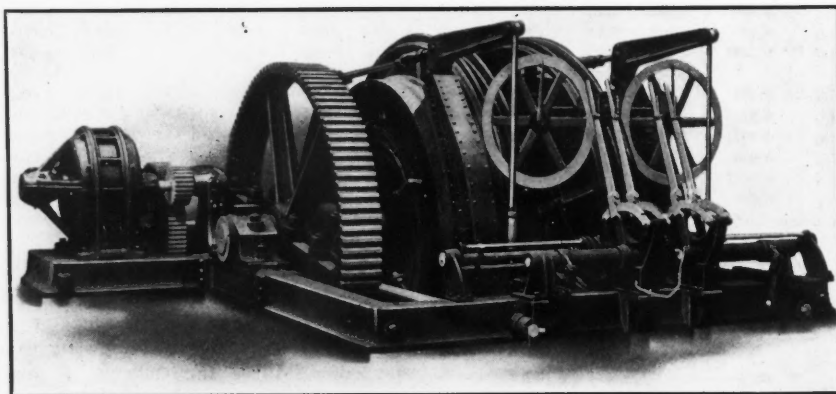


FIG. 2. ELECTRICALLY OPERATED REEL HOIST

The electrical equipment consists of a General Electric type I, 14-pole, 250-h.p. 429-r.p.m., 1040-volt, 50-cycle, 3-phase motor, having a full-load efficiency of 90 per cent. The full-load torque of the motor is 4000 lb. at 1-ft. radius, and the maximum torque is approximately  $2\frac{1}{2}$  times that amount. The insulation is tested to withstand 3000 volts alternating current for one minute, and the temperature will not exceed 40 deg. C. at rated capacity after 24 hours' run. The controller is provided with primary contacts, operating in oil, inclosed in a cast-iron case, separate from the main controlling mechanism.

furnished in Rio de Janeiro at 82 to 120 milreis, or from \$25.42 to \$37.20 per ton at present exchange. It seems to be of very good quality in the three grades."

An excellent self-lubricating, non-shrinking packing for a high-pressure steam, hot water locomotive and stationary engine throttle valves, should be made of twisted strands of pure asbestos, braided and combined with water proofing material, vulcanized and coated with plumbago.

## Laboratory of the Coffeyville Zinc Works

By E. W. BUSKETT\*

The laboratory equipment here described, at Coffeyville, Kan., with the exception of the balance table, was designed by the author. The plan of the building was furnished by the Allis-Chalmers Company, of Chicago, and only a few minor changes were made. Before making any plans for the equipment of the laboratory the author visited the laboratories of several Kansas smelters and from the information thus obtained, together with knowledge obtained from previous experience, the plans represented in this article were evolved.

### LABORATORY BUILDING

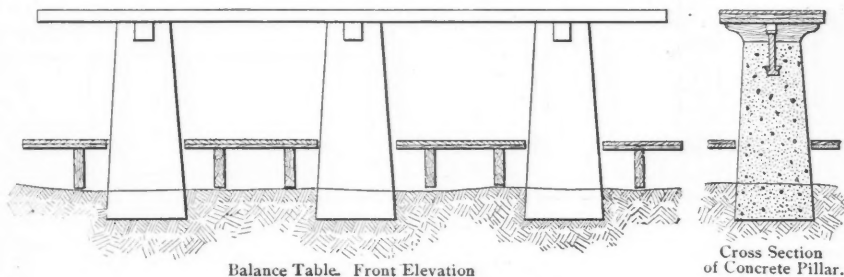
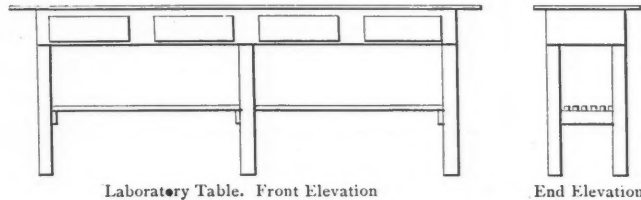
The laboratory is a frame building 30x40 ft., containing four rooms; a chemical laboratory 20x30 ft.; an assay room 20x20 ft.; a weighing room 9x13 ft., and a toilet room 5x9 ft. The floors are of two-ply pine, laid on 2x12-in. pine joists 16 in. apart. The floor of the assay room is cement. The walls are plastered with agatite and the wood work, which is of yellow pine, is finished in natural color. The ceilings are all 12 ft. high and the rooms are well lighted by large windows. The doors opening from the weighing room into the chemical laboratory and as-

### CHEMICAL LABORATORY

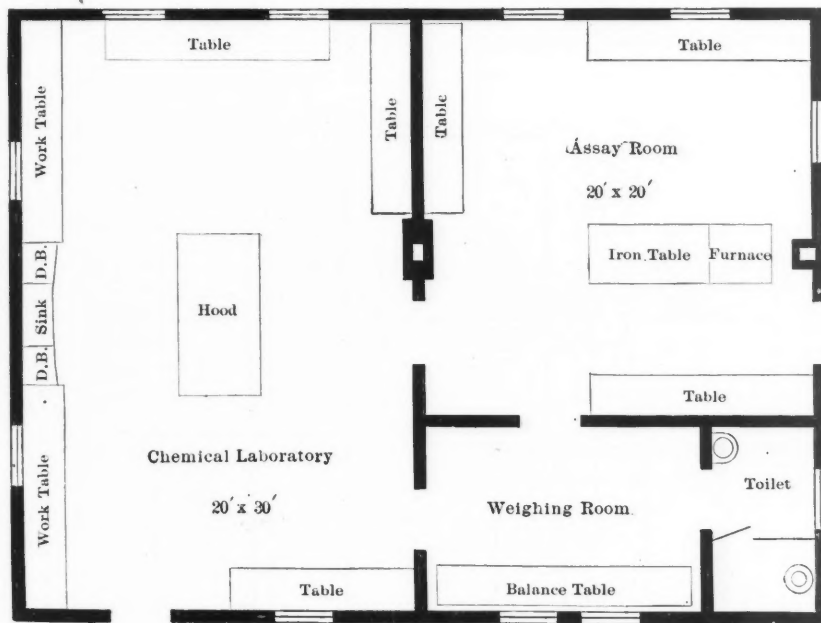
The hood, which stands in the center of the chemical laboratory, is built of yellow pine and is finished in natural color outside. There is no finish on the inside, except to putty the nail holes. It is 4 ft. wide, 8 ft. long and 10 ft. high. There is room for four men to work at this hood. At present it is equipped with only two hot plates. These are of boiler iron, 18x36x3/8 in., and each is heated by a small Fletcher solid-flame burner. A shelf 6 in. wide runs along each side of the

through a straight wooden flue, 12 in. square, the top being covered by a ventilator. This ventilator was found to work splendidly when the wind was from the north or south, but when it blew from the east or west, it struck the slope of the roof and was driven into the ventilator slats, causing a down draft. The closets under the hood make ample storage space for acids, etc.

On the north side of the chemical laboratory are two work tables 11 ft. long. These tables are covered with sheet lead, which



LABORATORY AND BALANCE TABLES



PLAN OF LABORATORY BUILDING

say room, and the door between the chemical laboratory and the assay room swing both ways and have proved to be much more convenient than ordinary doors. Fireplaces were provided in the chemical laboratory and assay room for heating, but were found insufficient in very cold weather.

\*Chemist with Mineral Point Zinc Company, Depue, Ill.

hood. This shelf is covered with sheet lead. However, it was found that too many beakers were broken by the sudden cooling when brought in contact with the metal, so an asbestos board was placed over the lead. The upper part of the hood is built of glass, the sashes being made to order. The lower sash is movable and raises 2 ft., giving ample head room for the operator. The gases are carried off

gave entire satisfaction. They are equipped with funnel racks, each holding 24 funnels. On the walls at the ends of the tables are shelves for chemical bottles, etc., while at the opposite ends are two drain boards draining into a sink in the center. This sink is provided with hot and cold water. Above each north window is a shelf for standard solutions, which are siphoned down to the burettes which stand near the ends of the tables. Above the center of each table is a shelf 14x18 in., on which is a small hot plate and water bottle, the water being siphoned to the funnels.

These work tables were built in two lengths, 11 and 9 ft. They are 24 in. wide and 39 in. high. They have four drawers 16x18x5 in.; 18 in. from the floor are shelves made of 1-in. slats placed 1/2 in. apart. These make an excellent storage for beakers.

On the west side is a 9-ft. table, used exclusively for color tests. On the east is an 11-ft. table for general use, while on the south is a 9-ft. table on which are placed carboys of acid.

### ASSAY ROOM

The assay furnace stands 1 ft. from the chimney on the east side of the assay room. It is 3 ft. square and 6 ft. high. The base of the furnace is of concrete and extends 3 ft. below the level of the floor of the room. The furnace is built of com-

mon brick and is lined with 4 in. of fire-brick. There are 750 common brick and 255 firebrick in this furnace. It is bound by 1½ in. angle irons on the corners, fastened by three sets of tie rods.

The arrangement of this furnace consists of a melting chamber below and two muffles above. The melting chamber is

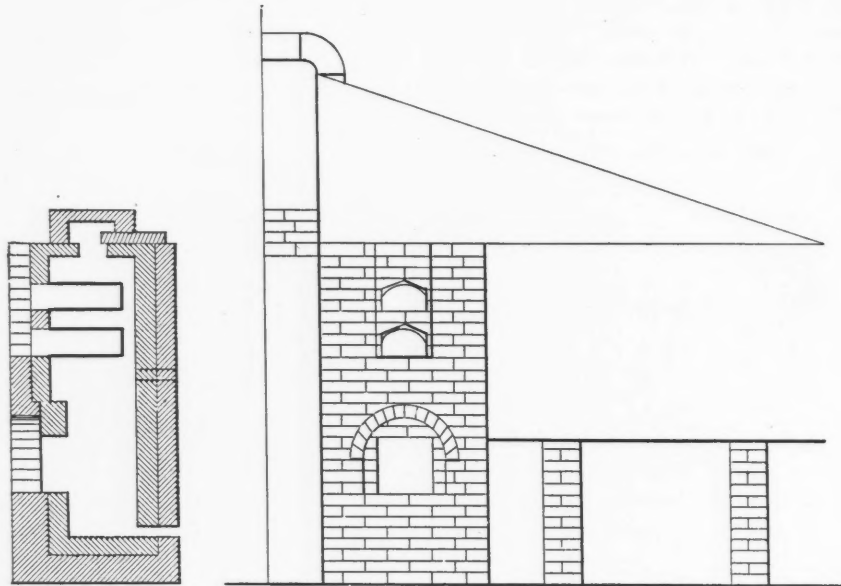
connected to the chimney by an ordinary 6-in. stove pipe. One end of the hood rests on the furnace while the other end was designed to be supported from the ceiling by wires, but it was found that the large end was heavy enough to support the small end without the aid of the wires, so they were not used.

on account of the direct sunlight in the afternoon. To avoid this, and at the same time have the room well lighted, the shades were hung half way up the window. Another good way to keep out direct sunlight and at the same time have plenty of light is to use thin white shades, but it is much better to have the weighing room face the north, when no shades will be necessary.

The balance table rests on three concrete pillars 18 in. square at the bottom and 12 in. at the top. In the top of each pillar is a wooden block, 4 in. square and 18 in. long at the top and 12 in. at the bottom. These blocks are held in place by a bolt 1 in. in diameter and 12 in. long, which is embedded in the concrete. The top of the table is fastened to the blocks by long screws which pass through the blocks into the bottom of the top. The table top is 24 in. wide and 12 ft. long. It is made of three-ply cypress, making it about 3 in. thick, and is finished in natural color.

No part of this table touches the building, the floors being cut away from the pillars by the space of 1 in. It is consequently free from all vibrations of the building and in Kansas, where high winds prevail, this is quite an item.

An ingenious method for making artesian wells deliver water to heights above



Section

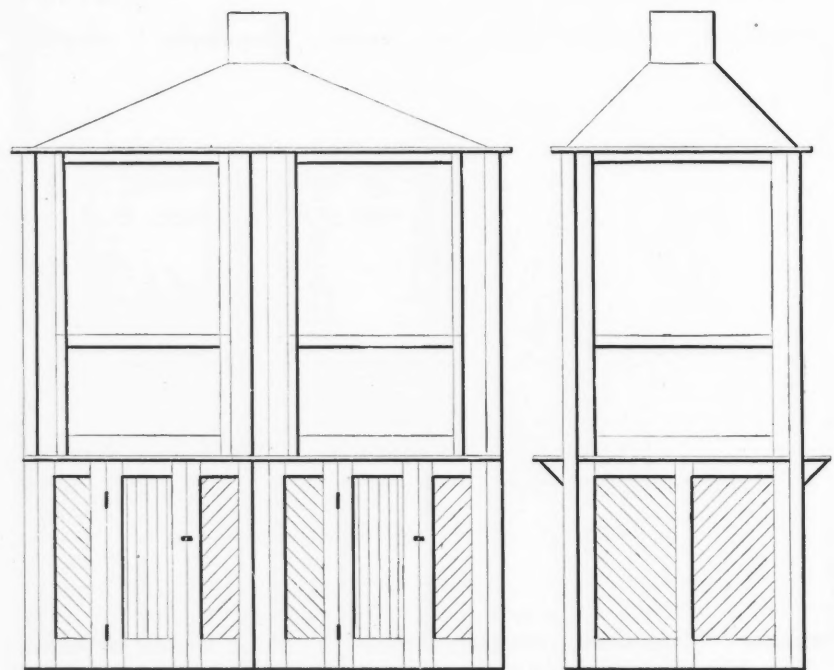
Gas-fired Assay Furnace. Front View.

ASSAY FURNACE

11 in. wide, 15 in. long and 9 in. deep. It is heated by one 1x2-in. mixer. A white heat may be obtained in this chamber. There is a recessed door, 18 in. wide and 8 in. deep, inside of which there is a smaller door 11 in. wide and 15 in. high.

The muffles are of Denver Fire Clay Company's make and are 9x15 in. high-side pattern. There is a recess 11 in. wide and 4 in. deep, beginning at the floor of the lower muffle and continuing to the top of the furnace. This serves to carry the fumes into the furnace hood. No muffle arches were used, the bricks being chipped out as shown in the cut. These were found to serve the purpose fully as well as muffle arches and are much cheaper. The muffles are heated by two 1x2-in. mixers, the position of the burners being shown by the dotted lines in the sectional cut. The gases from the furnace discharge through an opening 6 in. square into a longitudinal flue 5x8 in. which carries them into the chimney. This flue is supported on angle irons. The draft may be regulated by the tile damper shown in the sectional cut. The chimney was found to be too thin and endangered the building, so the longitudinal flue was carried through it into a special stack which was built outside of the building.

At the right of the furnace is an iron table for pouring assays. It is made of boiler iron and is 3 ft. wide, 6 ft. long and ¾ in. thick. It is supported on brick pillars 30 in. high. The furnace and table are covered by a sheet-iron hood which is



Front Elevation of Hood.

End Elevation

TABLE AND HOOD

The tables in the assay room are of the same design as those in the chemical laboratory, the slat shelves being used for the storage of crucibles and scorifiers.

#### WEIGHING ROOM

The weighing room has two windows facing the west. This is very inconvenient

their source is used along the Potomac and James rivers. The force developed by the artesian flow is used to operate hydraulic rams, which in turn raise the water to the heights desired along the bluffs above the rivers and inlets. Thus it may be said that the artesian wells pump themselves.



### Colorado Fuel and Iron Company

This company owns extensive coal and iron-ore properties in Colorado, New Mexico and Wyoming; also blast furnaces, steel works and rolling mills in Colorado. Its report is for the year ended June 30, 1907. The balance sheet shows \$34,235,500 common stock, \$2,000,000 preferred stock and \$19,945,000 funded debt. The production statement for the year is as follows, in short tons:

	1906.	1907.	Changes.
Coal mined.....	5,056,378	4,844,461	D. 211,917
Coke made.....	1,095,133	992,661	D. 102,472
Iron ore mined....	803,384	893,454	I. 90,070
Limestone quarr'd	369,921	417,612	I. 47,691
Iron & steel made..	1,900,168	1,994,410	I. 94,242

Of the coal mined last year 2,272,120 tons were sold 1,846,206 tons used at the coke ovens, 163,088 tons used in operating mines and 567,110 tons used at other plants of the company. Of the coke made, 374,048 tons were sold and 613,448 tons used at the company's iron and steel plants. All the iron ore and limestone were used by the company. Sales of finished iron and steel were 418,646 tons.

The earnings for the year are reported as follows:

	Earnings.	Expenses.	N. Earn'gs
Iron dep't.....	\$13,927,108	\$12,180,037	\$1,747,071
Fuel dep't.....	9,454,224	8,370,629	1,083,595
Denver sales dep.	410,967	383,205	27,762
Interest, etc.....	396,054	.....	396,054
General expenses	.....	262,384	.....
Total.....	\$24,188,353	\$21,196,255	\$2,992,098

Payments from net earnings were: Taxes, \$160,691 interest and sinking fund, \$1,177,190; rentals, \$959,182; loss on railroads worked, \$173,802; prospecting, \$39,855; sociological department, \$11,286; total, \$2,522,006, leaving a surplus of \$470,092 for the year.

The president's report, in part, says: "One additional coal mine was opened in Las Animas county, and is operating successfully, with fair prospects of soon becoming as large a producer as any coal mine in Colorado. Another mine in Las Animas county and one in Huerfano county are now in the course of development, and the opening of one and possibly two more mines in Las Animas county in the near future is contemplated. Eight mechanical coke drawing and loading machines have been purchased by which it is expected the output of coke will be greatly increased at reduced cost.

"A fire which broke out in Engle, one of the largest coal mines in Las Animas county, during May, 1906, and caused suspension of operations in half the mine, has been burning continuously ever since, but is now believed to be under control. Early in January, 1907, an explosion occurred in the Primero mine in Las Animas county, the largest coal mine operating in Colorado, resulting in the death of several men and serious temporary damage to the property. These two occurrences and the shortage of labor before referred to are responsible for failure to have a substantial increase in out-

put and earnings in the fuel department over the preceding year.

"The additional iron ore blocked out during the past year at the New Mexico and Wyoming properties greatly exceeds the consumption during that period and insures a larger supply than has heretofore been known to exist, thus removing all cause for doubt or anxiety about the ore reserves of the company.

"The sixth blast furnace (F) was completed and blown in May 4, 1907, taking the place of furnace D. The work of re-lining D was completed, and the furnace blown in at the close of the year; but the inadequate supply of coke, due to shortage of coke oven labor, is at the present time preventing the continuous operation of all six furnaces.

"One additional open-hearth furnace has been placed in operation, increasing the number now operating to seven, and it is expected that five more will be completed and lighted up by October of this year. The new calcining plant, the hot metal storage tank in the open-hearth department, and the additional soaking pits at the rail mill were installed during the year, and are in successful operation.

"The additions to the bolt and spike factories have also been completed, resulting in increased earnings that fully justify the expenditures for these additions. A continuous merchant mill, which was partially constructed several years ago and work stopped thereon after the expenditure of a large amount of money, is now nearing completion, and should almost double the output of merchant mill products.

"The conduit from the Arkansas river to the reservoirs near Minnequa was finished early in the present calendar year, furnishing an ample supply of water for the Minnequa plant.

"Owing to circumstances beyond our control improved results foreshadowed in the last annual report were not secured, and although the gross earnings increased nearly \$1,500,000, the increase was practically all absorbed by the higher prices of labor and materials and the increased cost of mining operations, due to the unavoidable casualties in two of our principal mines. In addition to these, the transportation companies found it necessary, on account of increased cost of labor and materials, to advance their freight charges during the last half of the fiscal year. The effect of these unforeseen conditions was to absorb practically all the increase in gross earnings. But as the result of recently improved operating conditions and consequent increased output at the smaller mills in the Minnequa plant, the resumption of practically normal conditions at coal mines and moderate advances made in the selling price of products the last few months, the monthly net earnings are now showing substantial gains over corresponding months of the previous year.

"The increase in the output of pig iron already obtained and the completion of the additional open-hearth furnaces early in the second quarter of the current year should insure a full supply of steel for the various finishing departments, notwithstanding the additions made to the latter during the past year. The opening up of additional coal mines and the installation, now in progress, of improved equipment, where needed, at old mines, should result in a substantial increase in the output of both coal and coke. Sales of all of the company's products continue to equal the output, with no signs of abatement, and the orders now booked will absorb the capacity of all departments for many months, the unfilled rail contracts being sufficient to keep the rail mill working continuously through the current year and well into the next."

### Philippine Manganese Ore

Some interesting notes on manganese ores in the Philippines are given by Warren D. Smith, of the Philippine Bureau of Science in the *Philippine Journal of Science*, June, 1907. While there is no demand for manganese ores within the islands, it is hoped that the deposits, of which three are known, can compete with outside producers. Very little is known of the extent and quality of the Luzon deposit, which was found when cutting the road from Capas to Iba. Information relating to the second deposit, in the island of Masbate, is very meager, but on the whole this district appears promising.

The most important and best known deposit is in the eruptive conglomerate region of Nagpartion in the province of Ilocos Norte. The occurrence may best be described as a system of veinlets of pyrolusite between boulders of eruptive material. The matrix is a soft and yielding tuff. This material has been decomposed and the decomposition has resulted in a concentration of nodules of pyrolusite in the depression between the adjacent hills of tuff. The original veinlets are from 5 to 50 mm. wide.

In the Nagpartian hills the concentration is greatest, but transportation difficulties will probably prevent much development in that region. Actual working is now being carried out between Punta Negra and Punta Blanca, where the lateral extent of the nodule concentration is considerable; but recent development has made it seem probable that the thickness of the deposit is small. The nodules are of very good quality, running 77.5 per cent. manganese dioxide and containing only 0.02 per cent. phosphoric anhydride, and 1.1 per cent silica.

The use of fluorspar in a cupola furnace, it is stated, reduces the amount of slag made on account of a small volatilization of silicon.

# The Montreal River Silver District

The New District Is 60 Miles from Cobalt and Covers an Area of about 80 Square Miles. Native Silver Found on Many Claims

BY REGINALD MEEKS

After the silver-bearing area in and surrounding Coleman township in Ontario had been entirely staked, and mining operations had been under way for some time, prospectors turned their attention to new fields and in the summer of 1906 started up the Montreal river to search for silver. Reports came down to Cobalt of some promising leads in James township and a small rush started in the fall. It was not until the winter, however, that the real rush began and prospectors

been thrown out, only to be re-staked immediately. There have been a number of good discoveries made and these have extended over a larger territory than the finds at Cobalt. On this account, and for geological reasons, much is expected of the Montreal river district. At Cobalt the rocks are very complex and foliated. In the younger district the prevailing country rock is diabase, but conglomerate and sometimes a capping of gabbro are observed. The Kewatin is not in evidence,

S. R. Cragg has found a vein containing 18 in. of barite on one of his properties in Smythe township, but this is the only instance of this mineral having been found in the district. Native silver has not been found on every claim but nearly all have leads which promise results when shafts have been sunk. The precious metal has been found on all of Munroe's 14 claims in James and Tudhope townships, recorded in the names of Munroe, Mitchell and Saville. Downey's, Harbeck's and



MOUNTAIN CHUTES ON THE MONTREAL RIVER

went there in large numbers. When the snow had nearly gone, there were probably 3000 men actively engaged in searching for the precious metal. It is doubtful if more than 150 of these were successful in locating properties of value.

## THE CLAIMS

Almost every square inch of country from the unsurveyed territory to the older district of Cobalt has been staked and recorded. A large number of lots have

according to reliable reports of those who have been over all the district. The veins in the Montreal river district resemble those of Cobalt in that they consist of calcite carrying smaltite, niccolite, native silver, and the two blooms of cobalt and nickel. But a marked peculiarity of the leads is that copper, in the form of chalcocopyrite, bornite, or a mixture of both, is everywhere present. There is also considerable partly decomposed quartz carrying copper but the usual vein filling is calcite.

Gifford's claims have shown values in native silver and recently Gates obtained a 50-lb. nugget from one of his claims in James. Most of the other properties have leads of calcite, smaltite and copper which show silver by assay. Pullis, Baldwin, Rogers and Heard have a vein of calcite in a contact between conglomerate and diabase which carries, at one point about 10 in. of smaltite. No assays have been made, but the vein has all the indications of the presence of silver.

PRESENT STATUS OF THE DISTRICT

The claim-owners are at present bending all their energies toward completing their assessment work. This consists of 30 days' work, which may be either trenching or sinking, and must be performed on each claim within 90 days after the claims are passed. In most cases the claims have been taken out not only for the prospector himself, but also for relatives or friends, and thus one man may hold a group of claims on which the as-

future looks promising. Silver is not found in quantity from the grass roots as was the case at Cobalt, but it is confidently believed, by all who have visited the district, that good shipping values will be found when the veins have been sunk on, and when the country is thoroughly prospected.

ABUSE OF MINING LAWS

The Ontario Mines Act of 1906 distinctly states that a discovery must be

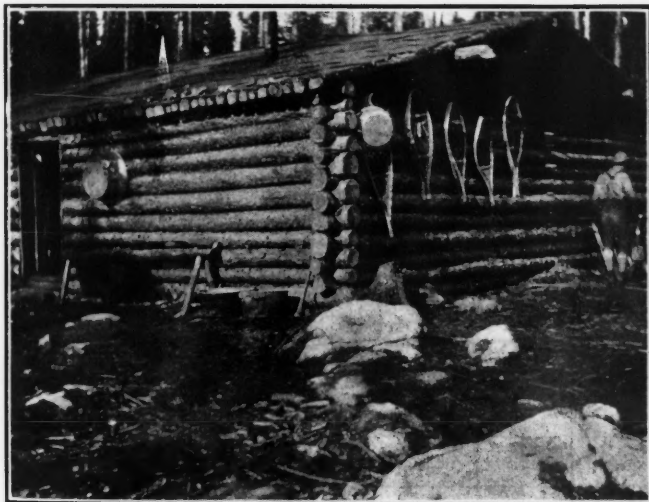
thus enabled to hold their claims. It is practically impossible to throw out a claim on the ground that the discovery was made after the record had been filed in the Recorder's office. It is unjust, of course, to those prospectors who abide by the law and record only after discovery, to find that their claims are antedated by others made under practically impossible conditions; but nothing could be done under the circumstances. It was even stated that some claims were "staked in the Recorder's of-



PROSPECTOR'S CAMP



A CAMP IN JAMES TOWNSHIP



MUNROE'S CAMP



BLACKSMITH'S FORGE IN THE WOODS

essment work must be completed. Time will undoubtedly show that many of the original claimants will be unable to do this work and the claims will be thrown open for the next staker.

