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The Nomenclature of Modern Placer Mining

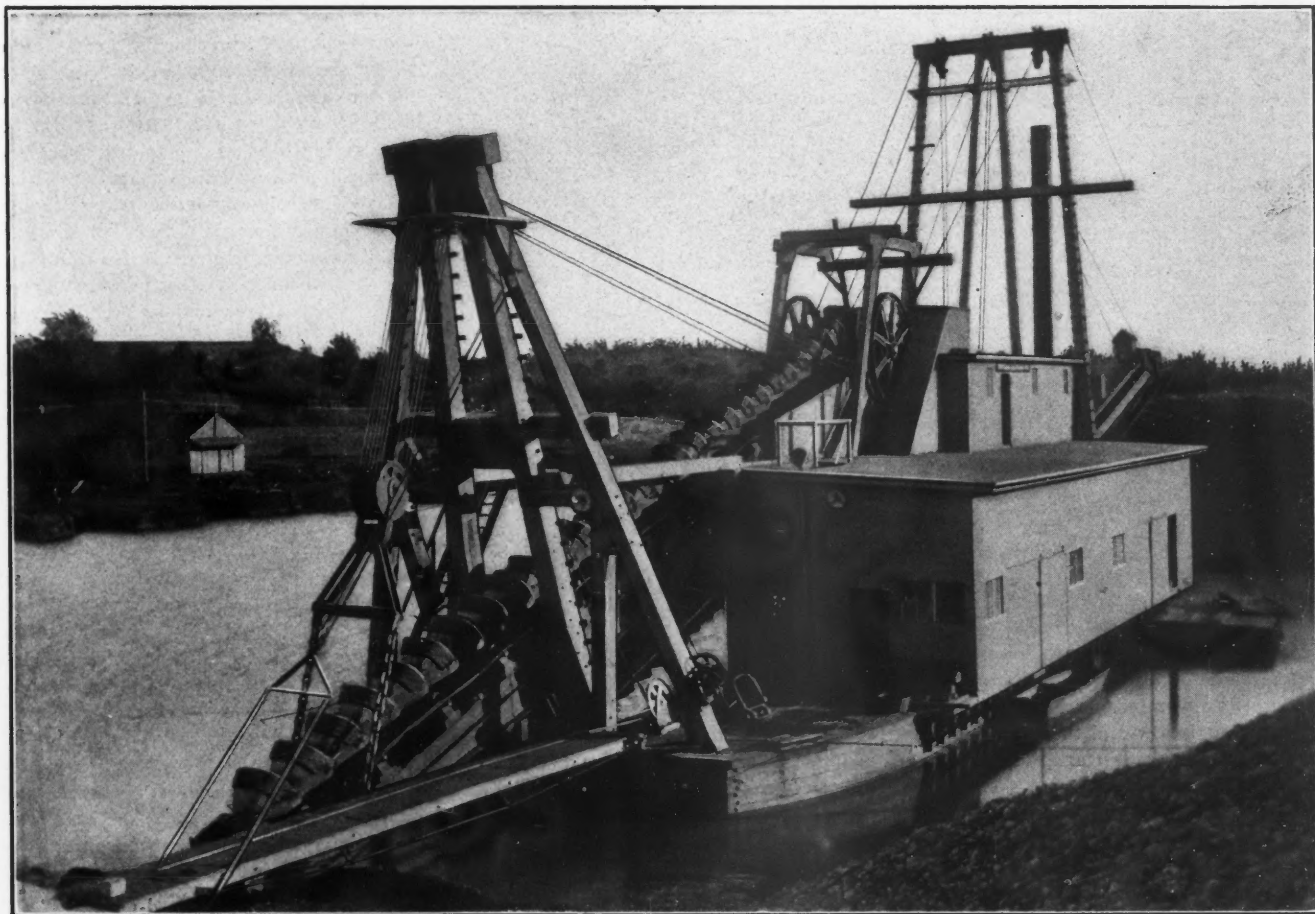
The Numerous Classifications of Placers Are Discussed in General and in Particular. Origin of Placers and Methods of Exploitation

BY J. P. HUTCHINS*

According to its Spanish significance a placer is a gravelly place where gold is found, especially by the side of a river, or in the bed of a mountain torrent. There is unfortunately no one term that is entirely comprehensive. The word placer is the most generally used on the western continent and it has come to have a general application to deposits that, in

broad heads, depending upon their origin by transport or *in situ*. Placers of transport are those the contents of which have been transported to them from a distance by water, ice or wind. Alluvial and diluvial placers are placers of transport, as also are those where ice, as glacial or floating ice, or wind, were agents of transport.

is generally applied to material existing in placers where, as in peneplains of present rivers, there may not have been a great lapse of geologic time since their deposition. Present placers are those where agencies of deposition are going on. Among such are the flood plains, banks and beds of existing streams. Alluvial placers exist in the beds of streams as



A MODERN GOLD DREDGE. BUCKETS 7 CU. FT. CAPACITY

having been laid down by water, are usually gravelly. Thus all deposits having an origin directly or indirectly due to aqueous agencies or possessing characteristics of a gravelly type even though flowing water, except as percolations, had nothing to do with their origin, are called placers.

GENERAL CLASSIFICATION OF PLACERS

Placers may be classified under two

*Mining engineer, No. 52 Broadway, New York.

ALLUVIAL PLACERS

Alluvial placers are those that have been deposited by streams in their normal seasonal fluctuations. They may be ancient, recent or present. Thus the "buried rivers" of California, Australia and elsewhere, existing as they often do under many hundred feet of fluvial material, volcanic ejecta, and other débris, are alluvial because they were deposited by streams; such placers are ancient. "Recent" has of course a purely relative meaning, but it

bars, as debouchments, as flood-plains, as peneplains, as high benches and as old channels, depending upon their locations relative to the present water courses.

Bars are deposits of fluvial material above or below the water line of present streams; their occurrence is due to peculiarities of gradient and direction or to anything that temporarily decreases stream velocities. The wonderfully rich gravel, first worked in California, occurred on the bars of present streams.

Debouchment placers are those that exist where a marked change of gradient results in a reduced stream velocity. They exist at the mouths of streams, or where streams, in debouching from a hilly or mountainous region into a valley, encounter a change of gradient and topographic features that together make for the deposition of material. It is not easy to distinguish between such placers and those of the flood-plain type and there is no distinct line of demarkation between them. They often occur contiguously, the debouchment placer nearer the mouth of the stream or where the abrupt change of gradient occurs, and the flood-plain placer where a less gradient is found. Debouchment placers occur where streams empty into lakes, estuaries and seas and they are then called deltas.

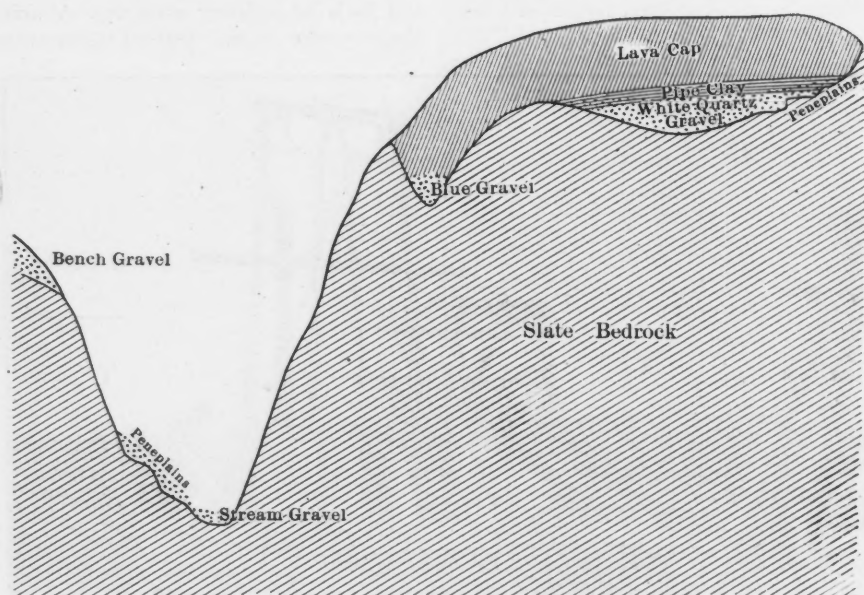
Flood-plain placers occur on the flats of

benches. Such are the isolated remains of parts of the "white channels" of California and the Klondike which, in having a large part of their cross-sectional area removed by erosion, appear as bench deposits.

Old channels are the remains of pre-existent streams which generally have been covered by some capping of volcanic material, as the result of a lava flow, and thus protected them from subsequent erosion. Earth movements which have abruptly shifted streams from one to another course have had the same result in preserving these ancient streams. They are generally, although not always, above the present rivers but subsidence, filling and shifting the old stream have in many instances resulted in the occurrence of old channels below the level of the present water courses. The old streams also have

by ice, that were subsequently much modified by fluvial action and their metallic content concentrated in less volume of material and in such degree as to allow their present profitable exploitation. Such deposits are, of course, classed as alluvial. Glacial ice has laid down placers as lateral and terminal moraines. Inasmuch as streams generally occur at the terminal points of glaciers, and usually at their sides near the terminal, material deposited at these places has sometimes predominating alluvial characteristics.

Floating ice, occurring in streams as the thaw progresses, transports considerable material which may have been accumulated as the stream froze, by the agglomeration of anchor ice particles with adhering gravel picked up off the stream bed, or by detritus falling onto the ice from the banks.



CROSS-SECTION SHOWING ANCIENT, RECENT AND PRESENT ALLUVIONS

rivers and they owe their existence to the deposition of material by floods. The typical flood-plain deposit generally occurs in the lower reaches of a river where the gradient is low and the current is not great enough to have transported and deposited heavy metallic particles. Thus it is exceptional to find ore in such deposits.

PENEPLAINS

Peneplains are deposits of material at a comparatively slight perpendicular distance above stream channels. They are commonly called benches or terraces, and are remains of a former stream deposit which erosive agencies have not degraded with the general lowering of the region.

High benches or terraces have generally the same origin as peneplains but they occur at greater relative elevations. They may, however, be the remains of an entirely different pre-existent river system which, in appearing as terraces, through peculiar erosive effects, are called

all the peculiarities of present streams, bars, peneplains, etc.; in addition they possess features that do not seem to be the result of fluvial action such as is going on at present. This circumstance is readily explainable if proper allowance is made for the difference of climate and meteorology of the geologic past.

DILUVIAL PLACERS

Diluvial placers are those deposited as a result of deluges or abnormal floods. They may occur in a variety of ways, but they are rather limited in number and importance and are of greater geologic than economic interest.

The placers deposited by ice transport are numerous and extensive and they sometimes possess sufficient metallic content to permit profitable exploitation, though generally there are very few such deposits; the circumstances of deposition, unless aided by fluvial action are not conducive to the occurrence of ore. There are numerous deposits, probably deposited

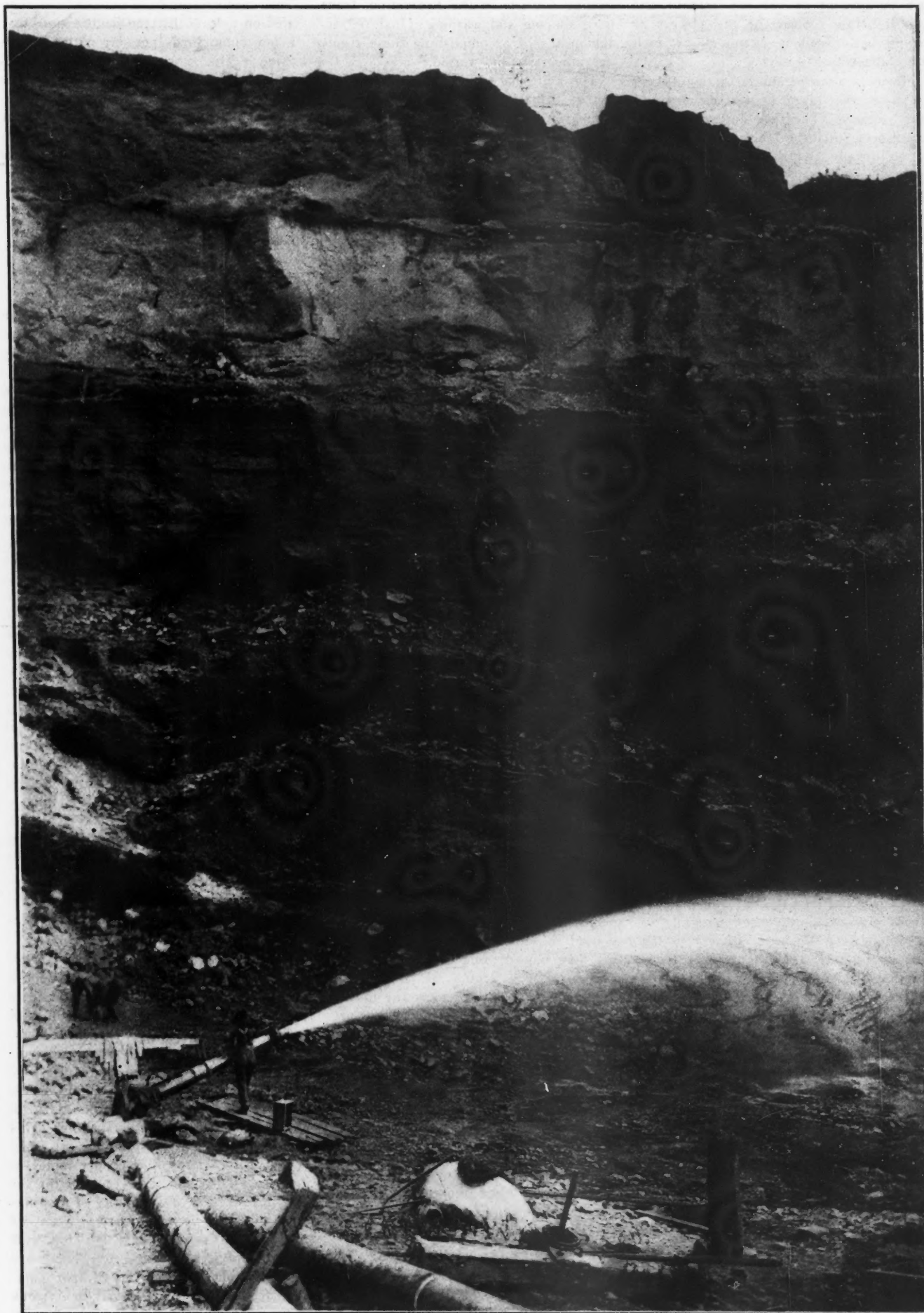
PLACERS FORMED IN SITU

These are generally the result of saprolitic and corrosive action. They are those resulting from saprolitic action alone or by saprolitic action aided by percolating and rain water or by saprolitic action aided by wind. Litoral deposits either of lake or sea beaches are *in situ* placers.

Saprolitic action rarely takes place without the aid of percolating water, though it sometimes occurs. Such placers are rare and not of interest. Saprolitic action, in conjunction with percolating and rain water has resulted in the formation of a large number of placers, metalliferous in large variety. This action is really a metamorphosis and the resulting deposits are not properly placers though they are so considered in the legal aspect. Thus the strict meaning of placer has to be liberally construed to include saprolitic deposits. They often occur intimately related with placers of transport and there is generally a slight degree of superficial transport by rain water on saprolitic areas with consequent superficial concentration. Saprolitic action in conjunction with wind which acts to remove the lighter decomposition products sometimes occurs; it is infrequent and of merely passing interest.

Of saprolitic areas in general it may be said that they are difficult of successful exploitation and of limited area and uncertain value. The circumstance that they are often so cohesive as to make the extraction of metallic content well nigh impossible often prevents their successful exploitation, even where a comparatively rich ore is found. The gold placers of the Appalachian system are examples.

Littoral placers are formed *in situ* although there have been, in many of them, a considerable vertical movement and concentration during extended periods of geologic time. They are often formed by aid of fluvial agencies which transport material to the beaches but subsequent wave action results in a deposit possessing no alluvial attributes and they are thus classed as littoral. Such placers may oc-



HYDRAULIC GRAVEL, 130-FT. OVERBURDEN, 12-FT. PAY GRAVEL

cur on present or old sea, estuary and lake beaches. Some of the placers at Nome are excellent examples of such beach deposits.

Marine, estuarine, and lacustrine placers are those that occur on sea, estuary and lake bottoms. They are similar in nearly all respects to littoral placers and fluvial action usually has the same relation to their deposition as is noted above in conjunction with littoral placers.

PLACERS OTHER THAN AURIFEROUS

In this article the placers that have been considered are those containing gold; and of the gold placers those particularly which owe their origin to alluvial agencies, that is, to the action of streams. Inasmuch as there are platinum, tin, diamond, copper and other alluvial placers of economic importance, this article is not comprehensive in not considering them

mining consists in the excavation, transport, sluicing and washing of material, and the means of accomplishing these results are numerous and varied.

The drift placer is that which, in having its valuable content concentrated in a comparatively shallow stratum somewhere in the gravel section under such a depth of overburden as to make it uneconomical to work it by open cutting, is exploited by drifts with shafts or tunnels. This pay stratum may or may not be on or near bedrock, though generally it is near it. Various mechanisms are used in drift mining; these include steam, hydraulic, steam-electric and hydro-electric motors in excavating, transporting, screening, sluicing and wasting material.

It is not simple to determine the various conditions that may have a bearing upon the profitable exploitation of a placer which requires other than unmodified

Such mechanisms have not yet been operated on a scale that can handle more than a few cubic yards per day with one machine. This work is sporadic and generally of economic insignificance. It is well to note, however, that there are numerous dry placers of considerable volume and reputed richness awaiting the evolution of a machine that will do on a commercial scale what has been, in some instances, successful in a laboratory way.

A Redwood Pipe-line in the Yukon

As a part of its Twelve-Mile-Klondike water supply system for hydraulicking on Bonanza and other creeks, one of the Guggenheim companies—the Yukon Consolidated Goldfields—is constructing a redwood inverted siphon line some 14,000 ft. in length. This line is being built over rolling and rugged country where the dip is not of sufficient depth to require steel, yet conditions are not favorable to trestle building or making a detour for a ditch. The redwood pipe, about 2000 ft. of which have been constructed, is 48 in. inside diameter. The length of the staves varies from 10 to 24 ft., their width is 5½ in., and thickness 1½ in. In constructing the pipe the staves are broken at alternate joints, so continuously overlap. They are held in place by round rods of ½-in. soft steel. The staves were taken from California to the Yukon last summer, landed at Twelve-Mile on the Yukon river, and during the winter hauled in sleighs along the pipe line. Construction is under the direction of C. W. Bromley, who is an expert at this class of work and who lately completed in Utah a line 10 miles in length and of similar material. Completion of the Twelve-Mile line before next winter's snow is expected.



BEACH GRAVEL

particularly, but the essential data for auriferous placers apply rather generally to the others as well; little else except the methods of extracting the valuable content are different. Thus in this consideration of the data of gold placers essential for determination, before it can be decided that work can be carried on at a profit, the matter noted also has a direct application to most of the other alluvial placers.

METHODS OF EXPLOITATION

Open-cut placers are worked by either hand or animal labor or by machinery. Hydraulic methods with water under little or great pressure, or modified hydraulic methods including the use of hydraulic elevators, or hydraulic or steam or hydro-electric or steam-electric motors may be applied. Floating dredges, or dry excavators with any one of a considerable number of methods of handling the excavated material, may be used. Placer

hand methods. Generally hydraulic means, in its great variety of application, is used in some phase of operation and this may require long ditches and large reservoirs in a region of rough topography. This feature makes any investigation of this type include extensive preliminary and final surveys.

DRY PLACERS

There is a class of placers which may have been deposited in any of the ways noted above; the meteorological conditions may be such that there is no water to wash them. They are the so-called dry placers and they are worked in a variety of ways, including dryers, jigs, air-blasts, magnetic separators, and other means in diverse combinations to extract the metallic content. The process is generally of the following sequence: Drying, pulverizing, screening, jigging with magnetic devices or with air blast from bellows or fans.

Copper Ore Gems

The name "azurmalachite" or "azurmalachite" has been given by Dr. George F. Kunz to the natural mixture of azurite and malachite, which occurs sometimes in concentric layers, one within the other, as in the form of stalactites, or as botryoidal masses, which when cut cross-wise show their regular or irregular bands, rings or markings of the blue azurite combined with the green malachite. This is found in beautiful specimens of large size at Bisbee and other copper mines in Arizona. The name is a result of the recent introduction of a quantity of this material in the less expensive form of jewelry, the stones being cut for cuff buttons, rings, scarf-pins, etc. There are some magnificent specimens of azurmalachite from the copper districts in Arizona in the Morgan collection of gem stones in the Metropolitan Museum, New York.

Zinc-ore Analysis

G. C. Stone and W. G. Waring (*Journ. Am. Chem. Soc.*, XXIX, pp. 262-269) in the report of the sub-committee of the American Chemical Society on zinc-ore analysis, have proposed the following modification of the Waring method:

The weighed sample is decomposed by acids or by fusion as the case may be, and the zinc brought into solution as sulphate. Nitric acid if used in the decomposition is expelled by evaporation, first with hydrochloric acid and then with sulphuric acid, or by two evaporations with sulphuric acid, in either cases evaporating, finally to dense white fumes. The mass is dissolved in 25 to 40 c.c. of water and enough sulphuric acid added to bring the free acid content in the solution up to 10 or 15 per cent. The solution is boiled with a piece of sheet aluminum for 10 min. or until reduction is complete. The solution is filtered and washed through a filter containing a piece of aluminum into a beaker containing a rod or strip of the same metal. When cool, a drop of methyl orange is added and the solution carefully neutralized with sodium bicarbonate to a light straw color. Dilute formic acid (20 per cent. strength) is added drop by drop until the pink color is just restored, then 5 drops more. Dilute hydrochloric acid, one part strong acid to 6 parts water may be substituted for formic acid when ammonium sulphocyanate is to be introduced. The solution is now diluted to 100 c.c. for each 0.1 gram zinc possibly present, and if much iron is present 2 to 4 grams ammonium sulphocyanate introduced, the aluminum removed, the solution brought nearly to boiling and saturated with hydrogen sulphide. The zinc sulphide is allowed to settle and then filtered and washed with hot water. The filter and precipitate are placed in a large beaker and treated with 8 to 10 c.c. of strong hydrochloric acid and 30 to 40 c.c. of water until the zinc is in solution. The zinc is determined gravimetrically as pyrophosphate or volumetrically with ferrocyanide.

The use of ammonium heptamolybdate (1 per cent. solution) as an indicator is recommended in the volumetric method, provided all free hydrogen sulphide has been previously expelled by heating. If a blue color still appears in the test drop, a crystal or two of sodium sulphite is added to the zinc solution to decompose any remaining hydrogen sulphide. The separation from cadmium is complete with aluminum but traces of copper may remain and be precipitated with the zinc but it does not redissolve with the latter. Sodium or potassium hydroxide may be used to neutralize the major portion of the acid, finishing with bicarbonate.

The hydrogen sulphide need not be passed in under pressure if the solution is

diluted as directed. The gas should be passed through the solution until a drop of the liquid blackens a drop of cobalt or nickel sulphate or chloride made alkaline with ammonia. It is very important to pass the gas rapidly through the zinc solution which should be kept quite hot during the precipitation. The excess of formic acid should be maintained. The authors strongly recommend the gravimetric determination.

The Volatilization of Gold During Melting*

By DR. T. KIRKE ROSE.†

It has long been known that gold is lost by volatilization during melting in mints, but the amount of the loss has not been determined exactly. Moissan has recently shown (*Compte Rendus* Vol. 141, page 977) that gold can be distilled rapidly in an electric-arc furnace, and has given reasons for believing that its boiling point at atmospheric pressure is about 2530 deg. C. At such temperatures specimens of gold have been found to lose as much as 50 per cent. of their weight in a few minutes. In 1893 I found that pure gold (*Journal of Chemical Society*, Vol. 63 p. 714) begins to volatilize in ordinary furnaces at a temperature just below 1100 deg., and that the loss per minute at 1250 deg. is four times as great as that at 1100 deg. I also showed that the standard gold-copper alloy is more volatile than pure gold, and that the alloy loses proportionately more copper than gold, although owing to the absorption of gases or other impurities during melting, an increase of fineness may not be observable in all cases. The temperature of the gold pots in the melting-house furnaces has been found to vary between 1100 and 1200 deg. The melting point of standard gold is 951 deg.

Assuming that the loss by volatilization varies directly as the area of the exposed surface of the molten metal, then, judging from the results of experiments on a small scale the loss would amount to about 0.2 per 1000 per hour at 1200 deg. on a charge of 1200 oz. of gold.

The rate of loss during melting does not depend entirely on the temperature and the length of time in the furnace. The passage of a current of air over the surface of the molten metal is very deleterious in increasing the amount of volatilization, so that if the lid of the crucible is removed for any purpose the loss is increased. The presence of volatile impurities in bullion also causes increased loss. When the bullion is melted, they pass off, carrying gold and copper with them. It is probably due to this cause that a number of pots were rejected on assay in the past year as incorrect in composition. By the methods

*From the annual report, 1906, of the Royal Mint.

†Chemist and assayer at the Royal Mint.

of assay any lack of uniformity in the composition of the fine ingots used for making standard bars would be detected, but the presence of volatile impurities would not be detected.

Volatilized gold is condensed and solidified almost at once and is carried forward by the furnace gases in the form of fine dust. Where the draft impinges on any solid body some of the gold is deposited, but it is difficult to collect the whole of it. In the mint furnaces, the brickwork surrounding the flues is colored purple with deposited gold, and a sample of 103 oz. of dust recently taken from inside the flues was found to contain 1.39 per cent. of gold. At the Sydney mint some years ago Leibius found that the sweepings taken from the coping stone of the melting-house stack contained 1.46 per cent. of gold and 6.06 per cent. of silver. It is evident that in this case some of the volatilized gold must have been carried away into the air and irrecoverably lost.

In order to reduce the loss of volatilized gold, collecting chambers have been attached to the flues of melting furnaces in a number of mints. A chamber of this kind was recently built at a cost of \$900 at the Philadelphia mint. In the course of little more than six months after it was built the dust collected in the chamber produced a bar containing gold to the value of over \$4500, or nearly one ounce in 10,000 oz. melted.

The total amount of loss of gold by volatilization in ordinary melting furnaces is never larger and probably seldom exceeds 0.1 per 1000 in melting a charge of 1200 oz., but it represents a considerable percentage of the final waste after allowance has been made for the gold in the sweepings. An unrecovered melting loss of 0.1 per 1000 would correspond to over £200 on a coinage of £1,000,000, as on an average gold is melted somewhat more than twice in being converted into coin.

In modern magnetic separators the dropping of the magnetic material is generally effected by mechanically causing it to pass outside of the magnetic field, which may be done in various ways. (1) The magnetic material may be prevented from coming in direct contact with the magnet by means of a traveling belt, or a revolving cylinder of non-magnetic substance, to which the magnetic material will cling as long as in the field, but from which it will drop as soon as removed from the field. (2) The magnetic material may be attracted directly to the pole, which by revolution or change in electrical connection may suffer a change in polarity, or become non-magnetic, thus dropping the attracted particles after removing them from the stream of non-magnetic. (3) The magnetic material may be attracted directly to the pole and be removed therefrom by means of a brush or scraper.

Some Notes from Oaxaca, Mexico

SPECIAL CORRESPONDENCE

The only accessible lead mines in the State belong to the firm of L. R. Hamer & Co. They are 18 miles south of the City of Oaxaca, and 12 miles from the end of the railroad which is now being built to these mines. The properties in this group consist of 130 claims, covering a length of $1\frac{3}{4}$ miles, and a width of $\frac{1}{4}$ mile in a compact block. The ore carries a small amount of gold, from 0.5 to 6 kg. of silver, 10 to 45 per cent. lead, and 30 to 60 per cent. oxide of iron. The formation is a porphyry lime contact, with the ore-bodies deposited in the lime near the contact. There are extensive old Spanish workings on these properties, and also evidences of 10 or 12 old adobe smelters located up and down the creek near these properties. Three years ago the above

silver ore; the Veronica, which has just started shipping ore which runs well in silver; the Providencia San Carlos, which has started shipping silver ore, with some gold; and Esquadra, which is shipping about \$10,000 per month of silver ore.

In the Sierra Juarez, about 20 miles southeast of Oaxaca, is the Natividad, which is one of the oldest dividend-paying mines in the State.

Bichloride of Mercury in Nitroglycerin Explosives

A good deal has been heard in Great Britain recently with regard to the production of various nitroglycerin explosives of disputed value by Kynochs, of Birmingham. It is alleged that small quantities of bichloride of mercury are added in order to enable the insufficiently purified explosives to pass the official heat test, which

cotton, notably metallic iron derived from the machinery during manufacture. This prolongation of the heat test is not due to any preservative effect of the bichloride, and the evolution of nitrous vapors takes place in the presence of the bichloride exactly as it does when no bichloride is present. Some of the metallic mercury, however, produced as above explained, volatilizes at the temperature of the heat test and combines with the iodine liberated by the nitrous fumes, thus preventing the formation of iodide of starch. Originally, no doubt, the bichloride was introduced with the object of raising the heat test of the explosive, perhaps in the mistaken view that the higher test indicated greater stability. This, however, is not the case. On the contrary, there is some evidence showing that it rather reduces the stability. The addition of bichloride of mercury thus raises the heat test without increasing the stability of the explosive, and an insufficiently purified explosive may therefore pass the heat test which, without



HAMER SMELTER, OAXACA, MEXICO

firm secured these mines, exploited and developed them for about two years, and then built a smelter of 50-ton capacity, which has been running for about six months, and has produced in that time about \$400,000 worth of lead bullion, averaging 10 kg. silver, 2 to 4 oz. of gold and 95 per cent. lead.

As the amount of ore opened up in the development work is more than the small furnace can handle they have just bought another smelter of 100 tons capacity, which will be erected and running in a short time. These mines produce all the flux that is necessary for the smelter, and have been securing silicious ores from the Taviche mining district. The Taviche district is about 25 miles southwest of Oaxaca, on the Oaxaca & Ehutla Railroad. The producing mines in Taviche are the San Francisco, which produces about \$25,000 worth of ore per month, carrying silver and gold; the Conejo-Blanco, which produces \$20,000 per month, the value being in silver and gold; the San Juan mine, which produced last year a little over \$700,000; the Zapote, which produces \$15,000 per month of 4-kg.

they would not do in the usual course without the addition.

In this connection it is of interest to have Dr. Dupré's view of the effect of the presence of mercury. Dr. Dupré is chemical adviser under the Explosives Act. In his official report he mentions his research work undertaken for the purpose of detecting mercury in various explosives and refers to the cause why he undertook this research. An accident had occurred at Treffgarne, South Wales, by the explosion of some of Kynoch's gelignite, which was being thawed in an ordinary warming pan, heated only by warm water. This gelignite on examination was found not only to have been insufficiently purified, but also to have contained mercury. Attention was thus called to the possible presence of this material in other explosives. The mercury, added in the form of mercuric chloride, has, even when in extremely small quantities, a remarkable effect in prolonging, or masking, the heat test. The effect is not due directly to the mercuric chloride, but to the metallic mercury derived from it by reducing agents, practically always present in gun

such addition, would have been rejected. On this account the addition of bichloride of mercury or of any other material which has the effect of masking the heat test, has always been prohibited by the Home Office.

Such a prohibition is absolutely essential as long as the heat test is accepted for testing the purity of explosives, and after four years of special investigation of this and other published tests, Dr. Dupré's confidence in the value of the heat test is greater than ever. The heat test, moreover, is the only test published up to now which is applicable to nitroglycerin as well as to nitro-cellulose explosives. The confidence in the value of the heat test has been still further strengthened by recent experience, on a large scale, in actual practice.

Dr. Dupré mentions that there is some reason to believe, though his information was not authoritative, that the German government favors the addition of bichloride of mercury to gun cotton used in military explosives, as it is supposed to prevent wet gun cotton from becoming moldy. Gun cotton properly made, how-

ever, shows no such tendency, if kept out of contact with material likely to become moldy.

With regard to the testing for the presence of mercury in explosives, the usual test is to place a small parcel of gold leaf in the vapor evolved at a temperature of 70 to 80 deg. C., and then to test the gold leaf for mercury. Dr. Dupré does not find this at all a satisfactory test and recommends the spectroscopic test instead. This test, besides having greater delicacy, has the additional advantage of detecting the compound of mercury as well as the metal itself. The methods of preparing explosives for this spectroscopic test are still being elaborated and will be published later on.

Note on Prospecting a Group of Claims in Southern Arizona

By C. F. TOLMAN, JR.

In describing a piece of work which was done jointly by an old man and a young man, the latter just graduated from the University of Arizona, I cannot claim that modern mining methods were used, or that the work was economically done considering the time and labor expended. I give it, however, as an example of what can be done under unfavorable circumstances by pluck minus money. It was pluck which made the old man work himself sick, and which kept the young graduate's nose down close to the grindstone.

The properties are 26 miles from Tucson, Arizona. The last eight miles are over a mountain trail, and all provisions and supplies have to be packed this distance. Work was started June 15, 1906, and had been carried on just a year up to the time I visited the claims. During that time the two had done 140 ft. of work, including one 50-ft. and one 25-ft. shaft, the rest being 10-ft. holes. All work was in hard rock, some of it being solid quartz of the hardest variety.