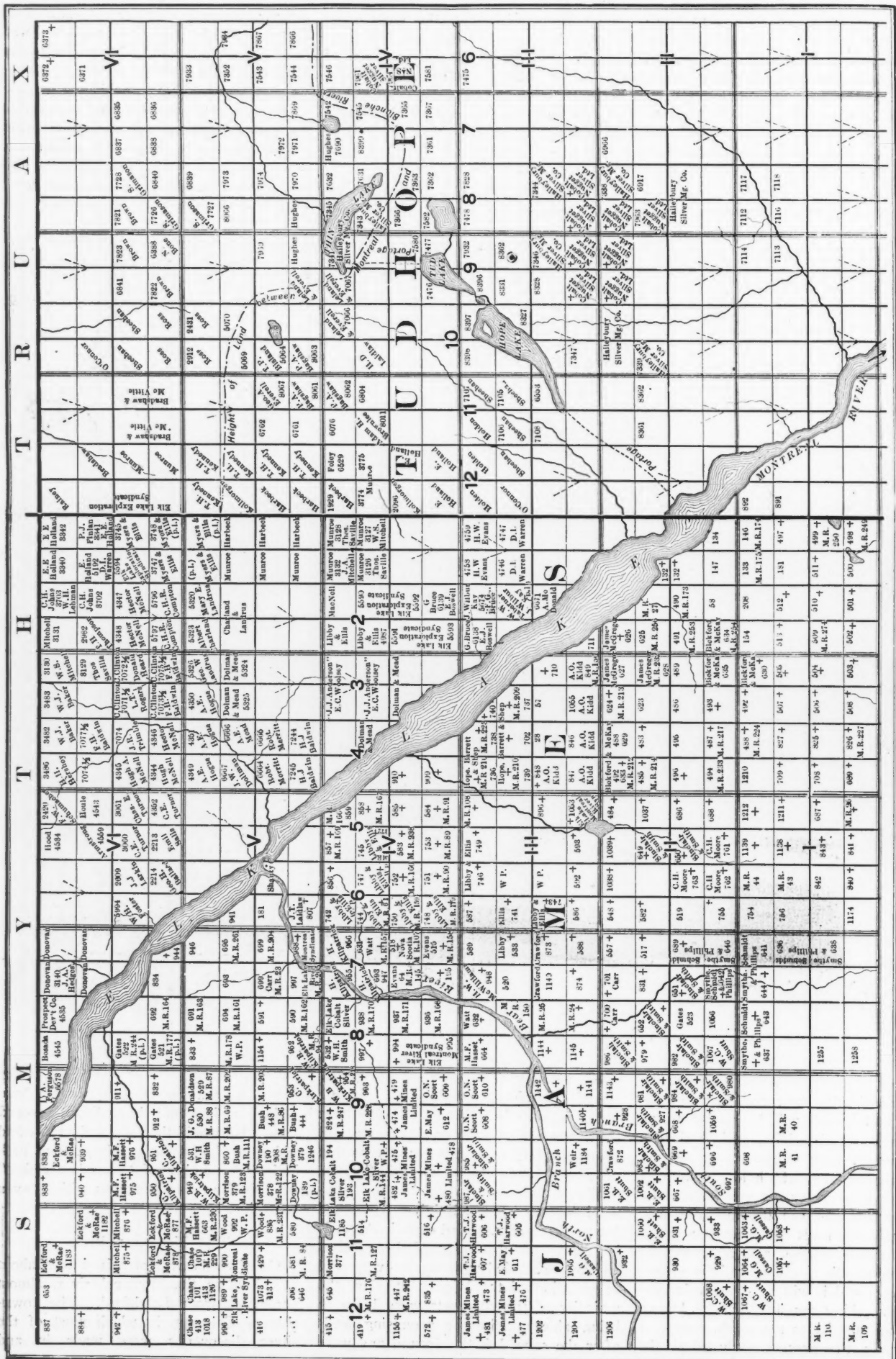
The majority of claim holders who have any money or resources are establishing permanent camps, and are employing men to develop the leads. At present no mining has been started, and none will be for some months. The camp is in a state of infancy and it will be some little time before anything tangible will be known about the district as a possible source of silver. In the present early stage the

made, a discovery-post located and the lot staked off before recording and applying for a claim. In spite of the fact that there was 6 ft. of snow in the woods until about April 15, 1907, the entire township of James and nearly all of Smythe, Tudhope and that portion of the Temagami forest reserve adjoining James had been staked and recorded early in April. It is safe to say that most of these claims had been recorded without discovery, and in violation of the Mines Act. But the majority of the claimants were lucky in being able to discover promising leads after the snow left the ground and were

face." By this is meant that a prospector would see that certain lots had not been staked and would immediately record them. He would then go up the river and stake the claims, dating his posts accordingly. A number of "snowshoe claims" were sold in the early spring, without even recording.

THE MONTREAL RIVER

The silver-bearing area is situated about 55 miles, up the Montreal river, almost northwest from Latchford. The township of Coleman, in which most of the silver discoveries were made in and



TOWNSHIPS OF JAMES AND TUDDOPE WHERE THE PRINCIPAL DISCOVERIES WERE MADE

around Cobalt, seems to be a sort of treasure trove. So it is with James township. Up to the present time silver has been discovered, or promising leads have been disclosed, within an area of about 80 square miles. This includes all of James and a strip about 1½ miles wide surrounding that township.

To reach the district two routes are available. One is by train to Earlton and thence overland, along the sixth concession line, on a fairly well defined trail, part of which is a wagon road. The other and more popular route is up the Montreal river, either by canoe or by the two lines of boats, one steam and the other gasoline, which ply between Latchford and Bear River or Elk Lake.

The river is broken by a series of rapids which preclude a continuous run. Starting from Latchford the first stage of the journey is to Pork rapids, a distance of 8 miles. Here the freight is portaged about ¾ mile by team and passengers go on foot to the next boat.

7 a.m. and arriving at Latchford at about 4 p.m.

#### COST OF FREIGHT AND SUPPLIES

Like all new mining camps, which are accessible only with difficulty, the cost of supplies is abnormal. It is more economical to purchase supplies, in large quantities at Latchford and transport them up the river than to buy at the stores at Elk Lake. The cost of transportation is \$1.25 per 100 lb. for everything except personal belongings, which are carried free. Transferring freight across the portages is included in the freight charges.

At Elk Lake supplies are costly. Bread costs 30 to 40c. per loaf; flour, 5c. per lb.; corn, tomatoes, and peas, 25 to 30c. per can; bacon, 25c. per lb.; new potatoes, \$3 to 4 per bag; beans, 8c. per lb.; coal (in bags) at the rate of \$35 per ton; drill steel, 17c. per lb. at Latchford. Other supplies cost in proportion, if bought up the river. Hardware, blankets, and camp necessities are usually purchased at

of underbrush, over fallen logs and trees, up hill and through swamps which afford very meager footing. From about May to August he is attacked by innumerable mosquitos and tiny black flies, which swarm about his head in clouds. The thick brush would quickly tear away any protecting netting and so far no relief has been discovered from these pests. During the fly season it is difficult to sleep even when a thick smudge is kindled, and the men's faces, necks and hands are a mass of sores from the bites. Cobalt suffered from the same cause, but now that the trees have been nearly all cut down the trouble has been practically removed. When the new camp has been developed and the trees cut the flies will probably disappear.

In the winter, which lasts from about Nov. 1 to April 1 or longer, the snow attains a depth of about 6 ft. and covers the fallen logs and underbrush. Traveling on snowshoes is then the only mode of locomotion, and many of the old bushmen



ALONG THE MONTREAL RIVER

There are camps and a company store at Pork rapids, where dinner is served. The next stop is at Mountain rapids, a distance of 29 miles through Indian lake and up the winding river lined with thick bush, and dotted here and there with camps and log cabins. At Mountain rapids a short portage is made and new boats continue to Mountain Chutes, a distance of 3 miles. This is the last portage and is only a few hundred yards long. The last stage is a run of 15 miles up through Mountain lake and on the river to the little settlement of Elk Lake or, as it is also known, Bear River.

The competing lines of boats are the Upper Ontario Navigation Company, Ltd., and the Joy line. The fare from Latchford to Elk Lake is \$3 for each passenger, and the trip takes from about 9.30 a.m. to 8 p.m. or later, even 11 p.m., depending upon the amount of freight to be handled. Going down the river the boats make better time, as a rule, leaving Elk Lake at

Latchford and are frequently brought up in canoes. Two good canoe-men can make the trip up-stream in about 14 hours and can paddle down in about 9 hours, packing about 150 to 200 lb. of supplies.

At Elk Lake there are two settlements of that name, one on each side of the river. These consist of tents and log cabins and on the "American" side there is a group of tents known as the "Grand View Hotel" where board and a cot may be obtained at \$2 per day.

Liquor is prohibited, but it was sold clandestinely until a short time ago, when the vendors were run out of town. At Latchford the bar is by far the most promising "mine" in the district.

#### HARDSHIPS OF THE PROSPECTOR

Prospecting in the bush of northern Ontario is extremely arduous and taxes all of a man's endurance and determination. The prospector must be able to pack from 75 to 125 lb. through a tangle

claim that they prefer the intense cold and deep snow to the bush in summer with its plague of black flies and mosquitos. The temperature often falls to 50 deg. F. below zero. Added to these hardships is the menace of a bush fire, which is always possible. In June, 1906, a fire swept over the greater part of James and Tudhope townships, destroying the entire equipment and the camps of nearly all the prospectors in its path. This fire delayed prospecting and development, and many prospectors were obliged to take special affidavits to obtain new licences, the old ones having been destroyed.

The Bureau of Mines extended the time in which work must be completed, to compensate for the delay caused by the fire.

#### SALKELDS GOLD DISCOVERY

A short time ago a party of prospectors, under the leadership of Colonel Salkeld, who saw service in South Africa,

went up the Montreal river to a point about 12 miles below Ft. Matachewan. On the Reserve side they encountered a great quartz vein fully 30 ft. wide. It did not take long to discover small particles of shining yellow metal and the party staked claims all along the vein. A "mining expert," brought up to examine the find, pronounced it gold and soon canoes were going up the river and more claims were staked. Plans were started to organize a \$5,000,000 company and a director of a bank at Haileybury indorsed the discovery; it was rumored that the bank loaned money. This statement, however, could not be corroborated. Munroe and his party visited the vein and saw the samples of "gold." One of this party recognized the metal and showed how Salkeld's men had unconsciously "salted" their own claim by walking over the quartz with brass-nailed boots. Even this demonstration would not satisfy the discoverers, who still firmly adhere to their belief in the presence of gold in spite of

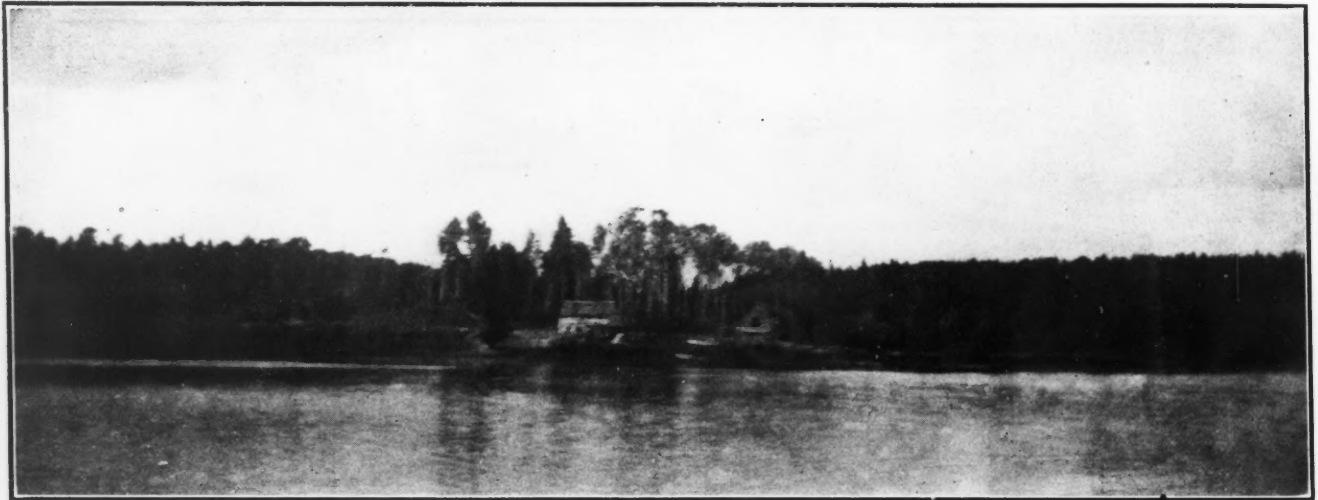
land. In such cases a man who is willing to work is entitled to jump the claim of the one who is too lazy to work or who does not stay on the claims. But when the prospector has worked hard and endured hardships, and is doing his best to conform to the law, he should be protected from the deliberate claim jumper who hangs around looking for flaws and technical errors in staking, etc. There are two men at least in the Montreal river district who are notorious for their attempts along this line. The prospectors who are earnest and sincere are determined to stand by each other and it will go hard with these men if they carry their pernicious practices too far.

#### INSPECTION OF CLAIMS

The Bureau of Mines of Ontario, realizing that there would be a heavy rush to the new district, appointed a corps of eight inspectors to cover the field. These men are not only efficient but are thoroughly honest, sincere and disinterested.

great. Native silver has been found in many parts of the area, although in much smaller quantities than at Cobalt. The leads, too, are smaller on the surface than in the older district. The veins have the same uncertain direction and vary in width from about 12 in. down to knife-edges. The diabase formation is favorable to the continuity of values. Further east, in Tudhope township, the diabase changes to granite and no discoveries of silver have been made in this formation.

When the assessment work is all completed and the claims finally passed, the men will start to find out what is below the surface. At present nothing has been done to establish continuity or increasing values. If the surface at Cobalt has suffered erosion in some past geological age, and that James has not, it would account for the difference in silver values found at the surface. It is generally believed that the silver will be found to increase when machinery is brought in and mining begins.



FOREST RANGER'S CAMP ON THE MONTREAL RIVER

several assays reporting only a "distinct" trace of the yellow metal.

#### RUMORS OF DISCOVERIES

Reports are constantly being circulated to keep the prospector at fever heat. Bloom lake was reported to be extremely promising and native silver was claimed to have been found. Prospectors silently paddled up the river and looked over the ground. A few days later many returned and said that, while there were some fairly good leads showing "bloom," they saw nothing good enough to stake and so came back. At Hubert and Lady Evelyn lakes, and at other points in the Reserve discoveries have been made and many claims have been staked.

#### CLAIM JUMPING.

There are two kinds of claim jumping. One is legitimate and the other is the converse. If a man stakes claims and makes no pretense to work them or complete the assessment work, he is not morally nor legally entitled to the ownership of the

They aim to give the prospector every opportunity in their power to show discovery. If they find a man working hard, but who is up to that time unsuccessful, they will frequently delay inspection. But they are relentless on the shirk. In one case an inspector pointed out a valuable lead containing native silver which the prospector had not seen.

The inspector has considerable license in passing or rejecting claims. If there is a good calcite vein with bloom and possibly smaltite or copper showing he will take a sample, and if there is an assay value of four or five ounces, the claim will be passed. If no silver is found it will, in all probability, be thrown open, but in this matter the inspector uses his own judgment. If native silver is visible the inspector rarely takes a sample but passes the claim on sight.

#### POSSIBILITIES OF THE DISTRICT

With a mineralized area more than ten times as great as that of Cobalt, the possibilities of the Montreal river district are

If the curses of "wild-catting" and overcapitalization do not choke the legitimate enterprises, the district, as a whole, will undoubtedly prosper. But even at this early date there are rumors of companies being organized with capitals ranging from \$1,000,000 to \$5,000,000, without the least thought concerning the obligation these capitals mean.

Promoters do not stop to consider that 40, 80 or even 160 acres of land must be bountifully mineralized with a good shipping grade of ore to give an adequate return on such capitals, especially in a district remote from smelting facilities.

The Timiskaming & Northern Ontario Railway has under consideration a branch railroad from Earlton to James township, and a preliminary survey has been run. If this road is completed it will give a great impetus to mining, cheapen supplies and furnish a means to bring in machinery. But for some time to come the river, with its three portages, will furnish the only practicable means of transportation.

# Workable Coal Seams of Western Pennsylvania

Pittsburg Coal Seam and Various Seams Found below It in Geological Depth. Thickness, Extent, Comparative Value. Coking Coals

BY WILLIAM SEDDON\*

The workable coal seams of western Pennsylvania are chiefly: First, what is known as the Pittsburg seam; second, the Upper Freeport; third, the Lower Freeport; fourth, the Upper Kittaning; fifth, the Middle Kittaning; sixth, the Lower Kittaning; seventh, the Brookville; eighth, sometimes the Upper Mercer; ninth, the Lower Mercer, and tenth, the Sharon Block.

The hights, which vary in different localities, are approximately as follows:

Pittsburg coal	from 5 ft. 0 in. to 9 ft. 0 in.
Upper Freeport	from 3 ft. 0 in. to 4 ft. 0 in.
Lower Freeport	from 6 ft. 0 in. to 8 ft. 0 in.
Upper Kittaning	from 3 ft. 0 in. to 3 ft. 6 in.
Middle Kittaning	from 2 ft. 6 in. to 3 ft. 0 in.
Lower Kittaning	from 3 ft. 0 in. to 4 ft. 0 in.
Brookville	from 4 ft. 0 in. to 5 ft. 0 in.
Mercer Upper	from 1 ft. 6 in. to 2 ft. 6 in.
Mercer Lower	from 3 ft. 6 in. to 4 ft. 6 in.
Sharon Block	from 3 ft. 0 in. to 4 ft. 0 in.
Total	34 ft. 6 in. 47 ft. 6 in.

## THIRTY-FOUR FEET OF WORKABLE COAL BELOW THE PITTSBURG SEAM

Thus we have a minimum hight of workable coal in Pennsylvania of 34 ft. 6 in., with a maximum of 47 ft. 6 in., making an average of 41 ft. 0 in., or 34 ft. of good workable coal beneath the Pittsburg seam. No doubt there are some people in the Pittsburg district who labor under the impression that nearly all the supply of the bituminous coal of Pennsylvania comes from the latter seam; such is not the case. You will find on examination of the mine inspectors' reports that something over 51 per cent. of the total bituminous coal mined in Pennsylvania comes from beneath the Pittsburg seam. Now, having named the workable seams, I will endeavor first to give you the depths, taking the Pittsburg as a basis or starting point; second, their analysis; third, their general characteristics.

I name the Pittsburg as a basis owing to the fact that the same belongs to the upper productive series, following which is the second series or lower barren measures. The Freeport, Kittaning and Brookville seams are found in the third or lower productive coal measures. The Mercer and Sharon Block are found in the fourth or interconglomerate coal measures. Again, in what is termed the second or lower barren series we have five veins of coal ranging from 0 to 4 ft. These seams are not taken into consideration owing to their lack of continuity. Yet three of them are named, the same probably derived from the vicinity in which they crop out, and are known as Elk Lick, Baker Run and

\*Mine superintendent, Brownsville, Pennsylvania.

Brush Creek coals. We also have in the lower productive measures the Clarion, which is not named in the foregoing.

## THE DEPTHS OF THE VARIOUS SEAMS

Again taking the Pittsburg as a basis, the first workable coal is the Upper Freeport and is found at an approximate depth of from 550 to 600 ft.; 50 ft. beneath, or from 600 to 650 ft., is found the Lower Freeport. What is known as the Mahoning sandstone, some 40 ft. in thickness, is generally found in close proximity, if not immediately over, the Upper Freeport. This sandstone can be readily recognized by its gray color and large silica content which makes it glisten when the sun's rays strike it at an angle. About 70 ft. beneath the Lower Freeport is the Upper Kittaning; 45 ft. below the latter is the Middle Kittaning, and 40 ft. lower we come to the lower Kittaning. A ferriferous limestone, 15 ft. thick, is found below the Lower Kittaning, then comes 65 ft. of shale and clay, after which is the Brookville seam.

Some 55 ft. below the Brookville seams which contain the Homewood sandstone we come in contact with the Upper Mercer with some 30 to 35 ft. of shale and limestone. Continuing through the Connoquenessing sandstone, which is from 85 to 90 ft. thick, and some 40 ft. of shale, the lowest seam in the conglomerate series is reached. This bed is in immediate or close proximity to the Pottsville conglomerate. The approximate depths of the workable coals beneath the Pittsburg seam taking the latter as a basis are as follows: From the Pittsburg seam to the Upper Freeport 596 ft.; Upper Freeport to Lower Freeport 55 ft.; Lower Freeport to Upper Kittaning 70 ft.; Upper Kittaning to Middle Kittaning 50 ft.; Middle Kittaning to Lower Kittaning 40 ft.; Lower Kittaning to Brookville 115 ft.; Brookville to Upper Mercer 55 ft.; Upper Mercer to Lower Mercer 40 ft.; Lower Mercer to Sharon Block 130 ft.; total, 1151 ft.

An approximate analysis of the various seams is as follows: Pittsburg—Moisture, 1.1, volatile matter, 34.9, carbon, 57.88, ash, 4.6, sulphur, 1.52. Upper Freeport—Moisture, 1.4, volatile matter, 36.9, carbon, 52.63, ash, 6.5, sulphur, 2.57. Lower Freeport—Moisture, 1.90, volatile matter, 31.99, carbon, 58.50, ash, 6.20, sulphur, 1.41. Upper Kittaning—Moisture, 2.27, volatile matter, 40.99, carbon, 46.89, ash, 8.04, sulphur, 1.81. Middle Kittaning—Moisture, 2.92, volatile matter, 38.495, carbon, 44.519, ash, 6.4, sulphur, 7.666. Lower Kittaning—

Moisture, 0.88, volatile matter, 28.24, carbon, 61.39, ash, 7, sulphur, 2.49. Brookville—Moisture, 0.86, volatile matter, 28.78, carbon, 62.18, ash, 6, sulphur, 2.18. Upper Mercer—Moisture, 1.09, volatile matter, 44.08, carbon, 48.25, ash, 4.63, sulphur, 1.95. Lower Mercer—Moisture, 2, volatile matter, 42.11, carbon, 44.31, ash, 7.5, sulphur, 4.08. Sharon Block—Moisture, 0.7, volatile matter, 20.4, carbon, 71.3, ash, 7, sulphur, 0.6.

## LITERAL MEANING OF "BITUMINOUS"

The term bituminous as applied to coal is somewhat vague and deceptive. Bitumen means or includes several combustible substances such as asphalt, pitch, rubber, petroleum and others, all of which are either fluids or are readily soluble in alcohol, and the application of the term cannot with propriety be extended to substances of a different nature. Coal, not being soluble in alcohol, cannot contain any real bitumen, though it may contain the constituents of it. Hence the term applied to coal must be understood to mean that the mineralizing process has proceeded to a less extent than in anthracite, and as a result a larger proportion of the hydrocarbons remain. Coal of the quality described as semi-bituminous occurs next above the anthracite in geological order; occupying a higher position, it has been less exposed to action of heat and other agencies and has consequently retained a larger proportion of its volatile matters. Semi-bituminous coal contains from 12 to 20 per cent. of volatile matters. Its color is usually a dull black. It burns with a slightly more abundant flame than coals of the anthracite class and evolves more smoke but not in dense volumes and from its freedom from a liability to coke together it has all the properties necessary to constitute a good steam coal. Coke obtained from semi-bituminous coal is generally brittle and not adapted for commercial purposes.

## COKING COALS

The Sharon Block, the lowest seam in our productive series, belongs to the semi-bituminous class owing to its low per cent. of volatile matter combined with the high percentage of carbon and small sulphur and moisture content. Owing to the fact that we are at present living in what may be termed the coke age, it is appropriate to mention, in describing the characteristics of the workable coals of western Pennsylvania, the ones that are best adapted for coke purposes. The Sharon Block or lowest seam owing to its

constituents and characteristics will not make good coke; however, it possesses properties that make it one of the most valuable coals for steam purposes; a valuable asset to have among the coal series of western Pennsylvania, for next to coking purposes, coal for steam purposes constitutes the most important use to which fuel is applied.

#### CHARACTERISTICS OF A GOOD COKE

Coke to be suitable for the smelting furnace, besides freedom from sulphur and ash, must possess the qualities of hardness, compactness and strength to withstand considerable crushing force. That which is brittle or liable to crumble is useless for this purpose. Coke is also of little value unless it can be obtained in large prismatic pieces. Hence good coke should on cooling split into such pieces somewhat in the manner of columns. Its color should be steel gray approaching to silver whiteness; an iridescent hue indicates the presence of sulphur. When coke is struck, it should emit a clear and almost metallic ring.

In the brief description of some of the characteristics of the western Pennsylvania coal seams, the varieties of the clear burning division of coals are the poorest in volatile matter coupled with a reasonable per cent. of carbon. These coals kindle with difficulty and burn away slowly with a short clear bluish flame and very little smoke. Coke obtained from the clear burning coals, while not of the best quality, is superior to that produced by any of the more bituminous varieties, and Upper Kittaning. The Brookville, as before mentioned, belongs to the latter class. The Lower Kittaning, owing to its low per cent. of moisture with a correspondingly fair per cent. of volatile matter, combined with a percentage of carbon that places it next to a semi-bituminous, would serve better as a steam coal than as a coking coal or coal for domestic and gas purposes.

#### THE FLAMING COALS

What are termed the flaming coals of the bituminous class are richer in volatile matter than the other varieties; a circumstance to which they owe their characteristic flaming quality. Their structure is distinctly laminated and their color black and somewhat glossy. They kindle without difficulty and burn away somewhat rapidly. Coals of this character become partially fused when strongly heated, and while in a fused state swell into a spongy mass. This property in the fire allows the small coal to be burned which would otherwise be useless or to be converted into coke of which it produces an excellent quality. Such characteristics can be found in the Freeports and in the Pittsburg seam.

Coal seams of the same class differ from district to district; in fact, even in the same seam or opening we will have

one or more different qualities. No seam of coal that I am acquainted with possesses such characteristics as the well known Pittsburg. In this seam, as we travel up the Monongahela valley, we find in the immediate vicinity of Pittsburg, a good domestic or house coal.