The partners were not able to afford a windlass and buckets, and the rock had to be shoveled to the top of the 50-ft. and 25-ft. shafts from one stage to another. They had no bellows. Wood was used instead of coal or charcoal and the forge was built so as to create a draft when the wind blew. At the first sign of a strong breeze all other work was dropped, a rush made for the forge and the steel sharpened.

The total expense of the year's work was \$215.40. This includes the outfit of drills, hammers, etc., which they bought second-hand; one burro with bridle, pack-saddle and hobbles; food and clothing for the entire time, and the expense of 12 trips to Tucson. This makes their work cost them \$1.54 per foot.

It is necessary to see the work accom-

plished and the way it was done, before it is possible to appreciate the hard work necessary to make up for the lack of money, and to keep things going against heavy odds.

Explorations on the Western Mesabi

SPECIAL CORRESPONDENCE

A full account was given in a recent letter of a few of the explorations now in progress on the western Mesabi. That included, however, only a small part of this work, and more is given below:

Probably the most important exploratory development of the year, so far, at least, is a find of ore in section 14-57-21, on a State lease, by G. H. Crosby and others. Their blueprints show a very considerable tonnage, estimated by some as high as 10,000,000 tons, much of which is fairly good-grade non-bessemer. One interesting fact concerning this exploration is that a drill was driven through 171 ft. of hard taconite and is now 75 ft. in good ore beneath it, and still going in ore. This is one of the deeper taconite holes of the range. It is understood that this find of ore is tied up with one of the large steel-making concerns. Crosby and associates are drilling on section 11, just north of 14, and hope to find ore there. Perhaps the next most important find of recent months is in sections 5 and 6, 58-15, on both sides of Embarras lake, where Longyear & Bennett have options on several tracts, and are developing extensively. On the south side of the lake, in the N. W. $\frac{1}{4}$ of the S. W. $\frac{1}{4}$ of section 5, one hole has been put down more than 540 ft., and there are about 300 ft. of ore, beginning at 180 ft. down. This ore is of fair grade, averaging about 55 per cent. iron. Other holes do not show as deep a deposit, but look well. On the north side of the lake, in the N. E. $\frac{1}{4}$ of section 6, a considerable body of the same ore is being shown. In all several million tons have been proved there. In section 11-58-19, Messrs. Jennings Brothers, of Pittsburg, and John Helmer, of Duluth, have found about 1,850,000 tons of quite good ore, and are preparing to mine it, expecting to begin operations in about a month. In section 14, same town, and just south of the Helmer find, the Oliver Iron Mining Company has a small new deposit of about 1,000,000 tons. A small body of ore has been found in 9-58-18 and another in 14-58-19, the two containing perhaps 250,000 tons. Pickands, Mather & Co. have been working in sections 2, 9, 10 and 11-56-23, and are still exploring portions of the tracts. They have some very good ore there, and a lot of very poor. In section 16-57-22 the Republic Iron and Steel Company is drilling, and has found some encouraging signs of orebodies, but not-

ing merchantable as yet. On the east end of the range the St. Clair work, in lands of the old Mesabi Iron Company, under way for nearly a year, has not shown the anticipated results, and it is doubtful if more ore has been found there than has been known to exist for many years. In general deeper work is carried on now than in the past, and the ground is searched much more carefully, with more holes to the forty and more care in examining the rock taken up. Some very deep work is under way in 36-59-15, so far without result.

Iron Trade of Bilbao, Spain

According to the latest estimates¹, the population of Bilbao is about 100,000, the majority of whom are dependent on the iron mines and iron industries. All ore exported is subject to a tax, a considerable portion of which is devoted to public works for improving the river, port and harbor, with a view of making Bilbao an important general port. In this way the town hopes to preserve its prosperity when the iron-ore resources are exhausted. Bilbao is already a port of call for large vessels from Great Britain and the north-west of Europe, plying to Central and South America.

There was a slight decrease in the shipment of iron ore during 1906, but the mines are not likely to be exhausted for many years. The general quality of ore has deteriorated. Ore that would not have been accepted some years ago is now bought eagerly. Old tailings and débris heaps are being washed, and even hand picking is being resorted to. Few new iron-mine concessions have been applied for in this district, because the area is already almost entirely taken up. Tempted by the high prices and demand, several Bilbao houses continue to prospect and acquire properties in more remote tracts, hoping that eventually railway communication may be provided. The steel works in Bilbao, foreseeing the approaching exhaustion of the mines whence they at present draw their supplies of ore, are negotiating for the purchase of mines in Asturias and Leon.

According to the British consul at Bilbao, only Cornish tin is used for solder in the fish and fruit packing industries and in general commerce in the north of Spain. German makers copy the Cornish brand "Lamb and Flag," and a good deal of the German tin imported from Hamburg and Rotterdam bears this mark. Cornish tin, however, always carries the name of the smelter as well, and as the German tin carries no such name the two products can be readily differentiated by those who know.

¹From the British Columbia report for 1906.

Open-pit Zinc Mine at Webb City, Missouri

Operations at the Bradford-Kansas City Zinc Company's Mine Are Open to the Air, the Orebodies and Formations Being Plainly Visible

BY F. LYNWOOD GARRISON*

It is not often one has an opportunity of seeing a mining operation conducted open to the light of day and the free air of heaven, the orebodies exposed to view as plainly and well defined as in those hypothetical models we were wont to gaze upon with becoming wonder and inspiration in the callow days of our mining school education. The accompanying photographs which I took a year ago at the mine of the Bradford-Kansas City Zinc Company near Webb City, Mo., ex-

In making these photographs the chief object was to show the relation of the orebodies to the chert and associated limestone. This was perhaps best effected in Figs. 1, 2 and 3, wherein the light-colored masses (usually nearest the surface) are limestone, and the darker the chert and associated zinc blende. The ore-bearing chert at the upper levels and spots (not cavities) shown in these photographs is lean, almost too much so to mill. The general formation of the rocks might be

upper part of the photographs are some of the old workings which are perhaps not over 75 to 80 ft. below the surface, and were cut out before the present open-cast system of working was adopted. The ore at the lower levels carries little galena, following in this respect the almost universal custom of the district, since whatever system of paragenesis is accepted, the lead ores come first nearest the surface, then the blende, and the marcasite (iron sulphide) at any or all levels.



NO. 1



NO. 2



NO. 3

hibit some of the features of such an extraordinary operation. The orebodies here come very near the surface, galena having been mined in the older workings within 25 ft. of the grass roots followed, as is usual in this district, by zinc blende at a somewhat lower level.

I do not know the history of this mine but it seems likely in those days the work was carried on under cover in the usual manner. The robbing of pillars probably caused the roof to cave in, necessitating its subsequent entire removal, an operation no doubt justified in this case by the general shallowness of the orebodies. The great pit or crater thus created is about 300 to 400 ft. in diameter, and at the time the photographs were taken 125 ft. deep at the lowest stopes.

*Mining and civil engineer, Philadelphia, Penn.

likened to a pudding, the limestone forming the crust, the interior being made of chert breccias and limestone with bodies of ore scattered through it like the plums in the time-honored dish that adorns our tables on Christmas day.

FEATURES OF THE WORKINGS

The lower stopes as they appeared at the date of my visit, (May, 1906) are well shown in Figs. 4, 5 and 6, the great benches of material shown being cemented chert breccias carrying from about 1½ to 5 per cent. zinc blende. Occasionally it may be richer, but as a general thing in the Joplin region the content of the zinc mineral (not metallic zinc) does not exceed these figures, perhaps as a rule the general average is not over 3 to 4 per cent., especially in the so called sheet or blanket deposits which are relatively lean.

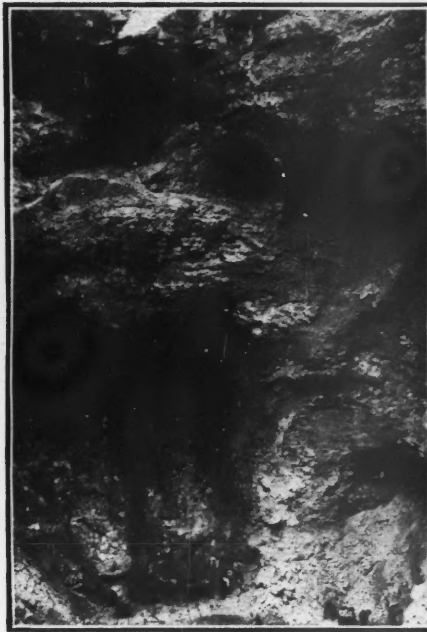
The cavities and caverns shown in the

The method of hoisting the ore at this mine is simple. The loaded cars are pushed by hand from the stopes to a hopper, through which they are dumped into large buckets that are hoisted to the apex of the tower of frame work shown in Figs. 7 and 8; thence the bucket is carried by an overhead trolley on a single rail to the mill a few hundred feet distant. The general aspect of the mine or quarry, as one may choose to term it, may be gathered from Figs. 9, 10 and 11, the last photograph showing part of the mill and tailing dump.

In order to sort ore by hand to the best advantage, the ore should be rinsed with water, so as to make the minerals show distinctly. The picking room should be well lighted. The pickers should be able to throw the ore from them, not draw it toward them.



NO. 4



NO. 5



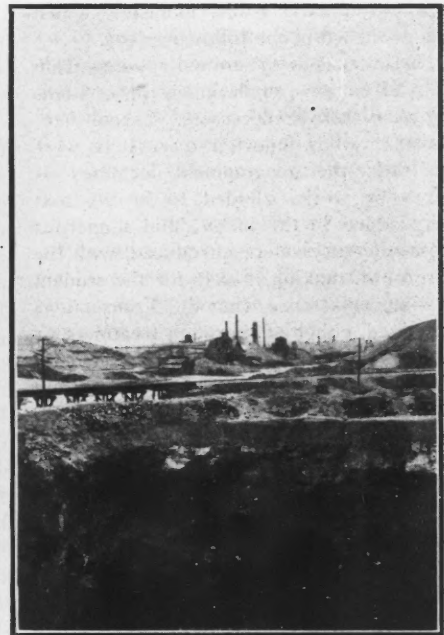
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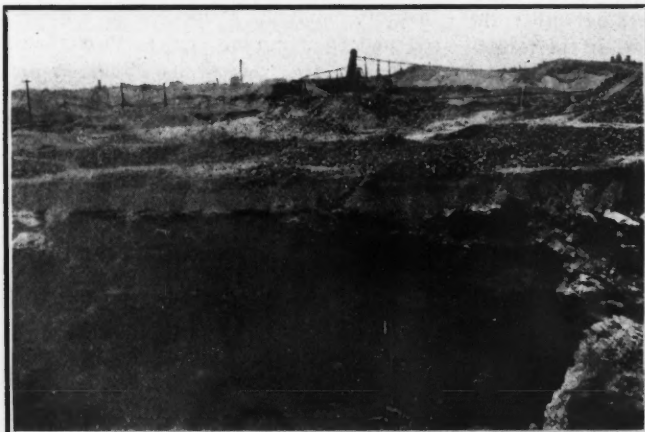
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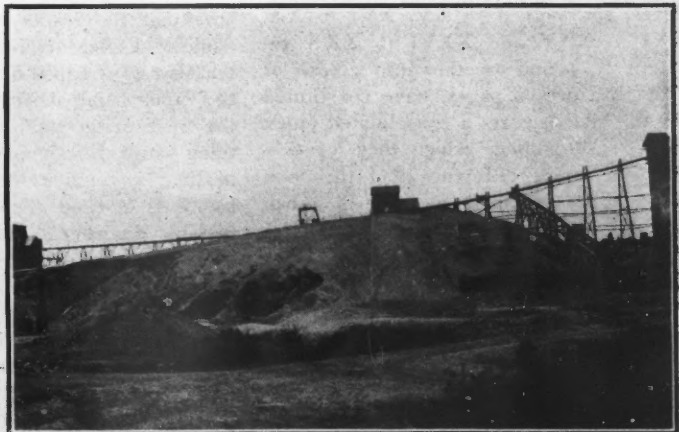
NO. 8



NO. 9



NO. 10



NO. 11

The Uses of Indexes

The following Preface to the forthcoming complete analytical and alphabetical index of Vols. I to XXXV, inclusive, of the *Transactions* of the American Institute of Mining Engineers, here published in advance through the courtesy of the secretary, will be interesting and suggestive to non-members, as well as to members, of that society.

PREFACE

The great additional value given to professional books by adequate alphabetical and analytical indexes has been recognized from the beginning in the publications of the *Transactions* of the American Institute of Mining Engineers. The first 10 volumes, edited by Dr. Thomas M. Drown as secretary, were provided with indexes as well as tables of contents. Moreover, he included in Vol. V (published in 1877) a consolidated index of Vols. I to V, inclusive; and, at the time of his resignation in 1884, he had prepared a similar index of Vols. I to X, inclusive, which was published in the following year.

The indexes of the annual volumes from Vol. XI on were made much more extensive than their predecessors. Casual mentions as well as important discussions were included; the geographical localities of mines or works alluded to in the text were added in the index; and numerous cross-references were introduced, with the purpose of making it easy for the student to discover at once what the *Transactions* contained, either of thorough treatment or of hints and clues to further inquiry, concerning any topic, locality or person within their scope. In order to extend the advantages of this larger scheme to the earlier volumes, a consolidated index of Vols. I to XV inclusive (published in 1888) was prepared by compiling the several annual indexes, and introducing additional items for those preceding Vol. XI. Vol. XX, issued in 1892, contained a similar consolidated index for Vols. XVI to XX inclusive; and in 1897, a separate index volume, covering Vols. XXI to XXV inclusive, was published. These four indexes, for Vols. I to XV, XVI to XX, XXI to XXV and XXVI to XXX respectively, bound together into a book of about 950 octavo pages, have constituted for the last 10 years a consolidated index to the *Transactions* which they cover—with the single difference that the book had to be consulted four times when a single comprehensive index would require to be consulted but once. This disadvantage, however, was relatively small, compared with the great convenience of finding by four trials in one book what would otherwise call for 30 separate searches in 30 books. Moreover, the possession of the one might be most useful to a student who did not possess the 30, by indicating to him what they contained,

and thus enabling him to make further inquiry without fruitless labor. To this feature of value in such indexes, I shall presently recur.

THE NEW INDEX

The usefulness of the compound four-fold index referred to, is proved by the fact that the supply of copies has been exhausted. In view of this foreseen event, it was decided to issue, instead of the customary additional five-year index, a complete consolidated index of Vols. I to XXXV inclusive, which should take the place of all preceding ones; and Miss L. E. Howard, the accomplished and indefatigable librarian of the Institute, has been for more than two years engaged, with competent assistance, upon this laborious task. The result, embodying a compilation of the former index volumes and the annual indexes of Vols. XXXI to XXXV inclusive, with numerous corrections, improvements in classification, additional cross-references, etc., is the present book, concerning which I desire to offer the following comments:

1. That this index is absolutely free from error, it would be ridiculous to assert. The atmosphere of an office and library crowded with daily visitors and overwhelmed with daily routine work does not permit such careful, intense and minute revision as technical perfection requires. While many errors contained in our former indexes have been detected and corrected in this one, some have doubtless been brought forward into it. In this respect, I beg (though I hope it is unnecessary) to say, that with regard to this, as to every other, publication of the Institute, our rule and practice is, to be grateful, not annoyed, when we receive notice of an error, and to acknowledge and correct, not hide or ignore it. Notice of any errors discovered in this book is therefore earnestly requested.

2. It would be likewise unwarrantable to claim for the present index a complete and consistent logical arrangement. Indeed, I am disposed rather to assert for it a higher merit—namely, that of a method more elastic than any fixed system. The controlling purpose has been, to make sure that the reader, seeking either the name of a mine or process, or the forgotten title of a paper or its author, or, on the other hand, desiring to be put upon the track of an inquiry concerning something which may or may not be mentioned in the *Transactions*, and wishing to be positively assured as to that point, before looking elsewhere, shall be satisfied as quickly as possible. Hence, in the construction of our index, we put ourselves in the reader's place, and often introduce a cross-reference not logically required by the text, because it may help him, if he has forgotten the term actually employed in the *Transactions*. In short, we make the index, not a mere concordance of words, but also a dictionary of topics and

ideas. And, as to any proposed cross-reference, our rule is, "When in doubt, put it in!" For it cannot harm anybody, and it may help somebody.

The result of this system, if system it can be fairly called, has been, I know, that many members of the Institute have formed the habit of going first of all to the index of our *Transactions*, sure of learning at once and without troublesome search, whether and to what extent, these volumes can aid them in any investigation they are called to make. I need not emphasize the folly of publishing, in these days, books on technical subjects without alphabetical indexes—a sin for which the most elaborate table of contents does not atone, and which, having repeatedly brought its own punishment, has well nigh gone out of fashion, as unprofitable sins are wont to do. But I may be permitted to express my surprise that so many editors and publishers of books intended for permanent reference, having taken the trouble to make indexes, do not take the small further trouble of making them adequately, abundantly, even unnecessarily and ostentatiously, full. There is no better recommendation of such a book to the potential purchaser, because there is no equal guaranty of its continued value to the actual purchaser. Practical men look to books for aid in the form of energy given or saved to them. Now mv^2 is the formula for energy; and in this case m is the information wanted, v is the speed with which it can be obtained. In other words, m represents the value of the text of a book, and v the effective aid furnished by the index; so that the permanent usefulness of the book is represented by the text, multiplied by the square of the index! This may be questionable mathematics, but it is unquestionable experience, as the practice of nearly half a century qualifies me to declare.

3. Comparatively few of the members of this Institute possess complete sets of its *Transactions*. The number of such complete sets now on hand is very small—perhaps twenty-five. The volumes have never been stereotyped, and it is not likely that any of them will be reprinted. The Institute maintains at more than a hundred important mining centers throughout the world, free sets of its *Transactions*, open for consultation without fee, by all suitable applicants. This list cannot well be increased. If this new consolidated index of 35 volumes would be useful only to those who possess, or may hereafter possess, all of those volumes, the large cost of its preparation and publication would involve a most unwarranted and foolish outlay. I wish, therefore, to urge upon all students and practitioners, whether members of the Institute or not, the following considerations concerning the special value of this Index to those who have not the volumes themselves.

VALUE OF THE INDEX

Indeed, in a certain sense, such an index is more useful to the non-possessor than to the possessor of the books. For the latter can, at the cost of some extra labor, find out what each volume contains, whereas the former, having at hand neither books nor index, is utterly ignorant whether the *Transactions* could help him or not. I often receive letters from members thus situated, inquiring what our *Transactions* contain on this or that subject; and while I do my best to satisfy them, I cannot be sure that my hasty search is complete and conclusive; and I am obliged, whenever practicable, to refer them to some library containing the volumes, and bid them do their own hunting. But, on the contrary, if a member, finding in the index the title of a paper, or the record of any remarks concerning a subject in which he is interested, writes to the secretary concerning it, I can easily, and always do gladly, tell him in reply what is the nature, length, etc., of the said passage; whether we can furnish it to him in separate pamphlet form, etc.—these being particulars which my clerks can ascertain for me at once. Moreover, members of the Institute send me, not infrequently, valuable professional papers, in which previous contributions to the *Transactions*, directly or indirectly dealing with the same subjects, are ignored. It is my theory that the author of an Institute paper should recognize what his fellow-members have done before him in the same line. Of course, if he fails to do this, it is because he does not possess the back volumes of our *Transactions*, and is not acquainted with their contents. It is the duty of the secretary to call his attention to this omission; and the result is not only extra labor for the secretary, but often also some unnecessary mortification to the author, who is obliged to recast his paper in the light of the new information furnished to him. All this would be avoided if the author had had at hand simply an index of the *Transactions* upon the consultation of which he could have obtained from the secretary, in advance, both guidance and aid.

4. But there is another and more important reason for recommending to all mining engineers, metallurgists, etc., whether members of the Institute or not, the acquisition of this volume. Namely, the issue of it by the Institute is part of a plan, the full realization of which is scarcely yet in sight, while every step toward its complete accomplishment is, in my judgment, to be regarded as an essential gain.

THE INSTITUTE LIBRARY

As is well known, the generosity of Andrew Carnegie, for many years a member, and now an honorary member, of this Institute, has provided for this Institute, together with the American Society of

Mechanical Engineers and the American Institute of Electrical Engineers, the magnificent building in which our headquarters are now permanently located. One consequence of this arrangement is that the libraries of the three societies are accommodated together in the 12th and 13th stories of the building. These libraries, aggregating more than 50,000 books, pamphlets, etc., comprise perhaps the most complete record of modern engineering practice in the departments of the three societies which can be found in the United States—for specifically American practice, perhaps the best in the world. At the present time, they are separately owned and administered by the three societies; but, so far as their use is concerned they constitute practically one library, to which the members of each society and others properly introduced have free access. We hope, by means of indexes and catalogs, to extend this advantage to members at a distance, who may thus be enabled to consult books and periodicals by correspondence, to obtain copies of text and drawings, etc., etc. Toward this end, the issue of the present index is an important step.

5. Finally, this volume has not been stereotyped: the edition is limited to 2500 copies; and orders received will be filled in succession, according to their dates, while the supply lasts.

R. W. RAYMOND.
SECRETARY.

Gold Dredging in Russia

By S. BOGOVIN.

Gold dredges are of recent date in Russia and were put in use only five or six years ago. Bearing in mind that the gold-mining industry has existed in Russia over 150 years and remembering the primitive method of washing auriferous sands, the rejection of old plants alone ought to present a large opportunity for the work of dredges. Moreover, there are in Russia a great many rivers and lakes with auriferous channels, where dredges might be used. Eastern Siberia and especially the Amoor region, presents fields where American dredges might be introduced. The easy and cheap delivery of a dredge can be made, duty free, at Vladivostok or Nicolaievsk, on the Pacific coast, but initiative, energy and knowledge of local conditions are required.

The Permanent Consultive Office of the gold and platinum industries in Russia, which represents the interests of the gold and platinum industry of all Russia, has collected and recently published some interesting data on the production of the Ural and Siberian dredges in Russia in 1906. There are in all about 40 dredges working in Russia at present; information has been obtained as to the work of 32 of these. They extracted 43,081 oz. troy

of gold and platinum in 1906; of this quantity there was 6472 oz. platinum and 36,609 oz. gold. The largest quantity of gold was extracted by the dredge of the Moscow Timber Industry Company in the Ural, which during 175 days saved 3338 oz., and washed 5,615,200 cu. ft., working 19.75 hr. per day on an average. This dredge was built by the Poutilov Works at St. Petersburg. The dredge is very solid, but the excessive price of these machines, from \$75,000 to \$85,000 each, prevents their general introduction. The price given includes the cost of the pontoon and the erection of the dredge on the spot.

The following average figures per dredge are from data given as to the 32 dredges in the Ural and Siberia:

Working days in 1906.....	173
Working hours in 1906.....	2837
Gravel washed.....	159,537 cu.yd.
Gold extracted.....	1,346 oz.
Average per cu.yd.....	0.10125 oz.

The results cannot be considered as successful, since the exploitation of the dredges cost more than the gold extracted. The failure is explained by the fact that dredges constructed by Russian works, other than the Poutilov Works, have proved to be too weak to do the work, and their buckets were not large enough.

Two foreign dredges are working in Russia; one owned by Marshall, Son & Co., an English firm, and the other by the Conrad Company, organized in Holland.

Low-grade iron ores and impure graphite have been smelted by electricity with success in Norway, the resulting pig iron being of very good quality.

The Colorado Zinc Company, of Denver, Colo., has four standard Wetherill machines in operation. Each machine has three double-pole magnets, giving six points at which magnetic material can be lifted off the main belt and separated from the non-magnetic material. The ore discharged over the tail end of the Wetherill machine is immediately treated by a Blake electrostatic machine. The capacity of the standard Wetherill separator on Leadville ores varies from 700 to 1000 lb. per hour, using 7.5 h-p. to excite the magnets and operate the machine. The capacity of the plant is 300 tons per week, the process being wet crushing and concentration to remove the lead (and silica when present), settling the slimes for zinc product, drying the mixed zinc-iron concentrate and treating it on four Wetherill machines, followed by four Blake machines. Consequently, if all the crude ore passed over the Wetherills, it would be less than 11 tons per day. Making allowance for the lead concentrate and for the slime, it would appear that each of the Wetherill machines, under the above conditions, averages in steady work, fully nine tons per day of Leadville mixed sulphide ore.

Briton Ferry Works of the Cape Copper Co.

Ores from Namaqua and Tilt Cove Are Calcined in Cylindrical and Mechanically Rabbled Furnaces and are Smelted in Reverberatories

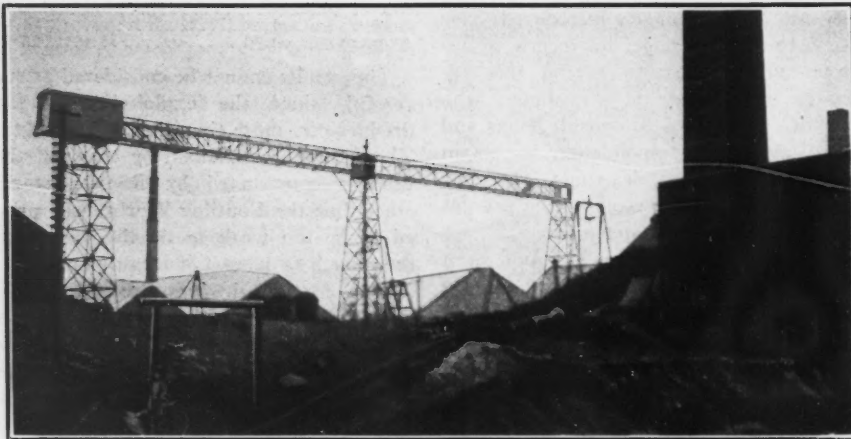
BY EDWARD WALKER

By far the largest copper-smelting works in South Wales is that owned by the Cape Copper Company. As mentioned in a previous article, there are only five works in South Wales where copper is produced. Three of them are customs smelters, one is the refinery of the Rio Tinto Company, and the fifth is the Cape works at Briton Ferry, which is the only

The Cape company smelts its poorer ores at the mine and produces a matte running from 48 to 50 per cent. copper. This matte is shipped to Swansea and then sent by rail to Briton Ferry, as also are the richer ores, which consist of mixtures of bornite and chalcopryrite averaging 26 per cent. copper. During 1906, matte amounting to 11,249 tons and ores

quite a different nature. They run 3½ per cent. copper and 35 per cent. sulphur, and contain a few pennyweights of gold per ton. During 1906, the amount treated was 27,945 tons.

The total output of copper at Briton Ferry during 1906 was 10,812 tons, of which 793 tons were in the form of sulphate and the remainder as ingots. Of this amount 7223 tons came from Cape ores and matte, 2936 tons from Namaqua ores and matte, and 653 tons from Tilt Cove ores.



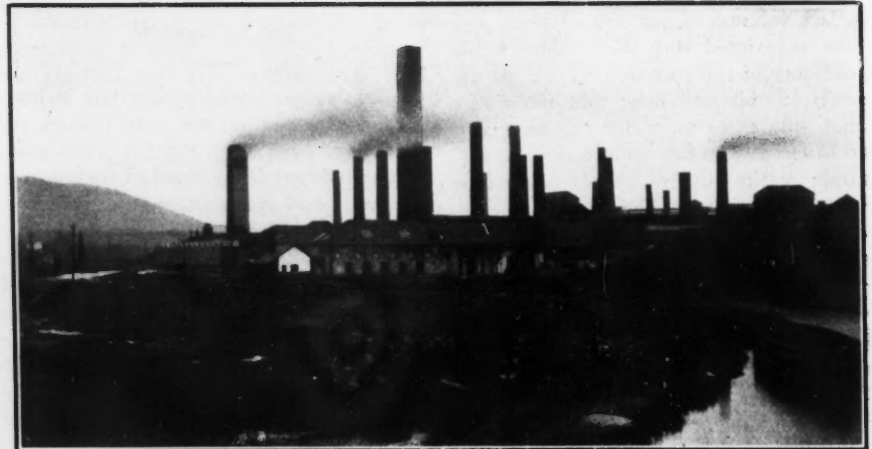
CAPE COPPER WORKS, BRITON FERRY

one where ores belonging to specific mines are smelted.

SOURCES OF ORE

The Cape Copper Company owns mines in Namaqualand, in the western portion of Cape Colony. The poorer ores are smelted on the spot, and the matte so produced together with the richer ores are shipped to Briton Ferry for treatment. The company also treats in a similar way the ore and matte produced at the adjoining mine owned by the Namaqua Copper Company. A third source of ore is the mine of the Tilt Cove Company in Newfoundland. The Namaqua company is an entirely independent organization, but the Tilt Cove mine is leased and managed by the Cape company.

The ore from these three mines shows signs of not being exactly inexhaustible, and the Cape company is always on the lookout for supplies from other sources. The company finds the same difficulty in meeting with other ores in the open market as is experienced by the Swansea customs smelters. It is also open to purchase another mine outright, but the prices demanded are always based on the London mining stock market's valuation of mining property, and are far too high to permit them to be discussed on a commercial basis.



SMELTING WORKS, CAPE COPPER COMPANY

amounting to 5278 tons were treated at Briton Ferry. Similar ore and matte are received from the Namaqua mine. The matte averages 54 per cent. copper and the ore runs from 12 to 28 per cent. copper, averaging 17 per cent. During 1906, the Cape works treated 883 tons of matte and 13,897 tons of ore from the Namaqua mine. These ores and mattes from the two mines are much of the same nature and are mixed in treatment. The gold and silver contents are not sufficiently high to warrant extraction.

The ores of the Tilt Cove mine are of

reaction between the sulphide and oxide removing all the sulphur and so producing copper.

The calciners employed at the Cape works consist partly of revolving cylinders, and partly of the traveling rake type; the latter are gradually being increased owing to their economy over the revolving cylinders. Some of the cylinders still in existence are 60 and 80 ft. long. The rake calciners are built according to the designs of D. W. Prosser of Neath. One of them is shown in the accompanying illustration. They are sim-

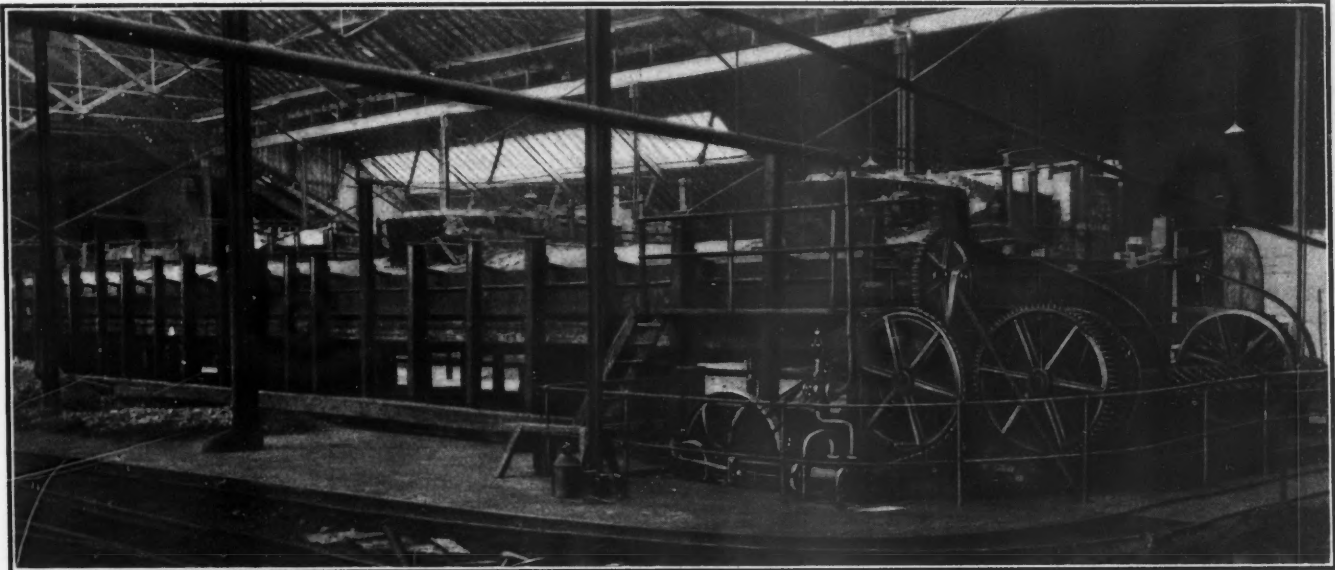
METHODS OF TREATMENT

The ores and matte from the Cape and Namaqua mines are first calcined and then treated in reverberatories, where a white metal containing 76 per cent. copper is produced. This white metal is refined by the direct method invented by T. D. Nicholls, the metallurgist of the company. This direct process has been described by Dr. Peters in "Modern Copper Smelting," and in a paper read before the Institution of Mining and Metallurgy by Christopher James. According to this process, some of the white metal is calcined and mixed with uncalcined white metal, the resulting

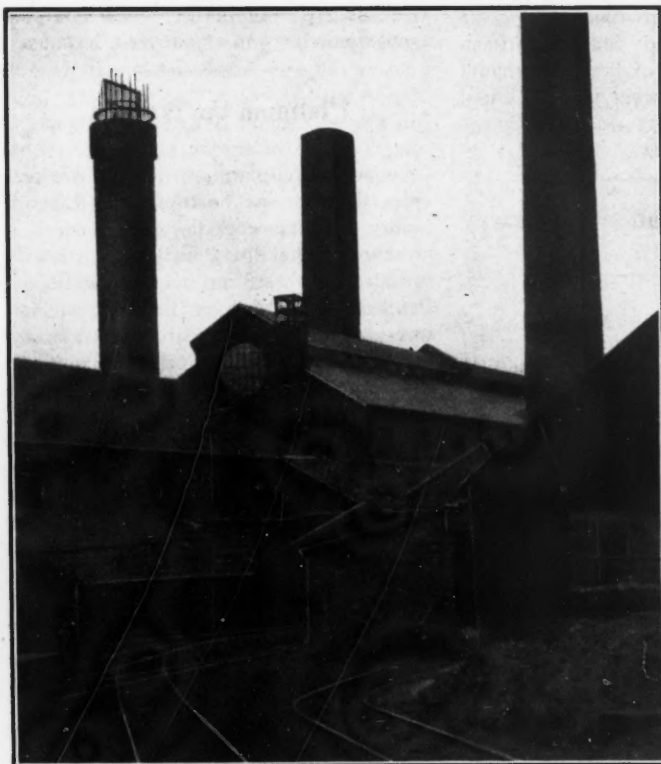
ilar in design to the straight-line calciner. There is only one floor, and the rakes are few and travel slowly. The rakes on entering and leaving pass through double doors and make the return journey outside and underneath the structure. Heating is effected by means of gas. The

plant above. About 30,000 tons of chamber acid is produced every year in this way. Some of it is used in the manufacture of sulphate of copper on the spot, and the rest is sold to the local manufacturers of tin-plates who appreciate it owing to its entire freedom from arsenic.

then calcined and treated in reverberatories. The metal produced is stripped and the resulting gold bottoms are treated in a furnace which produces granulated shot. The shot is used in the manufacture of sulphate of copper. In this operation the gold and silver in the shot are deposited



THE PROSSER RAKE CALCINER



STEEL-CONCRETE CHIMNEY AT NEW POWER HOUSE



AERIAL TRAMWAY

ores and mattes operated on are not difficult of treatment, and from the point of economy the rake furnaces give good results.