#### CHARACTERISTICS OF A DOMESTIC COAL

The quality of cleanliness in a domestic coal necessitates a considerable degree of strength to prevent crumbling, and the consequent production of dust. A coal that leaves a large amount of ash is also highly objectionable. While the Pittsburg seam may not possess all these qualities, it has sufficient to earn for itself a reputation as a good domestic coal. Again as we move up the valley in the immediate neighborhood, both above and below Monongahela, we find the Pittsburg seam possessing qualities that place it second to none for gas purposes. A gaseous coal, as a rule, occupies the highest geological position. Coals of this class are generally hard, compact and strong. Mining farther up the valley we find the coal possessing the finest properties for coking and to ship it as raw coal is an extravagant waste of the wealth of the State. While admitting that in the aggregate the mines opened in this valley, whether connected by river or rail, are not equipped in such an elaborate and modern style as the recently opened mines in what is known as the Klondike field in the South Connellsville region, yet the aggregate tonnage of raw material produced from the valley mines will compare favorably as to quantity with the latter named district; however, a wide difference in profit results to the operators in the former region who coke the product, while the latter operators ship the raw product. The Monongahela valley has long contributed assistance to building up the lower States at the expense of her most valuable coal deposits, with a comparatively small amount of remuneration financially for so doing. How long the owners of this wealth will continue such assistance is beyond my conception.

#### CONCLUSION

In conclusion I would state that what is here mentioned, is only a small part of what could be said in regard to the lower deposits of bituminous coal of western Pennsylvania. It is beyond anyone's conception to grasp the amount of fuel of good quality that lies in this region. Taking the average specific gravity of the seams as 1.3, we find an acre of coal 1 ft. in thickness will yield 1769 short tons, and as we have 34 ft. in thickness of the lower deposits, this will give us 60,167 tons per ft. per acre. As the coal area extends some 12,000 square miles, or contains in the neighborhood of 8,000,000 acres, it is evident that the stored wealth in the available workable coal seams in western Pennsylvania is almost inestimable.

## The Montana Coal Situation

By R. P. TARR\*

Time and conditions together are bringing interests face to face with the correct aspects of the problem, which, when solved, will put Montana in her proper place as a coal producer. The past winter witnessed considerable suffering for lack of fuel in both rural and city districts throughout the State. Rapid growth in population is now taking place and coal properties are not being developed in like proportion. The Interstate Commerce Act goes into effect May 1, 1908, and this legislation absolutely forbids outside supply from railroad mines. These are conditions which should be faced and measures should be taken immediately in order to prevent, as far as possible, further suffering during the time when coal development is shaping itself.

Coal was first mined in 1867 at Chestnut, near Bozeman. It was hauled to Helena, which is more than 100 miles from Chestnut, yet there were productive beds within half that distance. Great progress in the development of the coalfields was made during the years 1890-1895, through the efforts of the railroad and the smelter interests, and they now use approximately 85 per cent. of the entire output. This amount is furnished by five large mines. The remaining 15 per cent. comes from 35 smaller properties.

#### PAST OUTPUT

During 1905 there were 1,743,771 tons mined within the State, but in order to meet demands nearly as much was shipped in from other fields. During the first 10 months of 1906 there were 1,502,200 tons mined in Montana and a corresponding amount had to be imported. In 1895 the State's output was 1,504,193 tons, therefore for 10 years the tonnage has remained practically stationary.

#### EXTENT OF DEPOSITS

With 32,000 square miles of coalfields, Montana ranks second only to Illinois in the size of its coal-bearing area. In this territory two large lignite fields, together with a score of smaller ones, are known to exist. With its excess of moisture and its slacking qualities, lignite is generally an unsatisfactory fuel. The cold of the Montana winter makes it possible at that season to transport lignite in lump. This coal lies under a thin covering, which makes it easy to work by stripping, which is a cheap method of mining. These conditions, namely, extreme cold of the winter and the inexpensive method of mining, make it possible for the eastern half of the State to be supplied with fuel for a considerable portion of the year at a reason-

\*Mining engineer, Northwestern Improvement Company, Tacoma, Washington.



able rate. The lignite seams range in thickness from 4 to 20 feet.

There are also undeveloped beds of good semi-bituminous coals in Cascade, Carbon, Fergus, Gallatin, Lewis and Clark, Meagher, Park, Sweetgrass, and Teton counties. The best known coking varieties are located in Broadwater, Gallatin and Park counties. All but three of the remaining counties are underlain with a good grade of the brown lignite. More gas, blacksmith, coking and steaming coal beds must be worked, and there are strong indications of their existence.

CHARACTER AND COMPOSITION OF THE COALS

The coals of Montana are in general inferior to those of Washington and the following analyses are given for comparison as types of the various grades mined within the State:

seams but one are slate and shale, and most of the intervening strata are sandstone. The dip is 18 deg. and a fair average of clean coal shows: Moisture, 6 per cent.; volatile matter, 35 per cent.; fixed carbon, 46 per cent.; ash, 13 per cent.

Second: The thickest seam in the semi-bituminous of the Laramie is 16 ft. 7 in. It contains 2 ft. 1 in. of coal in the upper bench laid between four bands of slate and bone aggregating 3 ft. 9 in. Below this comes two benches of clean coal, separated by 8 ft. of bone, and measuring 4 ft. 1 in. and 3 ft. 1 in., respectively. In 35 in. next below are 24 in. of coal, which makes a total of 9 ft. 10 in. of coal, giving the following analysis: Moisture, 8.60; volatile matter, 32.39; fixed carbon, 50.34; ash, 8.67 per cent.

Seventeen feet of sandstone lie between this and a lower 13 ft. 9 in. coal seam containing five benches of coal and seven

entire supply is imported. One must remember, however, that this unsatisfactory condition is natural in so large a State, and especially so in one in which attention has been turned so largely to the exploitation of other mineral resources, such as copper and the precious metals.

The Fuel-testing Plant of the Geological Survey

By C. T. WILKINSON

The fuel testing work of the United States Geological Survey is important to all power consumers, since it has undertaken to locate, classify and test all kinds of available fuel. The following particulars of the plant in Virginia will be of interest. The first illustration shows the exterior of the power and alcohol building



U. S. GEOLOGICAL SURVEY, FUEL-TEST BUILDING, JAMESTOWN EXPOSITION

	Gas (Angnota), Lewis & Clark Co.	Coke (Aldridge), Park Co.	Steam (Red Lodge) Carbon Co.	Lignite, Yellowstone Co.
Moisture...	1.83	1.04	6.90	17.42
Volatile matter..	40.64	30.22	26.14	34.61
Fixed carbon....	44.20	57.91	57.84	37.94
Ash.....	13.33	10.83	9.12	10.03

In Madison county a variety of anthracite has been produced by local intrusions. This coal shows: Moisture, 4.62; volatile matter, 5.93; fixed carbon, 83.29; ash, 6.16. Coal in some localities, as at Chestnut, has been burned to an almost incombustible coke.

GEOLOGICAL BORE-HOLE RECORDS

The character of the coal beds in two distinct portions of the measures are given below in order to show general conditions. These are taken from bore-hole data and seam cross-sections. Both are from representative areas.

First: In 530 ft. of the Fort Union series are 11 seams containing 102 ft. 9 in. of coal, 23 ft. 8 in. of which is refuse. Ten of these seams are workable, but through them run 90 partings and bandings of impurities. The walls of all the

bands of impurities. The coal aggregates 8 ft. 2 in. The whole is styled a 30-ft. seam and dips 41 degrees.

GOOD ROOF, BUT SEAMS ARE FAULTED

Developments in Montana generally show good roof and bottom, a fortunate condition where timber is scarce. In the semi-bituminous districts coal-cutting machines have their place, but the dry-cleaning process is generally preferred by the different mining companies. All through the Cretaceous period these beds were accumulating, but the subsequent uplift affected chiefly those on the eastern slope of the Rockies. Away from the mountains, most of these coals were metamorphosed only to brown lignite, and were left largely in their original horizontal position. Faulting and pinching out of the seams are obstacles to be met with in all places where the pitch is great.

PRESENT DEVELOPMENT INSUFFICIENT

The development of the coalfields in Montana has not kept pace with the demands of settlement and of industrial growth, as might be expected in a new and rapidly growing territory. The result at present is that nearly one-half the

in the grounds of the Jamestown Exposition.

STEAM-ENGINEERING DIVISION

New apparatus has been added as follows: A 250-h.p. Babcock & Wilcox boiler, with superheater, provided with a Roney stoker; a Jones underfeed stoker with fan, added to one of the old Heine boilers; two direct-current DeLaval turbine sets rated 300 h.p.; also three Green Fuel Economizer Company's induced draft fans.

The method of work planned for this section is to be slightly changed, so that instead of testing a great number of coals, more tests will be made of the same coal; different sizes and different methods of stoking or feeding, etc., being employed with the object of determining the most economical performance under different rates of combustion and the best ratios of grate and heating surfaces. The Babcock & Wilcox boiler is placed beside the two Heine boilers, which have been brought from St. Louis, all three having been provided with induced draft apparatus in order to get a wide range of capacity. The Heine boiler provided with the Jones stoker has the usual arrangement for

forced draft. The Babcock & Wilcox boiler was put in partly to enable tests to be made of the same fuel, with different types of boilers. It serves to represent the types employing a perpendicular flow of the gases through the tubes, the parallel flow types being represented by the Heine boilers. The Heine boilers have been re-baffled, or partitioned, in such manner as to practically double their length by compelling all the heated gases to pass along the entire length of the tubes twice.

An additional alternating-current turbo-generator set may be installed, to supply power for external and exhibition purposes. The steam-engineering division, which has now practically succeeded in isolating the performance of the boiler from that of the combined performance of

which serves to drive the motors for the apparatus in the building, the machine shop, the briquet plant, the elevators and the conveyer. Any additional load required is obtained by means of a water-box resistance, which can be regulated by the switchboard attendant so as to maintain a steady full-load value.

The plans of this section include the following determinations. The proper length for a test run; the effect of the size of the coal; the best depth of fuel bed; the effects of rapid load variations; the maximum returns from different fuels; and the response of a producer plant to sudden demands for power.

#### ALCOHOL AND GASOLENE

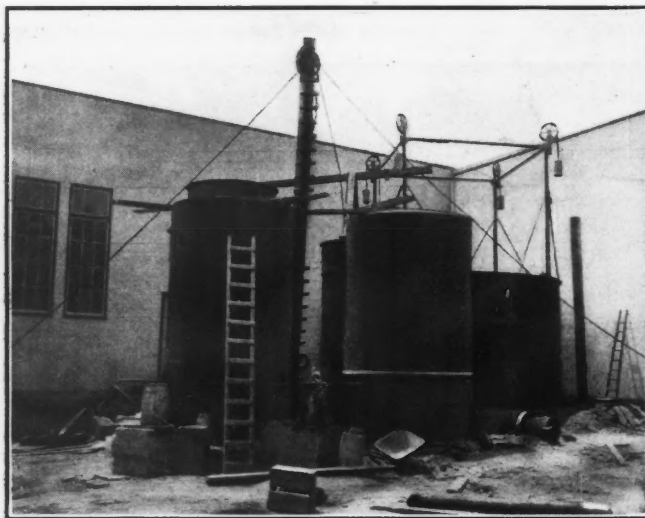
A new work is being undertaken by this section. Its equipment includes two

#### BRIQUETTING

The briquetting division, which occupies a large room at the end of the building, is putting in one additional German briquetting machine, while the previous apparatus of English and American manufacture, that was used at St. Louis, is installed in the same room. The work of this division will be chiefly the manufacture of briquets from various run-of-mine coals of the Eastern fields, which will be tested on war vessels under the direction of the steam-engineering division.

#### OTHER PLANS

The further fuel-testing work of the Geological Survey includes tests dealing with the spontaneous combustion of stored coals, in which an effort will be made to simplify the methods for its pre-



GAS PRODUCERS



BOILER FURNACES

the boiler and furnace, will carry on further tests with the object of still further determining the performance and efficiency of the furnace alone.

#### PRODUCER-GAS SECTION

The apparatus in this section is so arranged that the gas from the producer passes through the meter, and thence to the Westinghouse gas engine transferred from the St. Louis plant. Some slight changes have been made in this apparatus; for instance, producer No. 7 has been provided with a water-seal at the base to permit the ashes to be removed without admitting air, and several holes have been bored at different heights, to be used for extracting samples of the gas. The purifying apparatus used at St. Louis, which consisted of the usual chamber containing iron filings and wood shavings—has been removed, since experience indicates that the danger from impurities has been considerably exaggerated. A special steam pipe has been provided to insure a steady water pressure, since the pressure of the supply mains fluctuates considerably.

The gas engine is belted to a 200-kw. Bullock generator brought from St. Louis,

15-h.p., 250-r.p.m. Otto gas engines; two 15-h.p. Nash Company's engine; one 2-h.p. International Harvester Company's engine; and two John Deere engines, rated at 14 and 18-h.p., respectively.

Experiments will be made covering the whole range of this field; but for the present the work will be confined chiefly to examinations of different carbureters, with the object of showing the lines along which a more efficient method of vaporization may be obtained. The other prominent work is the examination of the kinds of fuel available, with special reference to the relative qualities of gasolene and alcohol, and an investigation of the use of kerosene as fuel for this class of engines; an investigation necessitated by the increasing demand for gasolene and the limited supply available.

#### DISTILLATION OF COAL AND COMBUSTION

The study of the destructive distillation of the coal and its combustion in gas-producers, coke-ovens, and furnaces, especially from the standpoint of physical chemistry, will be undertaken by several divisions.

vention; while a corps of specialists will be detailed to investigate closely the whole subject of explosions in coal mines with a view to eliminating danger from this source so far as possible.

Experience has shown that diamond drilling is the most economical method of prospecting, even with the present high price of carbon, which is really not a serious item when the rate of progress and the accuracy of results are considered. Careful records kept by a Western iron mining company shows the cost to range from \$1.50 to \$2 per ft. The cost in the Lake Superior iron country is estimated as ranging from \$1.63 to \$2.65 per ft. A Mexican copper mine reports the cost as \$2.22 per ft. Southern Arizona copper drilling costs \$1.73 per ft. Coal prospecting in Colorado, \$1.65 per ft.; in Tennessee, \$1.26 per ft.; in Indian Territory, \$1.18 per ft.; in West Virginia, \$1.13 to \$1.50 per foot. The cost of drilling, as is shown by these records, varies within wide limits and depends greatly on local conditions.

# Colliery Notes, Observations and Comments

Practical Hints Gathered from Experience and from the Study of Problems Peculiar to Bituminous and Anthracite Coal Mining

## DEVELOPMENT AND MANAGEMENT

Common illuminating gas, such as is found in every city in the Union, has an average calorific value of from 600 to 750 B.t.u.; if such gas is used for fuel, one-third to two-thirds more is necessary than when natural gas of good quality is used.

In splicing a wire rope experience has shown that the efficiency of a splice depends on its length, the larger the rope the longer the splice required. In ordinary splicing of a  $\frac{3}{4}$ -in. rope, the length of the splice should not be less than 20 ft., for a 1-in. rope it should be 30 ft., and for rope over  $1\frac{1}{8}$  in. in diameter it should be 40 ft.

In making steam-pipe connections aluminum elastic cement gives good results. This cement is made of several metals which resist the action of all common corrosive agents. It admits of expansion or contraction without injury to the heated joint. In mixing the cement, pure boiled linseed oil should be used and in such quantities as may be necessary for the work in hand.

In operating a gas engine the consumption of fuel per horse-power is generally in inverse ratio to the heating quality of the fuel used, as in the steam engine. The natural gas of the Pittsburgh district, or the equivalent of that quality, is an ideal fuel for a gas engine, as it has a calorific value of approximately 1000 B.t.u. per cubic foot under ordinary temperature and pressure. This class of fuel is the best known at present for this purpose, as it produces a given horse-power with the least supply.

Where deep shaft hoisting is done in balance, it is advisable to use a conical drum so that as the weight of the suspended rope in the shaft increases, the radius of the drum through which it acts decreases and so equalizes the work on the engine or motor. For such work each drum should be designed to meet local conditions of each installation. When cages are worked from one or more levels in each shaft at the same time it is impossible to hoist in balance with a conical drum. A reel hoist should be used instead.

In working pitching seams of coal by chutes a large percentage of fine coal is always made by the coal sliding down. Experience shows that the percentage of fine coal can be reduced to a minimum by drawing all the coal from the main chute, by sending none down the man-way, or by keeping the man-way constantly full of coal, in which case the man-way becomes only a chute. The saving of coal effected

by the latter method is from 4 to 6 per cent. of the total amount of coal mined. It has also been shown that the percentage of waste always increases with the length of the screen, used in preparing anthracite coal.

An economical system for handling and storing coal at a wharf is to employ one or more high-speed revolving locomotive cranes operating on tracks placed at right angles to the water front and connected by switches and curves, so that the cranes can unload directly from the ships to the cars located on the tracks, which latter should be parallel to the water front; or the coal can be stored by the crane traveling back with the load to the storage pile. One crane can load into cars about 80 tons per hour and can carry to the storage pile about 40 tons per hour. This method of handling coal is low in cost of installation as well as in the cost of handling the coal per hour.

Heretofore in the anthracite and bituminous coal fields the majority of mine openings were slopes, but since experience has shown that slope mining is not as profitable as shaft-mining, the latter system has gradually replaced the slopes. In installing an old slope engine for a new shaft hoist it must be remembered that the engine will not raise the same amount of weight per trip in a shaft as it has done in slope hoisting. If the engine lifts a gross load of 5000 lb. on a 30-deg. slope, it will lift in a vertical shaft only  $5000 \times 0.5 = 2500$  lb. For a change from 45- and 60-deg. slopes, respectively, the lift will be  $5000 \times 0.707 = 3535$  lb.; and  $5000 \times 0.866 = 4330$  pounds.

In order to properly discharge the exhaust steam from a mine pump a section condenser may be used, as it takes up the exhaust steam by condensing it and permitting it to enter the pumps as water, through the suction opening, from which the water is pumped up to the surface. It also relieves the steam end of back pressure, as a partial vacuum is created by the condenser, proportional to the height of the suction lift. In manipulating this apparatus it must be remembered that the water cylinder is fully charged before the exhaust steam is turned into the condenser by allowing the pumps to exhaust into the atmosphere until such time as the pump has become filled with water. An air leak is injurious to the successful working of a suction condenser and should be prevented.

In bituminous coal fields it is a very common practice in slope mining to con-

vey steam from the boiler house to the underground pumping plant, down the slope or in some cases, by a separate pipe way, built parallel to the slope. Experience has shown that this arrangement often does much damage and is a source of danger. In the anthracite field it is the practice to put down a churn hole from the surface to the underground pump room. This method of conveying steam reduces the source of danger to a minimum and also reduces the length of the pipe line and consequently the condensation of steam is reduced considerably. The cost of putting down such a hole is from \$2 to \$3 per ft., much depending upon local conditions and the depth of the hole.

An electric hoist used for a shaft should be equipped with a small air compressor and receiver, connected directly or belted to the hoist, to supply air to the clutch and the brake operating the cylinders. The air compressor is automatically operated. During hoisting or lowering it compresses enough air to operate the brakes and clutches at any time. Even if sufficient air from the main compressor is available, experience shows that this arrangement will prevent all danger of a complete shut-down in case the main compressor is being repaired or is out of service for other reasons. The advantage of this method is obvious as the absence of all complicated moving mechanisms such as gears, etc., with the direct application of the power to the point where it is called for, greatly reduces the friction, strain, wear, breakage, and delay.

In opening up a bituminous coal measure by drifts the experience of superintendents shows that the economical handling and screening of the coal depends on the difference in height between the mouth of the drift or the dumping point and the railroad tracks. The difference in elevation between these points should be from 20 to 35 ft., as the height of an ordinary railroad car is about 7 to 9 ft. above the tracks and the tippie platform should be 11 to 13 ft. above the tracks, if no gravity system of screening is required; that is, if the coal is to be dumped into the cars as mine run. In a tippie 16 to 18 ft. high, short screens can be arranged for two or three different sizes. In case the mouth of the drift is lower than the tippie platform, the loaded cars should be brought up by means of a rope, motor or by mules, but such a system should be avoided at all costs if a large area is to be mined through the drift opening.

# THE ENGINEERING AND MINING JOURNAL

Issued Weekly by the  
Hill Publishing Company

JOHN A. HILL, Pres. and Treas. ROBERT MCKEAN, Sec'y.  
505 Pearl Street, New York.

London Office: 6 Boulevard Street, London E. C., Eng.  
CABLE ADDRESS "ENOMINJOUR, N. Y."

Subscription, payable in advance, \$5.00 a year of 52 numbers, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines. \$6.50 in Canada.

To Foreign Countries, including postage, \$8.00 or its equivalent, 33 shillings; 33 marks; or 40 francs.

Notice to discontinue should be written to the New York office in every instance.

Advertising copy should reach New York office by Thursday, a week before date of issue.

For sale by all newsdealers generally.

Entered at New York Post Office as mail matter of the second class.

During 1906 THE ENGINEERING AND MINING JOURNAL printed and circulated 462,500 copies, an average of 8896 per issue. Of this issue, 9000 copies are printed. None sent regularly free. No back numbers beyond current year.

## Contents PAGE

Editorials:	
The Production of Copper in 1907...	554
The Situation in the Copper Market...	555
The Use of Electricity in Coal Mines	556
Gold Mining in the Yukon.....	556
*Lead and Copper Smelting at Salt Lake—I.....	527
A Portable Combination Meter.....	531
*New Caledonia and Its Minerals.	
G. M. Colvocoresses	532
Iron Smelting in Australia.....	535
*Flow of Water Carrying Sand in Suspension.....	536
F. K. Blue	539
Mining Laws in Colombia.....	539
Electric Current vs. Compressed Air in Collery Haulage.....	539
*Electric Reel Hoists.....	540
Talc Deposits in Brazil.....	540
*A Modern Laboratory...E. W. Buskett	541
Colorado Fuel and Iron Company.....	543
Philippine Manganese Ore.....	543
*The Montreal River Silver District.	
Reginald Meeks	544
Workable Coal Seams of Western Pennsylvania.....	549
William Seddon	
The Montana Coal Situation.	
R. P. Tarr	550
*The Fuel Testing Plant of the Geological Survey.....	551
C. T. Wilkinson	
Collery Notes.....	553
The Amalgamated Copper Company.....	557
Asbestos in the Philippines.....	557
Mine Tax in Manchuria.....	557
Valuation of Minnesota Mineral Lands	558
The World's Supply of Capital.....	558
Personal, Obituary.....	559
Societies and Technical Schools, Industrial, Trade Catalogs, Construction News.....	560
Special Correspondence.....	561
Mining News.....	563
Markets, etc.....	568

\*Illustrated.

## The Production of Copper in 1907

We have received reports from all of the refiners in the United States, with the exception of one, of their production of electrolytic copper in 1907 up to Sept. 1. In the case of the one from whom report has not been received, we have been able to make an estimate of its production that we have reason to believe is close to the actual figure. These statistics show that the production of electrolytic copper in the United States during the first eight months of 1907 was 532,060,000 lb. This is at the rate of 798,090,000 lb. for the year.

We estimate the production of Lake copper during the same period at 156,000,000 lb. According to published reports, which we believe to be approximately correct, the output of this district has been running about 10,000,000 lb. ahead of that of 1906, which if maintained would give 234,000,000 lb. for the current year.

In the following table we give the production for the first eight months of 1907 in the first column; the estimated production for the year if the same rate be maintained in the second column; and the actual production in 1906 in the third column. The production of electrolytic copper in 1906 is taken as reported by the U. S. Geological Survey; the production of Lake copper from our own statistics.

### Production of Electrolytic and Lake Copper.

	1907. 8 mos.	1907. Rate.	1906. Actual.
Electrolytic...	532,060,000	798,090,000	815,966,781
Lake.....	156,000,000	234,000,000	224,071,000
Totals....	688,060,000	1,032,090,000	1,040,037,781

The above statistics represent the production of refined metal—in final marketable form—and are not to be confused with the statistics of domestic production reported annually by the JOURNAL and the U. S. Geological Survey, which are based on the copper content of blister copper (except of course in the case of Lake Superior) and represent more nearly the direct production of the mines.

The above statistics show that the production of electrolytic and Lake copper during the first eight months of 1907 was at a slightly less rate than in 1906. The falling off was actually a little more than is here shown, because certain refiners in this year have converted into electrolytic copper what formerly they marketed

as casting copper, the greater difference between the prices of the two grades having made it more profitable to sell as electrolytic.

The above statistics do not represent the total production of American refiners inasmuch as they do not include the production of casting copper; nor do they include the pig copper which is exported.

The exports of refined copper during the first eight months of 1907 have been about 240,000,000 lb., which is a heavy decrease from the corresponding period of 1906. The Government statistics are available only for the first seven months of the year. These show exports of copper as metal and in ore and matte of 98,196 long tons against 121,215, in the corresponding period of 1906. On the other hand imports increased from 57,533 long tons in 1906 to 76,491 in 1907.

The reports which we have received as to stock of refined copper in first hands on Sept. 1, 1907, are not sufficiently complete to enable us to give figures on the basis of direct reports. There was probably about 14,000,000 lb. in stock July 1. Since then the production, including casting copper, has probably been about 3,000,000 lb. per day, or 186,000,000 lb. for July and August. The exports during those months were about 60,000,000 lb. Some of the copper exported was deferred shipment of metal produced and sold prior to July 1, and some was pig copper, but on the other hand there was some copper dispatched to domestic consumers and probably it is on the whole reasonable to reckon a total deduction of 50,000,000 to 60,000,000 lb. This would indicate a stock on Sept. 1 of 140,000,000 to 150,000,000 lb. Our knowledge of the holdings in certain hands leads us to believe that the actual total was not in excess of the latter figure, which is considerably less than was rumored at the time. The stock has probably increased somewhat since Sept. 1, and by Sept. 15 may have been as high as 180,000,000 lb. We do not believe it was at that time in excess of that figure. Under normal conditions this would not be an alarming accumulation. Of course this estimate does not take into account the crude copper in transit and process of refining, which in the case of electrolytic is normally between two and three months' production. It may be also that unrefined metal is being held back in some cases, but we do not believe that has occurred to any considerable extent.

## The Situation in the Copper Market

The situation in the copper market is now so well known that further explanation of the general features is unnecessary. The readers of the JOURNAL who have followed its market reports during the last six months are thoroughly conversant with the developments which led to the present situation. The latter is not a sudden *dénouement*, but is the result of causes which were clearly in evidence as long ago as last March and were doubtless in operation considerably before that time. A few details may now be added to the historical record.

The distressing effect of the great fall in the metal upon the stock market has led to much intemperate criticism of various parties which are held to be largely responsible for the present situation, particularly the management of the Amalgamated Copper Company. We do not, by any means, hold that management blameless in the matter, but nevertheless it must be recognized that it was largely the victim of circumstances; in other words, the causes leading to the present situation were entirely beyond its control. Such blame as is to be attributed to the Amalgamated must be confined to its failure to recognize the situation that was developing; or its attempt to conceal from the public the dangers which it knew to be impending.