The Tilt Cove ores are first burned in kilns where combustion is maintained entirely by the sulphur contents. The sulphurous gases pass to the sulphuric acid

ARRANGEMENT OF SMELTING PLANT

The burnt ore coming from the kilns is sent to the cupola house, where it is smelted in conjunction with the slags from the reverberatories. There are four cupola furnaces, each of 70 tons capacity, three of which are in use at one time. The matte produced in these cupolas is

as mud which after treatment in another process is sent away as slimes.

The works are equipped with electrical transporting plant by means of which the various products are handled. One of the illustrations shows the electric carriage and wagon in mid air. The ore coming from the breakers and crushers is ele-

vated to a bridge shown in another illustration, by means of which it is delivered to heaps as required. Other illustrations accompanying this article give a general view of the works, and a view of a new double concentric chimney made of steel and concrete, in course of construction. This double chimney is to take the place of two of the large square section chimneys adjoining.

The works are situated at a good distance from any habitation. They are on the Great Western and the Rhondda railways, and also on the canal, and being only a few miles to the east of Swansea, are favorably placed for the reception and shipping of ores and products.

Assay Work in the British Mint

Dr. T. K. Rose chemist and assayer to the British Mint, reports that a much larger number of gold assays were made during 1906 than during any previous year owing to the very extensive issue of coins during the year. The total number was 31,309, of which 8524 were assays of ingots, 15,570 assays of bars, 4157 assays of coin and 3058 check assays on fine and standard gold. The mean assay of the sovereigns struck at the mint during 1906 was 916.694, and that of the half sovereigns 916.604. The assay of the sovereigns and half sovereigns was 916.667 as compared with 916.661 during 1905. The mean assay of silver coins struck during 1906 was 924.813 as compared with 925.109 during 1905. The total number of assays of silver was 13,673, distributed proportionally in a manner very similar to that of the gold assays.

Once a year portions of metal removed from gold and silver ware assayed and hall-marked by the assay offices at Birmingham, Sheffield and Chester are submitted to the chemist at the Royal Mint. During 1906 this assaying was done on July 13. In every case the gold and silver contents of the wares were found to be appreciably greater than the legal standard. For instance 22-carat (916.66) ware from Sheffield was found to average 919.06 and 15-carat (625) from Birmingham averaged 629.2 fine.

The British mint struck an unusually large number of gold and silver coins during 1906. The total value of the gold coins was £12,165,000, as compared with £6,500,000 during 1905, and an average of £7,167,554 during the years 1896-1905. The face value of the silver coins was £1,705,070, as compared with £510,691 during 1905, and an average of £1,068,403 during the years 1896-1905. During the year gold bullion valued at £12,541,066 was taken into the mint, and the face value of light coins received for recoinage was £2,700,000. The deficiency in weight of the withdrawn coins was £30,061 in all.

Meerschaum in Asia Minor

According to a recent United States consular report, meerschaum in a raw condition is soft, light, and non-transparent. The color is white, with an occasional blending of yellow, red, or gray. It is dug up in nuggets, some of which are of enormous size. The meerschaum district, in Asia Minor, extends from the town of Eskischehr, on the Anatolian railway line, almost due eastward to the city of Angora. The diggings are about 10 hours by camel train from the railway station. The conditions of labor are very primitive. Every digger works independently and on his own account. The Government demands 15 per cent. as a tax on the mineral which is removed from the field.

The most of the meerschaum of Asia Minor finds its way to Vienna, where it is used almost exclusively in the manufacture of pipe heads and cigar holders. In recent years fashion and competition have done much to injure the Austrian export trade in meerschaum pipes, and indirectly the output of meerschaum in Asia Minor.

In recent years a meerschaum industry has also sprung up in the United States, where many emigrant Austrian cutters and polishers are doing well. This has also had the effect of greatly reducing the exports to the United States. Fifteen years ago 60 per cent. of the meerschaum exports from Vienna went to the United States, but Germany has since supplanted America as Austria's best customer.

Iron Ore Concentration in Norway

SPECIAL CORRESPONDENCE

The progress of the Dunderland Iron Ore Company, which has embarked on the vast enterprise of concentrating and briquetting iron ores in Norway, is still embarrassed by unforeseen difficulties. For some years past I have in these columns referred to the troubles of this company. The chief trouble during the past year has been the defect of the fine grinding apparatus. The plant erected could not cope with anything like the amount of material expected, and was not able to crush to a fine enough mesh. A new plant is now in place, and is stated to be giving greater satisfaction. Another trouble experienced recently is the choking of the hematite magnets with particles of ore, which greatly reduces their efficiency and prevents the recovery of the iron. As regards the briquetting it is stated that this section of the enterprise gives satisfaction, though owing to the irregularity of the work done, it is impossible to give any idea of the actual cost of the operation. Up to the present time only 17,000 tons of briquets have been shipped and sold. The company has also suffered from labor difficulties, and has found it next to im-

possible to secure sufficient hands. Altogether the outlook is no better than when I wrote my last notice of the company in the autumn of 1906.

The Grecian Asphalt Industry

A few aspects of the condition of the asphalt industry are given in the *Zeit. f. angew. Chem.* (July 5, 1907). The first discoveries of the asphalt deposits at Marathonopolis on the western side of Peloponnesus, were made about five years ago. The material is a pure lime rock richly impregnated with bitumen. On the surface of the deposit the sun has bleached the rock to the color of ordinary lime, and this action has been attended by an enrichment of the lower part of the deposit. The material contains from 15 to 25 per cent. bitumen, which is about one quarter fixed asphalt and three quarters liquid petroleum. Dry distillation of the asphalt yields an oil which can be used in the manufacture of oil-gas, but which is more advantageously applied to the extraction of the bitumen. This last process is carried out either by the use of the oil, by heating the rock in a current of gas or acetylene to melt out the bitumen, or by extracting with benzol. The chief use of the bitumen is in the manufacture of an asphalt paving mastic which contains approximately 15 to 17 per cent. bitumen.

Platinum in Nevada

Copper-nickel-platinum ores of Bunker-ville district in northeastern Lincoln county, Nevada, occur in diabase eruptives in schist. The dikes, striking northeast-southwest, are of an average width of about 20 ft. and have been traced for several miles. There are three nearly parallel dikes, only the middle one of which has been exploited. The assay value of the ore exposed is reported as 4 per cent. copper, 2.5 per cent. nickel and $\frac{1}{3}$ oz. platinum.

Recently a large area of country around Miller's Lake, a dry desert pan near Stonewall mountain, some 15 miles southeast of Goldfield, has been located for platinum-mining purposes. The ground has long been known to contain black-sand deposits which are in places auriferous; but the returns from a recent shipment of the black sand to a smelter at Seattle, Wash., showed a platinum value of \$38 in addition to gold and silver values. The ground will now be thoroughly tested for platinum.

The British consul at Trieste, Austria, reports that several bauxite deposits have been discovered in Lesina, which is one of the islands in the Adriatic, forming part of the State of Dalmatia. New coal mines have recently been opened up in the same state.

The Operation of the Iron Blast Furnace

Details of the Working of a Blast Furnace. Disposition of the Iron and the Slag. Difficulties Sometimes Encountered

BY BRADLEY STOUGHTON*

In previous articles the construction of the blast furnace has been outlined, and an account given of the chemical reactions which occur in smelting iron ore. In the present article the working of the furnace when in blast is outlined, with an account of some difficulties encountered in its operation.

DRYING THE BLAST

The water vapor blown into the furnace (derived from the moisture of the air) is equivalent to from 0.33 to 2 gal. of water per 10,000 cu.ft. of blast, or 1 1/2 to 8 gal. per minute, depending on the humidity of the atmosphere. Though this steam is as hot as the blast, it materially cools the smelting zone of the furnace by dissociating there. The reaction $H_2O = H_2 + O$ absorbs 58,060 calories, or 1 lb. of steam absorbs 7,110,000 calories. The hydrogen and oxygen reunite in a cooler part of the furnace and return the same amount of heat, but this does not compensate for that taken away from the smelting zone where it is most needed. For this reason a few American plants, and at least one in England, have adopted James Gayley's invention of drying the air by refrigeration before it is drawn into the blowing engine. This results in greater regularity of furnace working and valuable saving in fuel. In fact so great is the economy shown in this respect that there was a tendency at first to receive the results with skepticism. However, J. E. Johnson, Jr. has explained this saving, in a very ingenious and skilful manner by showing that every blast furnace has a certain "critical temperature" below which it will not perform any smelting, and that the theoretical temperature of combustion of the smelting zone is only a little above this "critical temperature." To increase this small interval between the two therefore greatly increases the "available heat," though the change in nominal temperature be small.¹

SLAG DISPOSAL

On account of its lower specific gravity the slag floats on top of the bath of iron in the hearth and accumulates frequently until it reaches the bottom level of the tuyeres. Four or five times every six

*Adjunct professor of metallurgy, School of Mines, Columbia University, New York.

¹If further explanation of this argument is needed, it may be found in the following simile: Water boils at 212 deg. F. If the temperature of a boiler is 262 deg., there is a certain pressure of steam. If we increase the temperature only 50 deg., we double the pressure; yet 50 deg. appears small in comparison to 262 degrees.

hours the plug in the cinder notch is pierced with a steel rod and the cinder above this level allowed to run out. It flows down an inclined iron runner for a distance of 15 to 30 ft. and pours into an iron ladle on a standard-gage railroad track, whence it is drawn away by a locomotive and poured out on the slag dump. Slag varies in composition according to the will of the blast furnace manager, and some typical analyses are given in Table

the percentage of lime in the limestone and other materials charged into the furnace. Since all the lime charged goes into the slag, the amount of the latter will be equal to the weight of lime divided by the percentage of the lime in the slag. Thus if we use per ton of iron 1300 lb. of limestone, containing 50 per cent. of lime, there will be 650 lb. of lime charged for every ton of iron made. If the slag made contains 40 per cent. lime, then the

TABLE I. COMPOSITION OF BLAST FURNACE SLAGS.*

	SLAG.						IRON.		REMARKS.	
	SiO ₂	Al ₂ O ₃	CaO	MgO	FeO	S	Total not including S.	Si		S
1	33.10	14.92	40.76	9.67	.....	.....	98.45	3.37	tr.	Cuban ore, hot furnace.
2	32.27	14.57	41.02	10.30	.....	.....	98.16	3.18	tr.	" " " "
3	34.26	11.63	40.25	13.28	.....	.....	98.32	4.81	0.01	" " " "
4	32.68	13.50	43.28	9.44	.....	.....	98.90	1.25	0.06	" " warm.
5	32.28	9.38	46.95	9.52	.....	.....	98.13	0.70	0.11	" " cool.
6	34.50	7.94	46.47	10.47	.....	.....	99.38	0.69	0.05	" " " "
7	34.98	12.05	41.33	9.62	.....	.....	97.98	2.60	0.03	Spanish ore, hot furnace.
8	34.70	11.44	41.27	9.96	.....	.....	97.37	2.32	0.02	" " " "
9	35.68	11.93	45.96	6.69	.....	.....	98.26	1.27	0.02	" " " "
10	29.86	12.04	45.20	11.41	.....	.....	98.51	1.27	0.02	" " " "
11	28.95	12.04	49.30	8.46	.....	.....	98.75	0.57	tr.	" " cool furnace.
12	30.62	10.47	49.13	7.49	.....	.....	97.71	0.26	0.02	" " " "
13	32.55	11.13	47.16	6.61	.....	.....	97.45	0.15	0.03	" " " "
14	30.09	11.44	46.36	8.76	.....	.....	98.64	0.58	0.03	" " " "
15	31.46	11.50	44.85	10.41	.....	.....	98.22	0.20	0.07	" " " "
16	36.08	12.85	41.69	7.25	0.54	1.02	98.41	2.15	0.020	Hot furnace.
17	37.19	12.65	35.47	11.32	0.90	1.70	97.53	1.92	0.029	Lake ore and Fairly hot.
18	36.86	10.74	42.46	6.62	0.63	1.54	97.31	1.50	0.028	part an-
19	32.06	11.97	42.46	10.25	0.63	1.76	97.37	1.59	0.032	thracite
20	35.57	10.65	44.11	8.55	0.81	1.74	97.69	0.94	0.017	coal; most-
21	35.38	11.76	38.19	12.32	0.90	1.60	98.53	1.13	0.040	lyConnell-
22	36.35	10.21	40.10	10.95	0.99	1.28	98.60	0.66	0.085	ville Coke.
23	39.70	12.56	38.12	11.60	0.32	0.96	98.30	0.50	0.101	Cool.
24	35.11	14.21	28.41	22.38	.....	.....	100.12	1.37	0.048	Lake ore and
25	35.10	14.75	27.95	22.28	.....	.....	100.08	1.85	0.038	Av. of 8 weeks.
26	35.84	14.34	32.71	17.46	.....	.....	100.35	1.60	0.034	Connell- Av. of 7 weeks.
Averages for hot furnaces—										
	33.21	13.67	40.68	11.08	.....	.....	98.64	3.79	tr.	Cuban ore.
	34.84	11.75	41.30	9.79	.....	.....	97.68	2.46	0.025	Spanish ore.
	31.77	11.98	45.58	9.05	.....	.....	98.38	1.27	0.020	" "
	35.55	12.05	40.52	8.86	0.68	1.66	97.66	1.79	0.027	Lake ore.
Averages for moderate or cool furnace—										
	33.15	10.27	45.57	9.81	.....	.....	98.80	0.88	0.07	Cuban ore.
	30.73	11.32	47.36	8.35	.....	.....	97.75	0.35	0.03	Spanish ore.
	34.75	11.30	40.12	10.86	1.26	1.40	98.29	0.81	0.063	Lake ore.
	35.35	14.43	29.69	20.71	.....	.....	100.18	1.61	0.040	" "

NOTE—All slags are from Steelton furnaces except Nos. 24, 25 and 26. The ore mixture was the same in all the cases where Spanish ore was used.

*From *The Manufacture and Properties of Iron and Steel*, by H. H. Campbell, p. 59.

1. Slags high in lime are sometimes treated with additional lime to make a good grade of portland cement, known as "Puzzolani." The amount of cinder made will depend on the amount of silica, alumina, etc., in the ore, the amount of coke ash and the amount of flux, which will also depend on the desired slag analysis. Under favorable circumstances the slag may weigh slightly less than half as much as the iron produced; under other conditions it may weigh nearly twice the iron.

The amount of slag may be calculated from the amount of lime (CaO) in the furnace, which may be calculated from

weight of slag will be $650 \div 0.40 = 1625$ lb. per ton of iron made. The accompanying table gives the composition of a number of slags.

IRON DISPOSAL

Immediately after the last "flushing," that is, removal of cinder, the tap hole or iron notch is opened by several men drilling a hole in it with a heavy pointed steel bar. Out of this flows 100 to 150 tons of liquid pig iron, with which is carried along 30 tons or so of slag. The "skimmer" is situated about a dozen feet in front of the furnace. It is an iron plate extending down almost to the bottom

of the runner. The slag is deflected by this plate into a runner of its own which leads it off to a slag ladle such as described before. The heavier pig iron flows under the skimmer and is distributed to six or seven brick-lined ladles on a standard-gage railroad track. It is then drawn away to the steel works, or, if not wanted there, is poured into iron molds at the pig-casting machine.

There are several types of molding machine but a common form is illustrated in Fig. 1, and consists of a long continuous series of hollow metallic molds carried on an endless chain. *A* is the pig-iron ladle pouring metal into the spout, whence it overflows into the molds as they travel slowly past. The pig iron chills quickly against the metallic molds and by the time it reaches the other end of the machine, it consists of a solid pig of iron which drops into the waiting railroad car as the chain passes over the sheave. The pig iron is now in a form convenient for transportation or for storing until needed. The molds travel back toward the spout, beneath the machine and hollow side down. At the point *C* they are sprayed with whitewash, the water of which is

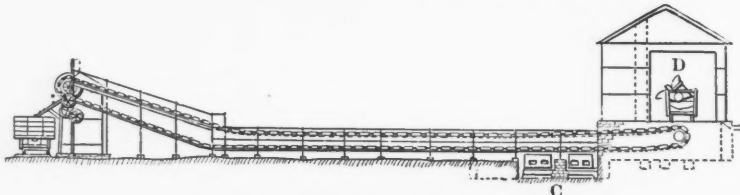


FIG. 1. CASTING MACHINE FOR PIG IRON

quickly dried off by the heat of the mold, leaving a coating of lime inside to which the melted iron will not stick. This mechanical casting is a great improvement over the former method of cooling iron in front of the blast furnace, because of the severity of the work which this involved and which, in hot weather, was well nigh intolerable to human beings. It also gives pigs which are cleaner, that is more free from adhering sand. This silicious sand is objectionable especially in the basic open hearth furnace.

SAND CASTING

This method is still used at some furnaces because of the capital needed to install machines and their high cost for repairs. Moreover, foundrymen often prefer the sand-cast pig because they are able to tell by the appearance of its fracture what grade of castings it will make, which they cannot well do with iron cast in metal molds. In the sand method the cast house extends in front of the furnace and its floor is composed of silica sand in which the molds or impressions to receive the liquid iron are made. The main runner extends from the tap-hole down the middle of the floor, and the space on either side of it is used alternately for alternate castings. The plan of the arrangement is shown in Fig. 2. After cool-

ing the iron the pigs are broken away from the sows, which are also broken into pieces with a sledge, and then all carried over and thrown into a railroad car.

In making "basic iron," that is, iron for the basic open-hearth steel process, the molds for the sows and pigs are permanently made of metal, so that the iron will not carry acid sand into the basic hearth.

IRREGULARITIES IN BLAST-FURNACE WORKING

The blast furnace is by no means a perfect machine, and great difficulties arise in the working of the furnace, and in maintaining a uniform grade of product. The chief of these difficulties result from localized chilling of the semi-molten charge. This is most liable to happen in the upper part of the smelting zone, where a little lump of pasty material may attach itself to the walls of the furnace. This has the effect of hindering the descent of that part of the charge above it, and of deflecting the hot gases to other parts of the furnace. The result of the first action is to disarrange the order and evenness with which originally horizontal

are provided with explosion doors, which fly open under pressure and relieve the strain, while the practice in other instances is to fasten everything down as tight as possible and prevent the rapid escape of the gases.

There is also a large amount of hanging due to the action of the blast tending to drive the stock before it up into the stack of the furnace, and thus compress it. This action is more liable to take place with fine ores.

Cooling of the charge also results in some cases in the freezing of material over the mouths of the tuyeres. The solid layer may sometimes be broken away with a bar, and thus allow the blow to be continued until more heat can be brought down into the hearth. Sometimes it is necessary to melt out the frozen material

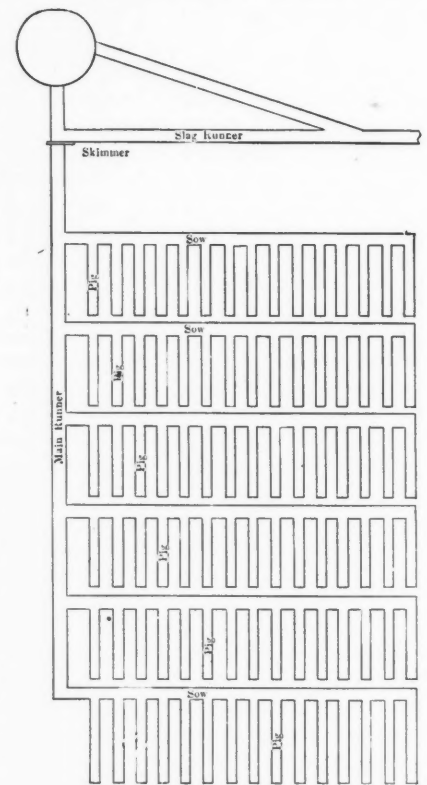


FIG. 2. ARRANGEMENT OF CASTING HOUSE

with a blow pipe, and in extreme cases it may even be necessary to break through it with explosives. Another difficulty sometimes met with is freezing up of the metal in the lower part of the hearth, so that it is impossible to open the tap-hole. Then a new tap-hole must be made by boring through the front of the furnace at a higher level, from which the iron is drained, and then the heat gradually worked down until the whole hearth is melted out and normal conditions established. The bad work of a furnace is often cumulative in its effects, because irregularities in the smelting zone have an effect upon the top gases which, in turn, derange the work of the stoves and hence the hot blast.

These irregularities in smelting have a disturbing effect upon the character of the

rings of stock come down into the hearth. The obstruction is also liable to receive chilled materials from above and to build itself out toward the center. When the furnace is working badly, these scaffolds may occur at two or more places at the same time and cantilever out toward the middle. This will cause a "hanging" of the charge, and may become so bad as to cause a complete arch over the smelting zone, through which it is impossible to drive the blast. Sometimes the scaffold may be broken down by suddenly cutting off the blast pressure and allowing the full weight of material in the furnace to come upon the obstruction; but sometimes it is necessary to cut a hole in the wall of the furnace and melt it out with a blow-pipe burning oil or gas, or with some other form of heat.

The scaffolding of a furnace and hanging of the charge are more liable to happen when large percentages of the earthy Mesabi ores are used, and in this type of practice localized hanging and slips are not infrequent. When the slip is extensive in character, and a large amount of material is suddenly precipitated into the hearth, the upward rush of gases resembles an explosion inside the furnace, and may do damage to the charging apparatus, and throw a part of the stock out of the top of the furnace. Some furnaces

iron made, and the changes sometimes come suddenly and without warning. For instance, a sudden precipitation of cold material into the hearth will chill the smelting zone and cause the silicon in the iron to be low, and the sulphur high. The same effect will be produced by the leakage of several gallons of water into the hearth through the burning out of a tuyere or the cooling ring of one of the tuyeres.

The General Mining and Finance Corporation

The annual report of the General Mining and Finance Corporation, Ltd., which controls and operates nine gold mines in the Transvaal, for the year ending Dec. 31, 1906, shows that the capital of the corporation is now 1,875,000 shares of £1 each, fully paid up and all issued, of which 1,874,000 shares are ordinary shares and 1000 founders' shares. The premium of 5s. per share on the issue of the 625,000 new shares added to the amount standing to the credit of the premium account, makes a total of £593,750.

Operations for the year resulted in a profit of £21,011, which, added to the balance brought forward from 1905, gives a total credit balance of £36,122. The aim of the directors during the year was to secure the best possible results from the mines already crushing, and to proceed with the development of these properties on which work had been begun rather than to seek for new investments. The results for the year were disappointing. The turnover financially was less than in any previous year, while, with stagnant share markets and unsettled mining conditions, there were few opportunities to engage in new business.

The total issued share capital of the nine subsidiary companies at the end of the year amounted to £4,704,424 of which the corporation's holdings were £1,165,980. The corporation also owns £134,975 of the debentures issued by these companies.

In contrast to the heavy fall in market values during 1906, the returns of the four producing mines show a considerable improvement. The Meyer & Charlton, Van Ryn, Roodepoort United and New Goch treated 768,744 tons of ore, yielding gold and other revenue of the value of £1,350,282 and giving a gross profit of £462,654. For 1905, the tonnage treated was 607,471, the gold and sundry revenue amounted to £992,549 and the gross mining profit to £311,773. In 1906, 161,273 more tons were crushed, yielding £357,733 additional revenue, and providing an increased profit of £150,881. The number of stamps running at the end of last year was 460, as compared with 385 in December, 1905. The working costs for the 768,744 tons crushed amounted to £887,628 or an average of £1 3s. 1d. per ton, as compared with £1 2s. 5d. for 1905,

£1 5s. 3d. per ton during 1904, and £1 8s. per ton in 1903. Although the average operating expenses for 1906 show an increase as compared with 1905, there has in reality been an appreciable reduction, more especially in the underground costs. The ore reserves of the four producing mines total 2,240,000 tons of an average assay value of 8.8 dwt.

The Meyer & Charlton declared dividends of 60 per cent., absorbing £60,000; the Van Ryn paid 20 per cent., equivalent to £100,000; making a total distribution for the year of £160,000. The dividends paid by these mines, together with those paid by the Roodepoort United, since their inception, amount to £1,309,808.

The profits earned by the Roodepoort United and New Goch companies are being applied toward the reduction of their indebtedness to the corporation for sums advanced to enlarge their equipments and extend the underground development.

Owing to the conditions which have prevailed, it was impossible during the year to obtain either the necessary unskilled labor or provide the additional working capital required to commence milling operations at the Aurora West, and consequently this mine remains closed down.

At the Cinderella Deep, a considerable tonnage was developed and a reef body of high average value and great width was exposed. Plans are being prepared to erect a mill of 80 stamps, and it is anticipated that gold production will commence about the middle of 1908.

At the Rand Collieries, shaft sinking was continued. No. 1 shaft having at the end of the year reached 1347 ft. and No. 2 shaft a depth of 1489 feet.

An amalgamation scheme has been arranged between the West Rand Consolidated Mines, Ltd., the West Rand Mines, Ltd., and the Violet Consolidated Gold Mining Company, Ltd., On the outcrop section of the combined properties, the West Rand Mines, a large tonnage of ore has already been developed, which it is estimated will yield an average recovery of between 30s. and 32s. 6d. per ton. It is intended eventually to provide a large central reduction plant, commencing as a first instalment with a mill of 100 stamps, which should be in operation in about 18 months provided that the necessary unskilled labor is available and that there are no unforeseen interruptions.

The report further states that during the greater part of the year, mining operations were hampered and rendered more costly by the limited supply of natives. Much of the black labor forthcoming was of an inferior class, unsuitable for underground work, and did not remain on the fields for sufficient time to gain even moderate efficiency. The action of the Witwatersrand Native Labor Association in throwing open the whole of South Africa, with the exception of Portugese territory, to independent re-

cruiting, a step forced upon it by political agitation, resulted in an increase of the rate of wages paid and heavier recruiting fees, without the general labor force being materially augmented. Toward the end of the year, extraneous causes, such as the cessation of public works throughout South Africa, and the restriction of operations by certain of the mines, resulted in a temporary surplus of Kafirs becoming available.

The Crown Reef Gold Mining Company

The annual report of the directors of the Crown Reef Gold Mining Company, Ltd., of the Transvaal, for the year ending March 31, 1907, shows a total revenue for the year of £360,424 on an issued capital stock of £120,000. Two dividends, Nos. 34 and 35, each of 110 per cent., were declared during the year, making a total of 1979 per cent. paid during the 19 years that the mine has been in operation.

The reduction plant handled 244,644 tons during the year as against 232,493 tons for the previous year and the working costs amounted to 21s. 8.5d. per ton, showing a decrease of 3s. 6.5d. The actual reduction of profits due to the approach of the end of the mine's life was only 3s. 6.25d. per ton. The chairman estimates that the developed ore will be sufficient to keep the mills in operation for 2½ years. The ore milled during the year decreased in value from 51s. to 44s., a shrinkage which was expected as the mine has reached the stage when working faces where machine drills can be employed are becoming limited, leaving no chance for selection.

The introduction of three tube mills for regrinding improved the extraction 6.22 per cent. In the treatment of the ore crushed, the mill recovered 61.57 per cent. of the value and the cyanide works, 26.96 per cent. from sands, and 6.63 per cent. from slimes.

Hand sorting is extensively practised on the Rand for removing waste from the comparatively low-grade gold ore of that field, although the cost of stamp milling is only about \$1.10 per ton. From 10 to 30 per cent. of the ore is picked out at a cost of 14c. per ton of material picked, this being done with native labor at 50c. per day. There would obviously be a large saving, even if the wages for labor were \$3@3.50 per day. It is to be remarked that this result is accomplished on material of low specific gravity (probably not more than 2.8). It is to be remarked further that the work is performed with such efficiency—in spite of the fact that there is far less distinctiveness between ore and waste than there is between galena (or blende) and gangue minerals—that the waste culled by hand at certain mines assays less in gold than the final tailings from the cyanide plant.

Differentiation by Leaching in the Wisconsin Zinc Region

By H. A. WHEELER*

A striking feature of the old Upper Mississippi lead region, now known as the Wisconsin Zinc district, is the very marked predominance of lead above the permanent water level and the great preponderance of zinc below the water-level.

The \$50,000,000 worth of lead that was produced by this region from 1830 to 1870, when it was our main source of supply, was derived from an area about 60 miles north and south by 70 miles east and west that lies largely in southwestern Wisconsin and overlaps into northwestern Illinois and northeastern Iowa. The zinc output that has recently been growing so rapidly has mainly been derived from an area only 40 miles long by 25 miles east and west, and as this lies entirely in Wisconsin it has created the erroneous impression that the new zinc-fields of Wisconsin were a different district from the very much older and better known Upper Mississippi lead region.

CHARACTER OF THE WISCONSIN ZINC DISTRICT

The facts are that the Wisconsin Zinc district is that portion of the old leadfields in which the ground-water is so moderate that it has been possible to re-work the old lead mines below the water level. As zinc is the predominating ore below the water level, the present active mining camps are essentially zinc producers, with only a small output of lead as a by-product. As the fact is becoming better recognized that zinc occurs under or is closely associated with the old lead mines, although it has been difficult for the old lead miners to appreciate it, the area of the zinc belt is being extended until it now covers almost the entire lead region. The Illinois and Iowa portions of the district are now being developed and give much promise as to their future zinc output, although the water problem will usually be more serious, on account of the general dip of the formation toward the southwest. In the shallow ground or above the water level, the ore is nearly always lead, which usually occurs as loose fragments and sheet-like forms of galena in a soft, yellow to brown ocherous mass, or as large crystals lining old caves or crevices.

LEACHING ACTION

If any zinc occurs, it is generally in the form of "dry-bone" or the carbonate, with occasional chunks of limonite and iron pyrite. Below the water level, zinc-blende or "jack" is the predominating mineral, with which is always associated more or less iron pyrites and minor amounts of galena or lead. The iron pyrite (or "sulphur" as it is locally called) is usually in

the form of marcasite and it often occurs in large amounts, while the lead is always in subordinate quantities and is usually about 2 to 5 per cent. of the zinc. If the three intermixed sulphides of zinc, iron and lead once occurred in the upper or dry ground as they are now found below the permanent water level, as is usually regarded by geologists before oxidation and leaching occurred, it has always been an interesting problem why the shallow ground is so rich in lead and the lower ground so very much poorer. For it was not an infrequent occurrence, before the shallow lead diggings were exhausted, to find local enrichments, from which carloads of clean galena would be shipped out by a pair of leasers, that would assay from 80 to 84 per cent. lead after a trifling amount of hand cleaning. While recently examining the new Cottingham mine of the Etna Zinc Company, at Benton, Wis., I had an opportunity of seeing this problem being solved at the new strike that has just been made on this property. For on further sinking an old shaft that geological evidence indicated would open up good ground, a rich sheet or flat was found that was 6 to 30 in. thick and consisted mainly of zinc and lead with minor amounts of iron. On following this to the southeast, an extensive cave was encountered that had formerly been incrustated or lined with a solid sheet of the mixed zinc, iron and lead sulphides, as frequently occurs in this district. The interesting feature about this cave is the fact that it is now just above the water level, yet the water level has only very recently, geologically speaking, been lowered below the cave—in fact, when the underground channels are gorged by the spring floods the cave is temporarily submerged. The oxidation and leaching processes are consequently in full operation and on an orebody that is so unusually rich as to make it clear why rich lead deposits should occasionally be found above the water level. For the zinc blende is now being oxidized by downward percolating air and water into the soluble sulphate and being carried away in solution. This oxidation is accompanied by physical changes that have altered the jack or blende into a soft, porous, earthy, white to gray condition that has no resemblance to the usual bright primary forms of blende. In fact it was not even recognized by the miners, who would not believe it was "white jack" until it was analyzed.

The iron pyrite is similarly oxidizing into the soluble sulphate of iron, but as the latter meets the underlying limestone, there is an interchange, the iron being thrown down as the ferric-hydrate in a soft, earthy, brown mass or ocher while the calcium sulphate passes off more or less completely into solution. Carbonic acid would necessarily be produced by this decomposition of the limestone and quite appreciable amounts of it are slowly

exuding through the porous orebody, in fact enough to extinguish a candle when held closely to a fresh face of ore.

The lead, however, is unaffected by the surface waters, so it is concentrating through the loss of the other sulphides into a very rich deposit of loose pieces in a bed of soft ocher. The process has not sufficiently advanced to result in an exclusive bed of lead, as much of the zinc and a little of the iron still remain. But the orebody is so phenomenally rich, as the pay-streak of solid ore is over 3 ft. thick in places, that in a very short time, geologically, a fine residual body of lead ore would have resulted. It is thus possible to see now in the Etna mine the very interesting process going on by which the shallow deposits of lead were formed from prior mixtures of the sulphides of zinc, lead and iron; and as this particular orebody happens to be very rich, a fine orebody of lead would have resulted had not the present energetic Chicago operators discovered it and inaugurated its conversion into dividends.

CONTRASTS IN NEIGHBORING MINES

In the adjoining Pittsburg-Benton mine, which works a similar rich sheet of ore, the leaching of the orebody has not advanced as far as in the Etna, so there is relatively considerably more pyrite and less lead, although much of the jack or zinc blende is in the secondary form of "white jack."

About 1500 ft. west of the Etna mine is the Corr mine, where another rich sheet of ore was recently discovered by drilling. In the Corr orebody, the leaching action is about completed, as it consists essentially of a sheet of lead in a thick, soft ocherous bed, in which occur only occasional fragments of "bone" and iron pyrites. The zinc has practically all leached out, the pyrite has been thoroughly oxidized into limonite and ocher and the lead remains as a sheet of granular fragments of galena. Thus can be seen in these three rich adjoining mines, whose orebodies occur at about the same horizon, a completely leached and therefore simple lead orebody in the Corr mine, a partially leached orebody that is high in lead yet rich in zinc in the Etna mine, while in the Pittsburg-Benton mine leaching has only just begun, so that it is essentially a zinc mine with only minor amounts of lead.

The orebodies occur in the usual "Galena" limestone formation of the district and about 40 ft. or so above the "oil-rock" or Trenton limestone (Lower Silurian) formation. The difference in the progress of the oxidation and leaching in the three orebodies is due to a marked variation in a combination of topographic and geological conditions by which the access of air and surface waters has been greatly facilitated in the Corr mine, has been less favorable in the Etna and still less favorable in the Pittsburg-Benton orebody.

*Mining engineer, St. Louis.

The Sulphur Smoke Question in Germany

By ALFRED GRADENWITZ

While there are in Germany stringent regulations controlling the installation of chemical works generally, there are no special requirements for factories in which sulphur smoke is produced. Present practice is controlled by these general regulations and by custom justified by precedent.

Chemical works have been subject to a license law since January 17, 1845, these plants being liable to cause inconvenience or danger to owners or inhabitants of neighboring buildings and to the public at large. The conditions prescribed by the Trade Code (*Gewerbeordnung*) are calculated to remove, or at least to reduce to a tolerable measure, this danger or inconvenience. Those who do not conform to the conditions stipulated are subject to fine or imprisonment according to Article 147, Part II, of the *Gewerbeordnung*, which reads as follows:

"Whoever erects an industrial plant subject to special license, owing to the situation or condition of the locality (Arts. 1 and 24), unless such license has been given, or alters or transfers the locality or carries out any material change in the operation of the plant, will be liable to a fine of \$75, or to imprisonment in the case of insolvency."

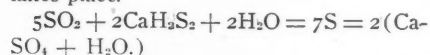
According to the regulations, the licensing authorities can require that sulphur gases be prevented from escaping either wholly or in part. In fact, the authorities in most cases satisfy themselves before issuing a license, that measures have been taken to remedy any of the evils mentioned. Should the emission of gases prove objectionable or dangerous in course of operation, authorities may insist that necessary measures be adopted. Further regulations to this effect will be found in the German Civil Code, Articles 906, 1004, 1011, 1017, 1027, 1065, 1034 and 832. In regard to sulphur smoke in sulphuric acid works, the usual requirement is that the gases from the Gay-Lussac towers shall not contain more than a certain proportion of sulphur dioxide.

CONDITIONS REGULATING BLENDE ROASTING

A case typical of German methods of dealing with the question, is recorded in the annual report of the factory surveyors for 1881, page 193. A zinc-smelting plant was situated in an inhabited neighborhood. The authorities required that all sulphur contained in the blende should be utilized for the manufacture of sulphuric acid. It was further stipulated: (1) that with the gases, no more than 5 per cent. sulphur dioxide be allowed to escape into the atmosphere; (2) that the chimney be at least 100 m. high; (3) that a metallurgical

officer, sworn in especially by the local police, daily make analyses of the gases passing to the chimney with an Orsat apparatus, or with other apparatus prescribed by the government, the result of these analyses to be recorded in a special book; (4) that on requisition by the government an apparatus for quantitative analyses to be made of the sulphurous acid contained in the escaping gases, be provided; (5) that contractors keep permanent records of the amounts of blende treated, as well as of the percentage of sulphur contained in the crude and in the roasted material, and of the amounts of lime used for absorbing the sulphurous acid, these records to be at all times open for the inspection of the government official.

Similar requirements are made in licensing other chemical factories which generate sulphurous acid smoke, such as glass works, in which SO₂ is formed by the reduction of sodium sulphate. The requirements, however, depend to some degree on the special operation to be licensed. A process of absorbing the escaping sulphurous acid by means of quicklime is used for eliminating the objectionable gas. Another process is described in "Handbuch der Praktischen Gewerbehygiene," by Dr. H. Albrecht. This is the Kosmann process (German patent No. 13123) based on the use of calcium sulphide, in which the following reacting takes place.



At many places smelter smoke is washed in coke towers rinsed with water, steam-jet blowers, stirring plants and other mechanical means.

Mount Morgan Gold Mining Company, Ltd.

The twenty-second annual report of the Mount Morgan Gold Mining Company, Ltd., Australia, shows a total revenue of £934,431; the expenditures were £571,618, leaving a balance of £180,536 after the payment of £162,500 in dividends and writing off £24,699 for plant, machinery and property. Of the surplus £30,000 was set aside for the erection of an insurance fund which will enable the company to carry its own risks and save the large sums annually paid in premiums.

Consideration of the advantages which would be gained by the erection of an electrolytic refinery for treating blister copper in Australia led to the formation of the Electrolytic Refining and Smelting Company of Australia, Ltd., in which the firm of A. Hirsch & Sohn, Halberstadt, Germany, is also interested. G. A. Richard, general manager, recently visited all the principal copper refineries in the United States, and plans for the erection of a plant, probably near Sydney, are in course of preparation.

The oxidized ore treated was furnished by the open-cut workings and amounted to 120,373 tons, yielding 35,313 oz. fine gold, a decrease of 17,569 oz. from the yield of the previous year, due to a falling off in the grade of the ore. These workings are approaching the 315-ft. level, at which depth sulphide ore comes in.

The removal of overburden by steam shovel has been continued during the year to carry down the open-cut to the 362-ft. level. From the underground workings 114,902 tons of sulphides were mined. This ore, with 564 tons of silicious sulphides from the acid works, yielded 61,371 oz. gold and 364 tons of copper as precipitate.

The cost of treatment of oxidized ores at the West works increased slightly, owing to an increase in the percentage of pyrites necessitating longer roasting and a greater consumption of chlorine. The vat capacity of the Mundic works for the treatment of sulphide ore was doubled during the year. In the copper reduction works 193,923 tons of material were treated, yielding 3757 tons blister copper, containing 3723 tons copper and 47,215 oz. gold and representing a recovery of 88 per cent. of the copper and 101.8 of the gold. The acid works produced 4793 tons sulphuric acid.

Development work, comprising 1725 ft. of driving and 1628 ft. raising and sinking, was not directed toward increasing the ore reserves but some portion extended beyond the area included in previous estimates, and a quantity probably equal to that already extracted has been added to the reserves.

The general advance in prices of commodities, which has been so marked in recent years, is common throughout the world, and in fact appears to be greater abroad than at home. The Bureau of Statistics has recently made comparison of the prices of twenty-five articles of import and of the same number of articles of export for the ten months ending April, 1907. Taking these articles and giving to each its proper weight according to the value of the trade in order to obtain a proper weighted average, it appears that the average advance in price of the twenty-five articles imported was 55.2 per cent., and of the twenty-five articles exported 38.06 per cent. Of the articles imported the advance in the case of pig tin has been 207 per cent., copper 127 per cent., raw cotton 69 per cent., lumber 64 per cent., hides and skins 63 per cent., wood pulp 56 per cent. and pig iron 22 per cent. Of the articles exported the advance has been for sawed lumber 105 per cent., copper 91 per cent., boots and shoes 31 per cent., leather 29 per cent., wheat 28 per cent., corn 27 per cent. and steel rails 21 per cent.

A Mine Dam to Recover Flooded Workings

How Difficulties Were Overcome in Constructing a Dam to Permit Unwatering Coal-mine Workings Which Were Already Flooded

BY JOHN H. HAERTLER*

The construction of mine dams is a subject of much interest to the mining world, especially so when the question at issue is the permanent sealing of immense bodies of water of great head, as in case of a mine fire, where it is desired, as a last resort, to isolate one portion of the mine to flood another; or where two collieries are worked jointly and one is to be abandoned.

PURPOSES OF THE DAM

While the dam here described was not designed and built to be a permanent one for any of the purposes just stated, yet the existing conditions under which it was built and the methods of procedure will, it is hoped, prove beneficial and interesting.

workings of the Richardson colliery swing around the hill into the Buck Run basin on the south dip. The location of the collieries is geographically shown in Fig. 1.

The Thomaston colliery was abandoned in the early part of 1898, its western territory, south of Buck Run, having been but partially worked, and then only on the north dip or Mine Hill side. In the early part of 1901 the Buck Run company pumped out the old Rohrersville colliery, another early operation, the workings of which extended to a point 300 ft. east of the present Buck Run Daniel vein hoisting slope, one lift below water level. Plans for future development were carefully laid out and the tonnage to be derived from the pillars of the abandoned Thomaston col-

heading, + 1007 ft. Penetration east or west from the air hole was rendered impossible by the presence of black-damp in large quantities. A partition was put in the air shaft, a brattice extended down to the foot of the air hole, and a battery, with a door in it, was placed in the monkey heading. A 2-in. steam line was laid from the colliery boiler plant and a small fan placed over the shaft. This permitted a safe daily measurement of the height of the water by some competent person, who started the fan a few minutes prior to descending. At the same time weather conditions were noted in connection with the rise and fall of the water.

An attempt to open water-level courses would have proved futile from the num-

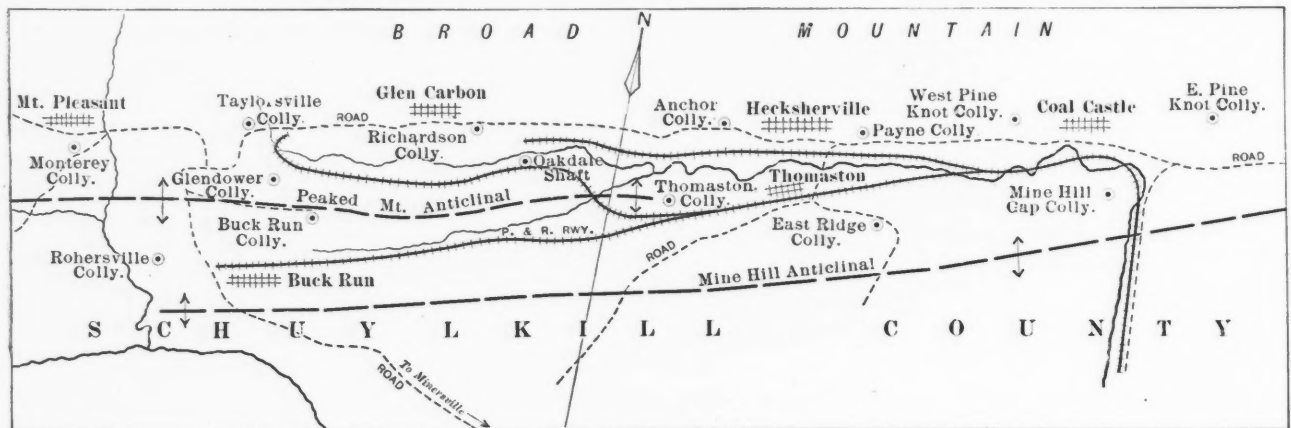


FIG. 1. LOCATION OF THE COLLIERIES WHERE THE DAM WAS CONSTRUCTED

The dam was built to unwater and recover territory already flooded.

The Buck Run Coal Company's colliery is located at the west end of the Hecksherville valley, in the southern anthracite coal-fields, about three miles almost due west of Minersville, Penn., between the Peaked Mountain and Mine Hill anticlines. The workings adjoin to the north those of the Glendower and Richardson collieries and to the east and south those of the Richardson and Thomaston collieries of the Philadelphia & Reading Coal and Iron Company, and are protected on the east by a barrier pillar of 400 ft. thickness; this unusual width was adopted to take every precaution against conditions known to exist at the time some of the early workings were abandoned. The apex of the Peaked Mountain anticline in the Daniel and Skidmore veins tails out 6000 ft. east of the Buck Run slope and the north dip

liery was included in the proposed output.

The pillars would soon have been reached had it not been for the great strike of 1902 when the Richardson colliery, which until then was keeping the Thomaston water down to an elevation of + 780 ft., was abandoned and the pumps removed. The water from the two collieries and from the various operations on both sides of the valley, extending from Rohrersville on the west to Mine Hill gap on the east, a distance of five miles, prevented, without great expense, the early recovery of the Thomaston pillars.

In the latter part of 1904, various methods for reaching the Crosby vein pillars were discussed. For an examination of the Thomaston side, immediate access was to be had by means of the air hole at the shaft marked *A* (Fig. 2), where shaft ladder and manway steps were still intact and in good condition. The level of the water was found to almost reach the elevation of the Murphy

erous cave-ins which would have been encountered along the roadways in the long distance the work would have to be done, and from the fact of their having been abandoned so many years before. An upright boiler and a large Knowles pump were installed at the Thomaston hoisting slope about 9000 ft. east of Buck Run, and pumping carried on continuously. Levels were carefully run and checked between the shaft *A*, the slope and the Skidmore air hole *C*; (Fig. 2) the elevation of the water at the three places was ascertained. All three elevations differed and showed conclusively that falls were blocking the water in its courses to the pump. Further proof of this was furnished from the fact that the rise and fall of the water at the air hole did not correspond to that at the pump. After a number of attempts pumping was abandoned.

SINKING THE SHAFT

The next step taken was to start down,

*Engineer with Lehigh Valley Coal Company, Wilkes-Barre, Penn.

on Dec. 5, 1904, the shaft B (Fig. 2), near the location selected for a dam, which would install ventilation and serve as a way for getting down material for constructing the dam. The breasts not having been surveyed, only an approxi-

and ventilation commenced. The measurements were from now on made at the location for the dam.

PRECAUTIONS TAKEN

On Jan. 12, 1905, experienced and cau-

was drilled up the pitch for 20 ft., and two pieces of specially made cast-iron pipe, 6 in. outside diameter, were driven into it. The pipes were made male and female and the exposed or down-pitch end flanged. A gate valve was bolted on and across its

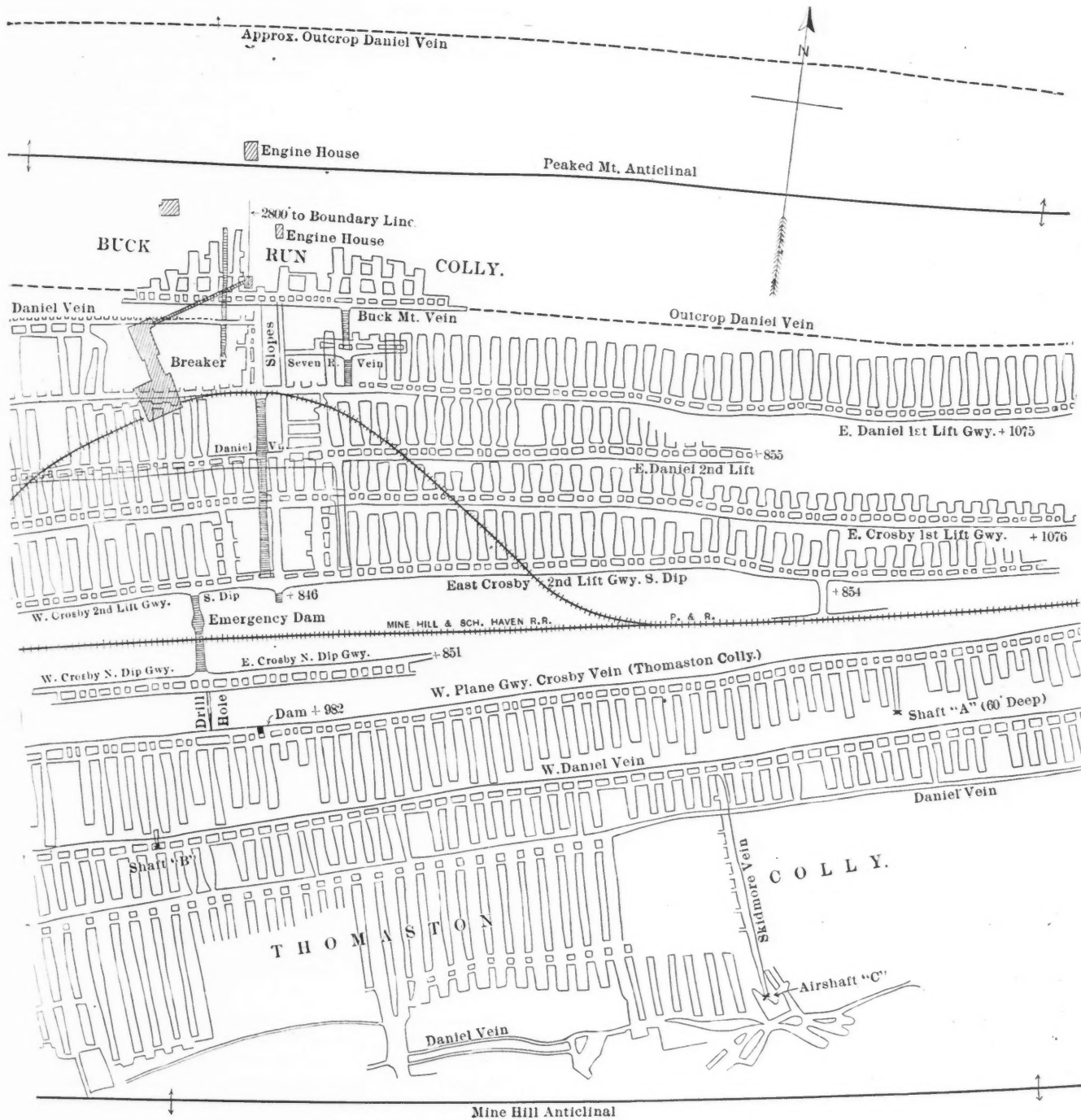


FIG. 2. PLAN OF GLENDOWER COLLIERY

mate location for the shaft could be chosen. A breast, thought to be driven nearly to the outcrop, was selected and upon reaching the vein a narrow hole was driven down the pit in the seam for 30 ft., when a short heading on the east rib, holed into the breast, was selected on Jan. 28, 1905. The door in the battery of the monkey heading at shaft A was opened

tious miners were selected and a narrow breast was started from the Buck Run second level East Crosby north-dip gangway and driven 78 ft. from the monkey heading, when a narrow hole was commenced from the face of the breast and driven 20 ft., making a total distance driven of 98 ft. from the air course. From the face of this narrow hole a 6-in. hole

flange were placed two heavy wrought-iron bars, which were in turn backed up by heavy timbers securely hitched, thus making it impossible for the pipe to be washed down the hole by the water after tapping. Everything having been secured, 3½-in. drills were put in the pipe and drilling commenced from the face of the narrow hole. The water was tapped

March 6, 1905, after drilling 50 ft., when the drills were withdrawn from the pipe and the valve closed. The idea of the pipe was to prevent the chipping out of the hole by the water, in its mad rush, making possible the chance of losing control of the flow. Precaution was taken against a possible flood by having an emergency dam prepared in the tunnel across the basin. Stout props were firmly hitched in the sides of the tunnel and material kept on hand for quick service if needed.

CONSTRUCTING THE DAM

Preparations were at once made to construct the dam. On March 17, when the

bosses and mine foremen, with the superintendent and general manager in charge, a wood and clay dam was built next to the sand bags. The plank and material for this dam was all prepared in the monkey heading for immediate use and despatched down a timber chute to where the men were building the dam, thus enabling the builders to work with rapidity. This was a difficult piece of work, the men working in exceedingly cold water which reached to their shoulders. Two 12-in. props were placed in the gangway, 2 ft. apart, on an east and west line close to the ditch, and set securely in the roof; one prop was directly opposite an

THE DAM PROVES SATISFACTORY

A man was immediately despatched to open the gate valve. The water after running for some time was seen to lower on the west side of the dam, showing that more water was going through the drill hole than was leaking through the dam, and all felt confident that the work would prove satisfactory.

From now on every chance to gain on the water was taken advantage of. In dry seasons the pump handled, in addition to the Buck Run water, as much of the Thomaston as it was capable of doing. At night, with high pressure at the

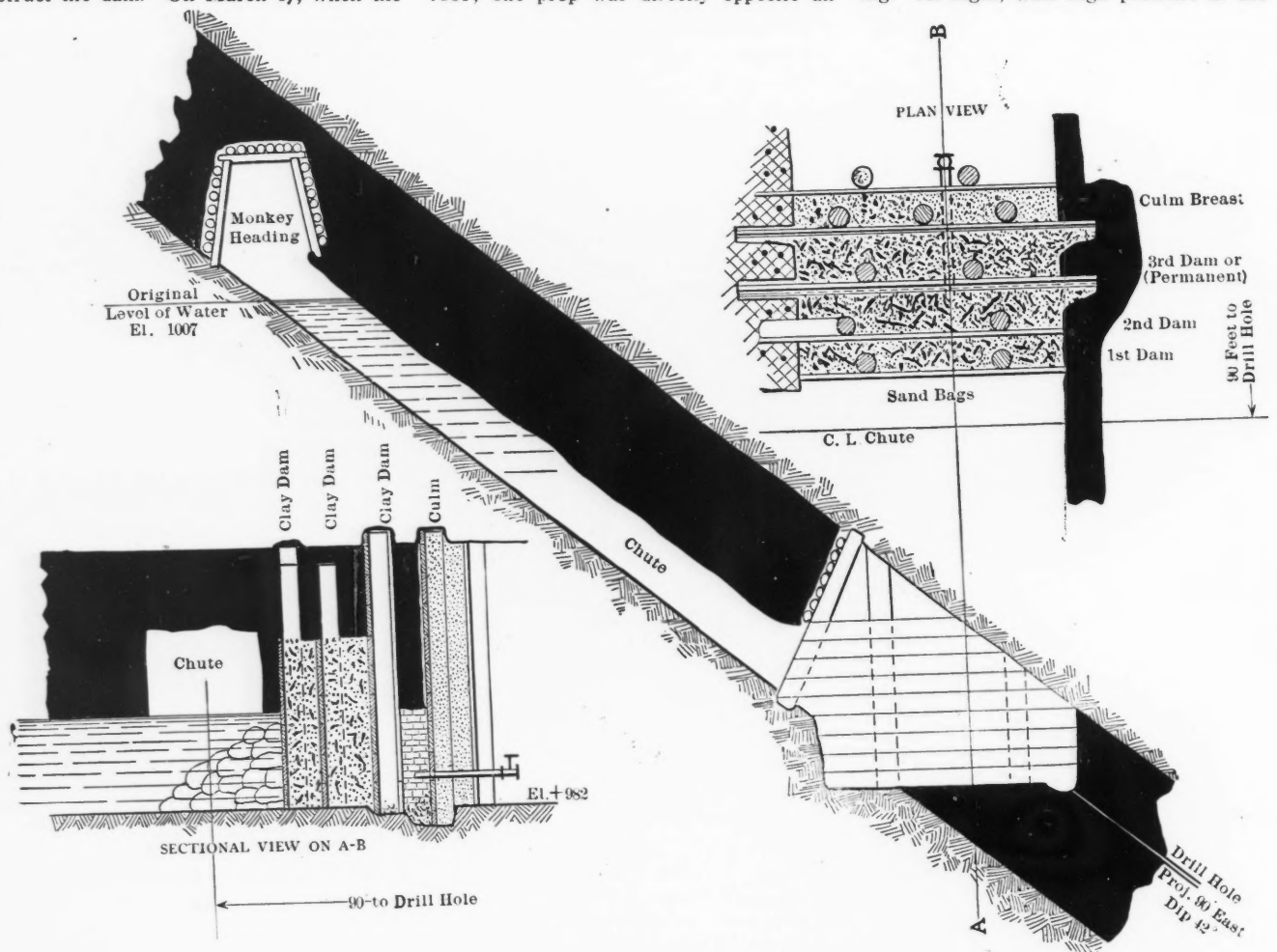


FIG. 3. CONSTRUCTION OF DAM

water reached almost to the roof of the gangway, a dam was built of sand bags and the gate valve opened. A big compound duplex Jeannesville pump, 16, 30 and 10x18 in., at the foot of the Buck Run slope forced the water to the surface. It was hoped in this way to gain on the water, west of the sand bags, and to lower it at least enough to permit men to get into the heading to place props. After the water had been running for some time it was found that its level on the east and west sides of the sand bags was the same, proving conclusively that the dam was not holding, and that the pump was not gaining. On March 22, with a competent force of men, consisting of the best miners, fire

old gangway prop on the high or up-pitch side. Opposite the second prop a third timber was set close to the high side and 2-in. planks nailed across the gangway on the east side of the props. With matched lumber the gaps between the ends of the planks and the roof and sides were patched up as well as possible, after which clay and oakum were packed in and well rammed. Remarkable endurance was shown by the men; the work commenced at 7 a.m. and was completed at midnight; some of the men were out of the water only long enough to eat lunch. The nailing of the plank and the patching with matched lumber were all done under water, and were extremely tedious and difficult.

pump, a good stream was handled. Measurements were made every day, and a record kept of the heights of the water on both sides of the dam. For various reasons rises and falls took place; these were caused by continuous rains, occasional low steam at the pump, etc. In the early part of May, after a continued dry spell, the water left in the dam lowered rapidly and on Sunday, May 14, it was ankle deep, retaining its former height on the east side of the dam. Good hitches were cut into the roof and sides, but before a trench and hitches could be cut in the bottom, the bore hole became blocked and the water rose rapidly. A 3-in. pipe was driven down the drill hole

from the upper end later on, after the dam was finished, forcing through particles which had blocked the hole and further trouble of this kind was averted.

The props were hurriedly placed, planks nailed on, matched lumber pointed and driven vertically into the floor, and the space filled with clay and oakum. While the attempt was not entirely successful, it was a much better one than any previous, since the water was not so high, and the patching could be better accom-

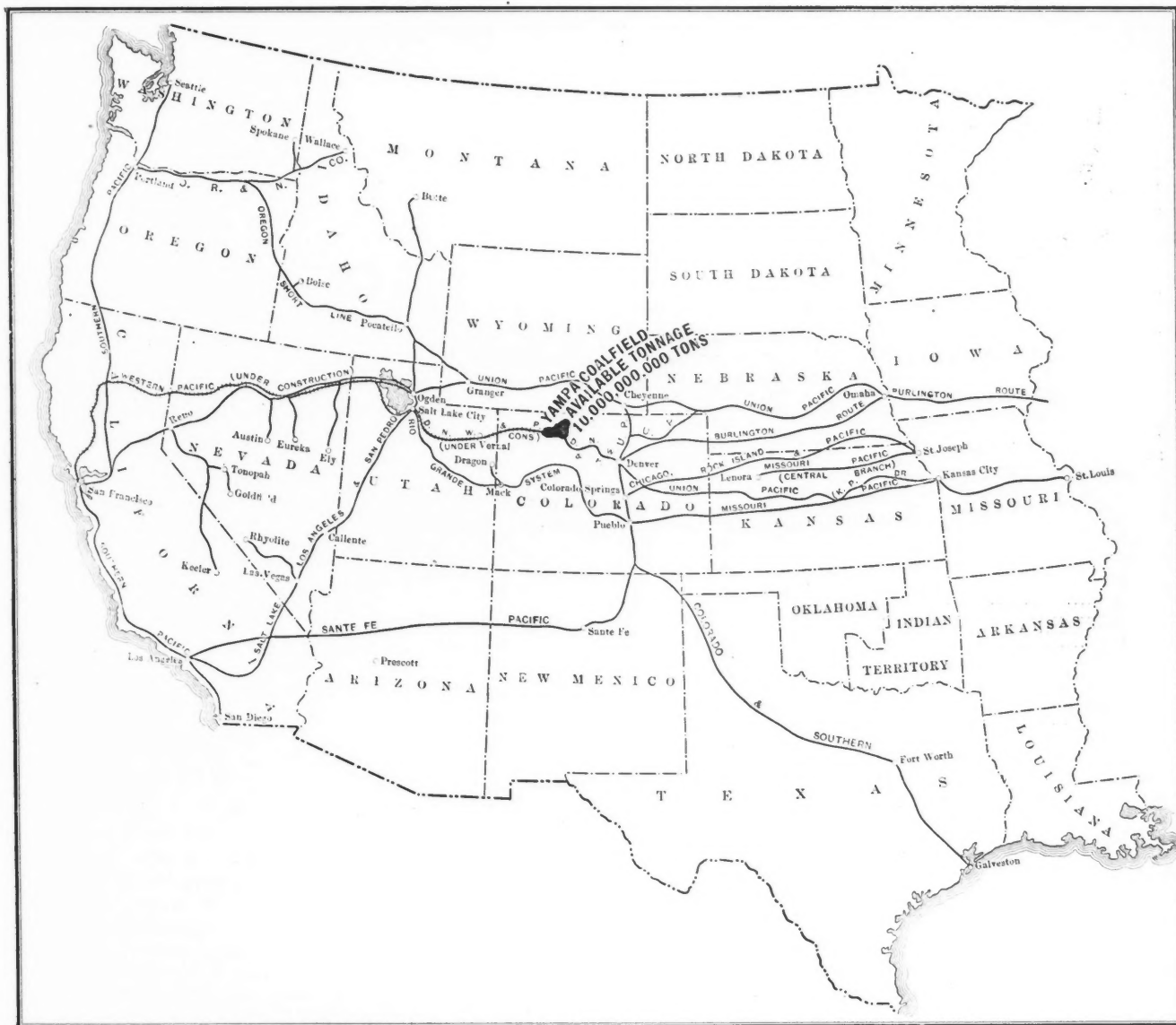
plished; a breast was driven through 400 ft. west of the drill hole for a counter-chute, after it was positively known that the water was successfully and permanently dammed off.

There are two kinds of diamonds set in the bits used in coalfields. These precious stones are called bort and carbon. The former is the real diamond, which on account of its imperfections is not fit for jewelry. Its shape is nearly spherical

The Fuel Famine in the Western States

SPECIAL CORRESPONDENCE

The story is a simple one and the accompanying map will, perhaps, tell it more succinctly than the letter press. The facts, however, are these: The grade of the Denver, Northwestern & Pacific Railway is now in the southeast portion of



THE YAMPA FIELD IN THE CENTER OF AREA AFFECTED BY FUEL FAMINE

plished. In a few days the gangway west of the dam was drained. A good substantial dam was immediately built and a 6-in. pipe, with gate valve attached, was inserted. The mine inspector approved the construction of the last dam and in addition suggested the immediate placing of a 2-ft. breast of culm next to the dam to render it absolutely safe for the men to rob the pillars.

Thus a territory containing 30 pillars, 350 ft. long and 24 ft. wide, besides gangway stump pillars, which at the time were otherwise inaccessible, was rapidly

and it is not often used in sizes larger than a pea, and is usually set on the outer edge of the bit. A carbon is set vertical, as it is not so liable to catch in cracks, as in the irregular shaped and sharp-edged carbon. Carbons resemble in shape small, irregular pieces of weathered anthracite buckwheat coal. When a bit is set with both bort and carbons, the carbons should be set vertical and inside the cutting edges. The price of bort, at present, is about \$18 per carat, while carbons are worth about \$80 per carat. Eight stones should be set on an ordinary bit.

Colorado, and advancing into the center, of a virgin coalfield of 1200 square miles, or 768,000 acres, in extent, the aggregate workable thickness of the seams being 50 ft., and the quality excellent. Forty square miles of this coal is anthracite and semi-anthracite, and the balance bituminous; there are at least 800 additional square miles of lignites and inferior bituminous coals which have not been taken into account. Indorsement of these statements will be found in the report of the United States Geological Survey, published as Bulletin 285.

During the past winter, in the States adjoining and surrounding Colorado, a very severe fuel famine existed, which will be still more acute in the winter of 1907-8, and which I believe, cannot be relieved until the coals of the Yampa field are brought into market by the Denver, Northwestern & Pacific Railway. Kansas and Nebraska especially are suffering for coal, and can only be supplied by the completion of this line through the coal-fields. This will mean that the surrounding States will be furnished with an ample supply of high-grade, clean bituminous coal at the same price, or less, than they are now paying for poor lignite and other inferior coals, and with only a half supply at that.