The Amalgamated Copper Company itself is not a "trust;" it is simply a big mining and smelting company, the biggest individual producer of copper in the world, but not sufficiently big to control the market for the metal. The product of the Amalgamated Copper Company is sold by the United Metals Selling Company, which also has contracts with many other producers. These contracts are of various nature, but in general they give the United Metals Selling Company the uncontrolled disposition of the metal, and thereby this company is a far larger factor in the market than its agency for the Amalgamated alone would make it. During the period when the price for copper was rising, the management of the United Metals Selling Company was firmly convinced that the statistical position justified the large advance, culminating last spring. The other large interests, including Phelps, Dodge & Co., and the Calumet &

Hecla, coincided in this view. But although the policy adopted by the selling agencies promoted the scare among the consumers which caused the wild buying of the latter, and the consequent runaway market, there was never any combination in restraint of trade among the producers or the selling agencies. Suspicion as to such a combination was common, but was incorrect.

However, when the demand for the metal began to become slack, last March, the United Metals Selling Company attempted to hold up the market to its previous high level. It openly pursued the policy of staying out of the market until the half-starved consumers would be compelled to pay its monstrous price, and while other dealers were liberal sellers of copper at gradual concessions, it connived at, if it did not inspire, attacks upon the Metal Exchange, which was quoting the actual market with substantial accuracy, which the United Metals Selling Company knew to be the actual market, and to give verisimilitude to these aspersions it compelled its own president, who was also president of the Metal Exchange, to resign the latter position.

As far back as last March the buying of copper, for domestic consumption especially, began to fall off heavily and soon dwindled to small proportions. The consumers have remained generally out of the market up to the present time, and this nearly complete cessation of business has been the most remarkable feature of the recent history of the market. The explanation is, of course, the intimate connection between some of the largest uses of copper and the condition of the money market. The fact that the trouble in the latter was due to the expansion of industrial undertakings beyond the present capital resources of the world has been repeatedly pointed out. The illuminating article by M. Leroy Beaulieu, the eminent French economist, which is published elsewhere in this issue, throws an unusually clear light upon this situation. It was a natural consequence of the situation that a halt should be called upon new work, which meant a large and immediate reduction in the demand for copper. The producers had largely sold their output up to July 1, and it turned out that the manufacturers had over-provided for their requirements. Nevertheless it is erroneous to say that no copper has been sold since July 1. There have been small

but steady sales to Europe, as is manifest from the exports, which amounted to about 30,000,000 lb. in July and about the same in August. The sales to American consumers have indeed been very small, and their ability to remain out of the market so long has been a mystery, but as pointed out above, they generally overbought during the first half of the year, many large undertakings calling for copper were suspended, and moreover some producers have supplied the pressing requirements of certain old customers by letting them have copper without naming any price, leaving the latter for later adjustment, in other words lending the copper.

As early as last May certain producers began to have an accumulation of unsold copper. During May and June the addition to stocks was small, but after July 1 the accumulation began to be rapid, and by the end of the first week of July there was probably 30,000,000 lb. of unsold metal. At the end of August there was probably 140,000,000 to 150,000,000 lb. in the hands of the refiners. Of course, the market could not be otherwise than weak under this condition, especially in view of the stringency of money.

The management of the United Metals Selling Company was for a long time unwilling to recognize the development of this situation, and by its policy of holding back its production at an asked-price much above the actual market contributed largely to the public uncertainty. It is futile to attempt to point out now what might have happened if a different policy had been pursued. Such business as was offered was eagerly competed for by various outside sellers, and if those who were holding aloof had entered the market, the result probably would have been a more rapid decline. It would have been impossible to market any very large quantities except at a radical cut in the price. Early in August a certain large seller was disposed to make a reduction to 15c., but was dissuaded from doing so by friendly interests, which were of the opinion that a higher price could still be maintained. Perhaps the proposed policy of the company referred to would have been the best; if the worst had to come, the sooner would have been the better. Yet in the face of the situation which had then been developing for four months, H. H. Rogers, upon his return from Europe early in July, at a time

when copper had been for many weeks selling in the open market at a price decidedly below the figure of 25c., for which the United Metals Selling Company was holding out, when stocks were beginning to accumulate seriously, and when the Calumet & Hecla itself was cutting prices, made a public statement to the effect that the copper market was in a healthy condition and that the price could not fall below the level of 25c. then asked by his company, because the demand for consumption was so far in excess of production and visible supply. This blundering statement is to be explained only by an infatuation which prevented a reading of the clear writing on the wall, or a deliberate attempt to deceive the public as to the real situation, and was largely contributory to the loss of confidence which led to the subsequent demoralization of the market.

As to the future, Charles F. Brooker lucidly presented the position of the manufacturers who buy the largest part of the copper in a public interview last week, saying "the people who have an idea that I dictate the price of copper are all wrong. I am not the maker of the demand for the metal; I am only the middle man between the consumer of the manufactured product and the producer of the raw material. I am not going to buy copper until I have orders from my customers for the goods I manufacture, and so to find out when the price of the metal will settle on a basis that will induce buying, it will be necessary to go back to the general business condition of the country. When that causes a renewal of the demand for my products, I will be able to say what I will pay for the metal." On the other hand, the producers cannot long continue to turn out metal which cannot be sold, and the curtailment of production which is now beginning at Butte and elsewhere is a natural consequence of the situation. The price of 15c. affords a handsome profit to most of the large producers. Thus, the cost of copper to the Anaconda Copper Mining Company in 1905 was 10c. per lb. Since then, the wages of miners, both at Butte and at Bingham have been advanced 50c. per day, conditionally upon the price of electrolytic copper remaining at 18c. or upward, but with the decline below 18c., wages will return to the old figure. This question has not yet been raised, because the contracts with the men are based on the

average monthly price, and the latter has not yet been lower than 18c., but the average for September will doubtless be below that figure. There has been grave doubt as to whether the men would adhere to their contracts, but under the present intention of the principal company at Butte to curtail production anyway, which has already led to the laying off of a large number of men, this question is not so likely to arise.

With this curtailment of production in sight and with the signs of a realization among consumers that the price for the metal has at last come down to a fair basis, there is this week a manifestation of hopeful feeling in the trade that a larger business will soon develop and the strain of the last six months will be relieved. The bankers are now the masters of the situation. With the restoration of confidence in the business world, the release of money that is tied up, and the knowledge that production is being restrained, there will be a revival of demand that will soon absorb the present accumulation of metal, but that there will soon be a rebound of prices to the former high level is not to be expected, inasmuch as the increasing production of the new mines will tend to keep the market at a normal and healthy level.

### The Use of Electricity in Coal Mines

The increasing use of electricity in our coal mines has caused James E. Roderick, chief mine inspector of Pennsylvania, to discuss the situation in detail. The mine laws of Pennsylvania prohibit the use of open lights and electric currents in all mines where explosive gases are being generated in such quantities as can be detected by the ordinary safety lamp. The use of electric wires is also forbidden in all working places, roadways, or other parts of any mine to which fire-damp, in dangerous quantities, might be carried in the air current.

One of the serious hindrances that tend to prevent the proper and safe working of many mines is due to the fact that, when these properties were first opened, the early development did not show any considerable amount of gas, while later on, after electricity had been installed in the mines, the more remote workings have shown considerable gas, with the result

that open lights and electric currents have often become serious menaces to life. In such cases, the operators have been loath to do away with electric wires and to substitute locked safety lamps for the open lights in use, and strange to say, in many cases the miners have upheld the operators in this attitude.

One disputed question that has now presented itself is whether the use of locked safety lamps is advisable. Those who oppose the use of safety lamps argue that where open lights are used in gaseous mines the management finds it necessary to supply large currents of fresh air to all parts of the workings, in order to carry away the explosive gases and render the mines safe. On the other hand, when safety lights are in use, those in charge do not concern themselves so much about the quality and quantity of air sent into the workings, placing faith in the safety afforded by the locked lamps.

### Gold Mining in the Yukon

The present season in the Yukon has been the driest known since the country was first opened to miners. The result is that hydraulic mining and other placer operations have been much restricted on the creeks and rivers of the region. The chief gold mining operations have been dredging. Seven dredges have been at work and five more are being put together, to be in readiness for next season. The gold output for this year is estimated at only about \$3,000,000, the lowest production for any year since the Canadian Yukon district a large producer.

On the other hand, according to a statement from W. B. McInnes, recently gold commissioner of the Yukon, there is much capital being expended in the country. The Guggenheim interests are employing more than 1700 men, and other companies are doing much work in preparation for extensive operations next summer. The magnitude of this work in hand for bringing in a supply of water for future hydraulicking operations—the Guggenheims' water-supply system alone having about 70 miles of ditches, flumes and piping—indicates that hereafter there will be an abundance of water, even in dry years, with a resultant considerable increase in the yield of gold.

## The Amalgamated Copper Company

The New York *Evening Post* of Sept. 14 makes the following comments upon the position of the stock of the Amalgamated Copper Company in the market and its relation to the price for the metal:

This week's sensational break of 14 points in Amalgamated, following the gradual cut in the price of copper from 17¼c. a pound to 16¼, has been more talked about than any other factor in the market. And all discussions centered on one question, Will the Amalgamated follow the example of the Calumet & Hecla, and reduce its dividend? The movement of the stock certainly speaks eloquently of what the consensus of opinion was on that subject. Nevertheless it is difficult to get away from the argument that despite the violent decline in copper the price of the metal is now within a fraction of a cent of the highest point touched in 1900 and 1901, when the Amalgamated paid 8 per cent. dividends, the present rate.

Although Amalgamated has been dealt in on the Stock Exchange for eight years, the company only makes a pretense of publishing annual reports. When those feeble efforts appear it is always found that the management has carefully omitted any information of value.

During 1905 the lowest price for copper was 15c., and Amalgamated paid dividends at the rate of 4 per cent. If, as stated in the 1905 report, a difference of 4¾c. in the price of copper meant a difference of \$9,700,000, or 6 per cent., on Amalgamated stock, roughly, the advance from 15c. to 26c. meant a difference of \$22,464,000, or 14½ per cent. on the stock. The cut in the price of copper from 26c. to 16¼ will make a tremendous difference in the Amalgamated's surplus; nevertheless, all of the known facts justify the continuation of the 8 per cent. dividend.

But no one outside of H. H. Rogers, the president, and a few of his associates has ever known what was going on in Amalgamated. The company has been operating as a blind pool pure and simple since its formation. Only a short time ago it was learned that in one week small investors picked up 10,000 shares of Amalgamated in odd lots, acting partly on the advertisements of the Boston stool-pigeon of the copper speculators, and partly perhaps on Mr. Rogers's own statement of July 5:

"I do not know why the price of copper should change—certainly not for lower values. Europe is short of our copper and the world's demand is greater than the world's supply."

It was only a month ago, when copper was selling at 23c. a pound, and Amalgamated was quoted around 92. Since

then the price of copper has dropped 7c. and Amalgamated has declined 34 points. From which it must be concluded that President Rogers is either incompetent or guilty of managing the affairs of Amalgamated for stock-jobbing purposes.

If proof had ever been needed that this stock is a wholly unsafe investment, recent experience surely ought to have provided it. That money, not only of professional stock gamblers, but of small outside investors, should actually have sought the shares of this concern, when nobody knows its earnings, surplus, or deficit; when its use as a trap for the outsider, by the men who manage its finance, is a matter of record which would be valid evidence in court, and when, for the second time in the company's eight years' history, it has been publicly demonstrated that the conduct of its trade affairs is frankly stupid—this is a matter of study for psychologists.

The philosopher might indeed find equal interest in a study of the management itself. The men in control of it are men identified prominently with the Standard Oil—an enterprise of which, whatever its offences against the honest principles of trade have been, was never accused of folly or blundering in its relations to the market. On the contrary, the consistently sagacious attitude of that great monopoly, in regard to the price of oil and the condition of oil-consumers, is the redeeming feature in its whole extraordinary history. No one can wonder that the silent John D. Rockefeller, his business instinct outraged by the clumsy knavery practised in the original flotation of this copper stock, should have publicly washed his hands of the enterprise while it was still unmarketed, and should twice have broken silence, since that time, with agonized assurances that the mismanaged undertaking had no real connection with his Standard Oil. To him, the affair could have been only a little less irritating than it was to the hapless "community-of-interest" directors in the Amalgamated of 1901, who went around Wall Street, when the company's foolish blunders of that year were a topic of everyday conversation, begging their friends to believe that they did not know what was going on. It was not they who voted to hold up copper prices; they had never attended directors' meetings while all the world was emptying otherwise unmarketable copper into the Amalgamated's lap. Perhaps the most that can be said, regarding the history of this enterprise, is that its managers held to the obstinate belief, so strikingly displayed in their disastrous stock market ventures of last autumn, that the brute force of money can accomplish anything.

No doubt the larger consideration of the collapse in copper has to do with the question whether the fall in price, and the cut in dividends of producing com-

panies, is or is not an omen of evil for industry at large. But this much may be safely said—that people who reason from the copper trade, to all other lines of industry, need to remember that in most of these other trades—with the Steel Corporation, for example—powerful companies have taken to heart the lessons of the past half-dozen years, and have framed their policy towards the trade on lines of real conservatism.

## Asbestos in the Philippines

Information as to deposits of asbestos in the Philippines is given by Warren D. Smith of the Philippine Bureau of Science, in the *Philippine Journal of Science*, June, 1907. The province of Ilocos Norte contains the most important deposit; the mineral is found there as a stockwerk in the serpentine formation of the district. Two varieties occur, known as the "parallel" and the "cross-fiber," the former kind being the more abundant. The local designation of "cross-fiber" is applied to the true crysolite asbestos and by "parallel fiber" is meant tremolitic or amphibole asbestos.

In regard to the actual situation of the deposits, mention may be made of occurrences in the Dalumat and Baruyen schist areas in the northern part of the province, and to a pocket formation on the Dungen-Dungan estate. It appears as though these two occurrences are confined almost entirely to shear zones in the rock and hence are likely to be of only limited importance.

In the shaft on property near Baruyen a large pocket of rather inferior tremolitic asbestos has been met with, but there are also several small veins of the "cross-fiber" variety which are very promising.

At the present time actual exploitation of the deposits has not taken place, and no mineral has been marketed; but it is claimed that there would be little difficulty in disposing of a considerable output in the Philippines themselves.

## Mine Tax in Manchuria

According to the *Manila American* (Manila, P. I.), a circular has been issued by the Board of Foreign Affairs at Harbin to the effect that no foreigners shall henceforth be allowed to engage in mining enterprise within 30 li of the railway, without a special license. Mines which are already being worked will be examined to ascertain their daily output, and as soon as the proper agreements have been drawn up with the foreign countries interested, a scale of taxation will be arranged for all mining enterprises.

In Cornwall experience shows that woven-wire screens in the stamps which crush tin ores are better than punched plates.

## Valuation of Minnesota Mineral Lands

The discussion of the Minnesota State valuations on mining properties has been of the utmost interest to the iron trade the past week or two. The following statement has been issued by the tax commission. As preface, it may be said that since the original valuations were prepared, amounting to \$305,000,000, the commission has cut its figures by about 40 per cent., the valuation resting at but \$186,000,000.

The factors taken into consideration in the determination of the valuation of mining properties are as follows: 1, Geological conditions; 2, difficulty of mining; 3, character of the ore; 4, character of mining rights.

Mining properties are divided into two grand groups: operating mines and prospects.

For the purpose of determining the valuation of operating mines the following groups are suggested:

Class 1. (a) Properties in which mining is comparatively inexpensive, and the ore of high grade; (b) properties where mining is comparatively inexpensive and the ore of lower grade.

Class 2. Properties where mining is somewhat more difficult and mining cost greater than in the case of Class 1, and the ore of mixed grades.

Class 3. Underground properties where the expense of mining is comparatively low, for that kind of mining, and the ore of high grade.

Class 4. Underground or milling pit properties of distinctly second grade, determined by a higher cost of mining and lower grade of ore than in the case of Class 3.

Class 5. Mines of inferior character where expenses of operation are high.

Prospects may be classed under four groups, as follows:

Class 1. Lands that have been drilled and test-pitted, and where stripping of the overburden has been carried on—in other words, where the property is about to become a mine.

Class 2. Lands that have been drilled and test-pitted and ore found in some abundance.

Class 3. Unexplored lands near good mining properties.

Class 4. Lands that have not been explored, but are in the well known ore belt.

### RATES OF VALUATION PER TON IN THE GROUND.

1. Operating Mines:
  - Class 1. (a) 50c.; (b) 45c.
  - Class 2. 40c.
  - Class 3. 30c.
  - Class 4. 25c.
  - Class 5. 20c.
2. Prospects:
  - Class 1. 15c.
  - Class 2. 13c.
  - Class 2. 10c.
  - Class 4. \$5 to \$10 per acre.

The foregoing memoranda and tables relating to method of classification and the valuation of mining properties are tentative, and are offered as a basis for discussion.

## The World's Supply of Capital

Two months ago, an article by M. Leroy-Beaulieu in the *Economiste Francais*, on the cause and probable results of the rise in the price of capital, translated and reprinted in the *New York Evening Post* attracted much interest in financial circles. The same veteran economist has returned to the subject in the number at hand this week, says the *Evening Post*, and publishes an exceptionally interesting series of calculations, reducing to figures the annual increment of capital in the financial nations and the annual demand on that increment. It arrives at an estimate of the precise shortage of demand compared with supply.

M. Leroy-Beaulieu bases his calculation first on France, whose annual savings for investment he computes from the tables prepared in the proposed legislation on the income tax, from the amount of new securities habitually absorbed, and from the customary ratio of the sum laid by to a thrifty citizen's total income. He deducts from this the losses from bad investment, outright waste, and commercial disaster; then uses the best European calculations on the demands of 1906 for investment of capital in new securities. The figure he reaches, after deducting securities sold merely for conversion purposes, is 16,182,000,000 francs for the entire world, or \$3,250,000,000. This done, M. Leroy-Beaulieu thus pursues the inquiry. In the subjoined translation, the values, given in francs in the original, are for the reader's convenience rendered into dollars:

### ANNUAL SAVINGS OF THE NATIONS

"It is then at \$300,000,000, it would seem, that one may value the sum of capital available in France every year for investment in securities. This figure of \$300,000,000 would no doubt be excessive if it were not for the necessity of reckoning in what the railways and other industrial and financial companies, together with the national Government and the cities, apply each year in redeeming something like \$36,000,000 to \$40,000,000 of their own securities—which is in effect added to the annual saving. It is safe to value at \$300,000,000, or thereabouts, the annual capital available in France for new security investment.

"Now let us consider, no doubt in a largely conjectural way, the civilized world as a whole. One may admit that Germany, which has grown very rich of late, disposes annually of an amount of savings for investment in securities equal to that of France—say again \$300,000,000;

that England provides \$400,000,000; Belgium and Holland together \$140,000,000, Austria-Hungary \$160,000,000, Italy \$60,000,000, Spain and Portugal \$50,000,000, Scandinavia \$40,000,000, Russia \$100,000,000, all the rest of Europe \$40,000,000, the United States \$600,000,000, the rest of the world \$100,000,000.

"Add up these figures and you will reach a total of \$2,290,000,000; throw in something, if you wish, for some country whose annual savings destined for Stock Exchange investment (only those are under discussion) may have been in your judgment undervalued, and you will reach \$2,400,000,000, or, at the outside, \$2,600,000,000 or \$2,800,000,000. In any case, you will remain very far below the \$3,250,000,000 of security issues, after deducting conversions during 1906.

### THE "DEFICIT" OF 1906

"Here in a nutshell is the explanation of the present financial difficulties. The civilized world, so far as it can be reckoned up, produces \$2,400,000,000 in available capital for investment in securities; it is asked in 1906 to provide \$3,250,000,000; there was a demand, in America at any rate, for even more to be provided during 1907. But the world has not got it; therefore it cannot provide it. Add to this the effect of catastrophes such as the San Francisco and Valparaiso earthquakes, which cost something like \$200,000,000, and you will have a perfectly clear explanation of the existing crisis, the rise in the interest rate, and the fall of high-grade investment securities.

"The truth is, nations, quite as well as individuals, have reached the point where they must limit their undertakings to the possibilities of the case; that will be done, if not willingly, then by force of events. During several years yet, however—at any rate during a couple of years—we may be sure that capital will remain in strong request, and that its holders will be able to obtain a more remunerative interest rate than hitherto. These larger returns will be an advantage for the general run of capitalists, and the necessity of paying them will bring about a series of economies in industry to the great profit of civilization as a whole. Afterward, by degrees, the excitement of enterprise will calm itself, and things will tend to return to their former status."

It is stated that the Imperial Steel Works, near Shimonoseki, Japan, are about to submit their Siemens mild steel to a series of tests before Lloyds' surveyor at Nagasaki. The object is to have their name added to the list of approved firms who make steel to be used in the construction of ship and boiler materials for vessels classed at Lloyds. At the present time most of the structural steel used in shipbuilding in Japan comes from Great Britain.



## Personal

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

M. J. Walsh, of Mexico City, is examining properties in Jalisco, Mexico.

Carl Olson has been appointed superintendent of the Esperanza mine at Ocotlan, Oaxaca, Mexico.

E. Phillip Gilman has returned from England and will be in Vancouver, B. C., for several months.

S. N. Graham, superintendent of El Favor mine, Hostotipaquillo, Jalisco, Mexico, is in Canada.

Bruno Newman, formerly of Aguascalientes, is superintendent of several copper properties at Asientos, Mexico.

C. E. Singer is chemist at the smelting works of the Compania Metallurgica Mexicana, San Luis Potosi, Mexico.

George T. McGee is superintendent of the Barnes-King properties in Montana, taking the place of Superintendent Lamb, resigned.

Judd Stewart, auditor of the American Smelting and Refining Company, has been elected to the board of directors of that company.

Prof. L. S. Austin, professor of metallurgy at the Michigan College of Mines has returned from a trip to Salt Lake City, Utah.

W. H. Brame, of Salt Lake, Utah, has been in the Eldora district, Boulder county, Colo., making an examination of mining property.

W. A. Green has been elected secretary and treasurer of the Tennessee Coal, Iron and Railroad Company to succeed L. Hoover, resigned.

J. D. Thompson, manager of the Fortuna Gold and Copper Company, in the Cave Creek district, Ariz., has resigned because of ill health.

Frank Lehmer, superintendent of the Zapote Mining Company, Oaxaca, Mexico, has returned to Ocotlan from a business trip to the United States.

E. C. Metzner, of Wheeling, W. Va., has returned east after an examination of mining interests in the Pine Creek district, Gilpin county, Colorado.

M. Nesbitt has been appointed auditor of the Tennessee Coal, Iron and Railroad Company to fill the vacancy caused by the resignation of W. D. Truesdale.

James MacNaughton, general manager of the Calumet & Hecla mine, has returned to the Michigan copper district from a visit to the Eastern States.

John Gillie, general superintendent of the properties of the Amalgamated Copper Company, at Butte, Mont., has been elected president of the Barnes-King.

U. H. Hosterman, of Kansas City, Mo., has been looking after the interests of

the Wellington Mines Company operating in Summit county, Colo., during the past week.

John Hayes Hammond is ill at his summer home at Lookout Hill, at Gloucester Mass., with intestinal trouble, and is not expected to return to business for several weeks.

Edgar L. Newhouse has been appointed a vice-president of the American Smelting and Refining Company, especially in charge of the smelting operations of the company.

N. Westheimer, of New York City, was a visitor to the Idaho Springs district, Clear Creek county, Colo., last week. He is interested in the Sun and Moon property.

Etienne A. Ritter, of Colorado Springs, Colo., has been appointed manager of the Evergreen Gold and Copper Mines Company operating in the Pine Creek district, Gilpin county, Colo.

Lafayette Hanchett, general manager of the Boston Consolidated Mining Company, of Bingham, Utah, has been looking after mining interests in Gilpin and Clear Creek counties, Colorado.

A. H. Buck, after nine years of active mining in Mexico and Central America, has joined M. S. Parker in the firm of Parker & Buck, consulting engineers, Bartlett building, Joplin, Missouri.

Dr. Thomas T. Read, professor of mining and metallurgy of Colorado College, Colorado Springs, has accepted the position of professor of metallurgy in the Imperial University in Tientsin, China.

Albert L. Waters, after a two months' visit in Los Angeles, has returned to Ayutla, State of Jalisco, Mexico, where he has charge of the smelter and Ayutla mines of the Carrizo Copper Company.

Louis D. McCall, of Chicago, president of the Jefferson-Calhoun Mining Company, has returned to Chicago after visiting Gilpin county, Colo., with a party of eastern investors, looking over their interests.

Alfred H. Brooks, geologist in charge of the United States Geological Survey's work in Alaska, was at Whitehorse, southern Yukon, on August 20, whence he proceeded down the Yukon river to Alaskan points.

A. S. Dwight, consulting mining and metallurgical engineer, of New York, left last week for a western trip, which will probably extend to a month or more. He will visit Cananea, Sonora, before returning to New York.

J. P. Hutchins, consulting mining engineer, of New York, has been at Dawson, Nome, and elsewhere in Alaska, engaged on professional business. He is now on his way home, and expects to be in New York about Oct. 1.

F. C. Schirmer, of Boston, Mass., has been looking after mining interests in Clear Creek and Gilpin counties, Colo.,

and is now in Bingham, Utah, where he is interested as a director in the Boston Consolidated Mining Company.

Anthony J. McMillan, general manager of the Le Roi Mining Company of Rossland, B. C., has been in Victoria urging the provincial government not to forbid the shipment of coke from Crows Nest Pass collieries to smelters in the United States.

C. B. Lakenan has been appointed general manager of the Guggenheim companies, operating in the Robinson mining district, Nevada, with headquarters at McGill, where is situated the works of the Steptoe Valley Smelting and Mining Company.

Chas. S. McConnell, formerly chief clerk for the Oregon Smelting and Refining Company at Sumpter, Oregon, and for the past year with the Utah Smelting Company of Ogden, Utah, has been appointed assistant manager by the latter company.

J. T. Kong, Chinese mining engineer and metallurgist and graduate of three universities, is completing his education by means of practical work in the West Allis plant of the Allis-Chalmers Company before undertaking important operations in the lead and zinc district of Hunan, China.

M. Otagawa, assistant general manager of the Furukawa Mining Company, of Japan, sailed from New York, Sept. 18. He will pass some time in Great Britain and Germany, and will then go to Japan by way of the Suez Canal. Mr. Otagawa has made a long stay in the United States, and has made a thorough study of the copper industry here. He contributed an interesting article on "Copper in Japan" to Vol. XV of *The Mineral Industry*.

## Obituary

R. E. H. Maunsell was shot and killed in a restaurant at Goldfield, Nev. He was a native of Ireland, 36 years of age, and was a graduate of the Cameron School of Mines.