But the fuel famine in the States surrounding this virgin coalfield is of small moment compared with the fact that its speedy opening is one of national importance. It is a fact that there are no steam coals suitable for the bunkers of battleships or liners, on the Pacific slope. The coal brought as ballast from Australia,

have been classed as non-coking, it has been proved that as the workings get under cover, and away from atmospheric influences, the coal will coke.

It is also stated that the copper smelters in Utah are going to revert from the ordinary method of copper smelting to the reverberatory furnace, producing a low-grade matte, which system calls for raw coals instead of coke.

As the Western limit of the Yampa coalfield is only 50 miles from the Utah-Colorado line, and 250 miles from Salt Lake City, this fact will still further emphasize the importance of bringing the coals of this field into the western as well as the eastern markets.

The accompanying table gives a number of analyses of coals from the Yampa field, including the three classes of coal found there, which are referred to above as anthracite, semi-anthracite and bituminous.

During the ten years 1896-1905, inclusive, there were 4793 deaths in British

Notes on Pennsylvania Mines

SPECIAL CORRESPONDENCE

In the annual report for 1906 of J. E. Roderick, chief of the Department of Mines of Pennsylvania, it is claimed that out of the 557 persons killed in the anthracite mines, 274 were the result of their own carelessness; 69 to the carelessness of others; 188 unavoidable, and 26 resulted from accidents for which the responsibility could not be determined. Mr. Roderick claims that the figures show that two-thirds of the accidents were due to the negligence of the victims and that the remaining one-third may be taken as the reasonable percentage of accidents to miners. He fears that it seems impossible to adopt any method either by legislative enactment or by special rules that will tend to lessen the loss of life among the mine workers.

To lessen the danger from coal dust in bituminous mines he states that shooting from the solid must be abandoned and the dust properly watered and taken from the mines in water-tight cars.

Discussing the question of ventilation the chief inspector is satisfied that the various companies have made adequate provision for keeping pure air in the mines and urges that insufficient ventilation is due to the carelessness of the foremen.

Speaking of mining examinations the chief believes that it would be an excellent plan to hold examinations for candidates for important mining positions and to allow say, 300 points for personal qualifications; 300 for oral and 400 for written examinations, out of a possible 1,000. Mr. Roderick states that he has no authority to prevent the robbing of pillars and quotes a recent decision of Justice Meztrezat, of the Superior court to uphold this contention.

Dealing with the child labor question, Mr. Roderick makes positive statements that no boy under 14 years is employed in anthracite breakers and that no boy under 16 years is employed inside the mines. It is possible that the parents make false statements of the ages, but, he adds: "This department does not approve the present provision of the laws but it is a duty to enforce them." He believes that the minimum age at all the mines should be 14 but if the State insists on 16 years, the department will enforce the law. Some provision should be made for the widows and orphans; while the State forbids the boys from working until they attain the proper age it should make some provision to overcome this hardship.

Permonite, one of the new blasting explosives, which is made by the Carbonite Company at Schlebusch, Germany, contains 41 to 44 per cent. of nitrate of ammonium, 31 to 34 per cent. of perchlorate of potassium, 9 to 11 per cent. of trinitrotoluol, with 2 to 4 per cent. of wood meal and 9 to 12 per cent. starch.

ANALYSES OF REPRESENTATIVE YAMPA COALS.

Location.	Thickness.	Moisture.	Vol. Mat't'r.	Fix. Carb.	Asb.	Sulphur.
ANTHRACITE:						
Elkhead.....	30 in.	1.60	5.80	88.10	4.50	Trace.
Colo. Anth. Co.....	6 ft.	0.80	8.40	86.90	3.90	
SEMI-ANTHRACITE:						
Elkhead.....	10 ft.	4.51	4.97	79.91	10.61	Trace.
Elkhead.....	14 ft.	1.20	14.20	70.90	13.70	Trace.
Colo. Anth. Co.....	30 in.	0.70	13.60	76.90	8.80	
BITUMINOUS:						
Elkhead.....	14 ft.	6.80	36.68	51.97	4.20	0.25
Colo. Anth. Co.....	7 ft.	6.50	31.50	57.19	4.60	0.21
Wadge.....	11 ft.	5.00	35.00	53.00	7.00	
Oak Creek.....	5 ft.	3.50	32.00	60.00	4.50	
Oak Creek.....	12 ft.	3.60	37.00	55.50	4.40	
Trout Cre. k.....	10 ft.	6.50	32.50	58.50	2.50	
Fish Creek.....	5 ft.	4.30	39.20	53.80	2.91	0.39
Wolf Creek.....	20 ft.	6.40	34.55	52.45	6.50	0.10
Dry Creek.....	8 ft.	7.10	34.20	55.40	3.30	
Dry Creek.....	10 ft.	7.80	34.46	52.16	5.70	0.08

and from British Columbia to San Francisco, and the Washington, Oregon and Montana coals are all more or less soft and dirty, this being proved by the fact that our battleships coaling at San Francisco have been using Welsh, Scotch and Pennsylvania coals, when, with a through connection with the Coast, the anthracite and semi-anthracites from the Yampa field could be laid down at Pacific Coast points, at a profit, for half what the above coals cost. And the Yampa bituminous coals are bright and dense, do not slack, nor cake in combustion, and are excellent carrying coals for ships' bunkers, and all steam purposes. This is of special importance in view of the probable increase of our fleet in the Pacific.

There is another enterprise in connection with the Yampa coalfield, which, though at present in a crude state, will, if it proves successful, mean increased value to that territory. That there is a coke famine among the big smelters of Utah, Nevada and California, is well known. So acute is it that they are at this time importing coke from Germany to San Francisco at a cost of \$17.50 per ton. While our surface coals, or out-

coal mines caused by falls of ground. Of these deaths 3195 took place at the working face, 1577 on the roads while working or passing, and 21 while in the shaft. The number of accidents has not varied greatly from year to year. With the hope of mitigating the danger at the working face, new rules were introduced in 1904 dealing with the systematic timbering, but unfortunately the new rules have not been effective.

That the continual watering of coal mines to prevent dust is costly, cannot be denied, and it may also have an injurious effect on the health of the miners. It is suggested that explosions may be mitigated by having wet zones here and there, across which the explosion could not travel, or that the roadways might be laid with non-combustible material at certain places, such as broken stone or sand, with the same object in view. In one colliery in Staffordshire, England, the roads at a special central point, are bricked over, whitewashed and kept continually clear, so that an explosion may be prevented from traveling from one part of the colliery to another.

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

In thick seams of coal the over-cast should be driven in the upper part of the seam, leaving a bridge of solid coal between the two air courses.

In England where all coal is raised through shafts, it has been shown that during 11 years, one life is lost by rope breakage, for every $5\frac{1}{2}$ million tons of coal raised. Calculations based on the same statistics show that a man may ride up and down a shaft on a cage every day in the year for 6840 years before meeting with a fatal accident.

An ordinary hose should not be used for the chemical fire extinguisher which has been recently introduced in the anthracite coalfield as it is readily affected by the chemicals which crystalize the internal structure and cause it to wear out quickly. In case a rubber hose is used such a hose should be made of ingredients that will resist the action of the chemicals. Hose one inch in diameter costs about 60c. per foot.

Because of neglect or lack of caution, accidents to miners caused by blown-outs shots are common. Accidents may happen when the hole is drilled too far into the solid or when the shot is laid too deep; a large hole with too little tamping will generally cause a blown-out shot. A mixture of different grades of explosives is often the cause of accidents, also firing two or more shots at the same time is apt to give a windy shot, which should be avoided, especially in a dusty mine, as it is apt to cause a dust explosion.

The importation of coke into the north of Spain continues to decrease, being 65,738 tons in 1906, as compared with 68,817 tons in 1905. Practically the whole of this comes from Great Britain. The decrease is due chiefly to the larger local production by the Altos Hornos iron works. The total consumption of coke in the Bilbao district during 1906 was 309,081 tons, of which 218,693 tons were made by the local iron works, 18,650 tons were obtained from the Sabero coal mines, 6000 tons were made by gas works, and the remainder imported, as already mentioned.

In locating a winding engine with reference to the headframe of a shaft it is important to place the engine at a certain distance to give sufficient lead so that the rope will coil regularly on the drum with the least amount of friction, but the lead must not be increased to such an extent that the rope will be subjected to violent oscillations; the latter difficulty is sometimes overcome by placing bearing pulleys

between the drum and the sheaves. Such pulleys, if used, should run freely on a shaft of sufficient length to allow them to travel laterally with the rope as it coils and uncoils from the drum.

The output of anthracite in South Wales during 1906 was 3,042,216 tons, as compared with 2,789,178 tons in 1905. The increase in the output has been uniformly maintained year by year. In 1888 the output was only 906,258 tons. It cannot be too often mentioned, in order to remove a popular error, that this Welsh anthracite is not the smokeless steam coal for which South Wales is famous, but is a coal identical in composition and fracture with Pennsylvania anthracite. This anthracite is very little used for domestic stoves, but is chiefly employed in malting, for drying hops, and, nowadays, for producing suction producer gas.

In anthracite and bituminous coalfields second-motion hoisting engines are gradually being replaced by first-motion engines, especially for deep shafts (over 250 ft.) In using the first-motion engine, experience has taught us that the drum should run loose on the main shaft and be provided with removable phosphor-bronze bushings which can be replaced when worn out. The drum should be driven by powerful clutches of the brake-band type, and be controlled, when lowering, by powerful strap brakes. The engine should be provided with link-motion reversing gear, which allows the cages to run in balance and also allows the use of an early steam cut off in the cylinders, thus giving an economical distribution of steam. The engine should be controlled by small levers at the engineer's foot plate, through which liquid under pressure operates the various clutches, reverse gear and brakes.

The hose is the most important element in the fire equipment at a colliery. It should be either rubber or cotton; the latter is preferable as it has greater strength with less weight as compared with rubber hose. A cotton hose should be multiple woven so that every thread bears the strain. It should be made in a number of plies according to the pressure. The most important feature of the weave is that the whole outside ply may be worn out or cut without affecting the strength of the plies under it. It being flat woven, when reeled it is in its natural position which fact should be kept in mind when comparing it with a circular-woven hose, which when reeled, is subject to great strain on the edges, causing the fabric to weaken and to wear out quickly.

Flat woven hose has a smooth water-way so that the friction is reduced to a minimum.

In loading coal coming from a steep breast, the proper construction of a battery is important, for upon its strength and stability the safety of the loader depends. In starting the battery, it often happens that the whole mass of loose coal in the breast will come down several feet with great momentum; if the battery is not wedged tight it is apt to be destroyed. A set of double timbers across the chute should be put up against the top slate; the collar should be long enough to reach across, and the legs should be spread $1\frac{1}{2}$ to 2 ft. on the solid bottom at each side to get a rigid foothold. One end of the battery prop is then placed in the footholes cut in the bottom rock and the other end laid on the collar and wedged tight. The planks and slabs should be spiked across the props. The top of the battery should be flat so that the fine coal may be heaped on it and so form a cushion which saves the structure when falls occur in the empty breast.

In setting up a pump it is well to remember that dirt or rubbish in a steam cylinder will wear it away, hence a steam pipe should be thoroughly blown out before connecting up the pump. After the connection is made, take off the reverse valve covers, remove the valves and blow the steam through, then wipe out the pockets and thoroughly cleanse and replace the valves. A pump should be placed as near the water as possible. If hot water is to be pumped, the supply should be located above the pump and delivered to it from a head as it cannot well be lifted by suction for the vapor destroys the necessary vacuum. It is well to supply a suction pipe with a vacuum chamber close to the pump; on long lines or on pumps run at a high rate of speed this is an absolute necessity as it causes a uniform flow through the pipes and prevents pounding. When doing heavy work a pet cock should be placed in a suction pipe, between the vacuum chamber and the pump in order to keep the air chamber supplied. All surplus air will pass with the water into a discharge pipe and form an elastic column which will prevent pounding and the resulting shock on the pumps and pipes. In oiling a steam cylinder never use tallow or any oil that corrodes or gums the working parts. Only the best refined mineral, sperm or lard oil should be used for this purpose.

Metallics

In installing a pump it is essential that its capacity should be in excess of actual requirements in order that it may be speeded up and still supply the necessary amount of water even when a leak causes temporary loss.

Some of the cement manufacturers, using 6x60-ft. rotary kilns, claim an output of 400 to 500 bbl. per day per kiln. Some of the mills in the Lehigh district, which have 135-ft. kilns, have made as high as 750 bbl. per day per kiln.

The electric smelting of zinc ore is one of the possibilities of the future; in fact it is being practiced already in Scandinavia. This substitutes water-power for part of the coal required in the ordinary process, although it cannot replace the coal required as reduction material.

Pyrite is changed into the magnetic sulphide by roasting for 15 to 20 minutes at dull red heat (600 deg. C.). The mineral becomes black, indicating the formation of the magnetic sulphide. If brownish or reddish particles are manifest, it is an indication that the roasting has gone too far, oxidation having been begun, which is undesirable.

A highly interesting use of preheated air is found in cement manufacture. It has been found that by heating air by the discharged clinker and blowing the air thus heated into the kiln, in some instances as high as 10 per cent. of the fuel has been saved. In other words, the fuel consumption has been decreased 10 per cent. This points out the possible advantage of a similar procedure in connection with ore-roasting furnaces.

Almost every magnetic separator now on the market is patented. The art is, however, an old one, and the broad practice is incapable of monopoly. In most cases the patents are only on particular types of machine, or portions of machines, and in view of the long history of this method of separation, which dates back to 1847, possibly earlier, and the great number of separators devised since that time, it is likely that many forms manufactured under patents at the present time would prove upon investigation to have been anticipated.

The automobile manufacturing industry has led to a great increase in the consumption of special steels, especially nickel steel, nickel chrome steel, and vanadium steel. With nickel chrome steel, properly made and afterward properly treated, it has been found almost impossible to break one of the teeth in a six-pitch gear by means of a heavy hammer. So successful were these gears that they rendered it possible to run an entire season sometimes without the breakage or serious injury of a single tooth. Vanadium steel has some properties that are even more remarkable and valuable.

The roasting as a preliminary to magnetic separation may be done in a revolving cylinder, or in a furnace of the McDougall type. A furnace of the latter type costs, erected, from \$5 to \$6 per square foot of hearth area. Either the revolving cylinder or the McDougall type of furnace makes a rather large percentage of flue dust, and an ample dust-settling chamber should be provided. This chamber should be of such section that the velocity of the furnace gases passing through it will be reduced to 4 ft. per second, and before the gases are allowed to escape in the chimney they should remain in the chamber long enough, say 15 seconds, for the dust to settle.

The voltage at the switchboard required to force the current through the tank-house in electrolytic copper refining depends upon a number of factors. The resistance is made up of metallic resistances, liquid resistances, contacts and counter electromotive force. The metallic resistances can be figured on Thomson's law that the cost of power lost should equal the interest on the investment in copper. As the continuous operation gives a load factor of 100 per cent. the rule can be applied without the usual allowances. As regards the investment, the copper can be considered as so much extra metal tied up in the process. Any density under 1000 amperes per square inch will run cool enough. The liquid resistance of the electrolyte is largely influenced by its chemical composition.

The purification of solutions in electrolytic copper refining is almost always done by working up a certain quantity regularly into copper sulphate, and adding fresh acid to the electrolyte. If the purification requirement is heavy the bluestone department becomes disproportionately large, and consequently copper running high in arsenic is most unwelcome. Antimony and bismuth are seldom present in sufficient quantity to cause trouble. Various chemical methods of purification have been tried with the object of regenerating the electrolyte and returning it to the circulation, but there are few substances that will precipitate arsenic in an acid solution, and further the action of such reagents does not seem reliable, probably due to differences in form of arsenic compounds present at different times.

Besides coal, the important factors in zinc smelting are labor and refractory material. In Europe, coal is the largest single item in the cost of smelting; in the United States, labor is the largest, the rate of wages being higher than in Europe. While the labor cost in smelting a ton of ore is a fundamental consideration in determining rentability, there is another important consideration which must be reckoned upon in starting a new plant in a new locality. This is the question of

obtaining skilled men. The zinc smelter is made, not born. There is no metallurgical process in which so much is dependent upon the skill of workmen as in zinc smelting; nor is it possible to eliminate manual labor by mechanical devices to so great a degree as it is in other smelting processes. No matter how perfectly the zinc smeltery be designed; how elaborate its construction; and how modern its methods—poor smeltermen will neutralize all the advantages planned by the engineers.

In the smelting of zinc ore there are two prime considerations: (1) The quantity of fuel required per ton of ore is greater than in any other of the common metallurgical processes. In the best practice of the world, about two tons of coal are required per ton of ore, while in inferior practice the proportion is much larger. It is therefore cheaper to take the ore to the coal than to take the coal to the ore. (2) The zinc smelting process requires ore concentrated to a rather high grade. On the average, ore to be smelted in Belgium or Rhenish furnaces, should contain approximately 40 per cent. zinc in the raw blende. Inasmuch as such ore will yield upward of one-third of its weight in spelter, so long as the ore is taken to coal on the direct line to the final marketing of the spelter, the waste carriage, so to speak, is only on two-thirds of the weight of the ore, and it may be actually less than that, inasmuch as the ore is usually rated as a lower class of freight than metal, and a portion of its lead and sulphur contents may be utilized.

In calcining blende-siderite ore, to make the siderite magnetic, it is necessary to expose the mineral to a bright, cherry-red heat (850 deg. C.) for only 10 to 20 minutes. The mineral particles blacken and become so strongly magnetic that comparatively large pieces can be lifted by a very small horse-shoe magnet. The ore loses weight through the expulsion of the carbon dioxide of the siderite and the second atom of sulphur of any pyrite that may be present, but the heating should not be prolonged so as to cause the blende to roast. The ore is withdrawn from the furnace red-hot, and emitting a strong odor of sulphur dioxide, but the latter disappears immediately and the particles of blende are observed to be coated with an infinitesimal film of white zinc oxide. These are evidences of a properly conducted calcination. When properly conducted, the siderite can be lifted out by a magnet of extremely feeble intensity and a very clean separation can be made from the blende. A low intensity of magnetism is desirable not only because of its less consumption of electrical power, but also because a higher intensity of magnetism may lift out some of the blende, when the latter contains combined iron.

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The Metal Markets

The metal markets generally at the present time have fallen into an unsatisfactory position. To a considerable extent this is the reaction from the excessive activity and high prices of the earlier part of the year; but in part also it is due to movements, the extent of which it is difficult to gage properly. It is true that business in many directions is active, and that there is a promise of measurable continuation of such activity; but it is also true that there is a feeling of uncertainty as to the future. This may be sentimental in large part, but sentiment has a great deal to do with business; and a lack of confidence in the future may have an important effect on present transactions. Just now this feeling is more apparent in Wall Street than elsewhere, but its manifestations on the stock exchange are not without their effect.

The copper market has felt the effects of the situation strongly. For several weeks there has been an almost total absence of large transactions, and the small business offered has been taken at gradually decreasing prices. The large manufacturers, who consume important quantities of the metal, have been wholly out of the market for over a month past. Most of them stocked up largely early in the year, but in many cases they must be approaching the end of their supplies. It is impossible to determine to what extent actual consumption, as gaged by sales of finished goods, has fallen off. There has been a decrease, but how great it is difficult to determine, and statements which have been made vary so widely, that it is evident they are not based on any thorough knowledge of the situation. The stringency of the money market, however, and the difficulty of securing capital for new enterprises, or extensions of old ones, have an important effect. Little or no change in the market can be anticipated as long as the present policy of holding back is continued.

How long this can last is an open question. The general belief is that buyers must come into the market before long, and that the middle of September must see some movement to replenish manufacturers' working stocks. The accumulation of metal in producers' hands has been considerable, but as compared with last January, for instance, it is in large part merely a transfer. Then the stocks

were in manufacturers' storehouses, which must now be nearly empty; now they are with the producers. On the hopeful side it may be said that we are now sure of at least average crops, and that business is generally in sound condition, and not at all liable to experience anything approaching a panic. A period of rest and adjustment was needed, and recovery may not be far distant. The volume of actual business is still large, and is likely to continue in that condition.

The other metals have followed chiefly the same course as copper, and there has been a general recession of prices. They are still at a high level, however, and there is no occasion to look for further rapid falls in price or demand.

The Control of the Diamond Output

Recent despatches from London report that the De Beers Company has bought the control of the Premier mine in the Transvaal for a very large sum. This action is not at all surprising, though it had not been expected to come so soon, and the preliminary negotiations have been conducted very quietly. The Premier mine had reached a point of productiveness where its owners could at any time attack the control of the diamond market which the De Beers Company has held for so long. Very probably no such action would have been taken, but the possibility existed, and the De Beers people seem to have thought it best to provide against it.

This purchase of the Premier gives the De Beers Company control of more than 90 per cent. of the diamond output of the world. For years past the chief supply has come from its mines at Kimberley in the Orange River Colony, and it was not until the Premier became a large and steady producer that any competition at all was even possible. The only other output of the precious stones is from Brazil and British Guiana, with occasional additions from Australia; and none of these productions is of serious importance. We noted last week a discovery in Arkansas, but its value is as yet entirely prospective.

So far the De Beers Company has exercised its monopoly of the trade with judgment. There has been a steady increase in prices, but so gradual that it was hardly felt by the trade, and was not con-

spicuous, unless comparisons extended over a considerable period of time. It may be expected that the same policy will be continued in the future. The diamond market has been good for some time past, as might be expected in a period of general prosperity. This has been especially the case in the United States, which last year absorbed about 60 per cent. of all the diamonds sold.

It is a comment upon human nature that the richest and strongest mining company in the world—the De Beers Company—is engaged in mining not a useful metal or one which finds employment as money, but gems which are almost wholly a luxury used for personal adornment, and which are a sign of the wealth of the owner.

A Remedy for the Strike Evil

From Linton, Indiana, come accounts of the practical operation of the method in force in that State for mitigating the strike evil. The method promises to be popular among employers if not among their men. The agreement made between the Indiana coal operators and the miners' union last spring, fixing the rate of wages, provided a penalty in the form of a "check-off" or reduction of \$1 a day in the wages due in case the men should for any reason break the agreement. Recently 300 of the men employed at the Mount Summit colliery walked out because the management refused to discharge the superintendent. The strike lasted eight days and under the agreement \$2400 of the wages due the men passed to the credit account of the company.

Many of the miners objected to the "check-off" upon their pay envelopes, and the trouble threatened to be prolonged indefinitely. Some even employed attorneys to bring suit for collection. But the district president of the union realized the danger of persisting in a violation of the agreement, and threatened to cancel membership cards in case the suits were pressed. His counsel prevailed and the majority acquiesced in his judgment.

The operation of the plan brings to the understanding of the most irresponsible employee a concrete realization that there are two sides to all agreements, and the "check-off", if once experienced, is likely to act as a powerful prophylactic if it does not effect a permanent cure.

Zinc Ore and Spelter

The decline in the price for spelter to 5.65, St. Louis, presages an interesting situation in the relation between the market for ore and metal. Ore of 60 per cent. grade is quoted at \$45, wherefore the margin is only \$1.75@2 per ton of ore, an amount that is much too small to leave the smelter any profit worth mentioning after he has deducted amortization and interest charges. However, the smelters have enjoyed two fat years, particularly the last. The miners are now having their ininings. Such swings in favor of one or the other have been the history of the zinc industry for many years.

The reasons for the decrease in the price for spelter are quite clear. Consumption has fallen off; in several lines this is in evidence. On the other hand, the smelting capacity and the offerings of ore are steadily increasing. But the interesting question is, how far can the decline in spelter go? If the smelter is to have a fair margin, the price for ore even now ought to be \$44. That would be getting uncomfortably near the danger point for the "sheet ground" mines of the Joplin district, whose output would probably begin to be restricted at \$40 per ton.

Mine Labor in California

At Grass Valley, the greatest gold-producing quartz district in California, it has been necessary in the past for men who wanted positions in the mines to file an application a month or two in advance. Now men who have some knowledge of mining are in great demand. Good, stout boys can also find plenty of chance for employment in the mines, which has not always been the case. It will be remembered that some months ago the miners at Grass Valley wanted higher wages, but the mine-owners successfully resisted the demands. The miners, however, have left in large numbers and gone to the big camps in the State of Nevada, where higher wages prevail than in California. This condition prevails nearly all over the State, but it is more marked at Grass Valley, owing to the large number of miners employed there.

In some other quarters a different condition prevails, and labor conditions have reacted upon the mines. Thus the mine-owners of Angels, in Calaveras county, whose mines have been closed down some

months by a labor-union strike, have decided now to discharge all employees except watchmen. No attempt will be made to open the properties before next spring. The principal mines in the camp are the Utica, Lightner and Angels, but there are numerous smaller producers. The place is being virtually deserted, there being no interests there not connected with mining. The Utica Company, which owns an extensive ditch and water-right system, by which the mines were operated, has been offered a good price for this by the new Stanislaus Electric Power Company and has the offer under consideration. The Utica has been a heavy producer for years, having yielded during some periods as much as \$1,800,000 a year. During the past three years the annual output has been much reduced, and there has been little or no profit, the mine being an expensive one to work owing to the necessity of unusually heavy timbering. If the water rights are sold, it may be some years before the property starts up again. With the big mines at Angels closed, Calaveras county will have a poor showing of gold yield for 1907.

Cement in San Francisco

Immense quantities of cement are being used in the reconstruction of the buildings in San Francisco. Since the great fire 1,300,000 barrels have been imported from foreign countries, 200,000 from States outside of California, and over 1,000,000 barrels of California origin have been taken. There are three large cement factories in operation in California, each of which has doubled its capacity this year, and three or four other large plants are approaching completion. Lime and clay deposits, situated close together, are earnestly sought for and most of the known ones have been purchased by cement-manufacturing companies. The construction of reinforced concrete buildings in San Francisco to take the place of the brick ones destroyed in the great disaster is responsible for this big demand for cement in one locality, but its general employment is increasing and may make work for the new plants.

THE EXPIRATION of the Héroult patents has made the manufacture of aluminum free in Europe, but in the United States the process is still subject to the Bradley patents, which do not expire until 1909.

Views, Suggestions and Experiences of Readers

Comments on Questions Arising in Technical Practice or Suggested by Articles in the Journal, and Inquiries for Information

CORRESPONDENCE AND DISCUSSION

The Air-hammer Drill

As my company has just placed an order with the Carnahan Manufacturing Company of Denver, Colo., for several air-hammer drills, I was greatly interested in a very lucid article by S. E. Wolcott, relating his experience with them in the Findley mine, in the JOURNAL of July 20, 1907. I would like him, however, if he can manage to do so, to give us an idea through the columns of your paper as to the wear and tear of the same, and to state what parts are most liable to first need repairs.

T. S. S.

Oaxaca, Mex., Aug. 3, 1907.

Low-grade Zinc Ores in Mexico

There is a great opportunity here for a moderately cheap process of separating zinc from iron in low-grade calamine ores. Mexico awaits with impatience the introduction of an economic process of treatment, whereby the large quantity of 25 per cent. zinc, now marketless, may be saved.

Seven veins of calamine in the same face give the following ratios of iron to zinc:

	Fe, Per Cent.	Zn, Per Cent.
I	25.8	26.2
II	37.5	3.2
III	7.7	42.1
IV	16.2	13.5
V	12.4	38.5
VI	22.3	32.6
VII	30.1	9.8

Only Nos. III, V and VI can be mined, under the present circumstances, because of the large amount of iron contained.

At Rinconada, Saltillo, and many other points in the Mexican calamine district, great quantities of mineral are thrown into the cañons because the zinc is less than 30 per cent. The presence of zinc smelters in Mexico will doubtless make it possible to use 25 per cent. ore, but there seems to be little immediate prospect for the relief of the Mexican zinc producer.

I earnestly invite personal correspondence from any of your readers who can suggest a method of concentration for our low-grade ores.

THORINGTON CHASE.

Rinconada, Mexico, Aug. 6, 1907.

Filing Notes and Clippings

I read with interest the article in the JOURNAL of April 20, 1907, by G. B. Levings on the subject of clipping and filing. For

20 years I have made a practice of collecting all available information relating particularly to chemical processes. Naturally such collection would comprise clippings, notes, sketches, etc. The problem was to file these in a manner requiring little time and labor, but so that every kind of information bearing upon a certain subject would be grouped conveniently for instant reference.

After trials of various schemes I provided a number of "Century" files, invoice size, containing alphabetic indexes. Only a portion of an index is used in each file, because the alphabet has to be distributed through a number of file cases to accommodate the bulk of papers collected. For each subject a folder of plain paper is provided and labeled. Notes, sketches, clippings are laid within the folder. The folders, with their contents, are stored within the indexed filing cases. To prevent loss of clippings, small notes, etc., these are pasted upon sheets of paper before placing in the folders.

A file of this size accommodates a full page of the ENGINEERING AND MINING JOURNAL or a sheet of legal-cap paper, which is adopted as standard for writing notes and descriptions upon; further, it is clear that plans of double legal-cap size can be filed by once folding.

SCHUYLER FRAZIER.

Bristol, Va., Aug. 3, 1907.

The Borax Industry

Having under consideration a project to develop some borax mines, I would ask you to advise me as to the condition of the borax market; if prices paid are on natural or refined mineral, where is the best market, and whether or not this substance is controlled by combination or corporation.

J. L.

Ventura, Cal., Aug. 5, 1907.

[The borax industry of the United States is practically in the hands of the Pacific Coast Borax Company, which mines and refines its own product. There are a few outside mines and refiners who produce a small amount of borax, and who live probably because the Pacific Coast Borax Company does not consider it worth while to make competition hot for them. The requirements of these outside concerns for raw material are so insignificant that they have but little interest in developing new sources of supply. Under these conditions the prospect for marketing a new supply of borax mineral is not very attractive

and there is no definite price per unit of boric acid, nor any other unit upon which borax mineral is bought from producers by refiners. Cheap labor is such an important factor in the production of borax in foreign countries that the United States product cannot hope to compete abroad, and there are no exports of domestic borax from this country at the present time. The possibility always exists, however, that large borax operators would be willing to consider the acquisition of deposits of crude material, if they are of such size and quality as to threaten too dangerous competition.]

The Franco-British Exhibition of 1908

There can be little doubt that the exhibition planned to be held in London during the summer of 1908 promises to be the most important affair of the sort ever held, at least in the Old World. The object of the promoters is "to demonstrate to the world the products and resources of the British Empire and of France and her colonies," and the official title is the Franco-British Exhibition of Science, Arts and Industries. The names of the chairmen of the committees of the various sections are some indication of the influential nature of the enterprise; they are all presidents or past presidents of learned and scientific societies. We would draw special attention to the mining and metallurgical departments. Sir Hugh Bell, president of the Iron and Steel Institute of Great Britain, is chairman of the iron and steel section. Prof. W. Gowland, president of the Institution of Mining and Metallurgy, is chairman of the metallurgical section dealing with metals other than iron and steel. Maurice Deacon, president of the Institution of Mining Engineers, is chairman of the committee dealing with mining engineering. Alfred Mond is chairman of the chemical industries section. Our readers will no doubt follow the enterprise with great interest.

The following data are of interest to persons interested in Mexican mines, or engineers who have examinations to make in Mexico: The Mexican league (*legua*) = 5000 *varas* = 2.6035 miles. The Spanish league = 2.6335 miles. The *vara* is 2.749368 ft. (Some authorities erroneously give it as 2.782 ft.) One square *vara* is 7.5590244 sq.ft. in area.

New Publications

METALS FREE FROM CARBON PRODUCED BY THE ALUMINOTHERMIC METHOD. Pp. 18, 6x9, paper. New York: Goldschmidt Thermit Company.

THE GOLDFIELDS OF SOUTH AFRICA. SOUTH AFRICA HANDBOOK, No. 39. Pp. 28, 5x6 in., paper; illustrated. London, England: *South Africa*. Price, 6d., or 30 cents.

BUTT-WELDING WROUGHT IRON AND STEEL PIPES AND RODS BY THE THERMIT PROCESS. Pp. 11, 6x9, paper. New York: Goldschmidt Thermit Company.

CHEMICAL REAGENTS, THEIR PURITY AND TESTS. A new and improved text based on and replacing the latest edition of Krauch's "Die Prüfung der Chemischen Reagentien auf Reinheit." By E. Merck. Authorized Translation by Henry Schenck. Pp. 250. 6x9 in.; cloth, \$1.50 net. New York, 1907: D. Van Nostrand Company.

HEBE UND TRANSPORTMITTEL IN STAHL UND WALZWERKS BETRIEBEN. By Dr. G. Stauber. Pp. 85, 1 plate; illustrated, 7.5x11 in.; paper, 4 marks. Düsseldorf, Germany, 1907: August Bagel Company.

A reprint from *Stahl und Eisen*, giving an extensive review of the present state of development of conveying apparatus in metallurgical plants and rolling mills.

THIRTEENTH BIENNIAL REPORT OF THE BUREAU OF LABOR STATISTICS OF THE STATE OF ILLINOIS, 1904. Pp. 665, 6x9 in., cloth. Springfield, Ill., 1907: Phillips Bros., State Printers.

The appearance of this report was delayed by various causes and this will undoubtedly impair its present usefulness, for conditions have changed materially since 1904. Still, as matter of record its full statistics will always have a value. The contents are divided into two parts. The first division is the third presentation of the statistics of manufacturers in Illinois, the data for which were collected by the United States Census Department. Part II is devoted to a consideration of the working time, earnings and general home conditions of coal miners and others employed about the mines of the State, covering the calendar year of 1903.

CONTRIBUTIONS TO ECONOMIC GEOLOGY, 1906; PART I—METALS AND NON-METALS, EXCEPT FUELS. By S. F. Emmons and E. C. Eckel, Geologists in Charge, Bulletin 315, United States Geological Survey. Pp. 505, with maps; 6x9 in., paper. Washington, 1907: Government Printing Office.

The volume is a collection of a number of smaller publications issued during the year and all noticed in the Mining Index of the JOURNAL. Besides an introduction

by C. W. Hayes there are reports of investigations of metalliferous ores, by S. F. Emmons; of iron ores, structural materials, etc., by E. C. Eckel; articles on the development and statistics of production of gold and silver; copper; nickel and uranium; lead and zinc; iron and manganese ores, aluminum and bauxite; portland, natural and puzzolan cements; lime, magnesite, etc.; gypsum, plasters, etc.; clays and clay products; building stone and road metal; glass-making materials; quartz and feldspar; mica, graphite, etc.; mineral paint; abrasive materials; phosphates and phosphorus; and sulphur and pyrites.

PEAT: ITS USE AND MANUFACTURE. By Philip R. Björling and Frederick T. Gissing. Pp. 173; illustrated, 5x8 in.; cloth. London, 1907: Charles Griffin & Co., Ltd. Philadelphia: J. B. Lippincott Company.

The chief obstacle to the use of peat as a fuel is the difficulty of removing the large proportion of water which it contains in its natural state. The present volume is the result of a suggestion made by the late Sir Clement Le Neve Foster, and aims to describe the methods and classes of machinery used in the preparation of peat for commercial use. Not only are successful and partially successful methods described, but also several that have failed; so that the volume is a handbook for investigators as well as a treatise for those engaged in practical operations. The subject is treated in a comprehensive manner and the matter is well classified and arranged. It covers not only the latest practice in the preparation of manufactured peat, but also the tools and methods employed in localities where this material has been a staple fuel for centuries.

THE COPPER MINES OF THE WORLD. By Walter Harvey Weed. Pp. 375; illustrated. 6½x9¼ in.; cloth, \$4. New York, 1907: Hill Publishing Company.

Contents. Part I—Geology of Copper: Distribution of copper deposits. Production of copper. Mineralogy of copper. Geologic distribution and occurrence. Outcrops and gossan formations. Genesis of copper deposits. Classification of copper deposits. Part II—Descriptions of the Principal Copper Mines of the World: Copper Mines of Europe. Copper Deposits of Asia. Copper mines of Japan. Copper deposits of Australasia. Copper mines of South America. Copper deposits of the West Indies and Central America. Copper deposits of Canada and Newfoundland. Copper deposits of Mexico. Copper deposits of the United States.

In the first part of this work the author gives a general account of copper deposits, with the broader features of distribution, geologic occurrence, nature of the ore, etc. In this he has not gone into the broad fields of physical chemistry or metallurgy, nor attempted to dis-

cuss the financial merits of particular properties. The deductions drawn are based upon the facts presented in the second part of the work. In that part an endeavor has been made to gather the evidence at first hand, so far as possible, or from the monographs of reliable investigators. The descriptive matter aims to give an account of only the world's more important mines, including those that are present producers, and of others which are of importance because of their past history, or because their study enables one to make a more trustworthy diagnosis of newly discovered deposits. An attempt has been made to give precedence to practical matters. This may not always be apparent; but the fact has been clearly brought out, in recent study of ore deposits, that the genesis, structural relations, and the occurrence of secondary enrichments really determine the value of a deposit as well as its method of exploitation and the nature of the ore which it furnishes.

The present work is the outgrowth of the need felt of a book presenting the known facts concerning the copper deposits of the world. It is confessedly in part a compilation; for, while the writer has seen almost all the big mines of the United States, Canada, and Mexico, which furnish two-thirds of the world's output, he has culled freely from the detailed studies of others for descriptions of them, as well as of foreign districts. Much interesting matter concerning the lesser and economically unimportant deposits of Europe has been omitted in the attempt to present more than a mere collection of mine descriptions, and to keep the matter written within a reasonable number of pages. Many important occurrences receive but short accounts, and many deposits of no present importance are fully described. The first circumstance is due to a lack of reliable information; the second, either to a belief in the future importance of the deposit, or to a desire to prevent the waste of money on worthless properties.

The illustrations include a number of maps and geological sections, and some photographic views of prominent mines. There is a complete and detailed index. The book is especially timely, in view of the active search for copper which is in progress at present, as a result of the great increase in demand for the metal. It will be found of value by all who are interested in copper.

Denmark imported 2,668,500 tons of coal during 1906 as compared with 2,375,500 tons in 1905. Almost the whole of this came from Great Britain. While there was an export duty on coals shipped from Great Britain, German coals found an inlet into Denmark to the extent of 100,000 tons a year. Now that the duty has been abolished, it is likely that this German trade will cease.

Personal

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

G. A. Overstrom has returned to Salt Lake City from a trip to Mexico.

George H. Aylard, manager of the Standard mine in the Slocan district, B. C., is in Ohio.

Herman C. Bellinger, who has been in Nevada and Utah during the past six months, is in Butte.

Alfred C. Sieboth has returned to Florence, Ari., after a trip through southern Arizona on professional business.

S. Hoover, treasurer, and W. E. Trousdale, auditor, of the Tennessee Coal, Iron and Railroad Company, have resigned.

Dr. Joseph W. Richards, professor of metallurgy in Lehigh University, has gone to New Mexico on professional business.

Edward K. Judd, of New York City, has returned from Cobalt, Ont., and has left for Colorado on professional business.

Dr. A. P. Low, Canadian Deputy Minister of Mines, is looking over the work of the Geological Survey and visiting the leading mining districts of the West.

Ben B. Thayer finished his inspection of the Amalgamated properties in Butte on August 5, and started for New York on August 6, going by way of Salt Lake.

Frank Bay, until recently city controller of Marquette, Mich., has resigned to accept the position of land agent with the Calumet & Hecla Company at Calumet, Mich.

E. A. Haggen, of Revelstoke, B. C., has been in the Lardeau examining the Broadview, St. Elmo, True Fissure and Blue Bell groups on behalf of Cincinnati investors.

W. J. Sutton, geologist for Dunsmuir interests who own coal mines on Vancouver island, has been looking over coal lands in the Nicola district of British Columbia.

Juan de la C. Posada, of Posada & Gonzalez, Medellin, Colombia, is in New York examining mining machinery with special attention to equipment employed in the cyanide process.

Donald G. Forbes, formerly manager of the Silver Cup mine in the Lardeau district, B. C., is in the Similkameen district as consulting engineer for the Silmilkameen Mining and Smelting Company.

J. S. Fenn, of Spokane, and J. W. Frank, of Reno, Neb., have returned from the oil fields at Fort McKay on the Athabasca river. Mr. Fenn located three oil channels for the British American Oil Company, of Seattle.

John C. Ostrup, who designed the Boston elevated-railroad structure and many

important bridges and structures for the American Bridge Company, has been chosen to fill the chair of structural engineering at the Stevens Institute of Technology, Hoboken, N. J.

Obituary

Dr. August Dupré, chemical adviser of the explosives committee of the British Home Office, died on July 29. Dr. Dupré had been connected with the explosives committee since 1873 and was a Fellow of the Royal Society. He was born at Mainz, Germany, in 1835 and was educated at Darmstadt, Giessen and Heidelberg. In 1864 he became a lecturer on chemistry at Westminster Hospital School. In 1871 he was appointed chemical referee to the medical department of the Local Government Board.

Societies and Technical Schools

Carnegie Library, Pittsburg—The Technology Department is making an extensive collection of trade catalogs and H. W. Craver, technology librarian, invites advertisers in the JOURNAL to contribute trade literature. The catalogs will be cataloged under both firm name and subject, and be made accessible to the public.

Stevens Institute of Technology—John C. Ostrup has been appointed professor of structural engineering. Professor Ostrup is a graduate of the Polytechnic School in Copenhagen, Denmark, later studying at the Chicago Engineering School, and has had a large and varied experience in important work extending over 17 years.

Industrial

The Sprague Electric Company, No. 527 West Thirty-fourth street, New York, has issued a new bulletin describing flexible-armored hose for steam or compressed air, suitable for transmission lines.

In the suit of the Westinghouse Electric and Manufacturing Company vs. Wagner Electric Manufacturing Company, of St. Louis, Mo., on Westinghouse oil-cooled transformer patent No. 366,362, damages were awarded to the Westinghouse Company amounting to \$132,433.35.

The Risdon Iron Works, San Francisco, Cal., has chosen the following officers, the election being necessitated by the death of Captain Taylor: Augustus Taylor, president; W. H. Taylor, Jr., vice-president; H. D. Rogers, secretary; P. H. Postlethwaite, superintendent; J. W. Rolph, auditor.

The F. W. Braun Company, Los Angeles, Cal., wholesale druggists and dealers in assayers' supplies, has been divided, F. W. Braun, president and general man-

ager, continuing the branch devoted to assay and chemical apparatus and scientific instruments under his own name, while the wholesale drug business will be conducted by the Brunswick Drug Company.

The Colorado Iron Works Company reports orders for smelting equipment from all quarters. While the bulk of this business is from the United States and from Mexico, orders for furnaces and smelting plants are going through the shops for installation in France, Japan, Chile and New Zealand. The furnace included in the Chilean plant is designed for hot-blast smelting, and the New Zealand order embraces the complete equipment of a hot-blast copper-matting plant with sampling plant.

Trade Catalogs

As noticed elsewhere, the technology department of the Carnegie Library of Pittsburg is making a collection of trade catalogs, and will be glad to receive catalogs of any of the advertisers in the JOURNAL. These catalogs will be given a prominent place on the shelves, carefully cataloged under both firm name and subject, and made accessible to the public. Catalogs should be addressed care of H. W. Craver, Technology Department, Carnegie Library of Pittsburg.

Receipt is acknowledged of the following trade catalogs and circulars:

Warren Webster and Company, Camden, N. J. The Webster Grease and Oil Trap. Pp. 6, illustrated, paper, 3½x6 inches.

The McMyler Manufacturing Company, Cleveland, Ohio. Locomotive Cranes, Bridge Conveyors, Grab Buckets, Car Dumpers. Pp. 75, illustrated, paper, 6x9 inches.

Allis-Chalmers Company, Milwaukee, Wis. No. 4007. Gates Rock and Ore Breaker Style "K." Pp. 4, illustrated, paper, 3½x6 in.; July, 1907. Also Monthly Calendar.

Construction News

Gold Springs, Utah—The Jennie Gold Mining Company is preparing to add a cyanide department to its mill.

Milford, Utah—The States Mining Company, which has acquired the old Lincoln and Creole mines in Beaver county, is preparing to install mill equipment. The post-office address of the company is Milford, Utah.

Charleston, West Virginia—The M. B. Coal Company will install mining machinery and construct coke ovens on the property recently acquired from the Cardiff Coal Company. C. C. Sharp, Charleston, W. Va., is superintendent.

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

August 7—The gold-dredging companies are engaged in removing their offices from Oroville, Marysville, etc., to San Francisco. The Nevada Gold Dredge Company, Garden Ranch Dredging Company, Gold Run Dredge Company, Oroville Gold Dredge Company, and Ophir Gold Dredge Company now have offices at No. 268 Market street. The principal offices of the Boston & California Dredge Company, Boston & Oroville Dredge Company, Feather River Exploration Company, Oroville Dredge Company, Ltd., Bear River Mining Company and Calaveras Gold Dredge Company are now in the Merchants Exchange Building, California street. The officials of the companies can now be found at these addresses instead of as formerly, at the points where the dredges are being operated. Consolidation of interests has doubtless brought about this change.

The Keystone Dredging Company, incorporated some months ago by W. P. Hammon, C. M. Derby, N. Cleveland, F. C. Van Deirse and A. E. Boynton, owns 160 acres of land on the Yuba river between the dredging lands of the Yuba Consolidated Gold Fields Company and the Marysville Dredging Company. While no dredges have been built to work this land, it is expected that one or more will shortly be built.

The California mining companies are determined not to have the experience the Nevada men have had, in losing money by "high-grading." George Johansen, who stole rich ore from the Bonanza King Company of Trinity county, was vigorously prosecuted, and has been sentenced by the judge to a year in the State prison.

The old Sheep Ranch mine in Calaveras county has been closed down again. After 20 or more years of idleness it was re-opened some years ago and subsequently changed hands. The present troubles are financial ones, several attachments having been placed on the property. This mine paid well for many years, and Haggin and Tevis, the former owners, realized millions from it. The vein is not large but the ore is rich.

Though the Union Copper mine at Copperopolis, Calaveras county, has closed down owing, it is said, to a low grade of ore, supplies continue to be received, which leads local people to believe that the mine will resume before long.

Geo. W. Rumble, of Sunset Mining

Company fame, is out of the State prison after 18 months' confinement under a sentence of using the mails to defraud. He worked the Old Glory and Amo hydraulic mines in Butte county enough to induce people to invest. It is estimated that Rumble made \$250,000 out of his fake mining scheme. He represented that he was secretary and general manager of the Sunset Mining Company, with a capital of \$10,000,000 at \$1 a share. Gold-bearing black sand in unlimited quantities worth from \$500 and \$800 a ton was the principal product of great treasure deposits, according to Rumble. He secured many victims, paying some of them 2 per cent. monthly dividends out of the funds contributed by subsequent victims. Rumble was convicted three years ago and his sentence was delayed 18 months by appeals to the higher courts.

The miners of the Plumas-Eureka mine, Johnsville, Plumas county, have gone on a strike. The mine is up the mountain a mile from the boarding house, and the men were ordered to be at work at 7 instead of 7:30 as before. The morning following the posting of the notice, not a single employee reported for work. This dispute comes at a very unfortunate time, as the Plumas-Eureka mine, a famous producer in the early days, has been idle for many years, and only last year work was again commenced with the expectation of starting the 40-stamp mill on the property within the next few days.

Bisbee, Arizona

Aug. 8—The Calumet & Arizona and Copper Queen smelters are making copper at the rate of 4,000,000 and 9,500,000 lb. per month, respectively, both of them doing some custom work. In the Calumet & Arizona large finds of rich ore have been made on the 950-ft. level of its Mag claim, which was supposed by many to have been pretty well worked out. There is, however, a large area of excellent ground in this claim, and it will be many years before it is worked out, unless the history of the camp proves a false prophet.

The Greene-Cananea has ordered three more large converter stands and is reconstructing its present smelting works as fast as convenient. The site of its new works has been selected and material is being ordered. This plant will have smelting capacity for about 3000 tons and will cost in the neighborhood of \$2,500,000. It will more than double the output of Greene. Ore of high grade is now being

hoisted from the Cananea Central part of the property and is going to the smelter, thereby enriching the copper contents of the mass, for Cananea Central's bonanza vein runs better than 6 per cent. An electrical hoisting plant good for 2000 tons a day has been installed at the Central, but of course will not be used to anything like capacity for a long time, probably not until the new smelting works is completed.

The Humboldt smelter, which is understood to have been purchased by T. W. Lawson and associates, includes a 400-ton concentrator, lead and copper stacks, a 200-ton blast furnace and two 100-ft. reverberatory furnaces. It has been doing a custom business exclusively but holds some promising copper prospects.

The Bisbee Extension Company is developing claims about 7 miles west of that city, in the granite. So far the property is highly speculative, but it is in the hands of engineers who are willing to stand on their chance. The work is now said to be showing some copper in fault planes.

Shipments of lumber to Cananea mines from the mills of the Sierra Madre Land and Lumber Company's property have begun and as soon as the large mill is in operation will be very much larger. It looks as though lumber shipments from there would be an important factor in the reduction of costs to all mines near the Mexican border.

The long fights about the ownership of El Tigre gold mine, between the Kansas City owners and the Harriman southwestern interests, has finally ended in the decision of the Supreme Court of Mexico, in favor of the Kansas City stockholders, who have been in possession, under the courts, since nearly two years ago. The \$290,000 in gold coin offered in part payment by the Kansas company, and stored for many months in the vault of the Bank of Bisbee, will now be distributed to the original owners, most of whom are Arizona people.

Copper Chief mine, east of Florence, in the Kelvin district, is now shipping a few loads daily to the railway, and will make railway shipments as soon as rates are established. The ore shipped is a high-grade oxide.

Operations at the Tombstone Consolidated are still suffering severely from excessive water, though depth is being slowly gained and the reduction works are busy, besides which, there are shipments to the El Paso smelter. The com-

pany has recently authorized a large addition to its bonded debt in order to provide additional funds for pumping and development operations.

The production of the Calumet & Arizona smelter for July was about 200 tons of blister copper less than the average, and that of the Queen was also somewhat less than usual.

Salt Lake City

August 9—The miners of Bingham have made a request for higher wages and the managers of the various companies have refused to consider the proposition, giving as a reason, the chaotic condition of the metal market, the probability of a fuel famine more serious than the one experienced last winter and the inability to get the desired tonnage of ore from the mines to places of reduction on account of inadequate transportation facilities. It is certain that the operators will not budge one iota from this position and if the demands for more pay are pressed, the mines will be closed down. There has been considerable uneasiness manifested among the men for some time. The Bingham miners' union has been gaining in strength and has now enrolled in its membership about 1200, out of a possible 2000 employed in and about the mines. Trouble seems inevitable, unless the wiser heads in the union and out of it are able to control the situation. The miners of the camp are mostly foreigners and a great majority of them are socialists. With this element to contend with, there is no telling what moment a break will occur. With the acquittal of Haywood fresh in their minds, the union miners have become more aggressive. If the worst should come, the mines of the district could be closed without serious injury other than the loss of the usual income from ore sent to market. There is no pumping to be done and therefore the danger from flooding can be averted.

Plans are being matured for the driving of a drain tunnel adit under the camp of Alta. The Columbus Consolidated and South Columbus Consolidated companies will be large shareholders in the enterprise and will put up the bulk of the money for construction. The length of the proposed adit will be about 4000 ft. and it will be used as an outlet for ore from the several mines interested in the project.

Engineers in the employ of the Nevada Utah Mines and Smelters Corporation have been conducting an examination of the property of the Blackbird Gold and Copper Company, in Beaver county, and it is said an option has been given on a control of the stock. The Blackbird adjoins the Cactus and Comet mines and consists of 98 patented and a number of unpatented lode mining claims. The Nevada Utah already owns the Comet mine.

A special meeting of shareholders of the Northern Light Mining and Milling Company has been called to consider a proposition to consolidate with the Chloride Point and Columbia mines and to form what is to be known as the Northern Light Consolidated Mining Company. The meeting occurs on September 5.

An effort is being made to bring about a consolidation of the West Quincy and Thompson mines at Park City.

Five Utah mining companies have posted dividends so far this month: the Gemini, for \$50,000; Utah, \$3000; Lower Mammoth, \$9500; May Day, \$8000; Uncle Sam Consolidated, \$10,000.

Articles of incorporation of the Uintah Treasure Hill Coalition Mining Company have been filed. It is to have a capital stock of 1,000,000 shares of the par value of 50c. each. The basis is the Treasure Hill, Kentucky and Typo groups of claims at Park City, Utah. Jesse Knight, of Provo, Utah, is president, and W. Lester Mangum, of the same place, secretary and treasurer.

Denver

August 10—Isabella, the old leader of the Colorado Springs market in the boom time of Cripple Creek, is said to be in rich ore again. At one time the company received \$316,000 in one check as proceeds of two carloads, or about 40 tons of ore; somewhere about that time the shares touched \$2, and they are now selling around 24c. The company has paid \$742,500 in dividends. Since then it was consolidated with the Empire State, which has three cross-veins to the Isabella, and large orebodies at and near the intersections. The company now has its own mill at the mine, and is said to be treating \$5 dump ore at a profit.

The Denver smelters are not getting such a supply of ore as will enable them to run at their full capacity, and the American Smelting and Refining Company is selling the old Grant smelter, which was closed in 1903, when the workmen went out on strike, and has remained so ever since. It is rumored that it will be pulled down.

A great deal of prospecting and surface development is being done on the metaliferous veins of Grand and Routt counties, in anticipation of the arrival of the Moffat road at Steamboat Springs next summer. The mountains of the Gore and Park ranges are full of prospectors, as also those of what is known as the Hahn's Peak district; and west of, and immediately contiguous to, these mountains is the Yampa coalfield of 1200 square miles. Professor George, of the State university, State geologist, and his three assistants, are just returning from an inspection of this region and we shall have their report shortly.

The Golden Cycle mill at Colorado City, which had just inaugurated a sched-

ule of cheap rates, by which the low-grade ores of Cripple Creek could be treated at a profit, was partially destroyed by fire on the morning of July 7. The fire broke out in the old roasting building. The origin is as yet a matter of conjecture, but it appears that flames issuing from the forced draft gas-producer grates of the roasting furnace set fire to the wood-work of the old building. Another account indicates an explosion from coal dust, the flames from the furnace igniting the fine dust from the conveyer belt, which distributed the coal to the various furnaces. All statements agree that a fierce flame broke out suddenly in the old roasting room of the original Telluride mill, and that the flames spread rapidly to the old bedding floor of the building adjoining, thence to the sampler, from which place flames are said to have extended over a clear space of 200 ft. to the general office, which was also consumed. The works are separated into two parts by some brick buildings, and big brick dust-flues. To those who know the plant, it will be best described by saying that everything south of this main dust-flue has been consumed, covering about 4½ acres of buildings and ore-bins, in which latter it is said about 15,000 tons of ore was stored. The fine-grinding department, leaching buildings and refinery are intact. The loss is variously estimated at \$300,000 to \$400,000; insurance reported to be \$300,000. It is said the plant will be re-built.

The Newhouse tunnel, with its portal at Idaho Springs, in Clear Creek county, and its present terminus three miles away under the Gilpin county mines, in the vicinity of Central City and Black Hawk, intersects deep down below their mine workings, a belt of veins, which in the past 40 years is estimated to have produced from their upper portions, gold to the value of upward of \$70,000,000. It is probable that the early investors in this project have never received any profits from, or interest on, their investment, but those who have stayed in have now brighter prospects for the future. Quartz Hill and its surrounding hills are wet ones, and its many mines, which had as a rule good ore in the bottom of the workings on their main lodes, are idle, chiefly on account of the cost of pumping and hoisting. With the approach of the tunnel, which is already draining these mines, and which, at the rates of haulage charged on ore and waste, will bring the same to the surface at less than half what it can be hoisted for, will put all these idle mines into commission again. The laterals are driven at the expense of the owners of the various mines which they are intended to tap, the cost being rebated to the mine in haulage charges for their ores and waste, a very business-like arrangement. For instance, the lateral which has been driven on the great Saratoga vein is now underneath the cage shaft, with a

raise being put up to meet it. It is rumored that some of the people connected with the tunnel, which was driven chiefly with English capital, are sampling the ores in the mines of Quartz hill, with a view to obtaining leases on them, which, if they succeed in doing, will probably prove a profitable and safe enterprise.

The strike of the switchmen of the Colorado & Southern Railway is at this juncture a more than ordinary curse on Colorado, as it is the height of the active season among the mines, smelters and every other enterprise which needs fuel. Their business is paralyzed, and in many instances closed down. It is also close on the time when winter stores of coal are laid in, so that the distress likely to be caused is more sharply accentuated.

Duluth

August 10—While the Mesabi range strike is still in force, according to the leaders of Western Federation affairs, ore to the amount of 80,000 tons a day is coming over the Duluth, Missabe & Northern road, and nearly the average to other dock systems. These are almost the average shipments for the time preceding the strike, and it is one of the most remarkable things connected with this whole business, that the roads have been able to pick up the ends and get down to business so rapidly after being out of business altogether. Ships are coming steadily, though somewhat bunched as yet, and the month of August will probably show as large a tonnage moved as during any month in the history of the Lake Superior ore trade. Shovels are all busy at surface mines and some big records will be made this week; most of the underground properties are getting their force back, although it is more difficult for them than for the steam shovel mines, and it will be some time before they are producing at the old rate. In the meantime the others make up the totals.

Contracts for the steel ore shipping pier referred to in this correspondence have been let to the Barnett & Record Company, of Duluth, the price for the entire work being in the neighborhood of \$1,250,000. This is the first pier of its sort ever built, and would not be undertaken now but for the belief that the ore pier has reached its final state as regards size and style, and for the fear of fire crippling wood piers. It will be entirely of steel, on a concrete base, and the pockets will be wood-lined. It will be known as No. 6, Duluth & Iron Range road, and will be located at the west end of Two Harbors, in a rather restricted space, so much so that it cannot be as large as the other docks there. This pier will cost about three times as much as a wood one of corresponding capacity.

The old Humboldt district, on the north range, Marquette county, is to be active

once more, by reason of the re-opening of the Humboldt mine, which has been idle since 1891, though a small tonnage was shipped later from stocks. There is still about 2000 tons of stocked ore on hand, mined in the old days, and this will be shipped at once. The old main shaft, 685 ft. deep, will be re-timbered, the mine unwatered, new machinery installed and extensive development carried on during the coming winter. The ore in the district is known as pockety, and horses of rock troubled former mine operators, though a total of more than 730,000 tons were taken out in the early days. This ore is a hard magnetite, of good grade and some ore is supposed to be in sight underground.

At the Tobin mine recently, 1680 tons of ore were hoisted in the 10-hour shift, from the 700-ft. level and in a 3-ton skip, or at the rate for the full 10 hours of 56 skiploads per hour, and probably, considering the delays incident to starting the shift, to about one skip per minute for the time actually consumed in operation. This is about the record that used to be made at the Auburn mine, Mesabi range, when it was active, and is by no means unknown on Lake Superior.

Toronto

Aug. 9—Owing to there being no smelters in Canada capable of purifying ore sufficiently for coinage purposes, the new Canadian mint will have to look to the United States for refined metal. When arrangements were made for the establishment of the mint at Ottawa it was understood that a smelter would also be erected, and the matter was left in the hands of the Department of Mines; but no action has been taken. It is stated that 1,000,000 oz. of silver will be wanted at the mint in November. The ore will have to be shipped across the border for treatment and brought back as refined metal.

The recent order of the Canadian railway commission prohibiting the use of lignite coal for railroad purposes, excepting in the winter months, owing to the danger from sparks, is strongly opposed by lignite mine-owners near Edmonton, Alberta, who are supplying the Canadian Northern with this fuel. They have asked for a reconsideration of the order and experts have been sent to Edmonton to make an investigation. The Canadian Northern Railway is experimenting to secure appliances that will obviate the danger from sparks.

The discovery of J. B. Miller, of Sault Ste. Marie, Ont., of a rich nickel deposit near Worthington, Algoma district, is reported, consisting of a vein 100 ft. wide with high metal content. No information on the subject has been received by the Provincial Bureau of Mines, and the officials are not disposed to attach much importance to the report.

There is little change in the strike situation at Cobalt. So far remarkably good order has prevailed considering the number of men out of work. Some men are coming in but they do not care to work in the mines near the town. A number from Michigan have obtained work in the Cross Lake district. The majority of men now employed are surface workers, little underground development work being in progress. It is estimated that there is at least \$4,000,000 worth of low-grade ore now on the dumps. The latest move on the part of the strikers is an attempt to organize the car-repairers employed in the shops of the Timiskaming & Northern Ontario Railway at North Bay, so as to bring them out on a sympathetic strike.

Sept. 1 is the date now set for the completion of the plant of the Montreal Reduction and Smelting Company at Trout Lake near North Bay, the opening of which has been repeatedly postponed owing to delays in the delivery of machinery.

Johannesburg

July 15—The strikers made every effort to bring out all the workers on the Rand on July 4, in order to finish the strike, and get their terms. In spite of monster demonstrations, the day's results were practically negligible. Scarcely anyone left work, and the mills kept hammering away quite merrily, as if nothing had happened. Now that the battle is lost, the leaders are seeking pastures new, and are leaving the men stuck in the bog, into which they conducted them.

The showing made by the mines for June, in spite of the strike, is very creditable. Many of the mills ran full time. In order to keep the stamps at work the amount of waste rock sorted out was much less than formerly. Some mines have stopped sorting entirely for the time being. The Luipaard's Vlei Estate mine once more makes a remarkably high record in the mill, namely, 8.5 tons per day of 24 hours. This is probably a world's record for a stamp mill. The total June output was 507,559 oz., valued at £2,155,976, showing a decrease of 16,918 oz., valued at £71,862. Of this amount the Rand contributed 487,956 oz. valued at £2,072,707. During the month, one developing mine, the Hercules, which is sinking a seven-compartment shaft, decided to close down. The Robinson mine was the premier producer during June, turning out 23,054 oz. and making a profit of £65,000. Next on the list is the Simmer & Jack, and third comes the Robinson Deep.

Now that the strike is practically over, July should show a big improvement. It will take some months yet to get the industry on the footing it enjoyed before the beginning of the strike.

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

Arizona

COCHISE COUNTY

The Copper Queen Mining Company is to install electric pumps for its general work underground at Bisbee, leaving the present plant for emergency purposes. It is also to revise its underground methods, so that all ore will be hoisted from one shaft 100 ft. lower and a mile or two southeast of its present main hoisting works. This is the new Sacramento shaft, which is now being equipped and which is the only shaft the company has in rock. Electrical tramping will be used for all underground main trams.

July's production from the Shattuck mine, was the largest on record, amounting to 400 tons per day during the latter part of the month, and it is being maintained at that rate. Half of this, a sulphide ore, goes to the Old Dominion smelter, and the rest is treated at Douglas by the Copper Queen works. Large ore-bodies are being cut on the 900-ft. level. The Shattuck interests have taken properties adjoining the Bonanza de Cobre at Cananea and will develop them at once. These lie close to the Calumet & Sonora Catilina group, which is showing good ore, both of copper and silver-lead.

In the Chiricahua district, good copper ore is being taken out of the Taylor-Cardwell property, and considerable other development is under way over a wide area of the mountains north from Rodeo.

Three properties that the Calumet & Arizona company is developing, in Pima county, at Mammoth and in the Turquoise district north of Bisbee, are all looking well, and the company expects to make mines of them all. Considerable ore is being shipped to Douglas. The three will cost, if bought, \$1,575,000.

YAVAPAI COUNTY

Bannie Mines Company—A new strike has been made at the mines, near Walker; 18 in. of high-grade gold ore has been opened in a cross-cut.

Dekalb Mining Company—This company operating near Crown King is putting up a permanent camp. A steam hoist will be installed in the near future.

New Copper Find—J. P. Storm reports a discovery of medium grade copper ore five miles west of Jerome Junction, the ledge being 10 ft. wide. This is the first discovery of any importance reported in that district.

California

AMADOR COUNTY

Burlington Gold Mining Company—On this mine near Sutter creek 1500 ft. of development work has been done. To the 10-stamp mill 10 stamps are now to be added, and 10 more later on. The shaft is down 450 feet.

Gold Top—From this gravel mine at Pine Grove, J. B. Batz, superintendent, nuggets up to \$100 value are being taken. A restraining dam has been built on the middle fork of Jackson creek.

BUTTE COUNTY

Sales—Wilson & Snyder have sold to Senator Rockwell of Nevada 30 acres of gold-bearing land near Oroville for \$15,000. M. E. Gunn has sold 160 acres near Pentz to G. R. and C. M. Hendrix and P. M. Ream, so that they now own 600 acres joined by a tunnel, and the miners are already in the gravel channel.

FRESNO COUNTY

Florence Mack—The discovery of a large body of cinnabar is announced in this mine near Coalinga.

KERN COUNTY

Tchachapi Mining Company—This new company has bought from the Minnehaha Company, five claims in Hamilton district, on Indian creek, the Hamilton tunnel site, and the "Hitchbird" mine. There is a small mill on the property.

MARIPOSA COUNTY

Copper—J. A. Salisbury of San Francisco has acquired possession of a newly discovered body of copper ore near Indian gulch, 12 miles from Merced falls, and will at once erect machinery and start work.

Rufe Pierce—The purchasers of this mine (formerly the Grimshaw), four miles from Hornitos, paid the \$20,000 from the earnings of the mine in 11 months.

NEVADA COUNTY

Home—From this mine at Nevada City, now owned by the Champion Mining Company, 55 tons of high-grade sulphurets are being shipped to the smelter.

Omaha & California Mining Company—This company at Spenceville, M. A. Daugherty superintendent, has discontinued shipping ore for the present, the tests having proved satisfactory; the mine will now be more fully opened up.

PLACER COUNTY

Georgia Hill—This old mine near Yankee Jims has been started up with E. W. Drummond as superintendent.

Homestake—This quartz mine near Forest Hill, idle for years, is being reopened.

PLUMAS COUNTY

Arcadia—A Nevada company has taken a working bond on this mine in North cañon, near Greenville.

Consolidated Copper-Gold Mines Company—A. Philbrick, president of this new company, which is developing a group of 15 claims on Ward creek, reports that the property has eight parallel veins from 1 to 30 ft. wide, carrying gold, silver and copper at the surface. In the bottom of a 30-ft. prospect shaft a 24-in. streak of almost pure chalcocite has been encountered. The company will install a 10-drill compressor and will drive a 2300-ft. cross-cut tunnel to cut the veins at a depth of 1500 ft. Several new companies have begun to develop the district.

Cooper Mountain—These properties, among them the Italia, Green Ledge, Copper and Colman mines, at Genesee, have been bonded by Carruthers and Philbrook, and operations will commence at once.

RIVERSIDE COUNTY

Gypsum—The 14 gypsum claims in Ironwood district, in the eastern part of the county, have been bonded to Allen Jones.