George W. Plympton, the senior director of the Cooper Union and veteran professor of physics and engineering at the Brooklyn Polytechnic Institute, died on Sept. 11, at Tyson, Vt., in his eightieth year. He was born in Waltham, Mass., and was graduated as a civil engineer from the Troy Polytechnic Institute in 1847. The five years following his graduation were spent in the practice of his profession. From 1852 to 1853 he was professor of architecture and engineering at Cleveland University, and for three years thereafter he was professor of mathematics at the New York State Normal School. From 1857 to 1863 he occupied the same position in the State Normal School of New Jersey. During a part of the civil

war he was in the service of the Government as an engineer. Mr. Plympton became connected with the Brooklyn Polytechnic Institute in 1863, and held the chair of physics and engineering from that time until his death. In 1869 he assumed the same professorship in Cooper Union, becoming a director of that institution in 1879. His literary ability found expression as editor, from 1870-1886, of *Van Nostrand's Engineering Magazine*, and in the preparation of several books on engineering and other topics. The titles of his books are "The Blowpipe," "How to Become an Engineer," "The Starfinder," etc. He further translated a number of scientific treatises from the French. He was connected with public affairs from 1885 to 1889, and again from 1892 to 1896 as one of the commissioners of electric subways for Brooklyn.

Daniel Willis James, senior member of the firm of Phelps, Dodge & Co., 99 John street, New York, died on Sept. 13, at Mount Washington Hotel, Bretton Woods, New Hampshire, of heart disease, aged 75 years. He was born in Liverpool, England, where his father was a prominent merchant. The son became early interested in the manufacture and importation of metals, and soon made a large fortune. He had been in business in New York City more than a third of a century. In the financial and business world, Mr. James was widely known and connected. Besides being the senior member of Phelps, Dodge & Co., he was president of the Golden Hill Corporation and Southwestern Investment Company, member of the New York Chamber of Commerce, vice-president of the United States Trust Company, a vice-president of the Northern Securities Company, and a director in the Copper Queen Consolidated Mining Company, the Commercial Mining Company, the Ansonia Brass and Copper Company, the Ansonia Clock Company, the United Globe Mines, the Arizona, El Paso & Southwestern Railroad Company, the Detroit Copper Mining Company of Arizona, the First National Bank of New York, the Morristown Trust Company, and the Northern Pacific Railway. Mr. James was deeply interested in educational and philanthropic work. He was for years president of the Children's Aid Society. He was a member and a benefactor of the Metropolitan Museum of Art, and was interested by membership and otherwise in the American Geographical Association, the American Museum of Natural History, and the National Academy of Design. His business made him of necessity a student of metallurgy, but his interest was given also to various other branches of natural science. Mr. James was a member of the following clubs: The Century, Metropolitan, Riding, Down Town, New York Yacht, National Arts, and Alpha Delta Phi.

## Societies and Technical Schools

*American Peat Association*—A meeting to consider plans for the organization of those interested in the development of American peat and swamp lands will be held at the Jamestown Exposition, Oct. 23-26. The technologic branch of the U. S. Geological Survey will have peat and peat products on exhibition at the Fuel Testing Plant, and a peat exhibit will also be made in the Mines and Metallurgy building.

The plan for the exhibit as suggested by Chas. A. Davis, includes the following divisions: Raw peat to show difference in origin, structure and amount of decomposition; Peat as fuel; Other uses of peat; Machinery for making peat products; Illustrations of apparatus for utilization of peat products.

The program includes: Address by the chairman; Permanent organization; Discussion of aims of the association; Papers on peat topics; and Excursion to Dismal Swamp. On Oct. 25 the Fuel and Alcohol building will be formally opened. To defray preliminary expenses participants and others are asked to contribute \$2 or more which will be credited to membership account.

Julius Bordollo, Kingsbridge, New York City, is temporary secretary-treasurer.

## Industrial

The W. J. Oliver Manufacturing Company, of Knoxville, Tenn., has been awarded the contract for 500 steel dump cars which the Isthmian Canal Commission will use on Panama Canal construction work.

The Doe Run Lead Company, of Flat River, Mo., has placed contracts for four Hancock jigs, built by Allis-Chalmers Company, to be installed at Elvins, Mo. Two of the newly ordered machines are for right hand and two for left hand operation.

The Standard Roller Bearing Company of Philadelphia, Penn., has completed additions to its plant which is now the largest of its kind in the world. The buildings cover a tract of ground one-half mile long and have a floor space of 500,000 square feet.

The Westinghouse Electric and Manufacturing Company has been granted a decision in the suit brought against the Prudential Insurance Company, charging the latter with infringement of Nolan Patent No. 582,481, in the generator manufactured by the Bullock Electric Manufacturing Company, of Cincinnati, O. The Nolan patent in this suit relates to a simple means for fastening the laminæ of the cores of electrical machines together and to the casting by which they are supported. The laminæ are clamped between

a cylindrical flange at one end and of a ring fitting over the other end of the casting. This ring is held in place by a small fastening ring interposed between it and a small shoulder on the casting. A shoulder is provided upon the cutter face of the clamping ring for holding the small ring from flying outward. Judge Lanning holds that the claims of the Nolan patent are valid and cover the construction found in the Bullock generator.

## Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

Kent Mill Company, 170 Broadway, New York. Kent Pulverizer. Pp. 4, illustrated, paper, 4x9 inches.

Fairbanks, Morse & Company, Denver, Colo. Booklet Series No. 123. Modern Stamp Milling. Pp. 14, illustrated, paper, 3x6 inches.

The Allentown Rolling Mills, Allentown, Penn. Pump Data No. 19. The Aldrich Horizontal Quintuplex Electric Pump. (Pot Chamber Design.) Pp. 8, illustrated, paper, 6x9 inches.

Buffalo Forge Company, Buffalo, New York. No. 177. Buffalo Forges, Blacksmith Tools, Power Blowers and Exhausters, Heating and Ventilating Pumps, Ventilators. Pp. 246, indexed, illustrated, paper, 3½x7 in.; 1907.

## Construction News

*Central City, Gilpin County, Colorado*—J. A. Jameson, of the Powers mine, is about to purchase an electrical equipment of machinery for that mine in Russell gulch district.

*Nederland, Boulder County, Colorado*—The Crucible Steel Company of America, which recently acquired interests in the tungsten district, is going to erect a 50-ton milling plant near the mines and it is also reported will erect a refinery near Boulder. W. H. Ryder, Nederland, Colo., is manager.

*Apex, Gilpin County, Colorado*—The Evergreen Gold and Copper Mines Company will build a concentrator for handling its low-grade copper ores in the Pine Creek district and may decide to erect a matte smelter for copper ores at a later date. Etienne A. Ritter, Colorado Springs, is manager.

*Eldora, Boulder County, Colorado*—The Consolidated Copper Mining Company is keeping up developments on the Fourth of July tunnel, and intends next spring to erect a large reduction plant for the treatment of the low-grade copper ores. J. B. Johnson, Eldora, Colo., is president and general manager.

# Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives  
at Denver, Salt Lake City, San Francisco and London

## REVIEWS OF IMPORTANT EVENTS

### San Francisco

Sept. 14—The new electric smelter at Heroult, Shasta county, is now turning out ferrosilicon at the rate of about two tons daily. The smelter will be kept running on this product until the plant for making electrodes is completed, when the production of pig iron by electric smelting will be resumed.

At the Mammoth Copper Company's plant at Kennett, Shasta county, two new furnaces are being added. The tops of the old furnaces are to be removed and water-jacketed steel tops substituted. The power-house, which has three blowers, will have four more. More electric motors are being put in and a new building has been prepared for the machine shop, blacksmith shop, warehouse, etc. The company's Quartz Hill steam railroad four miles long, has been finished, and ore is being hauled from the mine to the railroad station at Quartz.

The River Hill mine near Placerville, El Dorado county, for many years known as the Gentle Annie, has been closed down and the pumps withdrawn. This is a Mother Lode mine with a 1500-ft. shaft and is well equipped with machinery. The ore in the lower levels did not pay.

The San Domingo hydraulic mines at Fourth Crossing, Calaveras county, are to be opened on a large scale by the Stanislaus Electric Power Company. Large restraining dams are being built at Fourth Crossing to hold back the débris. There will now be an abundance of water which is brought in ditches and carried across the cañon of the Stanislaus in an inverted siphon; thence through a tunnel through Table mountain, and thence by ditch and pipes to the San Domingo mine at Dogtown.

Judgment has been entered in the case of the Goldfield-Mohawk Mining Company against the Selby Smelting and Lead Company in accordance with a stipulation filed by the attorneys. The 31 sacks of rich ore are to be placed in the possession of the plaintiff. One half of the proceeds of 14 sacks is to be paid to G. B. Gentry and the same percentage of the remaining 17 sacks to G. W. Floerchinger. These two are intervenors and deposited the ore with the smelting company. The remainder, after deducting expenses, is to go to the mining company. This ore was seized at the Selby works on the ground that it had been "high-graded" from the mine of the plaintiff last year. In all about 60 sacks were seized, worth about \$100,000.

The extensive smelting plant of the Balaklala company at Coram, is nearing completion. The three blast furnaces are in place and the reverberatory furnace is finished. All the machinery is in the power-house. The rock crushing plant is ready and the 16,000 ft. of suspension cable for the aerial tramway are hung on the 60 towers. The new smelter is expected to handle 2200 tons of ore daily and will be ready for operation by December.

The surface placer miners in Nevada county have been doing very well this season at various places, especially on the Yuba river. The freshets of last winter broke down much gravel and washed down a good deal of gold from above normal high water, depositing it in the gravels of the river bars. People have been using rockers on this material with success. Some of the men have been making from \$4 to \$10 per day.

During the past year the price of wood at Grass Valley has risen from \$5 to \$12 per cord, and the local miner's union has voted money to bring in a train-load from outside and sell it to the members of the union and to widows of the community. Some other fraternal organizations are doing the same thing, in preparation for the winter.

The proprietor of a small orchard which is 14 miles from the Mammoth Copper Company's smelter in Shasta county, complained to the company that the smelter fumes had damaged his fruit trees and other vegetation. At the suggestion of the company the matter has been left to arbitration. The company appointed a fruit grower on its behalf and the owner of the orchard appointed the county horticultural commissioner; these two to select a third man. Both parties have agreed to abide by the decision of the committee and thus avoid litigation.

The Coast Development Company, owner of the Rappahanock mine adjoining the Rawhide in Tuolumne county, has been sued and attached by an assignee of certain claims for supplies, machinery, etc.

### Salt Lake City

Sept. 16—The affairs of the Ohio Copper Company, a Newbraska corporation, have been closed out and the Bingham mine is now being operated by the Ohio Copper Company of Maine. The transfer offices are located in New York and the stock of the old corporation is being exchanged share for share in the new.

Articles of incorporation of the Sioux Consolidated Mining Company, have been changed, transferring the head office of the company from Salt Lake City to Provo.

The Salt Lake valley smelters are still experiencing difficulty in getting fuel and as a result, scarcely any of the plants have been running up to capacity during the past week. The diversion of a train load of coke consigned to Montana plants is all that saved a shut-down of Murray and Garfield smelters.

The traffic department of the Western Pacific railroad has announced that train service will be inaugurated from Salt Lake City to the junction with the Nevada Northern railroad in eastern Nevada on Oct. 1. The opening of the new line will be given another route to the Ely and other eastern Nevada mining districts.

The excitement about the oil discoveries in Southern Utah, particularly in the eastern portion of Washington county, is taking on the aspect of a boom. Los Angeles capital has become interested and a dozen rigs have been brought in from the California fields to be utilized in the opening of new wells. The permanency of the Virgin City field appears to have been fairly well demonstrated and will undoubtedly lead to the rapid development of the mineral resources of Iron and Washington counties.

### Bisbee, Arizona

Sept. 16—Copper production is being curtailed materially, though many of the big mining companies have as yet shown no desire to cut down their output. The Copper Queen reduction works, with a normal operation of nine furnaces, and an extra as a spare, is cutting down to six, announcing that the remaining four will be overhauled and repaired. Of course the works was planned for the continuous operation of the nine, with one furnace out at a time, undergoing repairs or otherwise as a spare, but the works may require excessive repairs at this time. With three out of nine idle, there will be a very material reduction of output. Some of this will be from the Copper Queen mines, where it is said that the force will be slightly reduced only, but that a larger force than of late will be turned into development and deadwork. This will make a reduced production from that property, whose annual output of copper is normally about 85,000,000 lb. Some of the

Copper Queen's reduction of product will be in the custom department, where it has a large business. It not only receives part of the ores of the Shattuck-Arizona, but those of the Imperial at Silver Bell, and many other smaller properties on both sides of the international line. There has been a curtailment at Jerome, on account of smelter conditions, and this is liable to continue. There has been a marked cessation of operations at low grade and high cost properties throughout the territory, and while none of these produced much copper, their aggregate is considerable. The Clifton district is liable to show much less production and some of its leading producers cannot be making very much money now, on account of lean ores and high costs.

Those who consider Arizona a rainless desert may find food for reflection in the fact that the rainfall for the past 12 months on the Chiricahua mining district was 27.57 in. This has made work difficult in many places throughout the mountains. A large amount of assessment work is now under way in the district.

The Wolverine & Arizona, which has been pegging away at Bisbee for the past five years, has at last found ore on two of its claims that lie near the Shattuck mine. The drift on these claims is now said to be in ore. The original portion of the ground taken, was long ago abandoned, as drifts several thousand feet long failed to discover favorable indications.

The Ortega Mining Company has increased its capital from \$2,000,000 to \$2,500,000, and will use the additional money for development. The properties are located six miles from Cananea. The new stock is 7 per cent. cumulative preferred, and will be offered for sale in Bisbee. The company has now issued about \$1,250,000 of its prior issues. Recently work on the Huerfana shaft was stopped on account of a heavy inflow of water, but this will be met by larger pumps.

Operations have ceased in the Ajo district of southwestern Arizona. This is the region in which were located the metallurgical marvels described in the *JOURNAL* a few weeks ago.

At Jerome the United Verde Extension Mining Company has cut good ore in its Little Daisy claim at the depth of 415 ft. and is now sinking in black copper oxides. This is one of the very few finds of copper in the immediate neighborhood of the United Verde and outside its own ore shoots. The district has been to a very marked degree a one-mine camp, though the Copper Chief and Equator mines, six miles south on the Black Hills, have shown good ore in some quantity. The Jerome Mines Development Company, with property close to the Little Daisy, has started a two-compartment shaft, claiming that a drill showed copper on the property. There will now be more activ-

ity in Jerome than for many years; the universal feeling among prospectors has hitherto been that the big United Verde covered all copper-bearing ground on Verde hill.

The Globe-Arizona Copper Mining Company, at Globe, lying south of the Old Dominion and Globe Consolidation workings, has been shipping 16 cars of ore to Douglas smelter this week, which has averaged a value above freight and treatment charges, of more than \$10 per ton. This must be more than the cost of mining, though this in the present situation at the property, is rather high.

The Imperial Copper Company, operating the Union and Mammoth mines at Silver Bell, Pima county, is beginning the erection of a matte smelter at its new town of Sasco, 14 miles out from the mines. At the mines work has reached the 700-ft. level at Mammoth and both properties are looking well. Shipments to the Douglas smelter are averaging 200 tons a day of 18 per cent. copper. At its mines and smelter site the company is employing about 600 men.

The Weir & Pellon group of properties in the Tucson mountains, 23 miles from Tucson, is being examined by the management of the Calumet & Arizona Company of Bisbee, with a view to bonding and exploration. A shaft has been sunk 190 ft. and has cut good copper ore, about 40 tons of which is on the surface. The geological formation is a lime-porphry contact.

### Toronto

Sept. 17.—The Provincial government of Ontario recently extended invitations to a number of the leading British newspapers to send representatives to inspect the mineral resources of the province. In accordance with the invitation 17 English journalists will arrive in Toronto on Saturday and leave early in the week for Northern Ontario, where they will visit the leading mining camps. A great deal in the direction of attracting British capital for investment in Canadian mining enterprises is anticipated from this visit.

As the time set by the Provincial government for the completion of assessment work on the Larder Lake claims expires shortly, much interest is being taken by mining men in the question as to how many will complete the work and secure their titles. Among the companies which have already done so are the Lucky Boys, Bluebell, Larder Lake Proprietary, Golden Peak, and Larder Central Gold Fields. Many others, it is believed, will find it impossible to finish in the prescribed time, and numerous claim-jumpers are awaiting an opportunity.

The finding of native silver and calcite similar to the Cobalt ore in the vicinity of Silver Lake, about five miles west of Bear creek, on the Montreal river, has been officially confirmed. The field in this

neighborhood has been extensively staked out and a small mining camp with a post office and stores has grown up.

### Sault Ste. Marie, Ont.

Sept. 17.—A prospector arrived here with native silver specimens from Michipicoten island. These specimens were taken from a vein which he described as from 1 to 3 in. in width, carrying calcite as a gangue, and in some of the specimens the silver and copper are alloyed. He showed other specimens of native copper without the silver, described as coming from a bed running with the formation. This bed averaged about 1 ft. in thickness, and an average sample yielded 2.6 per cent. native copper. It has long been known that native copper occurred on Michipicoten island, and considerable work was done in the early days, although in rather an extravagant manner. This new discovery has again directed attention to the island, and numerous prospectors are starting out.

### London

Sept. 7.—The industrial situation in Great Britain is at present centered round the price of coal. The outlook for consumers of coal for both power and household purposes is a very anxious one, owing to the continuance of high prices and the prospects of further abnormal rises. The cause of this firm attitude of the coal producers is chiefly the very considerable increase in the demand from the continent of Europe; but it is also due to some extent to the unusually cold summer. As a rule, the months of June, July and August are very slack times in the household-coal trade. This year the household consumption of coal has not dropped in the usual way, for a great many people have found it desirable, owing to the damp and cold, to keep their fires burning to some extent. We have had no "lowest summer prices" this year, and the present prices are pretty much the same as they were last January. Best qualities in London are about 27s. a ton, and there is every probability that by November we shall be paying 32s. or more—nearly \$7.75 per ton. The increased demand from Europe is very noticeable. Compared with two years ago the exports are now 30 per cent. higher in quantity and 50 per cent. higher in total value. This alteration is due chiefly to the remission of the export duty on coal. A Conservative government five years ago taxed the foreign buyer 2s. a ton, but a Liberal government three years later reversed the policy. No doubt the present situation is excellent from the point of view of the coal people, but all other industrial concerns and the community as individuals are aghast at the present prospect.

# Mining News from All Parts of the World

New Enterprises, Installations of New Machinery, Development of Mines and Transfers of Property Reported by Special Correspondents\*

## THE CURRENT HISTORY OF MINING

### Alaska

#### DOUGLAS ISLAND

*Treadwell*—The mills are all equipped with oil tanks and burners, which will, it is believed, eliminate future troubles due to failing fuel supplies. Three mills are in operation. A force of about 800 men is employed, and 600 more laborers are needed.

### Arizona

#### GRAHAM COUNTY

*Arizona Copper Company, Ltd.*—This company reports the production of its works at Clifton for the month of August at 1177 short tons of copper. The output was much diminished by the results of the strike at the beginning of the month, and by other temporary causes.

#### YAVAPAI COUNTY

*Derby*—At this mine sinking has again begun. The mill will be started in a short time as ore enough is now blocked out to keep it supplied for some time. These mines are in the Thumb Butte district, four miles west of Prescott.

*Mount Onion Mines Company*—This company has ceased to operate its mines on company account and has offered them for lease. Several miners who have worked in the mines are reported to be making arrangements to take leases.

### California

#### AMADOR COUNTY

*Illinois*—At this mine, near Drytown, owned by J. W. Buchanan and others, there is a 6-ft. ledge at the bottom of the shaft, the entire vein showing good value.

#### BUTTE COUNTY

*Mammoth Channel Gold Mining Company*—This company at Magalia, owning 1580 acres of auriferous gravel, is developing its channel.

*Pinal-Butte Gold and Copper Company*—This Los Angeles company has purchased the Hazelton mine near Forbestown, which has been shut down for the past two years. Development will begin at once.

#### CALAVERAS COUNTY

*Fort Ritter and Maine*—These claims on Murray creek, owned by C. F. Walter and M. Voorheis, are yielding rock rich in free gold and sulphurets

*Hedrick*—Work has been commenced

on this mine at San Andreas by Hickey & Lamb, who had an option on it.

*Viking Gold Mining Company*—This company is now operating the Hamby mine near Golden Gate and is crushing 50 tons of ore daily. Ten stamps are to be added to the 10-stamp mill.

*Voinich*—Work has been started up on this mine with three shifts of men, with Martin Voinich as superintendent.

#### INYO COUNTY

*Bishop Creek Gold Company*—The power plant of this company is finished and the water turned into the pipe. Air compressor and drills will now be used in mining.

*Black Canyon Gold Mining Company*—At this property, M. T. Stovall, manager, three or four air drills are to be used, the compressor to be driven by a 75-h.p. engine.

*Crackerjack Gold Mining Company*—This company at Crackerjack, J. L. Toenier, superintendent, has put more men at work and intends exploring the orebodies on the lower levels.

*True Fissure Mining Company*—At this mine a crosscut tunnel is already in about 130 ft. and will be extended 200 ft. farther to the main ledge. Three intermediate veins will be cut. The claim used to be a shipper.

#### MARIPOSA COUNTY

*Exchequer Mining Company*—After considerable development work the company has built a dam for power purposes and will install an air compressor and drills.

*Pocahontas Copper Mine*—This mine near Whiterock has been bonded to the Michigan Steamship Company of San Francisco. The shaft will be enlarged and new hoisting works put in. Ore is being shipped to the Peyton Chemical Company in San Francisco bay.

*Yosemite Dredge Mining Company*—This company has bought tracts of land along the Merced river and contracts have been let for building a dredge to work them.

#### NEVADA COUNTY

*Delhi*—Extensive repairs are to be made on the 20-stamp mill at this mine. The mill will be hung up, but underground work will be continued.

*Horseshoe Mining Company*—This company has bought the Phoenix mine (formerly the Sneath & Clay) and will de-

velop it. The mine has a good pumping and hoisting plant and a 10-stamp mill.

*Niagara*—In the shaft of this mine, near Newtown, quartz is said to have been encountered heavily mineralized with sulphurets and assaying \$40 in gold. It was found at a depth of about 200 feet.

*Placer Miners*—The Chinese and others who are mining along the South and Middle Yuba this summer are making money. The high water washed considerable gravel along the banks and this seems to carry much gold. One man who is rocking on the South Yuba has averaged \$10 a day during the summer.

*South Yuba Mining and Development Company*—Last fall, when the company was ready to begin washing, a storm wrecked the debris dam, flumes and ditches. John Lawrence has had a force of men engaged this summer in repairing the damage and will be ready to wash before the coming winter sets in.

#### PLACER COUNTY

*Dairy Farm*—At this copper mine, near Trent, new compressors have been put in place, new reduction works have been built and a hoist of large power has been erected.

#### PLUMAS COUNTY

*Copper*—Representatives of Augustus Heinze have purchased several copper properties from Geo. Goodhue, which lie close to the line of the Western Pacific Railway.

#### SIERRA COUNTY

*Empire*—This mine, Grass Valley, which has been operated for the past few years by some of the men interested in the Murchie mine at Nevada City, has closed down and 30 men were discharged. The drills are being taken out and the pumps will be pulled.

### Colorado

#### BOULDER COUNTY

*Crucible Steel Company*—Pennsylvanians have secured 260 acres of tungsten ground near Nederland and it is reported will invest \$250,000 in property as well as in development for a production of about 50 tons monthly of high-grade concentrates. The company contemplates the erection of a milling plant. W. H. Ryder, formerly of Sugar Loaf, will have charge, with headquarters at Nederland, Colo.

*Self Ridge & Maine Company*—A new

water power plant has been installed by the Leonard-Heffner Machinery Company on the property on Boulder creek. The company will open tungsten mines near Nederland.

*Strathmore Mining Company*—Eastern people who are interested will drive the tunnel workings with power drills. Howard Carpenter, Eldora, Colo., is manager.

*United States Gold Corporation*—This company is dismantling the chlorination mill at Wall street, which it recently purchased, and will move most of the machinery for use in the construction of the new mill at Sugar Loaf.

#### CLEAR CREEK COUNTY

*Empire Tunnel Company*—An order has been placed for two 4-ft. Hathaway mills, and during their delivery the Empress mill is being rebuilt in the Empire district.

*Linn Consolidated Mining and Milling Company*—Work has been started on the new 50-ton concentrating plant on the site of the old Stewart reduction works at Georgetown.

*Ramsdell Mining and Milling Company*—Hathaway mills are to be added to the mill. G. W. Teagarden, Georgetown, Colo., is manager.

*Terrible*—Good finds of ore are reported in the 11th and 14th levels. B. C. Catren, Georgetown, is manager.

#### GILPIN COUNTY

*Chicago-Carr Gold Mining Company*—A new and larger air compressor of the Sullivan kind has been installed by the Chicago owners, and sinking of several hundred feet will soon be started. B. M. Myers, Central City, is in charge.

*Copper Jim*—Ores running as high as \$400 per ton have been found in the adit level and there is talk of the company putting in machinery at the property in the Wisconsin district. Georgia and Denver people are interested, with J. A. McCracken, Tolland, Colo., as superintendent.

*Frontenac Mines Syndicate*—British capitalists are interested in the recent purchase of the Frontenac group and two car-loads of electrical machinery have been received from the East. A large shaft building is in course of erection and heavy developments are promised. H. P. Lowe, 1443 Marion street, Denver, is managing director.

*Hubert*—This property in the Nevada district is to be rejuvenated by Denver men under the superintendency of H. C. Bolsinger, Bald Mountain, Colo. It has a record of \$1,500,000 and has been idle for nearly 10 years.

*Metha*—Wheeling, W. Va., men are interested in operating the property in Pine Creek district and intend installing

a heavier plant of steam machinery. S. Z. Schenck, Apex, Colo., is superintendent.

*Nemeha*—This group of three claims, situated in the Gregory district, has been sold to Pennsylvania capitalist for a reported sum of \$45,000 by E. S. Moulton, of Central City. The new owners have organized the Nemeha Gold Mining Company, and H. Ehrhardt, Central City, has been appointed superintendent.

*Pearl Tatum Mining Company*—This company has absorbed the Banzai and Sleepy Hollow interests and the capital stock has been increased to \$2,000,000, with Denver and Missouri capital interested. Milling ores averaging 6-8 ft. wide have been opened up in a cross-cut at a depth of 900 ft. A 16x18 Sullivan air compressor has been ordered and a 100-h.p. boiler will be installed. Robert Wilkinson, Central City, is superintendent.

*Star of the West*—Chicagoans are interested in this group in the Russell district and they are preparing to install a plant of machinery. Stephen Harper, Central City, is superintendent.

#### LAKE COUNTY—LEADVILLE.

With all of the drawbacks, threatened coal strike and car shortage, during August the total output reached 78,000 tons distributed to different smelters, the bulk of the tonnage going to the local plant.

*Colorado Bonanza Mining and Milling Company*—This company is composed of Leadville men and owns 100 acres of patented land on Pennsylvania mountain near Alma in Park county. The property will be extensively worked; two shafts are already in ore, and can be sunk to a depth of 512 ft. without encountering water, as the Hocking tunnel has drained the mountain to this depth.

*Drilling*—The drill hole at Thirteenth street has reached a little more than 500 ft., and is passing out of the lake bedding. Water has been encountered.

*Elva Elma*—This shaft, Ball Mountain, is down 100 ft. and drifts have been run to the vein from which good ore is being shipped.

*Greenback*—Several years ago this mine, Carbonate hill, was closed, the reason given being that satisfactory arrangements could not be made to treat the ore. Recently Patrick Mulrooney purchased the interest of Tingley S. Wood and also secured the control of the other interests. It is now reported that he has succeeded in placing the property with a Salt Lake syndicate, of which Charles Clark, son of Senator W. A. Clark, of Montana, is the head. It is also stated that the United States Smelting Company is interested in the enterprise. The shaft of the Greenback is down 1350 ft. and the property contains one of the largest bodies of sulphide ore in the country. The ground is blocked out for hundreds of

feet, sufficient to maintain a heavy tonnage for years without further development.

*Leadville District Mill*—This mill is operating on ore from the Ibez dumps, but difficulty is experienced in securing sufficient ore to keep running steadily. The capacity of the mill is 100 tons daily. Two distinct products are made.

*Long & Derry*—An electric plant at this property, Iowa Gulch, has been completed, and underground work is now being carried on in the upper tunnel, which is in 325 ft.; 300 ft. have still to be driven before the ore shoot is reached.

*Kennebec*—This mine, lying northeast of the El Paso, Fryer hill, resumed work during the week. Exploration work is being carried on from the 200-ft. level. Considerable ore has been found in the old drifts which is being hoisted.

*Mammoth*—Work at this property on Big Evans gulch, during the week proves that the main ore shoot has not been opened. In the east drift the treacherous dolomite sand is still in evidence, making the work of development slow and tedious, but the streaks of ore remain and from them several tons have been hoisted. The ore runs well in silver and lead. In the west drift conditions are about the same, a little ore being in the upraise.

*Robert E. Lee*—The lessees on this property, Fryer hill, are shipping excellent silicious ore from the different drifts in the old workings, which have been extended into virgin territory. The value of the ore has materially increased during the past month. Occasionally small bunches of high grade are taken out.

*Ruby*—The lessees on this property, Weston pass, during the past month have exposed several veins of high grade lead ore which are being followed. The Colin Campbell shaft, near the Ruby, is being sunk deeper, and a body of ore has been encountered at the bottom of the shaft. Arrangements are being made to continue work during the winter on these two properties.

## Idaho

#### IDAHO COUNTY

*French Group*—This group of claims located between Newsome and the old Oregon mine has been sold by the owner, Peter Proux, to John Leland and associates for \$35,000. A company will be formed to develop the mine.

#### SHOSHONE COUNTY

*Independence*—The 1000-ft. tunnel driven and abandoned on this property near Burke, also known as the Old Bull Pen mine, has been leased to the Missoula Copper Company and will be extended 600 ft. to cut the Missoula orebody. The Independence property adjoins the Copper King, Missoula Copper and National prop-

erties. W. E. McCormick is manager of the Missoula mine.

*Ambergris*—At this mine, near the Hercules, the management has installed a boiler, hoist and power drills with which sinking has been resumed. It is proposed to sink to the 300-ft. level, when drifting will be done on the vein.

*Basin*—This mine, at Burke, recently cut the vein. A large volume of water necessitated the installing of more machinery. W. Clayton Miller, general manager of the Federal Mining and Smelting Company, is largely interested in the Basin and Ambergris companies, of which he is also manager.

*Gold Hunter Mining Company*—This company, Mullan, has cut its vein with the crosscut tunnel that it has been driving several years. The vein is 20 ft. wide, with pay ore the entire distance, several feet of which are of shipping grade.

*Hercules*—This mine, at Burke, which has paid about \$2,500,000 in profits since it was opened up in 1901, is making experiments with a view to saving the zinc contents of its ores.

*Imperial*—The strike reported in the middle of August has steadily improved with development. John H. Nordquist is president of the company.

*Star Mining Company*—This company, developing the Star Group, on the Morning-Frisco ore zone, near Mullan, Idaho, has struck ore at a depth of 700 ft. in the crosscut tunnel, 1990 ft. in length. E. H. Moffitt is manager of the company.

## Indiana

### DAVISS COUNTY

*Daviess County Coal and Mining Company*—The stockholders of this company, a \$1,000,000 corporation, with headquarters in Linton, have made application for the appointment of a receiver. They assert the liabilities of the concern exceed the assets and that large sums are due laborers. Little has been done by the company during the past year.

*New Coalfield*—Drilling for coal and sinking shafts has been begun in Barr township by Indianapolis capitalists interested in a rich coalfield in Barr, Reeves and Harrison townships. The field is near Montgomery and Cannellburg. Coal 5 to 6 ft. thick was recently discovered.

### GIBSON COUNTY

*Gibson Coalfield*—Options on coal land between Princeton and Oakland City are being taken rapidly. W. T. Hicks, of Bloomington, has secured options on several hundred acres at \$20 per acre. He also holds leases or options in Daviess, Green, Warrick and Pike counties—over 2000 options in all. The new Chicago & Indianapolis Railroad will penetrate the Gibson coal field and run direct to Gary.

## PIKE COUNTY

*Killion Coal and Mining Company*—This company, with headquarters in Petersburg, has incorporated with a capital of \$100,000, and will develop coal lands in Pike county. Charles A. Killion, Nathan E. Killion, Thomas Harris and Geo. B. McWilliams constitute the board of directors.

## VIGO COUNTY

*McNabb*—Flickering sparks from a miner's lamp caused an explosion in the mine near Blackhawk on August 26 which resulted in the injury of four men—two being severely burned. The men had loaded shots when one of the men took off the cap of his lamp. Some of the sparks set off the powder.

*Latta Creek*—An agreement between the miners and operators of this mine has been reached through the intervention of President John Mitchell. The trouble arose over the loading of mine dirt without pay. The miners asserted that they had merely "resigned," while the operators contended that they were on a strike. The miners were fined \$1 for one day's absence and agreed hereafter to load one car of dirt each day.

## Michigan

### HOUGHTON COUNTY—COPPER

*Baltic*—Work has started tearing down the No. 3 shaft house which is to be replaced by a steel structure.

*Isle Royal*—A contract has been let for three steel shaft houses to cover shafts Nos. 4, 5 and 6. The houses are to be erected within a year. Sinking is going forward in the shafts. No. 6 is down about 300 ft. and is in good stamp rock; No. 5 has reached about 50 ft. and has encountered a pocket of epidote copper.

*Obijway*—The new No. 1 shaft at this property has struck what is believed to be the ledge, at a depth of 32 ft. This shaft is a three-compartment and is to be sunk on the foot-wall at a dip of about 33 deg. A force of men is erecting two lodging houses which will accommodate about 100 men.

### ONTONAGON COUNTY

*Lake*—Sinking will be started on this property within a few days.

## Nevada

### ESMERALDA COUNTY—GOLDFIELD

*Florence*—The Rogers-Goldfield syndicate's lease is yielding high-grade ore. A crosscut northwest of the shaft at the 300-ft. level near the side line of the Mohawk during the week cut into a body of ore which promises to become a bonanza. The lessees have determined to sink the shaft to the 400-ft. level to develop the find.

*Little Florence*—The rich vein which is being developed in the 300-ft. level has been cut in the 400-ft. level. The width has not yet been obtained but it promises to be quite as wide as in the upper level where it is 8 ft. The new strike shows the vein has improved in value and carries heavier telluride ore. The company, in order to properly develop the vein, has decided to commence the sinking of a new double compartment working shaft. Orders have been placed for a hoisting plant capable of working to the 2000-ft. level.

*Kewanas Lease*—The vertical shaft of the Kewanas Leasing Company has been sunk to a depth of 400 ft. Preparations are being made to run a crosscut to cut the vein which is being developed by the Kewanas Mining Company.

### NYE COUNTY—BULLFROG

*Beatty Mountain*—No. 3 shaft has been sunk to the 70-ft. level and is in sulphide ore. A power hoist is being erected on this shaft and sinking will be hurried down to the 250-ft. level.

*Bullfrog Puritan*—A new double compartment shaft has been started on the vein. The shaft is down 35 ft. A power hoist will be put in.

*Croesus*—The shaft is down to the 300-ft. level and preparations are being made to start a crosscut to the Mayflower ledge.

*Gold Bar*—The report of this company states that there has been expended in development and equipment \$119,000, and that the work done with this money includes a 50,000-gal. water supply, hoisting equipment and 4861 ft. of underground work, 90 per cent. of which is in ore. The mine is developed to a depth of 500 ft., with crosscuts and drifts every 100 ft. from the 50-ft. level down. The company estimates that upward of \$3,500,000 in ore is now blocked out in the ground, ready for milling. The company paid \$117,000 for the property, which comprises 100 acres. The first unit of a 100-ton mill has been ordered and is now en route from the manufacturers.

*Montgomery-Shoshone*—Shipments of 100 to 150 tons of high-grade ore are being made weekly. A pump has been ordered to handle the flow of water in the triple-compartment shaft, which is down more than 550 ft.

*Original*—The shaft has reached the 112-ft. level and is in ore of shipping grade.

### NYE COUNTY—TONOPAH

*Extension*—The shaft has been sunk to a depth of 1080 ft. and according to the latest official report on the 270-ft. level the only development work done is No. 10 raise, length 39 ft. Shipping ore is being taken from the stope west of the shaft. There are some good stopes between the 400 and the 270 level, which

are being actively worked and which are producing shipping ore.

Shipping ore is also being taken from stopes between the 400 and the 500 levels.

The ore shipments for the past quarter were as follows: May, \$10,532.08; June, \$29,140.46; July, \$13,043.11. The balance on hand in the treasurer's hands on May 1, was \$83,384.89; and on August 1, \$103,581.25.

*Midway*—The principal mining work is being done in the 800-ft. level where the vein is wide and carries shipping ore. In the 435-ft. and 500-ft. levels large bodies of high-grade milling ore have been developed. The mine is at present shipping 50 tons of high-grade ore weekly, to the smelters.

*Montana*—The mill has been running steadily with 20 stamps in commission. The capacity being 100 tons per day. Figures regarding the extraction are not yet available, but it promises to be high.

*Rescue*—Development work is being carried out in the 950, 1050 and 1250 levels. Milling ore is being broken in the north and south crosscuts. The management will shortly resume sinking operations.

*West End*—The crosscut from the 275-ft. level, which is being run to connect with the new shaft, has run into the ledge for a distance of 140 ft. from the hanging wall. No sign of the foot-wall has been met. At a higher level the ledge is 112 ft. in width between walls. It is consequently widening as it is being sunk upon. At present it is the largest quartz ledge in Nevada. Much of the vein is of low-grade material, but it carries seams of rich shipping ore. The new hoisting plant on the new shaft has been erected and is now working smoothly. It will enable the shaft to be carried to the 1000-ft. level with despatch. The company continues to ship small parcels of rich ore.

#### NYE COUNTY—MANHATTAN

*Manhattan Ore Reduction Mill*—This new mill is nearing completion. It will have a cyanide plant similar to the new Montana Tonopah plant. According to the experiments of the designer, F. L. Bosqui, an extraction of 90 per cent. may be attained by very fine grinding and long agitation.

*Nevada Milling Company*—A new 10-head mill is being built on the Wolfstone mine to treat the ore from the mine and also any customs ore that may be offered. The plant will probably be completed and in operation early in the fall.

*Wolfstone*—The shaft is down 212 ft. The average width of the vein is 20 ft. and it has been proved for a length of 500 ft. The ore is chiefly of milling grade. A California syndicate has made an offer to the company for the purchase of the mine or of a controlling interest in the stock. Similar offers have been made by

the same people for the Little Grey and Gold Wedge properties, the object being to secure a large area of proved auriferous ground and undertake development and mining operations on a large scale.

#### NYE COUNTY—PACTOLUS

*Pactolus*—This old mine is under offer of sale to a San Francisco mining syndicate. It has been well developed to the 200-ft. level where the vein is wide.

*Goldyke Reef*—The company's new mill has been completed and will commence crushing on a large ore dump. The vein at the 200-ft. level is over 60 ft. in width and carries a good grade of milling ore throughout.

### Pennsylvania

#### ANTHRACITE COAL

*Delaware & Hudson*—This company has purchased three tracts of coal lands, in all about 50,000 sq. ft., in North Scranton and Dickson City. The tract is said to contain 30,000 tons of minable coal.

*Philadelphia & Reading Coal and Iron Company*—This company makes the following statement for July, the first month of its fiscal year:

	1906.	1907.	Changes.
Earnings.....	\$2,151,127	\$2,956,139	I. \$805,012
Expenses. ....	2,131,438	2,808,723	I. 677,285
Net earnings....	\$19,689	\$147,416	I. \$127,727

The expenses this year were 95 per cent. of the earnings, a reduction from last year, when they were 99.1 per cent.

#### BITUMINOUS COAL

*Kunnerly Coal Company*—D. B. Zimmerman, of Somerset, representing Eastern capitalists, has leased this company's coalfield in Conemaugh and Jennor townships, with the privilege of purchasing outright within three or four years. The field adjoins the properties operated by the Cambria Steel Company and the Berwind-White Coal Mining Company, and includes about 3000 acres.

*Cook Tract*—This tract comprising 287 acres of coal land situated partly in Fayette and partly in Westmoreland county has passed into the control of the Monongahela River Consolidated Coal and Coke Company, the purchase price being nearly \$350,000. The Cook lands have been the subject of negotiations many times during recent years.

### South Dakota

#### CUSTER COUNTY

*Saginaw*—At the annual meeting held in Custer the following board of directors was re-elected: I. W. Herber, Custer; Lewis Hahn, New Hamburg, Ont.; Howard N. Wagg, Chicago; Ben Uby, Michigan; Geo. S. Thompson, Columbus, O. Excavation for the new mill has been begun.

### LAWRENCE COUNTY

*Homestake*—The long task of removing the 68,000,000 cu. ft. of water from the mine is completed. It required 105 days. The mine is practically uninjured by the water and fire. Both mine and mills are again working at full capacity, turning out about 4000 tons daily.

*Oro Hondo*—This property has again been sold by the sheriff. T. D. Murrin, bought it in for \$10,000.

*Hidden Treasure*—Miners were put to work to continue shaft and drift development and clearing for a new 200-ton treatment plant was started. This was decided at the recent annual meeting held this week when Judge Corcoran, of Lincoln, was made president; Doctor Grimes, of Lincoln, secretary; Nate Hart, of Lead, treasurer and general manager.

*Pluma*—Supt. Alfred Fillion has resumed with a large force of miners. After unwatering, the new shaft, 180 ft. deep, situated in Lead City, will be sunk deeper. Electric machinery is expected in a few days.

*Reliance*—At the annual meeting held in this city, the old board of directors was re-elected. They chose S. E. Olson, of Minneapolis, president; F. W. Medbery, Deadwood, secretary and general manager.

### PENNINGTON COUNTY

*Dakota Calumet*—Machinery, including hoisting plant to raise ore 1000 ft., a double Corliss 250-h.p. engine, etc., has been ordered from the Downie-Wright Manufacturing Company, of Rapid City, S. D., to handle the rich ore recently found on the property.

### Utah

#### BEAVER COUNTY

*Burning Moscow*—This Beaver county mine is to be equipped with new hoisting plant and the management is determined to develop the property at much greater depth.

*Cedar Mining Company*—This company has recently placed its new compressor plant in operation and development work is being conducted by the use of machine drills. High-grade ore shipments are being made.

*Frisco Contact*—This property is closed temporarily, due, so the management claims, to the inability to get a supply of fuel.

#### IRON COUNTY

*Jennie Gold Mining Company*—This company is getting ready for mill improvements, which includes the installation of a cyanide department. The mine and mill are situated at Gold Springs.

*Reuben Gold Mining Company*—This company has let a contract to deepen its



working shaft. A large vein, showing gold and silver has been developed in the property, which is owned principally by members of the Salt Lake newspaper fraternity.

**JUAB COUNTY**

*Tintic Shipments*—A total of 176 car loads were sent to the smelters during the week ending Sept. 7, the contributing mines and amounts being: Ajax, 3; Beck Tunnel, 11; Bullion Beck, 11; Carisa, 4; Colorado, 10; Centennial Eureka, 54; Eagle & Blue Bell, 6; Eureka Hill, 9; Grand Central, 8; Godiva, 1; Lower Mammoth, 7; Mammoth, 20; May Day, 7; Scranton, 8; United Sunbeam, 1; Uncle Sam, 7; Victoria, 2; Victor Consolidated, 1; Yankee Consolidated, 4; DePue, 5; Ridge & Valley, 3; Clift, 1.

*East Crown Point*—The company has begun sinking a permanent working shaft and will probably do prospecting with drills.

*Utah Consolidated Mining and Milling Company*—This company was reorganized some time ago and is about to begin development.

**SUMMIT COUNTY**

*Park City Shipments*—The mines of Park City during the week ending August 24 shipped 3,301,280 lb. of ore, the contributing mines and amounts being: Silver King, 1,229,280; Daly Judge, 925,000; Daly West, 912,000; Little Bell, 80,000; Copper Apex, 45,000 pounds.

*Treasure Hill*—This company is preparing for an active campaign and the treasury contains over \$40,000 as a fund for development purposes. A deal is under way which is likely to terminate in the acquisition of the Creole mine, an adjoining property.

**West Virginia**

**RALEIGH COUNTY**

*Big Coal Company*—This company is erecting a complete plant at Dorothy, constructing tracks to the mines and building 40 dwellings. The property is said to contain an 11½-ft. vein of coal. The general offices of the company are in Pittsburg. C. E. Sanberg is general manager with offices at the mines.

**Canada**

**ALBERTA**

*Conference of Coal Miners and Operators*—A meeting of a joint committee of representatives of mine operators and miners, respectively, was held recently at Banff. John R. Galvin, vice-president of the Western Coal Operators Association, stated that there was more harmony between the mine workers and the operators than ever before. He expressed the opinion that in Alberta there will be enough coal mined next winter to provide for commercial and industrial purposes, but not for domestic use. He thinks an in-

crease in production of about 3000 tons of coal daily will be required to meet the winter's demands, but up to the present the daily increase is not 15 tons.

**ONTARIO—COBALT DISTRICT**

*Cobalt, Ore Shipments*—Ore shipments from Cobalt for the week ending Sept. 7 were as follows: Buffalo, 60,000 lb.; Coniagas, 125,000; La Rose, 80,000; Nova Scotia, 60,000; total 325,000 pounds.

*Kerr Lake (Jacobs)*—In grading for the Kerr Lake branch of the Timiskaming & Northern Ontario Railway a cobalt vein was struck on the property of this company yielding upward of 800 oz. silver to the ton. On No. 7 vein ore assaying 3000 oz. is being extracted.

*Timiskaming & Hudson Bay*—A new vein over 4 ft. wide yielding cobalt and galena has been found about 300 ft. from the main shaft. The company is installing machinery including two 80-h.p. boilers and a 16-drill air compressor. The main shaft is down 80 ft. and drifting has been commenced at the 65-ft. level. The newly discovered vein will be tapped by cross-cutting.

*McKinley-Darragh*—The concentrating plant is now in operation and is milling ore running 2000 oz. to the ton. The new Kendall vein is fulfilling expectations and ore running from 8000 to 10,000 oz. to the ton is being taken out.

*Timiskaming*—A new vein has been struck at the bottom of the shaft at about the 90-ft. level. It is a conglomerate vein about 4 in. wide.

**YUKON**

The water in Yukon river was lower in the latter part of August than when navigation was closed last year, a month later, and lower than has been known at this time for years. As a consequence the transportation of freight is being much hampered, steamers and freight barges getting on sand bars. The number of people leaving for "the outside" is already large, chiefly from Dawson and lower Yukon points, and especially from Fairbanks, this heavy outgoing travel being fully a month earlier than last year. It is estimated that there will be fewer people by about one-half remain in the country through the winter than in any year since 1898.

**Mexico**

*Shipment of Zinc Ore*—The producers of zinc ores along the line of the Mexican Central Railroad are again allowed to ship, as the yards at Juarez (across the river from El Paso) are at last comparatively clear.

**DURANGO**

*Amazon Gold Mining Company*—In the vicinity of Chacala this company is erecting a 50-ton concentrating plant for its

gold-bismuth ores, and a 50-ton smelter is projected by Sowers & Wilkinson for the Bismuth King Mine. At Milpillas, near Canelas, work has been resumed by the Compañía Beneficiadora.

**ZACATECAS**

*Santa Rita*—These mines, near Pinos, have been purchased by Luis Gayon and W. E. Vacher, of Mexico City, who will erect a 30-ton plant.

**Australia**

**NEW SOUTH WALES**

*Electrolytic Refinery*—The Electrolytic Refining and Smelting Company, of Australia, a subsidiary company to the Mount Morgan Gold Mining Company, has acquired a site at Port Kemble, on the South Coast and has commenced the erection of the works. B. Magnus, formerly of Butte, Mont., is the supervising engineer, and G. A. Richards, of Mount Morgan, is general manager.

*Lightening Rige Opals*—Recent discoveries on this new opal field in the western district near Collarendabri have proved its importance. A miner in one day won \$4000 worth of the gem, which is of splendid quality, in less than a day's work. Daily finds of pockets valued up to \$1000 in value are not uncommon. The chief difficulty experienced on the field at present is scarcity of good water. Petitions have been forwarded to the Government mining department to assist in bringing a supply to the field. There are about 500 miners on the field at present, but this number will soon be increased.

**Asia**

**INDIA—MYSORE.**

*Kolar Goldfield*—The gold output reported in August was 47,640 oz. bullion, the highest for any month this year, and 823 oz. more than in August, 1906. For the eight months ended Aug. 31 the total was 387,020 oz. bullion in 1906, and 361,118 oz. in 1907; a decrease of 25,902 oz. The bullion reported this year was equal to 325,006 oz. fine gold, or \$6,717,874 in value.

**New Zealand**

The Mines Department states the exports of gold from the Colony for May and the five months ended May 31 as follows, in ounces of bullion:

	1906.	1907.	Changes.
May.....	42,263	55,685	I. 13,422
Five months.....	216,484	199,773	D. 16,711

The bullion reported this year was equal to 188,472 oz. fine gold, or \$3,895,713. Exports of silver for the same periods were, in ounces:

	1906.	1907.	Changes.
May.....	190,485	265,450	I. 74,965
Five months.....	522,398	659,963	I. 127,565

The silver comes chiefly from the gold mines in the Hanraki district.

# Metal, Mineral, Coal and Stock Markets

## Current Prices, Market Conditions and Commercial Statistics of the Metals, Minerals and Mining Stocks

### QUOTATIONS FROM IMPORTANT CENTERS

#### Coal Trade Review

New York, Sept. 18—The coal markets are remarkable for the activity displayed and for the great demand for bituminous coal all over the country. It is expected, both in the local and western markets that a slight falling off in business is due just now but no adequate reason is given for the belief. Car shortage is beginning to become apparent and this will have a tendency to maintain present prices rather than lower them.

There is a decided scarcity of the better grades of western coal and some of the very low sulphur grades are practically out of the market. This has created a strong market for certain Pennsylvania grades and these are much in demand.

Shipments of coal up the Lakes have been heavy and vessels of all sizes are in demand. Western markets are active and prices maintain themselves.

In the far East the situation remains as in the past. Consumers are still calling loudly for coal and are taking on large tonnages. In the absence of the better grades they are contracting for poorer classes of coal. Along the Sound, consumers are taking large stocks of coal and tide-water ports are sending all they can to these two territories.

The anthracite trade is rather dull except in the small steam sizes. Among these the demand is persistent and unabated even at premium prices. The supply is not expected to increase materially.

#### COAL-TRAFFIC NOTES

The coal and coke tonnage of the Chesapeake & Ohio Railway for the fiscal year ended June 30 is reported as follows, in short tons:

	Coal.	Coke.	Total.
New River.....	5,579,192	223,923	5,803,115
Kanawha.....	3,759,405	104,837	3,864,242
Kentucky.....	184,483	.....	184,483
Connecting lines...	398,508	128,244	526,752
Total.....	9,921,588	457,004	10,378,592
Total, 1906..	9,414,898	469,975	9,884,873

Deliveries of tonnage originating on the company's lines last year were: Points west of mines, 4,366,959 tons coal and 240,116 tons coke; points west, 1,768,280 tons coal and 88,644 tons coke; tidewater, 3,387,841 tons coal. The total increase in tonnage was 493,719 tons, or 5 per cent.

The Southwestern Interstate Coal Operators' Association reports tonnages for the six months ended June 30 as follows, in short tons:

	1906.	1907.	Changes.
Missouri.....	1,072,563	1,378,169	I. 305,606
Kansas.....	2,122,185	3,104,682	I. 982,497
Arkansas.....	673,762	1,121,552	I. 447,790
Indian Territory....	1,088,922	1,372,248	I. 288,326
Total.....	4,952,432	6,976,651	I. 2,024,219

In April and May, 1906, the mines were largely closed on account of the miners' strike. The total increase this year was 40.9 per cent.

#### New York

##### ANTHRACITE

Sept. 18—The demand for prepared sizes is not especially good at present, in fact the market is rather dull, if anything. Small steam sizes, however, are extremely active and the demand continues unabated. There seems to be a growing preference among railroads to use anthracite rather than bituminous coal, and a number of instances have occurred where the railroads have started to burn bituminous and later substituted anthracite coal. The washeries have made large inroads in their banks and the efforts of the engineers to reduce the percentage of small coal has met with considerable success; hence the quantity of small steam coal has decreased and the market demand has increased. This has created a decided scarcity of these sizes, especially pea and buckwheat No. 1. Prices are quoted as follows: Broken, \$4.65; egg, stove and chestnut, \$4.90; pea, \$3.25; buckwheat, \$2.75; rice, \$2.15@2.25; barley, \$1.75@1.85; all f.o.b. New York harbor.

##### BITUMINOUS

Trade in New York harbor is good and the demand continues strong. Local dealers, however, are looking for easier conditions during the next week or two, but it is not entirely clear upon what they base their opinion. Stocks on hand are not large at tidewater shipping ports, nor are consumers taking on any considerable amount of coal. It is noticeable that a number of the smaller producers are talking high prices for coal and are mentioning as high as \$1.75@2 f.o.b. mines for ordinary steam grades as the price which will probably prevail this fall.