SAN BERNARDINO COUNTY

Copper Chief—The Ventura Development Company has sold this group of five claims in Silver Mountain district to Judge J. A. Day of Ventura for \$12,500.

Crackerjack District—A double compartment shaft is being sunk on the Bonanza property. A number of mining deals have taken place recently, among them transfers of the Apex, Bolivian and Cactus groups. Montana men have bought up several claims.

Family Mining and Milling Company—This new company in Cima district is shipping a carload of silver ore weekly.

SAN DIEGO COUNTY

Noble—This property at Descanso has been sold by Thomas Noble to F. M. Eliott, of San Diego.

SHASTA COUNTY

Conner Claims—The Stauffer Chemical Company, of San Francisco, is working this mine at Lower Springs under bond. New machinery has been installed.

Golden Calf—Luke and Thomas Mitchell, owners of this mine on Flat creek, which has been shipping ore to the Selby and Keswick smelters, have bonded it for \$45,000 to A. E. Monnette, of Goldfield, Nevada.

Milton—This mine, Lower Springs district, has been sold to a Minneapolis company.

Vulcan Copper Mining Company—A wagon road for hauling in machinery is being built to this mine, 10 miles from Kennett.

SIERRA COUNTY

Alaska—This company, at Pike City, is putting in poles for an electric line from the Rome power house. It is a wet mine and electric pumps of large capacity must be used to keep it drained.

Rainbow—The first clean-up has been made at the new 10-stamp mill of this mine, near Alleghany.

Reliance and Keystone—These gravel claims on Chipps ridge have been leased to F. de Lawney.

SISKIYOU COUNTY

Copper—At Oak Hollow, five miles north of Scott valley, new copper mines under bond to F. H. Dakin, Jr., of San Francisco, are being developed. Other copper prospects in the county are being examined, with a view to development.

Helena Gold Mining Company—This company, with A. Sydney Addison, of San Francisco, as the new general manager, has resumed operations on the McKean mine.

McKinley—This old mine, on Humbug creek, idle for years, is about to resume operations.

Salmon River Consolidated Mining Company—This company is putting in a power line from its mine at Rollin to the company's ditch at Sawyer's Bar.

Spencer—This mine on Humbug creek, which has been long idle, has been bonded to Portland, Oregon, men who are getting ready for operations.

TUOLUMNE COUNTY

Big Mill—Work on a 100-stamp mill is in progress for the Dead Horse and Lady Washington workings near Tuolumne. A long tunnel from the Lady Washington has tapped the Dead Horse mine and the latter is being drained through the tunnel.

YUBA COUNTY

Campbell—At this mine at Smartsville, E. B. Tarr superintendent, the gravel is to be broken up by crushers and then washed.

Colorado

LAKE COUNTY—LEADVILLE

Big Evans—Besides the Mammoth and Little Evelyn, three new shafts are being sunk.

Covey Lease—From 25 to 30 tons of carbonate ores are being hoisted daily from the Hibsche shaft. The shaft has reached a depth of 440 feet.

Half Moon—While blasting recently a vein, known as the Ideal, was uncovered.

Hoffer Shaft—Owing to the amount of surface water operations have temporarily ceased at the Hoffer shaft, north of Poverty Flats.

Ibex Mining Company—The Little Johnny is producing regularly about 7000 tons of ore per month.

Iron Silver—Good carbonate ore is being taken from the upper contacts of the Dome shaft which was sunk a few years ago.

Long & Derry—The new company which took over the property of the Anona Mining and Milling Company has secured a lease on the Old Long & Derry property, and will prosecute a campaign of development work. A tunnel will probably be driven from the Iowa gulch side.

Monarch Mining Company—In order to connect with the Winnie shaft, the company is driving a drift from the Cleveland in which a streak of ore was recently encountered. The Winnie shaft is making regular shipments of high-grade ore.

Nil Desperandum—Some large bodies of low-grade ore were lately discovered at the 650-ft. level in this property on Rock hill, but at the present low prices, will scarcely pay to ship. The lessees have discontinued work at this point but prospect work will be continued.

Sunday—A steady tonnage has been maintained since the opening of the ore in the lower levels. The mineral, which is the Breece hill silicious ore, carries both gold and silver.

Swisher Tunnel—This tunnel on Sugar Loaf mountain, has reached a distance of 1000 ft. and a vein has been cut which runs high in gold.

OURAY COUNTY

Mono-Baltic Mining and Smelting Company—Joseph Irving, general manager of this company, reports that developments have rendered the erection of a smelter desirable. The company, formed last spring, owns a number of claims including the Baltic, Saratoga and Maud S. The workings show large bodies of low-grade ore and fairly rich pyritic bodies carrying 7 per cent. copper, besides many thousand tons of oxidized silicious ore carrying silver.

Michigan

MENOMINEE RANGE—IRON

Crystal Falls—It is reported that a body of iron ore has been discovered on a property controlled by George J. Maas, of Marquette, in the Michigamme valley. Many drill holes have been put down, but without success until recently, when the new orebody was encountered at a depth of 740 ft. It is said to be low-grade. The Mansfield is the only working mine in this valley.

Montana

BUTTE DISTRICT

Anaconda—The company is cutting a station at the 2800-ft. mark in the High Ore and will open the veins at that depth. It is mining ore on the 2400-ft. level, the lowest point at which the veins have been opened.

Boston & Montana—Mining has been resumed in the West Colusa mine, the gas from the fire in the Minnie Healey having almost disappeared. The company is shipping 3350 tons of ore a day and has reserves in all of its opened mines. It is hoisting through the shaft of the Leonard the ore mined by Coalition in the lower levels of the Minnie Healey.

Butte & Bacorn—The crosscuts north and south of the 1000-ft. station of the Calumet are passing through mineralized vein matter, one having penetrated this class of material 50 ft.

Coalition—This mine is shipping about 1400 tons of ore a day, having increased the quantity by a partial resumption of mining in the Minnie Healey. The company is developing the vein cut at the 1800 of the Rarus and is extracting good ore.

North Butte—The company is mining about 1250 tons of ore a day, not taking particular pains to secure anything save second class. The first class is to be reserved for the winter season, when quantity will be superseded by quality.

Parrot—The shaft of the Little Mina is 1000 ft. deep and has been connected with the 1000-ft. level of the Mountain Consolidated. The ore of Little Mina and also that of the Clear Grit will be raised through the Little Mina shaft. The company is extracting about 300 tons of ore a day from its main workings.

Trenton—About 400 tons of ore a day is being extracted from the Gagnon mine and more vein is in sight on the 2100-ft. level than at any point between the 1700- and 2100-ft. levels.

Nevada

ESMERALDA COUNTY—GOLDFIELD

Combination Fraction—The east drift at the 520-ft. level has cut a vein which has been followed along the hanging-wall for 130 ft. The ore is of milling grade. It is proposed to sink the shaft deeper, to

enable a crosscut being run to cut the lode 100 ft. below the present level in the hope that the ore will be higher in grade.

Etta Wonder—A high-grade vein has been cut in this property at a depth of 115 ft. The mine is in the eastern portion of the field. The management is of the opinion that the mine will shortly be able to yield regular shipments.

Florence—The Rogers lease on the Red King claim of the Florence has struck extraordinarily rich ore in a drift on the 310-ft. level. The find was made a little to the south of the famous Little Florence claim. According to the surveys recently made the vein runs north and south, and evidently crosses the O. K. Fraction near the southeast corner post. It cost the lessees over \$50,000 to reach the vein. Seven local miners took up the lease two years ago, L. H. Rogers being the manager. After a year's fruitless search, their funds gave out and the Warner-Stewart Company of Chicago purchased a half interest for \$25,000.

Florence Hopkins—The shaft is down 380 ft. Several veins have been cut and good assay returns have been obtained. The country, however, has been broken and faulted. But recently the country has been of a sounder nature and is improving.

Frances Mohawk—A first shipment of 18 tons of ore has been made to the Salt Lake smelters. The vein is apparently the same as that opened up in the Mohawk Jumbo, near the side lines of which the strike was made. The vein lies about 216 ft. southwest of the shaft on the 365-ft. level.

Golconda—The F. M. Phelps lease on the Golconda claim of the Consolidated, has a shaft down 135 ft., and will sink to 250 ft. before crosscutting. The Stanton lease on the Golconda is down 50 ft. and will also go to 250 before any lateral work is attempted. Both leases are being developed under the direction of J. B. Higgins.

Sandstorm—The company has granted leases to three different parties, including James Atkinson, the former manager of the mine. In the early days the lessees made fortunes on this property.

Velvet—The Combined Mining and Leasing Company has cut a vein in the Sunrise claim at a depth of 350 ft. The ore is of milling grade at present, but is rapidly improving in value. It has been driven on for a distance of 35 ft.

NYE COUNTY—IONE

Quicksilver Mine—A cinnabar deposit in a lime and felsite formation, which has been developed since the first week in January of the present year, gives promise of developing into a producer. The owners are endeavoring to equip the mine with a plant, including a smelter. The mine comprises an area of 480 acres, situated in the

Ione, or Union mining district, about 90 miles northwest of Tonopah. A ledge yielding mercury has been traced by outcrops through the whole length of the leases. Prospecting shafts show that the ledge is a well-defined contact deposit.

NYE COUNTY—HANNAPAH

Newhouse—The damage caused by the fire last month has been entirely repaired. The north crosscut on the 300-ft. level has penetrated the ledge a distance of 6 ft. The ledge is between 5 and 6 ft. wide, and carries silver and gold, the ore being of the same character as that in the Mizpah, at Tonopah.

Silver Glance—The winze from the old workings is down about 40 ft., and a good grade of shipping ore is being extracted and sacked.

NYE COUNTY—TONOPAH

Midway—The new 20-head mill has been erected and has undergone a satisfactory trial run. Its capacity is 80 tons per day. The arrangement of the plant is as follows: From the ore bins in the mill, the ore goes to the stamps, which crush it enough to let it go through a No. 8-mesh screen. It is then passed through a Huntington mill, which reduces it to a No. 30 mesh. The pulp is then passed over Willey tables and the remainder of the value is extracted by cyaniding. After treatment, the tailings go into ore cars, which run down by gravity to the end of the tailing dump and are there emptied. At the end of the dump is a movable trestle, running on rollers, which can be shifted forward as occasion demands. While not in motion, the rollers are secured in position by the use of big wooden chocks.

West End Consolidated—The work of removing the steam hoisting plant from the Ohio-Tonopah shaft to the new double-compartment working shaft is progressing rapidly, and the installation will be completed by the first of September.

New Mexico

LINCOLN COUNTY

Jicarilla—In this camp the Wisconsin Mining and Milling Company has closed its mill for repairs. The Fleming Fox Copper Company has equipped its shaft with steam-hoist and air drills, and will go to a depth of 250 ft., before beginning to crosscut for the copper vein. On the Albatross claim a large vein of \$8 gold ore has been laid bare by an open cut and the owners believe the showing is good enough to warrant a mill. Anchor gulch gravel is being sluiced for gold by Hatford and Greene; while in Rico gulch, the McKinley dry concentrator will be given a trial by the Rico Mining Company.

Nogal—In this district W. A. McIvers is planning to equip the Buster Brown group, at Carrizozo, with a steam-hoist

and air drills, as pay ore has been opened for a long distance. Mr. McIvers has also sold a half interest in the Muldoon claim for \$15,000.

Hopeful—The Mines Management syndicate is employing 50 men at the mines, and it is proposed to furnish electric power from a plant to be erected at some nearby coal mines.

White Oaks Camp—The Wild Cat Leasing Company is mining and milling ore from the two Homestake claims. At the Old Abe mine the mill must be renovated.

RIO ARRIBA COUNTY

Hopewell—On the placers in the Headstone district, Superintendent J. P. Gill has been working two shifts of men with good results, and has also a sawmill running on Deer Trail creek. The Dixie Queen Mining and Milling Company has been dismantling the Bonnet mill, for transportation to the Red Jacket mine, and is erecting a new mill in its stead. A. H. Cooper recently bonded the 16 to 1 group to Boston people for \$12,000. On the Whale claim, a new vein has been struck.

TAOS COUNTY

Iron Mask—In this mine, in Red River district, a strike of ore, appearing like gold tellurides in quartz, has been made.

Ohio

CUYAHOGA COUNTY

The Upson Nut Company has purchased the 200-ton blast furnace of the Corrigan McKinney Company in the Pittsburg district. The company has operated this furnace under lease for the past three years and will continue the manufacture of merchant iron.

Oregon

BAKER COUNTY

California—Manager Richard Addoms has commenced the delivery of a 100-ton trial shipment to the Sumpter smelter. A good body of shipping grade ore has lately been opened up in the lower tunnel.

Coal Discovery—A discovery of a thick vein of coal was made 1½ miles southeast of Geiser, in Baker county, and two miles from the Sumpter railroad by A. Jones and James Richardson.

Golden Star—This property, under the management of J. W. Messner, is preparing for the erection of a 50-ton concentrator which will make it possible to mine 100 tons of ore daily.

Farrell—The Cincinnati syndicate which owns this mine has opened up a large body of high-grade ore at a depth of 400 ft. The same syndicate is operating the Gillette Kogar properties, including 32 claims north of the Iron Dyke on Snake river.

Oregon & Idaho Investment Company—This company has purchased for \$10,000, a group of seven claims adjoining its property, the Poorman, in the Goose Creek camp, 25 miles east of Baker City.

South Dakota

CUSTER COUNTY

Gertie Tin Mining Company—The option held by Pennsylvania capitalists has expired and E. C. Johnson, of New York, the owner, will likely soon resume control.

Hills City Arsenic—A representative of a New York chemical house is in Hills City to look over the arsenical ore deposits. Samples from several properties have been shipped.

LAWRENCE COUNTY

American Eagle—A new ore ledge 8 ft. wide has been encountered almost at the surface.

Arkota—A contract for another 100 ft. of shaft work has been let.

Beaver—Watson and Clark are dredging for black sands.

Custer Peak—Superintendent O'Brien announces that the company will resume within a few days. The property has been idle since 1903. Both pumps and skips will be used to unwater and new machinery will be installed including a steam hoist.

Globe—Completion of the crosscut tunnel shows the main ore ledge to be 40 ft. wide. A new tunnel has been started to tap the ledge deeper.

Golden Reward—From the old dumps and crevices around the Golden Reward smelter, idle for several years past, S. R. McKinney has cleaned up over \$40,000. On a contract with the company, he took the former refuse and worked it over on two Wilfley tables and a jig, shipping the concentrates to an Omaha smelter.

Queen Esther—Large veins have been uncovered by tunneling and are increasing in size with development.

PENNINGTON COUNTY

Bridget—A newly organized Colorado company has leased this property west of Keystone and will sink a shaft and operate on a large scale.

Holy Terror—E. A. H. Tays, of the United Mining Company, has examined the mine. New skips will be put in to facilitate unwatering the shaft.

Joe Dollar—G. Karr reports a rich shoot in a drift showing free, coarse gold.

Utah

BEAVER COUNTY

Cedar Mining Company—This company is putting in a compressor. Ore shipments are being made and the company will probably pay its initial dividend in September.

Commonwealth—A 5-ft. vein of high-grade lead-silver ore has been encountered at a depth of 400 ft.

Frisco Contact—A large body of low-grade ore has been encountered.

States Mining Company—This company, operating the old Lincoln and Creole mines east of Milford, has ordered equipment for an aerial tramway and for a small milling plant. D. States, Milford, Utah, is president of the company.

JUAB COUNTY

Eureka Railway—This road is to be operated in connection with the Tintic smelter, and will connect the latter with the principal mines of the Tintic district. About one-half of the grading has been completed.

SUMMIT COUNTY

Park City Shipments—Shipments for the week ending August 10 amounted to 3,603,920 lb., the contributing mines and respective amounts being: Silver King, 1,496,920; Daly, 170,000; Daly Judge, 737,000; Little Bell, 130,000; other mines, 129,000 pounds.

Silver King Coalition—The enlargement of the mill will increase the capacity one-half.

TOOELE COUNTY

Honerine Extension—This mine has reported in the Salt Lake market with its initial shipment of ore.

West Virginia

FAYETTE COUNTY

M. B. Coal Company—This company has purchased the holdings of the Cardiff Coal Company on Armstrong creek and will open additional mines, install machinery, construct coke ovens and erect buildings. The transfer includes 2500 acres of coal lands in fee, a leasehold on 5250 acres and four mines in operation, with a daily capacity of about 1800 tons. C. C. Sharp, Charleston, is superintendent.

Wisconsin

GRANT COUNTY

Enterprise—This mine, situated within the city limits of Platteville, is one of the great zinc producers in the county. The mine began drilling operations and sinking a shaft in 1899. The mine now has several shafts, varying from 125 to 200 ft. deep, all of which are operated with day and night shifts. The mill is situated on the line of the Chicago, Milwaukee & St. Paul road and also has access to the service of the Chicago & Northwestern Railroad. The mill is modern in every respect and was recently equipped with a new 8-cell jig. It is also equipped with a crusher, concentrating tables, a roasting and magnetic separating plant, "the roaster," as it is

called in this field, and also has its own power plant. The officials of the company, known as the Platteville Lead and Zinc Company, are considering the building of an aerial tramway from the shaft to the mill.

Vandeventer Lead and Zinc Mining Company—The board of directors, on July 24, let a contract to A. W. Grannis, Joplin, Mo., for the erection of a concentrating plant with a capacity of 50 tons in 10 hours. The Vandeventer ore was encountered at a depth of 26 ft. and occurs in sheet formation; a portion can be marketed without milling. The company owns 160 acres of land and has 250 ft. of drifts and crosscuts.

Wyoming

LARAMIE COUNTY

S. H. Ball, of the United States Geological Survey, gives some information as to the occurrence of titaniferous iron ores in Wyoming. The ore occurs in Iron Mountain in southeastern Wyoming about eight miles west of Iron Mountain station on the Colorado & Southern Railroad, from which it may be reached by wagon road. It is approximately 40 miles northwest of Cheyenne.

The mass of iron ore forms the main deposit of an igneous dike $1\frac{1}{4}$ miles long and 40 to 300 ft. wide. The ore is a black, granular, holo-crystalline rock, with metallic or sub-metallic luster and shows a high percentage of titanium. At one time the Colorado Fuel and Iron Company worked several months in hauling ore from the deposit to the railroad, from which place it was shipped to the smelters at Pueblo. In view of the possibility of utilizing this class of ore, these deposits promise to become of considerable importance because of their great extent.

Canada

BRITISH COLUMBIA—BOUNDARY

Granby Consolidated—Work has been begun to further increase the capacity of this company's smelting works at Grand Forks. A. B. W. Hodges, local manager, states that the eight furnaces are to be lengthened, thereby increasing the total capacity by 1000 tons and making the maximum treatment capacity of the works about 4500 tons a day. Enlargement of furnaces will be spread over a year, so as to keep most of them in blast while the work is in progress.

BRITISH COLUMBIA—EAST KOOTENAY DISTRICT

North Star Mining Company—Shipments from the mine for the year ended May 31 were about 1600 tons. The directors report a net profit of \$27,381 on the year's operations. N. McL. Curran, Cranbrook, the company's manager, reports

net returns from ore shipments of \$33,000. Prospecting with the diamond drill from the 200-ft. level is in progress. A big body of lead-zinc ore has been opened in the Stemwinder property and an experimental shipment has been made to the smelter at Coffeyville, Kan., to determine the treatment question.

SLOCAN DISTRICT

Payne Mine—The mine and concentrating mill have been sold by public auction to Senator Forget, of Montreal, Quebec, for \$60,000. Prior to 1902 dividends totaling \$1,363,000 were paid out of earnings. The concentrator, with provision for saving zinc, was constructed in 1901.

NOVA SCOTIA

Mabou Coal Company—On July 16 the mining and railway property of the company, Cape Breton, were sold by the sheriff, at the suit of the Eastern Trust Company, for \$210,000, the purchaser being W. A. Henry, representing the bondholders.

Victoria—A dividend has been announced of 7 per cent. on preferred stock, 12½ per cent. on common stock and 33½ per cent. on deferred shares of this Mond Nickel Company mine.

ONTARIO—COBALT DISTRICT

Cobalt Ore Shipments—Shipments of ore from the Cobalt area for the week ending Aug. 3 were as follows: Buffalo, 100,000 lb.; La Rose, 105,405; Nipissing, 347,400; Nova Scotia, 66,000; O'Brien, 61,000; total, 679,805 pounds.

City of Cobalt—A vein 2 in. wide, carrying 8000 oz. silver to the ton, besides a high percentage of niccolite, has been encountered at the 52-ft. level, just south of the Nancy Helen property.

ONTARIO—LAKE OF THE WOODS

Bully Boy—A. Strelow, one of the directors of this gold mine, Lake of the Woods district, has arrived at the property to complete arrangements for re-opening. The shaft is down 215 ft. with drifts of 100 ft. each way on the vein. At the bottom of the shaft the vein is 14 ft. wide. Stopping will shortly be undertaken.

YUKON—BONANZA CREEK

Yukon Consolidated—This Guggenheim company has begun work both above and below Discovery, Bonanza creek, and has made a departure from hydraulicking methods heretofore prevailing in the Klondike. The new system involves first the ground-sluicing of the creek bottom proper by hydraulic head, then setting sluice boxes in the bedrock, and then hydraulicking down the gravel into the bedrock flume, whence it is conveyed to a sump at the lower end of the claim. An endless conveyer belt acting as a tailings stacker

carries the water and washed gravel clear of the creek bed, thus allowing the bedrock to be thoroughly cleaned up. The creek bottom will afterward be used as a dump for tailings from the hill and bench claims on both sides of the creek. The conveyer and pump are electrically operated, the power being transmitted by pole line from the company's hydro-electric power house on Twelve-Mile, about 30 miles distant. Operations are being directed by Chester A. Thomas.

YUKON—DAWSON DISTRICT

Judge Burbidge, of the Canadian federal exchequer court, is in Dawson hearing suits brought by the Dominion Government to oust the concessionaries from the Bronson and Ray concessions on Bonanza creek, and the Anderson concession on Hunter creek, all of which have been declared cancelled. These concessions, covering miles of ground on two of the richest creeks in the Klondike, have remained for years practically unworked, hence the action of the Government. The Guggenheim interests are in possession of the Anderson concession and are preparing to install on it a big gold-dredge.

YUKON—WHITE HORSE

Whitehorse District—There is much activity among the copper mines of this district, all the miners obtainable being employed and every spare team is engaged in hauling ore to the Yukon & White Pass Railway; 35 tons of ore are being shipped daily to the Tyee smelter from the Grafter. The Copper King, operated by the Pennsylvania Syndicate, has 30 men at work and is accumulating a considerable tonnage of ore.

Pueblo—Byron N. White has received tramway rails, ore cars, etc., for his mine, from which he has shipped about 1000 tons of ore.

Pennsylvania Syndicate—This company, represented by Colonel Thomas, has bonded many claims in the Whitehorse camp and is having them examined by mining engineers.

Copper King—A well defined vein carrying bornite and chalcopirite was struck on May 20. The orebody is similar to that of the Carlisle mine which lies adjacent.

Grafting—A mine discovered several years ago about six miles from White Horse, and abandoned owing to the great cost of supplies is being reopened and is known by this name. R. Lowe is manager.

Mexico

SONORA

August 8—The Moctezuma Copper Company, of Nacosari, belonging to Phelps, Dodge & Co., is pushing its 2000-ton concentrator, to replace the 750-ton works now handling Pilares ores.

There is a smelting works at Nacosari, operated before the ores of this mine were sent to Douglas, which is still in shape for use should occasion require, but no ore is going there now. There is much development around Nacosari, and among the more important properties is the Copper Queen group, which E. H. DeVore is opening for a syndicate of Duluth men. This shows copper and silver values from the surface, and the present operation is expected to cut good ore at 390 ft. below the apex. The property is about 8000 ft. from the Nacosari railroad and less than three miles from the Moctezuma mill and smelter.

Africa

TRANSVAAL

The cable reports put the gold production for July at 532,000 oz. fine, showing a gain of 24,441 oz. over June, and an increase of 40,207 oz. over July, 1906. For the seven months ended July 31 the total was 3,148,242 oz. in 1906, and 3,670,732 oz. in 1907; an increase of 522,490 oz. The fine gold reported this year was \$75,867,829 in value.

Europe

GREECE

The present situation of the magnesite industry in the province of Eubœa is summed up in an article in the *Montan-Zeitung* (July 1, 1907). The magnesite deposits are about 3 or 3.5 km. from the sea and are very advantageously situated. The structure of the deposit is such that mining can be carried on with very little capital. The material is shipped raw or calcined. Although the magnesite is amorphous rather than crystalline, it is in great demand and prices per metric ton are given as follows: 93 per cent., 30 fr. (\$6); 95 per cent., also material calcined at 600 deg. C., 90 fr. (\$18); calcined at 1000 deg. C., 111 fr. (\$22.20). Completely calcined material (1600-1700 deg. C.) is quoted at 130 fr. (\$26) and upward. Both prices and demand are increasing.

New Zealand

The Mines Department reports the exports of gold from the Colony for April and the four months ended April 30 as below, in ounces of bullion:

	1906.	1907.	Changes.
April.....	44,592	25,969	D. 18,623
Four months.....	174,281	144,088	D. 30,193

The bullion reported this year was equal to 135,624 oz. fine gold, or \$2,803,330. The exports of silver for the same periods were, in ounces:

	1906.	1907.	Changes.
April.....	99,046	91,272	D. 7,774
Four months.....	331,913	394,513	I. 62,600

The greater portion of the silver is obtained from the gold-mines in the Hauraki mining 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

August 14—There seems to be a strong tone to the trade along the Atlantic seaboard, and the demand is fairly general. The various shippers report good order books to dispose of any coal coming forward, and the volume of shipments is at present large and not interfered with by weather conditions. This permits of large quantities of coal going into the hands of consumers which tends to keep conditions steady. At some points complaints are heard of a shortage of labor. This has been brought about, in some instances, by unsteadiness of product which has largely resulted from a lack of cars in the past.

The activity in the soft-coal trade is confined to points on tidewater, and does not apply to the all-rail trade. This class of trade is easily reached, and has been well stocked for some time. Consumers, therefore, are in no immediate need of coal shipments.

In the South the railroads have been taking on their winter supplies of coal so as to have cars available when the fall demand starts in. The mines in the Alabama field are producing to their maximum capacity and several new producers are entering the field. Western coal is fairly active for this time of the year, and prices hold firm for most grades.

In the anthracite trade, business is dull and prepared sizes are plentiful. In the small steam sizes, there is a better demand, and it is probable that there will be no diminution. There was a rumor that the Philadelphia & Reading Coal and Iron Company intended to advance the price of small steam coal 25c. per ton on Sept. 1.

Principal producers of anthracite claim to know nothing of this contemplated increase, and it is generally discredited. However, the producers have, for some considerable time, been making every effort to reduce the percentage of small sizes made, and that these efforts have been partially successful is evidenced by the shortage, all spring and summer, of the smaller sizes, especially pea. With the rapid progress in large buildings, operating their own power plants, the demand for small sizes, especially in New York city, has steadily increased and it does not seem improbable that an advance in price is bound to come in the near future. In fact, one of the largest producers confidently predicts an advance when the winter demand begins.

COAL-TRAFFIC NOTES

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Aug. 3 were as follows, in short tons:

	1906.	1907.	Changes.
Anthracite.....	2,528,497	3,332,392	I. 803,895
Bituminous.....	18,440,238	22,410,402	I. 3,970,164
Coke.....	7,458,350	8,261,428	I. 803,078
Total.....	28,427,085	34,004,222	I. 5,577,137

The total increase this year was 19.6 per cent.

Anthracite shipments from Buffalo by lake for the season to Aug. 1 were 950,360 tons in 1906 and 1,455,730 tons in 1907, an increase of 505,370 tons.

Anthracite coal shipments in July are reported at 5,602,435 tons, an increase of 620,987 tons over July, 1906. This is the highest tonnage ever reported for July. For the seven months ended July 31 the shipments, by companies, are reported as follows, in long tons:

	1906.		1907.	
	Tons.	Per Ct.	Tons.	Per Ct.
Reading.....	6,091,421	20.1	7,933,524	20.6
Lehigh Valley....	5,287,163	17.4	6,585,105	17.1
N. J. Central.....	3,747,210	12.3	5,044,968	13.1
Lackawanna.....	5,138,008	16.9	5,982,905	15.6
Del. & Hudson....	3,060,515	10.1	3,778,458	9.8
Pennsylvania....	2,601,626	8.6	3,413,417	8.9
Erle.....	3,123,155	10.3	4,170,458	10.8
N. Y., Ont. & W....	1,318,151	4.3	1,578,195	4.1
Total.....	30,367,249	100.0	38,487,030	100.0

The total gain was 8,119,781 tons, or 26.7 per cent. All the companies showed increases. That of the Lehigh Valley tonnage includes that of the Delaware, Susquehanna & Schuylkill in both years.

New York

ANTHRACITE

Aug. 14—The hard-coal market is inclined to be dull and supplies are more than sufficient to meet the demand. Small steam sizes, however, are becoming scarce and it was rumored that the price was to advance on all grades of small coal. This report emanated from Philadelphia, but local representatives of the largest anthracite producers claim to know nothing of such a raise. It is a fact that small coal is not being produced in large quantities as heretofore, and with the ever increasing demand the rumor may prove to be a forerunner of future conditions, as was predicted in the JOURNAL of Aug. 10. Prices are as follows: Broken, \$4.65; egg, stove and chestnut, \$4.90; small sizes remain at \$3 for pea, \$2.50 for buckwheat, \$1.90@2 for rice and buckwheat. No. 2, \$1.50@1.60 for barley; all f.o.b. New York harbor.

BITUMINOUS

The Atlantic seaboard soft-coal trade continues strong and the demand is fairly general. The tone of the market continues decidedly good. In the far East consumers continue to call for large amounts of coal and producers are sending it forward to these ports in a steady stream. A helpful feature this year is that the loading and discharging of vessels has been very speedy, no doubt induced by the loading and discharging clause called for by the vessel charter party. Trade along the Sound is taking on more coal and is ordering still more as the season advances; this started with the better grades and, owing to scarcity, the lower grades shared in the demand.

New York harbor trade shows a good tone and there seems to be no surplus of coal on hand; prices remain the same as last week, at \$2.60 for good grades of steam coal. All-rail trade shows no particular demand. Transportation from mines to tide is fairly good, coal generally running through on time. Car supply is up to all demands.

The coastwise vessel trade is steady. Vessels strive for 5c. additional, but seldom get it. There seems to be a little better supply. No change in freight rates is recorded and prices from Philadelphia are as follows: To Boston, Salem and Portland, \$1.10; to Lynn, Newburyport, Bath, Gardiner and Bangor, \$1.25; to Portsmouth, \$1.15; to the Sound, 90c.; with towages where usual.

Birmingham

Aug. 12—The coal production continues steady and every ton is being moved as fast as it is being mined. Some of the larger consumers have laid in a large stock of coal, so that there will be no hindrance because of a scarcity of fuel in the winter. Good prices obtain and some inquiries are being received for deliveries during the winter. There is need for considerable labor in this State in the coal mines.

The Three Rivers Coal Company, with a mine or two in the western part of Jefferson county and in Walker county, is having financial troubles and W. M. Drennen has been appointed receiver by the Federal court. There will be no loss of time at the mines of this company while the complications are being straightened out.

The best of feelings prevail in coal circles throughout Alabama and the future is

looked to with much expectation. The home consumption is healthy, while the railroads are watching the conditions closely to look out for their own interests.

Some of the coke makers in this State have withdrawn from the open market, preparing for the winter. The Tennessee Coal, Iron and Railroad Company will soon start up its coke ovens at Blocton, in Bibb county, again, after several years' idleness. The orders recently booked from Mexico City and other points will require considerable coke, and then no chances will be taken on the possible needs at home in the winter. The best prices prevail for the product.

Chicago

Aug. 12—The wholesale coal market continues quiet but firm. There is a disposition to easier conditions on some grades of Illinois and Indiana coals, owing to increasing shipments which are said to be due to larger operations at the mines. Consumption, however, is heavy, and it is probable that the good sense of operators will restrict shipments until the autumn trade sets in. Prices on bituminous coals are not high, but they are not fluctuating and promise to go higher with the resumption of cool-weather buying.

Run-of-mine from Illinois and Indiana mines, the chief steam coal, brings \$1.60 @2.10. Lump and egg from the same mines, in light demand, sell for \$1.75@2.50; and screenings, a size much in demand in the summer months, sell for \$1.25@1.40. Brazil block is in good demand at \$2.80 for 1¼-inch.

Eastern coals are in better condition, practically all grades being firm. Smokeless brings \$3.10@3.35 for run-of-mine and \$3.65@3.90 for lump. Pittsburg No. 8 is in good demand and has no over-supply, at \$2.90@3. Youghiogheny is a fair seller at \$3.20 for ¾-in. and \$3.30 for lump. Hocking Valley is firm, though not in heavy demand at \$3.15. The demurrage evil is not troubling Eastern coals to any extent.

Anthracite sales are steady but light, the September prices for autumn trade being too near to induce heavy buying before the end of the current month.

Pittsburg

Aug. 13—The trouble between the Pittsburg Coal Company and the United Mine Workers over an alleged violation of an agreement at the Youghiogheny mines was satisfactorily adjusted during the week and a general strike was averted. The strikers, numbering about 2000, returned to work on Monday, Aug. 12. All the mines of the Pittsburg Coal Company are in full operation and shipments to lake ports for the Northwestern trade are being rushed. While the curtailment of production due to the strike was serious,

officials of the company are confident that all contracts for the Northwest will be filled before the close of the navigation season. Prices remain firm on a basis of \$1.20 for mine-run coal at the mine.