The far East continues to call loudly for coal and in spite of the large quantities going forward, their demand seems insatiable. Consumers in this territory do not seem to be stocking up to any great extent and are content with good grades of steam coal, although they prefer to pay higher prices for the better

grades. Along the Sound the demand is active and large quantities of coal are going forward. The demand here is for the better grades. Transportation from mines to tide is fairly good, cars coming through on schedule except in some instances. Car supply is only fair.

In the coastwise-vessel trade vessels are in fair supply, but are maintaining the freight rates which have prevailed all along. These are quoted as follows: From Philadelphia to Boston, Salem and Portland, \$1.10; to Providence, New Bedford and the Sound, 90c.; to Lynn and Bangor, \$1.25; to Gardiner, \$1.30@1.35; towages where usual.

#### Birmingham

Sept. 16—The railroads are not furnishing all the cars that are needed in the Alabama coalfields. Some of the railroads are adopting a plan looking to an equal distribution of cars to the operators, and recently made a personal inspection of the properties and figured on the regular output at the various places, incident to the distribution. There is a strong demand for coal and the railroads are practically the factor determining the production for the year. The output at the mines is increasing and good prices obtain for the product. Contracts are said to have been booked in this district, which will warrant a steady operation throughout the entire winter. Labor is being sought for the mines.

The work at mines in the western part of Jefferson county is being pushed and expectations are ripe for an immediate operation. Coke is in strong demand again, with good prices prevailing.

#### Chicago

Sept. 16—The coal market continues to grow in strength. For both western and eastern coals there is a demand that not only prevents any weakness due to demurrage charges but makes some coals difficult to obtain in sufficient quantities for supplying the needs of customers promptly. The lack of cars is already apparent on some railroads. To all appearances the present briskness of the market will continue indefinitely. Indeed, everything points to continued increase of business. Despite the large contract movement of coal, the open market shows larger sales each week. Under these conditions prices are likely to increase, especially on eastern coals, which are scarce

because of transportation difficulties. Hocking and smokeless, the chief, in volume, of eastern coals in the market, are both holding firmly to circular prices. Hocking brings \$3.30 and smokeless \$3.60 for run-of-mine and \$4.05@4.30 for lump and egg. Pittsburg No. 8 at \$2.90 for 1¼-inch and Youghiogeny at \$3.30 for ¾-inch, are both in demand and scarce. All other eastern coals are strong.

In western coals, the great source of supply for steam purposes, the only signs of weakness are in the fine coals, lump being very strong. Illinois and Indiana lump bring \$1.90@2.65; run-of-mine brings \$1.60@2.10 and screenings bring \$1.10@1.65. The demand for western and eastern coals alike is reported increasing in the country as well as in the city.

**Cleveland**

Sept. 17—Local coal operators anticipate another advance in the price of soft coals toward the end of this week or next, as the car supply is inadequate to meet the demands of shippers. No. 8 district slack, which brought 60c.@65c. f.o.b. mine last week, sold Monday at 65c.@70c., and a number of contracts were made at the advance. The B. & O. is offering very poor car service and lake shippers are unable to secure cars to fill lake contracts. The M. A. Hanna Coal Company bought considerable coal last week to fill in, indicating that its car facilities on the Wheeling & Lake Erie are low. The middle district grades are quoted 10c. above No. 8. There is a prospect of an advance of 25c. in Massillon district on Oct. 1, as the operators in that section usually increase the summer rate that much in October. No. 8 slack sells for 65@70c.; mine run at \$1; ¾ lump at \$1.10 f.o.b. mines. The lake trade is good this month, with rates unchanged.

On account of the fact that the Cleveland Gas Light and Coke Company and other local producers are sold up well into 1908, the appearance of new demands in coke has created an upward tendency in price. Year-end prices are: Foundry \$3.25@3.50; furnace \$2.90@3.

**Pittsburg**

Sept. 17—Prices of all grades of coal for manufacturing purposes have been advanced 5c. a ton this week and for domestic use the rate is 10c. higher. The new prices are as follows f.o.b. mine: Mine run, \$1.20@1.25; ¾-in. lump, \$1.30@1.35; 1¼-in. lump, \$1.40@1.45; 3-in. lump, \$1.65@1.70; slack, 70@75c. Domestic coal prices are based on mine-run coal at \$1.30@1.35. The new list went into effect on Sept. 16. There is a good demand for coal and the mines are being pretty fully operated, no serious complaints being made as to the supply of railroad cars. Advantage was taken of another rise in the rivers late last week

when fully 2,000,000 bushels were sent to lower ports. The river coal mines are all in full operation and there is a good supply of empty craft to keep them going for a couple of months. Shipments south by water this year will greatly exceed all previous years owing to unusually favorable conditions, the rivers being navigable every month since Jan. 1, permitting the sending out of coal almost as fast as it was mined.

**Connellsville Coke**—The coke market shows but little change. Production continues heavy and prices are the same as have prevailed for several weeks, furnace coke being quoted at \$2.75@3 and foundry at \$3.25@3.50 for both prompt and shipments on contract. The *Courier* in its summary for the week gives the production in both fields at 425,952 tons. The shipments aggregated 14,315 cars distributed as follows: To Pittsburg, 4942 cars; to points west of Connellsville, 8417 cars; to points east of Connellsville 956 cars.

**Foreign Coal Trade**

Imports of coal into Germany for the seven months ended July 31 were as follows, in metric tons:

	1906.	1907.	Changes.
Coal.....	4,932,024	7,213,132	I. 2,281,108
Brown coal.....	4,897,556	5,178,135	I. 280,579
Total.....	9,829,580	12,391,267	I. 2,561,687

Imports of coke were 304,890 tons; of briquets, 101,191 tons; of peat fuel, 6552 tons. The large increase in coal imports this year came chiefly from Great Britain.

Exports of coal from Germany for the seven months ended July 31 were, in metric tons:

	1906.	1907.	Changes.
Coal.....	11,110,442	11,253,163	I. 142,721
Brown coal.....	10,443	11,468	I. 1,025
Total.....	11,120,885	11,264,631	I. 143,746

Exports of coke were 2,145,504 tons; of briquets, 670,474 tons; of peat fuel, 14,108 tons. Included in the coke exports are 10,240 tons to the United States. The larger exports were 4,761,216 tons to Austria, 2,483,952 to Holland, 1,685,672 to Belgium.

The production of coal in Germany for the seven months ended July 31 is reported as follows, in metric tons:

	1906.	1907.	Changes.
Coal.....	78,776,251	82,358,080	I. 3,581,829
Brown coal....	31,523,659	34,907,329	I. 3,443,670
Total mined..	100,299,910	117,325,409	I. 17,025,499
Coke made....	11,485,784	12,519,546	I. 1,033,762
Briquets made,	8,189,944	9,833,419	I. 1,643,475

A large proportion of the briquets are made from the brown coal, or lignite.

**Iron Trade Review**

**New York, Sept. 18.**—The demand for pig iron is not especially vigorous at present and, while there are a few inquiries, to test the future market, consumers are

generally holding off expecting prices to go still lower. What demand there is seems to be for basic iron rather than for foundry and forge brands. Bessemer is not active and few sales are recorded. The spurt in activity last week was only temporary and this week opened dull and without interest.

Contracts for 80,000 tons of pig iron were placed in Eastern markets during the past week, shipments to take place during the last quarter of this year with a few deliveries during the first quarter of 1908. The business during the week has consisted of about one-half basic and the other half divided between foundry and forge iron. It is stated that there are still important contracts pending for about 10,000 tons basic and about the same quantity of foundry iron.

The American Bridge Company turned out 59,000 tons of fabricated steel which is the maximum output, by this company, for any one month in the history of the company.

**Lake Superior Iron-Ore Shipments**—Shipments of iron ore from the Lake Superior region for the season to Sept. 1 are reported by the *Cleveland Marine Review* as follows, in long tons:

	1906.	1907.	Changes.
Escanaba.....	3,436,611	3,731,165	I. 294,554
Marquette.....	1,708,937	1,924,464	I. 215,527
Ashland.....	2,251,067	2,314,760	I. 63,703
Superior.....	3,578,496	4,416,454	I. 837,958
Duluth.....	6,584,272	7,202,645	I. 618,373
Two Harbors...	5,161,722	4,752,064	D. 409,658
Total.....	22,721,095	24,341,552	I. 1,620,457

Two Harbors was the only port showing a decrease. The total increase was 7.1 per cent.

**Pig Iron Production**—The total weekly capacity of 331 coke and anthracite furnaces in blast Sept. 1 was 508,500 tons, a reduction of 5650 tons from Aug. 1, and of 19,650 tons from the maximum reached on July 1. Taking the estimate made by the *Iron Age*, and making allowance for the charcoal furnaces, the output of pig-iron in the United States in August was 2,285,000 tons, making, for the eight months ended Aug. 31, a total of 18,059,044 long tons.

**Baltimore**

Sept 17—Exports from this port for the past week included 562 tons of flat steel billets, 181 tons of nails and 8 tons of iron pipe to Liverpool.

Imports for the week included 82 tons of ferromanganese from Holland, and 3860 tons of pyrites from Spain. Iron-ore receipts were 9865 tons from Nicolaieff, Russia, 4650 tons from Greece, and 5900 tons from Cuba, 20,415 in all. Pig-iron receipts were 5245 tons from Scotland.

**Birmingham**

Sept. 16—Buying has not yet started, and consumers are holding off purposely, it is believed among the manufacturers,

with the expectations that the quotations will go lower. The manufacturers assert that the market is beginning to strengthen again. Some inquiries were received in this section recently for the first half of the coming year. There is no doubt but that much iron is needed before all contracts are filled by the foundries, machine shops, cast-iron pipe-makers and other industries. The output is holding up fairly well in this district. One furnace goes out of blast this month; the Woodward furnace, which is being practically rebuilt, is nearing completion and it is announced that it will blow in within three weeks. Two other furnaces being repaired in the Birmingham district will shortly be in shape for operation. Raw material, especially ore, is picking up, though all needs by the Tennessee Coal, Iron and Railroad Company are not being met as promptly as is desired.

Considerable prospecting is going on in this State for ore. A lengthy statement was given out, during the past week, that the Alabama Consolidated Coal and Iron Company had drilled on its property and had located a large bed of ore which will be worked through shafts. J. B. Carrington spent the past fortnight in the ore fields making investigations.

The Birmingham Coal and Iron Company, which is a combination of the Birmingham Iron Company and the Birmingham Coal Company, capital stock \$5,000,000, is making extensive developments in the coal and iron-ore fields in Alabama. It has one furnace in operation and is building a new one. The company is related strongly to the Atlanta, Birmingham & Atlantic Railroad, now building into Birmingham from Brunswick, Ga., with the road almost completed.

Negroes are working in the Birmingham rolling mills, taking the places of the members of the Amalgamated Association of Iron and Steel Workers and Sons of Vulcan at the forges. The finishing departments in the big mills are not in operation. It is understood that labor is to be brought in to be placed at the rolling mills here. Colored labor is being used extensively at the bessemer rolling mills of the Tennessee Coal, Iron and Railroad Company. No union is recognized at this plant.

Steel, cast-iron pipe, finished iron and steel and other interests of a kindred nature in the Birmingham district continue to do well.

### Chicago

Sept. 16.—The iron market continues without large sales, but with no signs of demoralization of prices. Apparently selling agents are confident that there is a good demand yet to be supplied for quick-delivery iron, and are content to wait. The demand now is almost wholly for

small lots to fill the needs of melters in the next three months. Southern iron is, of course, the chief commodity of the market, northern furnaces having little to spare for quick-delivery business.

Southern is quoted at \$18@18.50 Birmingham (\$22.35@22.85 Chicago) for last-quarter delivery, and Northern at \$23.50, on No. 2 iron. For first-quarter delivery in 1908, the Birmingham price on Southern No. 2 is \$17@17.50, and Northern for the same delivery is held at \$21@21.50. For immediate delivery—within the next 30 days—premiums of 50c.@\$1 are paid on a few sales for small lots. Lake Superior charcoal is selling in small lots for last-quarter delivery at \$27@27.50.

The general conditions of the iron and steel business continue good, and it is probable that a good deal of pig iron will be needed before the resumption of contract business, merely to supply current needs of melters who are adhering to the hand-to-mouth policy. When the melters make up their minds that the bottom of the market has been reached the pig-iron business will be booming, once again for local needs are large and increasing.

Coke is firm at \$5.90 for 72-hour Connelville and \$5.65 for West Virginia coke, the demand being for small lots and the supply being none too large.

### Cleveland

Sept. 17.—Shipments of iron ore for August totaled 24,341,552 tons down lake, indicating that, with a shipment of 16,000,000 tons, allowed for the balance of the year, the season's movement will be close to 40,000,000 tons. The freight market is strong and small boats are doing a large business at trust rates.

The pig-iron market is dull, with few inquiries for 1908 shipment. The following prices are quoted for the balance of the year:

Bessemer, \$22.90; No. 1 Foundry, \$23; No. 2 Foundry, \$22.50; No. 3 Foundry, \$22; No. 2 Southern, \$22.85; Gray Forge, \$21.50.

### Philadelphia

Sept. 16.—The eastern Pennsylvania pig-iron market is recovering, due, in a large measure, to the lower prices named. Large contracts have been placed by buyers for pig iron to be delivered during the coming six months. The reductions have been extraordinary and include practically all irons used. Basic has chiefly participated in the activity, but consumers of all kinds are now buying. The reason for the present activity is the belief that the reactionary influences have reached their limit. Among the reasons given are that production has been somewhat curtailed by the blowing out of furnaces for repairs, the possibility of dearer ores later on, and the exhaustion of stocks among

consumers, due to the hesitating policy of covering because of advancing prices. Foundry and forge, as well as pipe iron, have been liberally contracted for. All melters of iron have been booking new work liberally and they are anxious to cover. Low phosphorus is quoted at \$28 as an outside figure; basic, \$19.50; Forge, \$19 and No. 2 X Foundry, \$21, with the usual variations according to circumstances.

*Steel Billets*—The fluctuations in pig iron have affected prices to some extent, but have not brought out large orders. Billets can be had at \$31.50 and the outlook is quite satisfactory.

*Bar Iron*—The consumption of bar iron is heavy and stores throughout our territory are well stocked. Consumers are buying small lots rather than in a large way and are favored with slight concessions. Buyers look for cheaper bars. Mill people say there will be no early change in the card. Steel bars, as they are usually sold—that is for early delivery—still command a premium.

*Sheet Iron*—Specifications are coming along satisfactorily and business is in good shape at the mills. The manufacturers anticipate a continuance of present conditions and regard card rates as settled, unless a very large buyer should come along.

*Pipes and Tubes*—The pipe and tube mills are catching up and this fact has something to do with the rumor that recent large buyers have been able to obtain concessions. The tone of the market is not quite as strong as a month ago. Merchant pipe transactions are of small proportions.

*Plates*—Specifications are reported this week as coming along better. The manufacturers are doing a profitable business, especially in the line of shop products, boiler plates, etc. No very large contracts are to be reported this week but general conditions are sound.

*Structural Material*—A large volume of business has been done and there is more big business coming along. Railroad bridge work is coming in nicely and the Pennsylvania mills will run full time for months to come. City building operations are using up considerable material. Prices remain as in the past.

*Steel Rails*—Our rail makers believe that nothing will prevent the placing of a large amount of business in rails when the announcement of the understanding, practically arrived at, has been made. A few good orders have been placed for trolley rails, but much prospective business is held up.

*Scrap*—Scrap dealers are offering recent accumulations at prices calculated to lead to business. No. 1 steel has been cleaned up at \$16.50; railroad scrap is wanted at \$17.50@18; machinery casting is quoted \$18; and wrought turnings at \$14.

**Pittsburg**

Sept. 17—The iron and steel market is in an unsatisfactory condition and the outlook seems to be anything but encouraging, despite the optimistic statements being given out by representatives of the large interests. It is believed that next month will see a decided slump in a number of lines of finished product. A heavy drop in pig-iron prices has been prevented by the scarcity of bessemer ore, which has been used by producers as an argument for maintaining a price around \$22, Valley furnaces, for bessemer pig iron; but sales during the week are reported to have been at 50c. a ton less. All buying of steel bars has stopped, but there is some activity in iron bars. Several sales aggregating about 1500 tons have been made during the past few days, the minimum price for iron bars being 1.70c. Inquiries are in for two lots aggregating 3500 tons, and it is expected that they will result in contracts before the end of the week.

There is a continued scarcity of crude steel and prices are much firmer. Bessemer billets are quoted at \$29.50 for future delivery, and it is impossible to buy for prompt even at \$30. The Carnegie Steel Company, which was a large buyer of steel billets, its contracts since April 1 running up to nearly 100,000 tons, is likely to fall short in deliveries before the end of the month by about 20,000 tons. It had been intended to put the Ohio works at Youngstown back on rails on October 1, but owing to the scarcity of steel it has been decided to keep this plant on billets. The Edgar Thomson rail works will not be able to turn out the rails ordered for delivery this month and the National tube Company will be required to assist. It will roll 5000 tons of standard sections for the Carnegie Steel Company. The rail mill of this interest, at Lorain, O., rolls girder rails, but the mill was changed on Sunday night and it is now rolling standard sections. This is an innovation, but the plan is working out successfully according to reports received here today. A few small orders for standard and light rails were booked during the week by the Carnegie company, but active buying for 1908 has not yet begun, and there is no positive indication that the railroads will soon enter the market for next year's requirements. The matter of specifications has been referred to a sub-committee, which will report to the general committee of representatives of the railroads and rail makers probably some time next week. The sub-committee is scheduled to meet in New York this week. While it is likely that a satisfactory agreement will be reached on specifications, there may be trouble when it comes to arranging prices.

The bi-monthly adjustments of wages under the new wage scale of the Amalgamated Association of Iron, Steel and

Tin Workers were made during the week. The iron workers' pay is based on the average selling price of bar iron and the average of sales for July and August was ascertained to be slightly above 1.65c. This gives the puddlers a rate of \$6.62½ a ton. Under the old scale, which expired June 30, the rate would have been \$6. The new scale, in addition to giving an advance of 50c. a ton, also provides for a 12½c. increase with every 1/20c. increase in the price of bar iron, instead of 25c. with every 1/10c. Under the old scale there would have been no advance until the price reached 1.70c. In sheets the ascertained average of gages Nos. 26, 27 and 28 was 2.5c., or 0.20c. above the base. This gives the sheet workers an increase of 2.6 per cent., a similar increase having been given at the last bi-monthly settlement, and provides for an advance of 5.2 per cent. for the sheet workers since July 1.

**Pig Iron**—The market is decidedly dull and there does not seem to be any signs of improvement. One large independent producer, who has some contracts to fill, is reported to have bought from three furnaces 6500 tons of bessemer pig iron for prompt delivery at \$21.25, Valley furnaces. This, however, is not regarded as the market and bessemer iron is quoted nominally at \$21.50. No. 2 foundry is quoted at \$21.50@22, Valley furnaces, for fourth quarter, but it is believed that \$21 can be done. Gray forge is quoted at about \$1 a ton under No. 2 foundry.

**Steel**—Billets are scarce and prices have advanced. Bessemer billets are quoted at \$29.50@30 and open hearth at \$31@32. Steel bars continue at 1.60c. and plates at 1.70c.

**Sheets**—Mills have caught up on all old contracts and there is but little new business coming in. Prices remain unchanged at 2.60c. for black and 3.75c. for galvanized No. 28 gage.

**Ferro-Manganese**—The market is very dull and prices are declining. A few small sales were made this week for prompt delivery at \$58.20, Pittsburg.

**Metal Market**

**Gold and Silver Exports and Imports**

NEW YORK, Sept. 18.  
At all United States Ports in July and year.

Metal.	Exports.	Imports.	Excess.
<b>Gold:</b>			
July 1907..	\$ 7,478,366	\$ 3,390,962	Exp. \$ 4,087,404
" 1906..	1,302,248	9,834,333	Imp. 8,532,085
Year 1907..	43,779,098	24,859,609	Exp. 18,919,489
" 1906..	32,912,962	72,372,111	Imp. 39,459,149
<b>Silver:</b>			
July 1907..	5,955,052	3,361,100	Exp. 2,593,952
" 1906..	4,360,628	3,277,706	" 1,082,922
Year 1907..	35,174,251	25,756,711	" 9,417,540
" 1906..	37,797,855	26,954,534	" 10,843,321

These statements cover the total movement of gold and silver to and from the United States. These figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

**Gold and Silver Movement, New York**

For week ending Sept. 14 and years from Jan. 1

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	\$ 50,000	\$ 161,761	\$ 1,501,798	\$ 256,481
1907.....	32,553,587	7,553,997	36,901,587	1,919,807
1906..	5,964,743	52,645,856	41,116,414	1,511,062
1905..	32,285,443	1,409,332	24,300,468	3,133,482

Exports of gold for the week were to South America; of silver chiefly to London. Imports for the week, both gold and silver, were from Mexico, Central America and South America.

The joint statement of all the banks in the New York Clearing House for the week ending Sept. 14, shows loans \$1,088,972,200, an increase of \$375,000; deposits, \$1,044,852,400, a decrease of \$1,803,000, as compared with the previous week. Reserve accounts show:

	1906.	1907.
Specie.....	\$177,366,500	\$198,909,900
Legal tenders.....	77,541,800	60,221,900
<b>Total cash.....</b>	<b>\$254,908,300</b>	<b>\$268,131,800</b>
Surplus.....	\$3,536,400	\$ 6,918,700

The surplus over legal requirements shows a decrease of \$453,650, as compared with the previous week this year.

Specie holdings of the leading banks of the world, Sept. 14, are reported as below, in dollars:

	Gold.	Silver.	Total.
Ass'd New York.....	.....	.....	\$198,909,900
England.....	\$193,270,505	.....	193,270,505
France.....	558,388,015	\$193,213,845	751,601,860
Germany.....	167,850,000	46,500,000	214,350,000
Spain.....	77,630,000	128,750,000	206,380,000
Netherlands.....	30,176,500	27,308,500	57,485,000
Belgium.....	16,386,665	8,193,335	24,580,000
Italy.....	171,760,000	24,886,500	196,646,500
Russia.....	580,355,000	31,475,000	611,830,000
Aust.-Hungary.....	226,370,000	60,545,000	286,915,000
Sweden.....	21,245,000	.....	21,245,000

The banks of England and Sweden report gold only. The New York banks do not separate gold and silver in their reports. The European statements are from the cables of the *Commercial and Financial Chronicle* of New York.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows, for the year to Sept. 5:

	1906.	1907.	Changes.
India.....	£ 11,872,013	£8,111,834	D. £ 3,760,209
China.....	280,700	.....	D. 280,700
Straits.....	1,750	598,700	I. 596,950
<b>Total.....</b>	<b>£ 12,154,493</b>	<b>£8,710,534</b>	<b>D. £ 3,443,959</b>

Receipts for the week were £223,000 in bars and £202,000 in Mexican dollars from New York; £425,000 in all. Exports were £650 to Port Said and £25,000 to India.

Indian exchange has been easier, the Council bills offered in London having been taken at an average of 15.96d. per rupee. There has been less buying of silver for India in London, but China is reported to be sending silver to India in some quantity.

**Prices of Foreign Coins**

	Bid.	Asked.
Mexican dollars.....	\$0.52½	\$0.54½
Peruvian soles and Chilean.....	0.48	0.50
Victoria sovereigns.....	4.850	4.87
Twenty francs.....	3.	3.91
Spanish 25 pesetas.....	4.75	4.80

SILVER AND STERLING EXCHANGE.

Sept.	Sterling Exchange.	Silver.		Sept.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
12	4.8530	68	31 $\frac{1}{2}$	16	4.8535	67 $\frac{1}{2}$	31 $\frac{1}{2}$
13	4.8540	67 $\frac{3}{4}$	31 $\frac{1}{8}$	17	4.8540	67 $\frac{3}{4}$	31 $\frac{1}{4}$
14	4.8535	67 $\frac{3}{4}$	31 $\frac{1}{8}$	18	4.8540	67 $\frac{3}{4}$	31 $\frac{1}{4}$

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals

Sept.	Copper.			Tin.	Lead.	Spelter.	
	Lake, Cus. per lb.	Electrolytic, Cus. per lb.	London, £ per ton.			Cus. per lb.	Cus. per lb.
12	16 @16 $\frac{1}{2}$	15 $\frac{1}{2}$ @16	66 $\frac{1}{2}$	36 $\frac{1}{2}$	4.75	5.15 @5.20	5.00 @5.05
13	15 $\frac{1}{2}$ @16 $\frac{1}{2}$	15 $\frac{1}{2}$ @15 $\frac{1}{2}$	65 $\frac{1}{2}$	35 $\frac{1}{2}$	4.75	5.15	5.00
14	15 $\frac{1}{2}$ @16 $\frac{1}{2}$	15 @15 $\frac{1}{2}$	.....	35 $\frac{1}{2}$	4.75	5.05 @5.15	4.90 @5.00
16	15 @16 $\frac{1}{2}$	15 @15 $\frac{1}{2}$	63 $\frac{1}{2}$	36	4.75	5.05 @5.15	4.90 @5.00
17	15 @16 $\frac{1}{2}$	15 @15 $\frac{1}{2}$	67	37 $\frac{1}{2}$	4.75	5.05 @5.15	4.90 @5.00
18	15 @16 $\frac{1}{2}$	14 $\frac{3}{4}$ @15 $\frac{1}{2}$	66 $\frac{1}{2}$	37 $\frac{1}{2}$	4.75	5.05 @5.15	4.90 @5.00

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b.'s. The New York quotations for electrolytic copper are for cakes, ingots or wirebars, and represent the bulk of the transactions as made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting and Refining Company for near-by shipments of desilverized lead in 50-ton lots, or larger. The quotations on spelter are for ordinary western brands; special brands command a premium.

**Copper**—The long hoped for demand from American consumers has not yet materialized but during the last week there has been more inquiry and it is expected that the declining prices will soon tempt buyers. Considerable business has been done for export, but orders have been eagerly competed for which has led to further concessions in price. Lake has been relatively weaker than electrolytic owing to the need of some producers to realize, and transactions in this grade of metal have consequently been at a wide range.

During the early part of the week the largest selling interest reduced its price for electrolytic to 16 $\frac{1}{2}$ . Other sellers had already been quoting lower figures and the reduction had no effect except to make competition keener for whatever orders presented themselves. Prices were lowered from day to day, and on a scale downward fair sized orders were taken for shipment to Europe. The market there has been a wide-open one, and all important sellers followed the daily quotations, with the exception of the largest interest, but even in its case it is said that the price it is naming for export is quite a little lower than its nominal

schedule here. Domestic consumers have been doing very little, but are beginning to show more interest in the market. Their supplies must be down to starvation point, and this, together with the attractive level at which the market is ruling now, ought to help bring about considerable activity before very long. The close is unsettled at 15@16 $\frac{1}{4}$ c. for Lake; 14 $\frac{3}{4}$ @15 $\frac{1}{4}$ c. for electrolytic in ingots, cakes and wirebars; 14 $\frac{1}{2}$ @14 $\frac{3}{4}$ c. for casting copper.

The standard market underwent violent fluctuations. After a decline to under £64 for both options, a covering movement on the part of the bears started upon the publication of the statistics, which showed a decrease in the visible supplies for the first half of the current month of 1500 tons, and a rapid advance resulted, which has been fairly well sustained at the close, being cabled as £66 15s. for both spot and three months.

Refined and manufactured sorts we quote: English tough, £64; best selected, £71; strong sheets, £77.

Exports of copper from New York for the week are reported at 1935 long tons. Our correspondent reports the exports from Baltimore for the week at 622 tons fine copper.

**Copper Sheets**—The base price of copper sheets is now quoted at 24c. per lb.

**Copper Wire**—The price of copper wire remains the same as last week. The base price for No. 0000 to No. 8 is 20 $\frac{1}{4}$ @21 $\frac{1}{4}$ c. per lb.

**Lead**—The price of the American Smelting and Refining Company for desilverized remains 4.75c., New York, and 4.67 $\frac{1}{2}$ c., St. Louis. Outside brands are offered at a discount in each market as low as 4.65c., New York, and 4.60c. St. Louis.

The London market is ruling firm and the close is cabled at £19 15s. for Spanish lead, £19 17s. 6d. for English lead.

**St. Louis Lead Market**—The John Wahl Commission Company reports as follows: Lead continues dull. Missouri brands have sold at 4.60c. and demand is light even at that figure. Buyers look for a further decline and purchase only for current requirements.

**Tin**—The market has been subject to wild fluctuations, receding the end of last week about £6 from the high point reached. The close is again firm, and cabled at £167 15s. for spot, £165 15s. for three months.

Our market here followed closely in the wake of that in London. Spot tin in both markets is very scarce and concentrated in a few hands, so that a premium is being exacted for it. Business in a retail way was done here at the close around 37 $\frac{3}{4}$  cents per lb.

**Spelter**—Urgent offerings from St. Louis brought about a sudden drop, and the market is barely steady, the demand continuing to be of rather small volume.

The close is easy at 5.05@5.15c. New York, 4.90 @ 5c. St. Louis.

The London market has shown a somewhat better tone and closes firmer at £21 5s. for good ordinaries, £21 10s. for specials.

**Zinc Sheets**—The base price was reduced 25c. on Sept. 12, and is now \$7.50 per 100 lb.—less discount of 8 per cent.—f.o.b. cars at Lasalle and Peru, in 60-lb. cases for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.50c. per 100 lb.

**Spanish Zinc Ore Market**—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Aug. 31: The market is quiet, with no change. Shipments for the week were 4800 tons blende and calamine to Antwerp.

**Antimony**—The market continues quiet but seems to be developing a stronger tendency owing to the gradual reduction of the accumulated stock. It is reported also that the demand abroad is improving. Quotations in this market are 10 $\frac{1}{4}$ @10 $\frac{1}{2}$ c. for Cookson's, 9 $\frac{1}{2}$ @10c. for Halllett's, and 9@10c. for ordinary brands.

**Nickel**—For large lots, New York or other parallel delivery, the chief producer quotes 45@50c. per lb., according to size and terms of order. For small quantities prices are 50@65c., same delivery.

**Quicksilver**—Current prices in New York are \$40 per flask of 75 lb. for large quantities and \$41 for smaller orders. San Francisco orders are \$37.50@38.50 per flask, according to quantities, for domestic orders, and \$36.50@37 for export. The London price is £7 per flask, but £6 16s. 3d. is quoted by jobbers.

**Platinum**—The market remains unchanged from last week and is without special features. Quotations are \$28.50 for ordinary metal, \$30.50 for hard and \$23@24 for scrap, per troy ounce.

Missouri Ore Market

**Joplin, Mo., Sept. 14**—The highest price paid for zinc ore was \$45 per ton, the assay price ranging from \$40@43 per ton of 60 per cent. zinc, and the average price \$40.84.

The highest price for lead was \$54 per ton for a few bins, the larger amount of ore shipped selling at \$51 per ton. Medium grade ranged from \$47@50, and the average, all grades, \$51.46.

Five meetings have been held to encourage producers to unite upon a restriction of the output, and at the last meeting, Thursday night, some of the larger producers announced that they would not close down unless at least 50 per cent. of the production was enlisted, and the movement is practically at an end. It has not met with ardent favor

from the first, except among those who cannot produce ore at present prices, it being understood that the greater loss is in the reduction of lead to \$51 per ton, or \$31.50 per ton less than a year ago, and that a restriction of the output could in no measure influence lead prices. Zinc is only \$1 per ton lower than a year ago, when the high price was \$46 and the assay base from \$41@43 per ton of 60 per cent. zinc. The output has been restricted approximately 15 per cent. by the closing of mines that cannot operate at a profit with lead so low as now, and by mines closing down for repairs that could conveniently be given attention at this time.

Following are the shipments of zinc and of lead from the various camps of the district for the week ending Sept. 14:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville.	3,221,330	201,500	\$72,886
Joplin.....	1,888,250	239,680	46,769
Alba-Neck City.....	857,860	12,320	19,192
Galena.....	735,120	119,530	18,018
Oronogo.....	746,370	.....	16,415
Duenweg.....	561,130	81,610	12,979
Aurora.....	449,580	.....	9,441
Granby.....	480,000	75,000	7,000
Prosperity.....	183,470	71,710	5,716
Badger.....	232,120	.....	5,107
Spurgeon.....	217,630	51,610	4,383
Cave Springs.....	126,030	10,500	2,852
Zincite.....	132,920	.....	2,791
Sarcozie.....	60,410	.....	1,238
Carl Junction.....	45,710	6,060	1,157
Westworth.....	23,560	.....	482
Reeds.....	20,100	.....	412
Totals.....	9,981,590	869,520	\$226,738

37 weeks.....433,951,590 66,477,930\$12,450,231  
 Zinc Value, the week, \$204,365; 37 weeks, \$9,958,374  
 Lead value, the week, 22,373; 37 weeks, \$2,491,857

Average prices for ore in the district, by months, are shown in the following table:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January...	47.38	45.84	January...	75.20	83.53
February...	47.37	47.11	February..	72.83	84.58
March.....	42.68	48.66	March.....	73.73	82.75
April.....	44.63	48.24	April.....	75.13	79.76
May.....	40.51	45.98	May.....	78.40	79.56
June.....	43.83	44.82	June.....	80.96	73.66
July.....	43.25	45.79	July.....	74.31	58.18
August....	43.56	43.22	August....	75.36	59.54
September.	42.58	.....	September.	79.64	.....
October....	41.55	.....	October....	79.84	.....
November..	44.13	.....	November..	81.98	.....
December..	43.68	.....	December..	81.89	.....
Year.....	43.24	.....	Year.....	77.40	.....

**Chemicals**

New York, Sept. 18—The general chemical market continues uneventful and quiet, except along certain lines, especially among the metallic salts, which are influenced by the fluctuating metal market.

Copper Sulphate—The price of this salt has again been lowered in sympathy with the price of copper metal. Buying is from hand to mouth and only in small quantities for immediate need. Carload lots are now quoted at \$6.25 per 100 lb. and smaller quantities at \$6.50 and up, depending upon quantity and terms of sale.

Nitrate of Soda—It is expected that more activity will prevail in the nitrate market with the approach of fall. The demand continues good and prices are

holding firm. For spot delivery, 96 per cent. is quoted at 2.55c. and 95 per cent. at 2.50c. For 1908 delivery these grades are practically the same, while for 1909 delivery no quotations are available at present.

Phosphate Rock—The demand for all grades is strong and they are easily absorbed. Quotations are as follows: Florida high-grade rock, \$10.25@15 per short ton, f.o.b. shipping point; land pebble, \$8.25@8.75 f.o.b. Tampa; Tennessee domestic, \$4@6.50 f.o.b. Mt. Pleasant, according to percentage and guarantee. South Carolina, hot air dried, \$7@7.50 f.o.b. Ashley river.

Messrs. J. M. Lang & Co. report the shipments of phosphate rock through the port of Savannah in August at 7543 tons, of which 4032 tons went to Holland and 3511 to Germany.

Sulphur—Emil Fog & Sons, Messina, Italy, under date of Sept. 1, state that the agreement with Mr. Frasci has been broken and that exports to the United States are once more free. Freight rates for about 2500 tons have been fixed, the selling price of this lot of sulphur being at a reduction of 4 to 5s. per ton. However, only a few American buyers can avail themselves of the lower prices, the rest being bound by old contracts.

The Consorzio also reduced prices temporarily for other destinations and the reduction of 25 centesimi per 100 kg. led to the sale of 6000 tons. Encouraged by the quick success, the price was, a few days later, raised 30 centesimi per 100 kg.

It is reported that a company has been organized to manufacture sulphuric acid from crude brimstone and every facility will be given the new industry. It is hoped that in this way a large part of the accumulated stocks of sulphur will be utilized.

**Mining Stocks**

New York, Sept. 18—The week was characterized by further losses, of which the mining stocks had more than their share. Prices shrunk lower than they have been for some time and recovery was very slight. Stocks which were considered bargains at much higher prices are now eagerly offered for sale and the idea seems to be to get rid, as fast as possible, of many good dividend-paying stocks. Amalgamated copper continued its downward course, closing at \$61¼, a loss of more than \$5 for the week. American Smelting, common, also closed lower, losing \$6 and closing at \$90½. United States Steel, common and preferred, were also weak and heavily sold, the former closing at \$28¾ and the latter at \$91¾. Other closing prices were Anaconda, \$40½; Granby Consolidated, \$90; Newhouse, \$83¼; Tennessee copper, \$30; and Utah copper, \$21½.

The curb stocks were also weak and the tendency was to sell rather than buy. Nipissing sold off fractionally and closed at \$7 on light sales. Green-Cananea was offered at \$9¾ and Cumberland-Ely at \$6¾. Cobalt Central was active all week and recorded a large number of transactions; it sold at the close at 27c. The Nevada stocks were somewhat stronger than the coppers or the Cobalt silver stocks, but they, too, have shrunk in value during the last few weeks.

**Boston**

Sept. 17—Copper-mining shares reached new low levels late last week and it looked for a while as if there was no bottom to the market. Forced liquidation was responsible for this state of affairs and it was largely for Michigan, Butte and other western interests. The so called Cole-Ryan stocks were the hardest hit and it would not be surprising to learn that there had been a change in the ownership of some of these properties. There has been a shrinkage of about \$118,500,000 in these securities from the high prices early in the year. The price of North Butte has been cut two-thirds. Calumet & Arizona has been halved. Superior & Pittsburg is but one-third of its original high value and Greene-Cananea sold on about the same basis. Further reductions have been made in mining dividends, notably Utah Consolidated, and Wolverine, while Shannon has passed its dividend.

Amalgamated Copper made its lowest price since 1904, selling at \$58 last week. Since that time there has been some improvement and prices have recovered slightly but sentiment is yet pessimistic. North Butte touched \$45, closing tonight at \$46.75 against \$56, a week ago. Copper Range broke \$4.12½ to \$56, closing \$2 above this tonight. Calumet & Arizona is off \$18 net, for the week to \$114, although on Thursday, it broke from \$120 to \$105, with subsequent rally to \$120. Calumet & Hecla went off almost \$100 to \$600, later selling at \$625. Mohawk is off \$7 to \$57, and Old Dominion broke \$2.50 to \$23, with full recovery today. Osceola fell \$10 to \$87, recovering all but \$2; Quincy is \$5 lower at 80; Tamarack fell \$6 to \$64; Wolverine broke \$27 to \$112 recovering to \$115. Utah Consolidated fell \$8 to \$32 on the reduction in the dividend, closing at \$35.50 today.

This company is now paying at the rate of \$4 per year and will have paid \$7 this year, against \$5 in 1906. To date the company has paid \$24.16 per share since 1901. The Wolverine dividend was reduced from \$10 to \$7.50. This company started in 1898 by the payment of \$1 for that year. It is figured that the average of 20 leading Boston copper stocks is around \$68, which compares with an average of \$142, this year's highest, a decline of 41 per cent. Bingham touched \$9, which is its lowest. There is likelihood of a consolidation of

mining and smelting interests in Utah under control of J. A. Heinze, in which Bingham will figure. Boston Consolidated broke \$2.75 to \$16.25, but is back again. Arizona Commercial made a low record at \$12.75, off \$2.75. Atlantic sold at \$9.75, off \$1.50; Balaklala at \$5.50, off \$1.50; Butte Coalition at \$15.50, off \$2.37½; Franklin at \$7.75, off \$2.25; Greene-Cananea at \$8.75, off \$1.75; Isle Royale at \$13.50, off \$2.25; Michigan at \$8.75, off \$2.25; Parrot at \$12.75, off \$2.25; Shannon at \$9.87½, off \$2.12½; U. S. Smelting at \$37, off \$2.50; La Salle at \$9.50, off \$1.50; and Winona at \$6, off \$1. Trinity closed the same as a week ago at \$15. Superior & Pittsburg went off to \$9.25 on the curb, but is back to \$10.50.

STOCK QUOTATIONS

NEW YORK Sept. 17		BOSTON Sept. 17	
Name of Comp.	Clg.	Name of Comp.	Clg.
Alaska Mine.....	.....	Adventure.....	2
Am. Nev. M. & P. Co.	.....	Allouez.....	.....
Amalgamated.....	61½	Am. Zinc.....	.....
Anaconda.....	40½	Arcadian.....	4
Balaklala.....	.....	Atlantic.....	9¾
British Col. Cop.	5¾	Bingham.....	9
Buffalo Cobalt.....	2	Boston Con.....	19
Butte & London.....	.....	Calumet & Ariz*.	114
Butte Coalition.....	16	Calumet & Hecla*	610
Butte Cop. & Zinc.	.....	Centennial.....	.....
Cobalt Contact.....	¾	Con. Mercur.....	38
Colonial Silver.....	¾	Copper Range*.	58
Cum. Ely Mining.....	6¾	Daly-West.....	12½
Davis Daly.....	8¾	Franklin.....	7½
Dominion Cop.....	3¾	Greene-Can.....	9½
El Rayo.....	3	Isle Royal.....	15½
Foster Cobalt.....	.66	La Salle.....	10
Furnace Creek.....	¾	Mass.....	3½
Giroux Mine.....	5¾	Michigan.....	.....
Gold Hill.....	1¾	Mohawk.....	57¾
Granby, New.....	90	Mont. C. & C. (new)	.....
Greene Gold.....	1¾	Nevada.....	.....
Greene G. & S.....	1¾	North Butte*.	46¾
Greenw'r & D. Val.	¾	Old Colony.....	.....
Guanajuato.....	3¾	Old Dominion.....	24¾
Guggen. Exp.....	.....	Osceola.....	95
Hanapah.....	.35	Parrot*.....	13
McKinley Dar.....	1½	Phoenix.....	.....
Micmac.....	3¾	Quincy*.....	80
Mines Co. of Am.....	1½	Rhode Island.....	3¾
Mitchell Mining.....	1½	Santa Fe.....	2½
Mont. Sho. C. (New)	6	Shannon.....	10¾
Nev. Utah M. & S.	31½	Tamarack.....	65
Newhouse M. & S.	8¾	Trinity.....	15
Nipissing Mines.....	7	United Cop., com.	.....
Old Hundred.....	2½	U. S. Oil.....	8¾
Silver Queen.....	1½	U. S. Smg. & Ref.	38
Stewart.....	1½	U. S. Sm. & Re., pd	38
Tennessee Cop'r.	30	Utah Copper.....	35¾
Union Copper.....	1	Victoria.....	4¾
Utah Apex.....	5¾	Washington.....	.....
West Columbus.....	.11	Winona.....	5¾
		Wolverine.....	116
		Wyandotte.....	.....

N. Y. INDUSTRIAL		*Ex. Div. †Ex. Rights.	
Am. Agri. Chem.....	.....		
Am. Smelt. & Ref.	90½		
Am. Sm. & Ref., pf.	97½		
Bethlehem Steel.....	22½		
Colo. Fuel & Iron.	.....		
Federal M. & S., pf.	.....		
Inter. Salt.....	4		
National Lead.....	46¾		
National Lead, pf.	95		
Pittsburg Coal, pf.	.....		
Republic I. & S.....	20½		
Republic I. & S., pf.	.....		
Sloss-Sheffield.....	425		
Standard Oil.....	.....		
Tenn. C. & I.....	.....		
U. S. Red. & Ref.....	.....		
U. S. Steel.....	26¾		
U. S. Steel, pf.....	91¾		
Va. Car. Chem.....	21		
Va. I. Coal & Coke	50		

ST. LOUIS Sept. 14		LONDON Sept. 18	
N. of Com.	High. Low.	Name of Com.	Clg.
Adam's.....	.30 .20	Dolores.....	£1 5s 0d
Am. Nettie.....	.04 .03	Stratton's Ind.	0 2 6
Center Cr'k.....	2.25 2.00	Camp Bird.....	0 19 6
Cent. C. & C.....	68.00 67.00	Esperanza.....	2 0 7½
C. C. & C. pd.....	79.00 78.00	Tomboy.....	1 8 0
Cent. Oil.....	110.00 105.00	El Oro.....	1 5 0
Columbia.....	4.00 2.30	Oroville.....	0 16 0
Con. Coal.....	27.00 25.00	Somera.....	0 16 3
Doe Run.....	130.00 120.00	Utah Apex.....	0 15 0
Gra. Bimet.....	.35 .30	Ariz. Cop., pd.	2 9 2
St. Joe.....	15.00 13.00	Ariz. Cop., def.	.....

S. FRANCISCO Sept. 11		NEVADA Sept. 18	
Name of Comp.	Clg.	(Weir Bros. & Co., New York)	
<b>COMSTOCK STOCKS</b>			
Belcher.....	.25	TONOPAH STOCKS Clg.	
Best & Belcher.....	.83	Tono'h Mine of N.	11.62½
Caledonia.....	.87	Tonopah Exten.....	1.75
Chollar.....	.30	Montana Tonop'h	2.85
Con. Cal. & Va.....	.83	Belmont.....	2.75
Crown Point.....	.34	Tonopah Midway	.78
Exchequer.....	.35	West End Con.....	.70
Gould & Curry.....	.24	Jim Butler.....	.80
Hale & Norcross.....	1.07	<b>GOLDFI'D STOCKS</b>	
Mexican.....	.59	Sandstorm.....	.40
Ophir.....	1.25	Kendall.....	.20
Overman.....	.13	Red Top.....	3.50
Potosi.....	.18	Jumbo.....	3.50
Savage.....	.86	Goldfield Mining.	1.25
Sierra Nevada.....	.47	Dia'dfield B. B. C.	.22
Union.....	.43	Atlanta.....	.43
Utah.....	.04	Mohawk.....	15.50
Yellow Jacket.....	1.05	Silver Pick.....	.53
		Laguna.....	1.25
<b>TONOPAH STOCKS</b>			
Golden Anchor.....	.13	<b>BULLFROG STOCKS</b>	
McNamara.....	.21	Mont. Shoshone C.	6.00
Montana-Pitts.ex.	.05	Tramps Con.....	.34½
North Star.....	.20	Gold Bar.....	.54
Rescue.....	.13	Bullfrog Mining.	.12
		Bullfrog Nat. B.	.17
<b>GOLDFI'D STOCKS</b>			
Black Ants.....	.05	Homestake Con.....	.....
Blue Bull.....	.35	<b>MANHAT'N STOCKS</b>	
Columbia Mt.....	.49	Manhattan Con.....	.40
Comb. Frac.....	2.15	Manhat'n Dexter.	.11
Conquerer.....	.11	Jumping Jack.....	.14
Daisy.....	1.42	Stray Dog.....	.14
Florence.....	4.42	Indian Camp.....	.08
Frances-Mohawk.	1.05	<b>COLO. SPRINGS Sept. 14</b>	
Goldfield Con.....	7.27	Name of Comp.	Clg.
Grandma.....	.17	Acacia.....	.....
Great Bend.....	.66	Black Bell.....	.....
Red Hills.....	.56	C. C. Con.....	4¾
St. Ives.....	.87	Dante.....	.....
		Doctor Jack Pot..	6
<b>BULLFROG STOCKS</b>			
Amethyst.....	.23	Elkton.....	.....
Bonnie Claire.....	.41	El Paso.....	37½
Mayflower Con.....	.33	Findlay.....	36
Montgomery Mt.....	.11	Gold Dollar.....	6¾
Original.....	.05	Gold Sovereign.....	3½
		Isabella.....	21
<b>MANHAT'N STOCKS</b>			
Gold Wedge.....	.08	Index.....	.....
Manhattan Mg.....	.06	Jennie Sample.....	.....
Pine Nut.....	.07	Jerry Johnson.....	5½
Ruby Wonder.....	.25	Mary McKinney.....	.....
Stray Dog.....	.....	Pharmacist.....	3½
Yellow Horse.....	.03	Portland.....	110
		Un. Gold Mines.....	6
		Vindicator.....	.....
		Work.....	17½

New Dividends

Company.	Payable.	Rate.	Amt.
Am. Iron & Steel, com.	Oct. 1	\$0.62½	31,875
Am. Iron & Steel, pf.	Oct. 1	0.62½	37,500
Am. Smg. & Ref. Co., com.	Oct. 1	2.00	1,000,000
Am. Smg. & Ref. Co., pf.	Oct. 1	1.75	875,000
Bald Butte.....	Oct. 1	0.04	10,000
Calumet & Arizona.....	Sept. 21	5.00	1,000,000
Calumet & Hecla.....	Sept. 28	15.00	1,500,000
Central C. & C., com.	Oct. 15	1.50	76,875
Central C. & C., pf.	Oct. 15	1.25	23,438
Col. & Hocking C. & I., pf.	Oct. 1	1.50	103,866
Copper Range Con.....	Oct. 1	2.00	767,562
Granby Con.....	Sept. 30	3.00	405,000
Guggenheim Expl.....	Oct. 1	2.50	262,500
Horn silver.....	Sept. 30	0.05	20,000
Iron Silver.....	Oct. 1	1.00	50,000
National Lead, com.	Oct. 1	1.25	186,318
National Lead, pf.	Sept. 16	1.75	260,820
Pioneer, Alaska.....	Oct. 10	3.00	150,000
Tuzoitian.....	Oct. 1	2.00	20,000
U. S. Reduction & Ref., pf.	Oct. 1	1.50	59,187
Utah Con.....	Oct. 15	1.00	300,000
Va. Car. Chem., pf.	Oct. 15	2.00	360,000
Wolverine.....	Oct. 14	7.50	450,000

Assessments

Company.	Delinq.	Sale.	Amt.
Belcher, Nev.....	Sept. 18	Oct. 9	\$0.10
Bullion, Nev.....	Sept. 12	Oct. 4	0.05
Caledonia.....	Sept. 12	Oct. 2	0.10
Douglas, Idaho.....	Sept. 16	Oct. 4	0.003
Etna-King, Cal.....	Sept. 15	Oct. 15	0.02
Grand Pacific, Cal.	Aug. 10	Oct. 2	0.02
Helios, Cal.....	Sept. 17	Oct. 15	0.02
Imlay, Nev.....	Sept. 26	Oct. 16	0.01
Morrison, Nev.....	Sept. 16	Oct. 3	0.01
Nassau Cop., Cal.....	Sept. 16	Oct. 14	0.10
Nevada-Fairview.....	Sept. 23	Oct. 28	0.02
Occidental Con., N.	Oct. 3	Oct. 28	0.10
Oro Cobre, Cal.....	Sept. 24	Oct. 14	0.02½
Raymond-Illinois.....	Aug. 29	Sept. 14	0.00
Raymond-Illinois.....	Oct. 16	Nov. 1	0.00½
Raymond-Illinois.....	Dec. 2	Dec. 18	0.00½
Salt or Consol., Cal.	Sept. 10	Oct. 7	0.01
Sheba G. & S., Utah.	July 30	Nov. 2	0.10
Sierra Nevada, Nev.	Sept. 4	Sept. 25	0.10
Wabash, Utah.....	Sept. 9	Oct. 1	0.05
Yellow Jacket, Nev..	Sept. 23	Oct. 30	0.15

Monthly Average Prices of Metals

Month.	AVERAGE PRICE OF SILVER			
	New York.		London.	
	1906.	1907.	1906.	1907.
January.....	65.288	68.673	30.113	31.769
February.....	66.108	68.835	30.464	31.852
March.....	64.597	67.519	29.854	31.325
April.....	64.765	65.462	29.984	30.253
May.....	66.976	65.981	30.968	30.471
June.....	65.394	67.090	30.185	30.893
July.....	65.105	68.144	30.113	31.366
August.....	65.949	68.745	30.529	31.637
September.....	67.927	.....	31.483	.....
October.....	69.523	.....	32.148	.....
November.....	70.813	.....	32.671	.....
December.....	69.500	.....	32.003	.....
Year.....	66.791	.....	30.868	.....

New York, cents per fine ounce; London, pence per standard ounce.

AVERAGE PRICES OF COPPER

Month.	NEW YORK.				LONDON.	
	Electrolytic		Lake.		1906.	1907.
	1906.	1907.	1906.	1907.	1906.	1907.
January.....	18.310	24.404	18.419	24.825	78.869	106.739
February.....	17.869	24.869	18.116	25.236	78.147	107.356
March.....	18.361	25.065	18.641	25.560	81.111	106.594
April.....	18.375	24.224	18.688	25.260	84.793	98.625
May.....	18.475	24.048	18.724	25.072	84.867	102.375
June.....	18.442	22.665	18.719	24.140	83.994	97.272
July.....	18.190	21.130	18.585	21.923	81.167	95.016
August.....	18.380	18.356	18.706	19.255	83.864	79.679
September.....	19.033	.....	19.328	.....	87.831	.....
October.....	21.203	.....	21.722	.....	97.269	.....
November.....	21.833	.....	22.398	.....	100.270	.....
December.....	22.885	.....	23.350	.....	105.226	.....
Year.....	19.278	.....	19.616	.....	87.282	.....

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

AVERAGE PRICE OF TIN AT NEW YORK

Month.	1906.	1907.	Month.	1906.	1907.
January.....	36.390	41.548	July.....	37.275	41.091
February.....	36.403	42.102	August.....	40.606	37.667
March.....	36.662	41.313	September.....	40.516	.....
April.....	38.900	40.938	October.....	42.852	.....
May.....	43.313	43.149	November.....	42.906	.....
June.....	39.260	42.120	December.....	42.750	.....
			Av. year.....	39.819	.....

Prices are in cents per pound.

AVERAGE PRICE OF LEAD