Connellsville Coke—The coke market continues strong and there is no spot coke to be had. The production for both regions is practically sold up for the rest of the year. Furnace coke is quoted at \$2.75 @3 and foundry at \$3.25@3.50. The *Courier* in its summary for the week gives the production in both fields at 419,025 tons. The shipments aggregated 14,555 cars, distributed as follows: To Pittsburg, 4878 cars; to points west of Connellsville, 8853 cars; to points east of Connellsville, 824 cars.

Foreign Coal Trade

The output of coal in the Nord and the Pas-du-Calais, the two chief districts of France, for the six months ended June 30 was 9,539,564 metric tons in 1906, and 11,921,467 tons in 1907, an increase of 2,381,903 tons. The light output in 1906 was due to strikes of the miners.

Coal production of the Transvaal in May was 339,551 tons, from 25 collieries. Sales of coal were 246,652 tons, the average price realized at mines being \$1.27 per ton.

The coal consumption of British India, including Burma, for the full years is reported as follows in long tons:

	1905.	1906.	Changes.
Production.....	8,417,739	9,261,714	I. 843,975
Imports.....	197,784	226,365	I. 28,581
Total supply.....	8,615,523	9,488,079	I. 872,556
Exports.....	1,144,680	1,394,732	I. 250,052
App. consumption	7,470,843	8,093,347	I. 622,504

The quantity consumed by the railroads in operating is reported at 2,668,424 tons in 1906 and 2,878,281 tons in 1907; being about 35 per cent. of the total. Of the coal imported in 1906, there was 199,275 tons from Great Britain.

Iron Trade Review

August 14—The general tone of the iron markets is dull, but there seems to be no signs of any material weakening. Blast furnaces are making up to practically full capacity and the dullness is entirely on new business. The strike on the Mesabi range has not seriously affected the estimated total production, and ore shipments from the northern ranges are heavy.

Western business is light, but prices hold firm. In the Pittsburg district the Carnegie Steel Company has purchased billets and steel rails in large quantities, and the sale of 5000 tons of spot bessemer iron to this company is recorded. The seller was a concern usually in the market as a purchaser.

Basic iron is more active than other

grades and considerable sales were recently made. Forge is in a little better demand, but foundry iron is somewhat slack.

Several contracts for structural steel have been let and it is reported that tenders were made this week on 13,000 tons of structural steel for three New York city piers. No contracts have been let to date.

The net earnings of the Sloss-Sheffield Steel and Iron Company for the quarter ending July 31 amount to \$429,895. The surplus, after paying charges, was \$190,895 for this period.

Pig Iron Production—The total weekly capacity of the coke and anthracite furnaces in blast on Aug. 1 was 514,150 tons, a decrease of 14,000 tons from the July report. 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 July was 2,294,500 tons; making, for the seven months ended July 31, a total of 15,772,044 tons.

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

	1906.	1907.	Changes.
Escanaba.....	2,565,505	2,812,879	I. 247,374
Marquette.....	1,254,794	1,349,805	I. 95,011
Ashland.....	1,679,359	1,707,107	I. 27,748
Superior.....	2,671,536	3,081,664	I. 410,128
Duluth.....	4,982,331	5,151,365	I. 169,034
Two Harbors. . .	3,850,943	3,431,921	D. 419,022
Total.....	17,004,468	17,534,741	I. 530,273

The effects of the strike were shown in July, the shipments for that month having been 5,762,772 tons in 1906 and 4,849,117 tons in 1907, a decrease of 913,655 tons.

Birmingham

Aug. 12—With the pig-iron market in Alabama still dull, the manufacturers appear to be lying back, waiting for the consumers to come into the market and begin making their purchases. Positively no inclination is apparent to make concessions to secure business and, despite rumors that prices have changed, the furnace companies give out statements of no change in quotations. Iron for delivery during the first half of the coming year is quoted at \$18.50 per ton, No. 2 foundry. Iron for delivery during the fourth quarter of this year is quoted around \$20 per ton, No. 2 foundry.

The Tennessee Coal, Iron and Railroad Company has blown in its No. 2 furnace at Bessemer, 12 miles from Birmingham, after 10 months' idleness, during which time considerable repairs have been made on the furnace. The stack has been relined and other work done about it. The daily capacity will be about 200 tons.

Three other furnaces are being worked on in this district and should be ready for blowing in within the next 30 to 60 days. Some improvement is noted in the raw-

material supply and it is believed that in a short while all needs will be met. Despite the little dull spell in selling, the manufacturers are confident that the conditions will remain firm and in a short while the buying will be on in earnest.

Railroad facilities are still good, and, though the cotton movement will soon start, there is no apprehension about scarcity of cars.

Steel, finished iron and steel, cast-iron pipe, soil pipe and kindred products in Alabama are in good demand, with steady prices obtaining. The future prospects in all these commodities appear to be bright.

Baltimore

Aug. 13—Exports from this port for the week included 2500 tons of steel rails and 153 tons of splices to Cienfuegos, Cuba. Imports included 636 tons of ferromanganese and 5000 tons of pig iron, from Great Britain. Receipts of iron ore were 5952 tons from Spain and 11,200 tons from Cuba; 17,152 tons in all.

Chicago

Aug. 12—The pig-iron market continues very quiet. There is much talk about a slump in prices, but on standard grades of iron there is little weakening. Leading furnace agents say the market is firm and will continue so on the light business that apparently will last until the end of the summer. No. 2 Birmingham is said to bring \$19.50 on desirable orders for the third quarter, making the Chicago price \$23.85. For most of the business done \$20 would be nearer an average price on quick shipments, with fourth-quarter needs represented by \$19@19.50, Birmingham.

Northern iron is firm at \$24@25 for the last half of 1907, the higher price representing immediate needs and the lower contract requirements for the last months of the year. On 1908 business Southern is quoted at \$18 Birmingham or \$22.35 Chicago, and Northern at \$23.50.

The business of the present is almost wholly small lots, with no substantial excess prices for quick delivery, the demand for such lots having become unimportant in view of the fact that there is little business being done. The demand for iron and steel products continues large, with little prospects of a change and the seeming certainty that melters must use large amounts of iron in the near future.

Coke is firm at \$5.75 for Connellsville 72-hour and Southern coke 15c. to 50c. less.

Philadelphia

Aug. 14—Interviews with a few of the larger consumers of pig iron today show the condition of the crude iron industry, from the buyers' standpoint, to mean delay in the further placing of orders. Most of our furnace people profess absolute indifference as to what course buyers pursue. There is more interest shown in basic pig than in other kinds of iron but

no important transactions are reported. Negotiations for two or three lots are held up. Buyers have concluded to watch and await developments. Small lots are selling daily, especially of foundry grades. The pipe iron makers are more likely to be heard from than others as they have not fully covered their needs. Low phosphorus was asked for yesterday. Forge is held firmly by most furnaces. No. 2 foundry is quoted at \$22.50; forge at \$20; basic, \$21.50; and low phosphorus at \$27.50.

Steel Billets—Vigorous conditions continue and the only thing which obstructs the placing of a good deal of business is that manufacturers are not willing to talk business on any other basis than \$32@32.50.

Bars—If there is any weakness it might be found in common iron but only large orders, to be filled at the convenience of manufacturers, would draw out concessions. The mills are all busy and refined iron and steel bars in small orders are firm at 1.85@1.95c. Inquiries are now under consideration for late delivery.

Pipes and Tubes—Merchant pipe is very strong and active and boiler tubes are as high as ever under oversold conditions at mills. The local demand is active.

Sheets—Mills are booking orders for still later delivery. Users of all kinds of sheet iron are looking far ahead and some are carrying larger supplies than for years.

Plates—The latest information is to the effect that large car-building orders will be placed early in September and that this influx will be followed by large orders for material. The conditions so long prevailing still continue as to retail demand, and prices. Even premium prices are paid for special accommodations.

Structural Material—The State mills are booking a good deal of business; in fact the mid-summer demand is phenomenal. General construction requirements are pouring in and quick deliveries are required. Such business is handled with greater ease than a few months ago.

Steel Rails—The long deferred understanding as to composition, size and details of mechanical construction are awaited with interest. The builders of trolley lines cannot get rails fast enough. Light rails are selling well and a large amount of work has to be delivered before cold weather.

Scrap—There has been sliding to lower levels this week. No. 1 steel scrap is offered at \$17; railroad is held at \$19; No. 1 yard scrap at \$16.50; and machinery scrap \$19. The scrap dealers look for a rising market.

This expectation is, however, based on the probable revival of demand about which there is some uncertainty as yet. In the mean time the dealers are actively gathering scrap in anticipation of future needs.

Pittsburg

August 13—Business in finished iron and steel lines continues light, but fairly good for a dull period. The Carnegie Steel Company this week booked orders for 9000 tons of standard steel rails and 2000 tons of light rails for delivery this year. There is no buying for next year, and will not be, until after the conference of representatives of the American Railway Association and the rail makers. Most of the members are enjoying their summer vacation, and it is not likely that a meeting will be called before the middle of September.

An indication of the great business being done by the Carnegie Steel Company is partially revealed in its purchases of bessemer and open-hearth billets. It was learned this week that since the first of the year, to date, the company has bought 86,500 tons of billets. All of these purchases are applied on contracts, and all contracts that expired on Jan. 1 and July 1 were not renewed. In addition to the large outside purchases the Ohio works of the company have been on billets exclusively since July 1. In the second quarter, 56,000 tons of billets were bought from independent steel interests, and in July, 30,500 tons were purchased. New finishing mills have been added since the billet contracts were taken, and the company can now use all the steel it produces.

The board of conciliation, to which was referred the wage dispute between the Amalgamated Association of Iron, Steel and Tin Workers, and the Republic Iron and Steel Company and the Western Bar Iron Association, made an award on August 10, after two weeks' session at Cambridge Springs, Penn., in favor of the workers' organizations. The decision was a surprise to the representatives of the manufacturing interests, and they asked for time to refer the matter to the chief officials before signing the scale. This was granted and the mills are still in operation. Unless the scale is signed within a reasonable time, a strike will be ordered. Under the terms of the award, the pay of the puddlers is to advance with each twentieth of a cent increase in the average selling price of bar iron for two months, over the base of the scale which is \$5 a ton with bar iron at 1c. a pound. The increase is 12½c. for each twentieth. The present average based on the July adjustment is 1.6c. or one twelve-twentieth, and means an advance of 50c. a ton for the puddler, making the rate \$6.50 instead of \$6 as at present. Heretofore, wages of the puddlers advanced 25c. a ton with every increase of 0.1c., beginning when bar iron sales average 1.3c. Now the advance begins when bar iron sales are 1.05c. when it is \$5.12½, and 12½c. increase with each one-twentieth cent increase. In the bar and 12-in. scale, the rollers' and catchers' wages remain unchanged, but all other workmen are advanced 5 per cent. The

only other important change is an advance of 5 per cent. on all jobs in the guide, 10-in. hoop and cotton tie mill scale.

Pig Iron—W. P. Snyder & Co., the leading independent producers, who were buyers about the first of the month, caused some surprise during the week, by becoming sellers and sold the Steel Corporation 5000 tons of bessemer iron for August delivery at \$22. As the Steel Corporation invariably received a concession of 50c. a ton in its outside purchases of bessemer pig iron, it was thought that the market was established at \$22.50, valley furnaces. The rule was not observed, however, as the Westinghouse Electric and Manufacturing Company bought several small lots of bessemer, for prompt delivery, at \$22.25 @ 22.40. There have been no transactions in foundry and forge iron, and prices are purely nominal: No. 2 foundry is quoted at \$23.40 @ 23.90 and gray forge at \$21.90, Pittsburg.

Steel—Outside of the purchases of billets by the Carnegie Steel Company, there has been nothing doing of any consequence in the crude steel market. Bessemer billets are strong at \$30 and open hearth at \$32. Plates remain at 1.70c. and bars at 1.60c.

Sheets—The sheet market is quiet as to new business, but the mills are still far behind on deliveries. Black sheets are firm at 2.60c. and galvanized at 3.75c. for No. 28 gage.

Ferro-Manganese—Prices are somewhat lower for prompt shipment, \$63@64 being quoted. For late delivery \$61 can be obtained.

Cartagena, Spain

July 27—Messrs. Barrington & Holt report on iron and manganiferous ores: There is but little inquiry for any class of ore at present, and as freights are considerably stiffer not much ore is being shipped. The local market is somewhat dull, and owing to holidays most mines have stopped work several days this week. Shipments for the week were 4200 tons to Great Britain and 3650 tons to Rotterdam; 7850 tons in all.

For iron ores prices are, f.o.b. shipping port: Ordinary 50 per cent. ore, 9s. 9d. @ 10s. 3d.; special low phosphorus, 10s. 9d.; specular ore, 55 per cent., 12s. 6d. For manganiferous ores, same delivery, No. 3 ore, 35 per cent. iron and 12 manganese is 14s. 6d.; no higher grades on the market.

Pyrites—The price of iron pyrites, 40 per cent. iron and 43 sulphur, is 11s. 9d. per ton, f.o.b. shipping port.

Dusseldorf, Germany

July 31—The German Iron and Steel Union reports the output of the German blast furnaces in June at 1,044,336 tons of pig iron, an increase of 22,521 tons over

June, 1906. For the half-year ended June 30 the production was as follows, in metric tons:

	1906.		1907.	
	Tons.	Per Ct.	Tons.	Per Ct.
Foundry iron.....	1,050,878	17.2	1,095,225	17.2
Forge iron.....	419,810	6.9	394,680	6.2
Steel pig.....	454,407	7.4	501,687	7.9
Bessemer pig. ..	238,492	3.9	235,788	3.7
Thomas pig.....	3 953,539	64.6	4,128,573	65.0
Total.....	6,117,126	100.0	6,355,953	100.0

This shows increases of 44,347 tons in foundry iron; 47,280 tons in steel pig, which includes spiegeleisen, ferromanganese, ferrosilicon and all similar alloys; 175,034 tons in Thomas, or basic, pig. There were decreases of 25,130 tons in forge iron and of 2704 tons in bessemer pig. The total gain this year was 238,827 tons, or 3.9 per cent.

Imports and exports of iron and steel, including machinery, in the German Empire for the half-year ended June 30 were, in metric tons:

	1906.	1907.	Changes.
Imports:			
Iron and steel.....	255,498	383,087	I. 127,589
Machinery.....	43,129	50,282	I. 7,153
Total.....	298,627	433,369	I. 134,742
Exports:			
Iron and steel.....	1,774,992	1,680,365	D. 94,627
Machinery.....	130,969	154,752	I. 23,783
Total.....	1,905,961	1,835,117	D. 70,844

There was a large increase in imports, but some falling off in the exports.

In 1906 the Grängesberg mines, Sweden, produced 620,606 tons of iron ore, and the profit enabled a dividend of 12½ per cent. to be paid. The output from the Gellivare mines amounted in 1906 to 894,746 tons, against 916,368 tons in 1905. In the Kiruna mines the output amounted to 1,488,021 tons in 1906, against 1,391,402 tons in 1905.

Metal Market

NEW YORK, Aug. 14.

Gold and Silver Exports and Imports

At all United States Ports in June and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
June 1907..	\$23,872,140	\$ 2,140,769	Exp. \$21,731,371
" 1906..	3,256,392	2,369,080	" 887,312
Year 1907..	36,300,732	21,444,074	" 14,856,658
" 1906..	31,610,714	62,537,778	Imp. 30,927,064
Silver:			
June 1907..	5,360,599	3,448,712	Exp. 1,911,887
" 1906..	4,518,386	3,760,012	" 758,374
Year 1907..	33,437,227	22,367,777	" 11,069,450
" 1906..	29,219,209	23,676,826	" 5,542,381

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 Aug. 10 and years from Jan. 1

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	\$807,500	\$ 58,892	\$1,537,541	\$ 49,674
1907.....	30,185,255	6,648,022	29,604,010	1,228,283
1906.....	5,932,003	48,287,063	37,130,253	1,303,616
1905.....	37,929,843	971,929	20,138,961	2,337,388

Imports for the week, both gold and silver, were from Mexico, the West Indies and South America. The exports of gold for the week were to Amsterdam and Panama; those of silver to London.

The joint statement of all the banks in the New York Clearing House for the week ending Aug. 10 shows loans \$1,110,453,300, a decrease of \$16,497,400; deposits, \$1,076,904,600, a decrease of \$22,397,800, as compared with the previous week. Reserve accounts show:

	1906.	1907.
Specie.....	\$188,939,000	\$206,346,700
Legal tenders.....	85,058,600	70,640,000
Total cash.....	\$273,997,600	\$276,986,700
Surplus.....	\$ 8,271,525	\$ 7,760,550

The surplus over legal requirements this year shows an increase of \$287,350, as compared with the previous week.

Specie holdings of the leading banks of the world, Aug. 10, are reported as below, in dollars:

	Gold.	Silver.	Total.
Ass'd New York.....			\$206,346,700
England.....	\$175,312,340		175,312,340
France.....	560,171,000	\$195,008,515	755,179,515
Germany.....	174,265,000	48,435,000	222,700,000
Spain.....	78,015,000	128,305,000	206,320,000
Netherlands.....	29,189,500	28,323,000	57,512,500
Belgium.....	16,026,665	8,013,335	24,040,000
Italy.....	168,410,000	22,582,000	190,992,000
Russia.....	586,520,000	34,245,000	620,765,000
Aust.-Hungary.....	227,185,000	61,445,000	288,630,000
Sweden.....	20,695,000		20,695,000

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 to 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 Aug. 1:

	1906.	1907.	Changes.
India.....	£ 10,818,313	£7,224,414	D. £ 3,593,899
China.....	213,700		D. 213,700
Straits.....	1,750	544,012	I. 542,262
Total.....	£ 11,033,763	£7,768,426	D. £ 3,265,337

Receipts for the week were £5000 from Chile and £156,000 from New York; £161,000 in all. Exports for the week were £136,840, all to India.

Indian Exchange has been fairly steady, the Council bills offered in London being taken at an average of 16.03d. per rupee. The buying of silver in London for India continues good, both for government and private account. This Indian demand has been less affected by the higher price of silver than had been generally expected.

Werner von Bolton claims to have succeeded in producing pure metallic niobium. Its chief properties are as follows: Specific heat, 0.071; density, 12.7; specific electric resistance (for 1 m. X 1 mm.²), 0.187; hardness less than steel; semi-ductile; crystalline aspect (rhomboid crystals) in fracture; melting point estimated at 1950 deg. C. Niobium at high temperature easily combines with nitrogen and hydrogen, but with oxygen a brownish film protects the niobium from further attack. It unites with 3 per cent. of carbon and is then hard enough to scratch quartz. Nitric acid, hydrochloric acid, sulphuric acid and aqua regia do not attack it.

Owing to heavy selling on China account, the silver market was forced down to 31 5/16d. in London; but on sudden buying to cover at market, on August 14, the price was raised to 32 1/4d. At this price buyers were satisfied and market closes weak.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars.....	\$0.54 1/2	\$0.56
Peruvian soles and Chilean.....	0.49 1/2	0.50 1/2
Victoria sovereigns.....	4.85	4.87
Twenty francs.....	3.80	3.86
Spanish 25 pesetas.....	4.78 1/2	4.80

SILVER AND STERLING EXCHANGE.

Aug.	Sterling Exchange.	Silver.		Aug.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
8	4.8645	69 3/4	31 1/8	12	4.8640	68	31 1/8
9	4.8655	69	31 1/8	13	4.8650	67 3/4	31 1/8
10	4.8640	68 3/4	31 1/8	14	4.8650	69 1/2	32 1/4

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

Other Metals

Aug.	Copper.			Tin.	Lead.	Spelter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.			New York, Cts. per lb.	St. Louis, Cts. per lb.
8	19 1/2 @ 20 1/2	18 1/2 @ 19	83	38 3/4	5.25	5.80 @ 5.90	5.65 @ 5.75
9	19 @ 20	18 1/2 @ 19	83	38 3/4	5.25	5.80 @ 5.90	5.65 @ 5.75
10	19 @ 20	18 1/2 @ 19	.....	38 3/4	5.25	5.80 @ 5.90	5.65 @ 5.75
12	19 @ 20	18 1/2 @ 18 3/4	80 3/4	37 3/4	5.25	5.75 @ 5.80	5.60 @ 5.65
13	19 @ 20	18 @ 18 1/2	76 1/2	37	5.25	5.75 @ 5.80	5.60 @ 5.65
14	19 @ 19 1/2	18 @ 18 1/2	78	36 3/4	5.25	5.75 @ 5.80	5.60 @ 5.65

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 market continues in the same unsatisfactory condition as reported for two or three weeks past. Business has been almost completely at a standstill; a little has been done for export, in small lots, but practically nothing for the domestic market. On this account prices are largely nominal, but competition for the little business going has brought down quotations still further and showed a declining tendency. The lower level reached, however, does not seem to bring larger consumers into the market, the in-

ducements offered having apparently no attractions for them at present. Stocks in manufacturers' hands seem to be holding out better than had been anticipated. The close is weak at 19@19 1/2c. for Lake copper; 18@18 1/2c. for electrolytic in ingots, cakes and wirebars; 17 3/4@18 1/4c. for casting copper.

London bear operators had it all their own way and succeeded at one time in depressing prices of standard copper to £76 for spot, £73 15s. for three months. The market closes somewhat steadier at £78 for spot, £75 12s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £80; best selected, £86; strong sheets, £92.

Exports of copper from New York for the week were 1522 tons. Our special correspondent reports the shipments from Baltimore for the week at 751 long tons.

Imports and exports of copper in Germany for the half-year ended June 30 are reported as below, in metric tons:

	1906.	1907.	Changes.
Imports.....	66,679	59,637	D. 7,042
Exports.....	5,564	4,130	D. 1,434
Net imports.....	61,115	55,507	D. 5,608

The total decrease in the net imports this year was 9.2 per cent.

Copper Sheets—The base price of copper sheets is now 28c. per pound.

Copper Wire—The base price for sizes from No. 0000 to No. 8 is now 24 1/4@25 1/4c. per pound.

Tin—The decline in prices, both on this and the other side, has continued, but at the lower level it seems that consumers are taking a little more interest than heretofore. However, no business of large proportions has materialized so far. Quotations from London are cabled at the close at £164 10s. for spot, £164 for three months, while business in this market is being done around 36 1/2c. at the close today, a decline of 2c. for the week.

Shipments of government tin from the island of Java are reported as follows by British Consul Rose, in long tons; in 1906, 9807 tons; in 1905, 9334 tons, and in 1904, 11,749 tons. The private tin shipped was 1935 tons in 1906 as against 2237 tons in 1905 and 3077 tons in 1904.

Lead—There is no change to report in this market, the quotation of the American Smelting and Refining Company for desilverized lead remaining at 5.25c. As reported last week, some business is being done at lower prices, and in St. Louis, sales of Missouri brands have been made at 5c., or a shade below.

The London market has recovered from its temporary depression and an active business is reported there. The close is cabled at £19 12s. 6d. for Spanish lead, £19 15s. for English lead.

St. Louis Lead Market—The John Wahl Commission Company reports as follows: Lead continues dull. Missouri brands

have sold at 4.95c., and demand is limited even at that price.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of July 27: The price of pig lead has been 97.25 reales per quintal; silver, 14.25 reales per ounce; exchange, 28.24 pesetas to £1. The price of lead, on current exchange, is equal to £19 5s. 5d. per long ton, f.o.b. Cartagena. Exports were 193 tons argentiferous and 100 tons desilverized lead to Marseilles.

Spelter—The demand for this metal has been very light, and every new order is being eagerly competed for by sellers. On this account, values show a declining tendency, and prices are quoted at 5.75@5.80c. New York, 5.60@5.65c. St. Louis.

The London market is reported as steady at the lower level reached, and closes at £22 2s. 6d. for good ordinaries, £22 7s. 6d. for specials.

Zinc Sheets—The base price is now \$8.10 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 July 27, that the market is dull. No shipments reported for the week.

Antimony—The market is weak and unsteady, but this condition is believed to be only temporary. Recently, considerable ore was forced upon the market, caused by advances being made against the ores by bankers, and forcing the miners to throw over their holdings.

Quotations are 10 3/4@11 1/4c. for Cookson's; 10 1/4@10 1/2c. for Hallett's; and 9@9 3/4c. 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.

Cadmium—Paul Speier reports from Breslau, Germany, that the cadmium market is quiet; first quality cadmium guaranteed 99.5 per cent. is quoted at 1175@1250 marks per 100 kg., equal to \$1.27@1.35 per pound.

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 platinum market remains the same as last week and the demand seems to be good. Supplies are fairly up to all

demands, but the price holds firm. The general opinion is that any change in the price of the metal will be toward a higher scale, but no reason is given for this belief. Prices are quoted as follows: Ordinary metal, \$28; hard metal, \$30.50; scrap, \$21.50@22.50 per ounce.

Missouri Ore Market

Joplin, Mo., Aug. 10—The week opened with a 50c. decline in the base price of zinc ore, producers generally letting their ore go, and the shipment was large. The easy movement of ore, coupled with the strike at the Lanyon smelters, thus reducing the demand for zinc ore, hastened the downward movement in price, and the week-end offerings were, as much as \$1.50 per ton less than at the opening. The highest price was \$49, the assay price opened at \$45@47, closing at \$44@46. The average price was \$43.78, exactly \$1 less than the previous week.

As high as \$64.50 per ton was paid for lead, medium grades ranging from \$58@62 per ton. The average price was \$60.16.

Following are the shipments of zinc and of lead from the various camps of the district for the week ending Aug. 10:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville.	3,932,040	690,070	\$111,172
Joplin.....	2,305,540	288,170	62,839
Galena.....	1,097,620	131,870	29,201
Alba-Neck City.....	873,090	.....	20,953
Duenweg.....	602,630	115,320	17,377
Oronogo.....	571,270	.....	13,079
Baxter Springs.....	308,150	156,910	11,640
Aurora.....	601,330	21,980	11,542
Granby.....	780,000	65,000	10,100
Prosperity.....	236,050	75,430	7,695
Spurgeon.....	308,210	35,740	5,577
Carthage.....	124,260	.....	2,982
Badger.....	86,160	17,700	2,642
Sarcoie.....	109,690	.....	2,522
Zincite.....	91,980	.....	2,115
Cave Springs.....	72,910	5,640	1,869
Reeds.....	45,560	.....	1,047
Stott City.....	45,870	.....	1,044
Totals.....	12,203,360	1,603,830	\$315,396

32 weeks.....385,826,190 58,248,640 \$11,208,745
 Zinc value, the week, \$267,146; 32 weeks, \$8,956,888
 Lead value, the week, 48,250; 32 weeks, \$2,251,857

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	83.63
February..	47.37	47.11	February..	72.83	84.58
March.....	43.68	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	.....	August....	75.36	.....
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	.....

Wisconsin Ore Market

Platteville, Wis., Aug. 10—The buyers from the different parts of the country are expressing themselves as being entirely satisfied with the future, as well as the present situation, of this district. All

the ore that was mined during the past week has been sold, leaving the bins ready to receive next week's output.

Zinc ore sold at \$47 per ton while lead sold at \$27.50 per 1000 pounds.

Following is the shipment of the district, by camps, for the week ending Aug. 10, 1907:

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville.....	523,305	.....	.....
Highland.....	436,900	52,300	.....
Benton.....	281,100	160,000	.....
Galena.....	220,000	.....	.....
Cuba City.....	207,000	.....	.....
Linden.....	178,450	.....	.....
Mineral Point.....	124,180	.....	.....
Livingston.....	105,000	.....	.....
Harker.....	47,000	.....	.....
Total for week.....	2,122,935	212,300	.....
Year to Aug. 10.....	64,230,557	2,645,420	335,060

Hazel Green-Buncombe reported no ore shipped last week, on account of their mill being shut down for repairs and general overhauling.

Chemicals

New York, Aug. 14—The general tone of the chemical market is quite firm for this season and prices hold well. There is a slight unsteadiness in the metallic salts due to the falling metal market, but the decrease in the price of the metals has not appreciably affected that of the salts.

Copper Sulphate—The market is very quiet and little business is being done while the uncertainty in the metal market exists. Prices remain unchanged from last week at \$7 per 100 lb. for carload lots and \$7.25 for smaller quantities.

Nitrate of Soda—The market is firm and prices are steadily maintained at the former high level. For spot delivery, 96 per cent. is quoted at 2.52½c. and 95 per cent. at 2.47½@2.50c. Futures bring 2.55c. and 2.50c., respectively, for these grades. No quotations are available for 1909 delivery.

Mining Stocks

New York, Aug. 14—The storm which was collecting over the local stock market broke Monday and prices crashed, creating almost a panic. Some of the best railroad issues broke many points and the mining stocks followed suit. Earlier in the week Standard Oil seemed to be resisting the attacks made upon it but the stock weakened and was hammered down to \$420 per share, a loss of over \$80 for the week. One of the biggest losers was Granby Consolidated, which receded \$17.25 for the day, recovering \$5 Tuesday, and closing at \$115. Amalgamated Copper closed at \$74½ after touching \$70. The loss for the week was \$5.75. American Smelting common was a heavy loser, selling as low as \$93 Monday, but on Tuesday recovered some of its loss and closed at

\$99½. United States Steel common did not show as large a loss as some of the other higher priced stocks. It closed at \$32¼, a loss of \$1.25. The preferred was sold down as low as \$92½ and closed at \$95½.

The curb acted in sympathy with the exchange and prices fell off, at a wild scramble to sell. Nipissing continued its downward course and, lacking support, sold as low as \$6¼, recovering fractionally at the close.

The other curb stocks have been freely sold and prices have sagged off materially from their former levels.

Boston

Aug. 13—A depreciation of over \$360,000,000 in 40 copper stocks from the high prices recorded early in the year tells a story unprecedented in copper history. Including the principal curb stocks, the shrinkage would be considerably over \$400,000,000. Amalgamated contributes the greatest amount of this loss with about \$78,000,000. The stock market the past week has been one of steady liquidation and constant declines. Rallies have been of little or no consequence until today.

Amalgamated went off over \$10 during the week to \$70.12½, with recovery to \$74.37½. Brokers reported that the feeling had ceased and there was some inquiry at the decline. The Western demand for mining shares has been accompanied by cash, which is a favorable sign. Copper Range broke more than \$9 to \$68, with a \$2 recovery, and North Butte was freely offered, causing the price to break \$12 to \$61.75, with recovery to \$66. Arizona Commercial fell \$3 to \$15; Bingham \$4 to \$10; Boston Consolidated \$4.25 to \$18.75; Butte Coalition \$3 to \$19.50; Greene Cananea \$2.37½ to \$12.50; Michigan \$1.75 to \$11.25; Old Dominion \$7.75 to \$30; Parrot \$4 to \$14; Shannon \$1.50 to \$13.25; Trinity \$2.25 to \$15.75; Winona \$1 to 5, and La Salle \$3 to \$10. Recoveries followed in all of them tonight.

Calumet & Hecla broke \$31 to \$739 per share; Mohawk \$8 to \$66; Osceola \$16.50 to \$103.50; Quincy \$19 to \$90; the latter recovered to \$99. Tamarack went off \$13 to \$80; Utah \$4.50 to \$39; U.S. Smelting \$8 to \$39, and Wolverine \$12 to \$143. Balaklala went off \$1.50 to \$6.50. This company's new smelter is expected to be completed Oct. 1. Butte Coalition, Greene-Cananea and Calumet & Hecla mining directors meet shortly to take dividend action. The report is again current that Amalgamated interests are looking for control of the American Smelting and Refining Company from the Guggenheims. Net earnings of the U. S. Mining and Smelting Company for the first six months of the year are stated to have been \$1,917,736, against \$1,472,169 for the same period of last year. Curb prices have followed the regular exchange. Boston &

Corbin has been conspicuous with a \$2.75 break to \$11, with recovery to \$12.50. Nipissing and Superior & Pittsburg have also been active on the curb at declining prices.

Colorado Springs

Aug. 10—Trading on the local mining exchange the past week has been fairly good, but prevailing prices have been several points lower than last week. The million-dollar reduction plant of the Golden Cycle Mining Company burned this week at Colorado City. This had a somewhat depressing effect on the market, until it was learned to a certainty that the plant would be rebuilt at once. Today's prices show more strength.

STOCK QUOTATIONS

NEW YORK Aug. 13		BOSTON Aug. 13	
Name of Comp.	Clg.	Name of Comp.	Clg.
Alaska Mine	.....	Adventure	.....
Am. Nev. M. & P. Co.	.....	Allouez	35
Amalgamated	74½	Am. Zinc	29½
Anaconda	46	Arcadian	4¾
Balaklala	6¾	Atlantic	11
British Col. Cop.	8½	Bingham	11½
Buffalo Cobalt	2¾	Boston Con.	20¾
Butte & London	.....	Calumet & Ariz.	147
Butte Coalition	19¾	Calumet & Hecla	739
Butte Cop. & Zinc	.....	Centennial	22
Cobalt Contact	.....	Con. Mercur	.....
Colonial Silver	1¾	Copper Range	67
Cum. Ely Mining	7¾	Daly West	13¾
Davis Daly	9¾	Franklin	10
Dominion Cop.	5	Greene-Can.	13¾
El Rayo	4	Isle Royal	14¾
Foster Cobalt	60	La Salle	10¾
Furnace Creek	¾	Mass.	.....
Giroux Mine	8½	Michigan	12¾
Gold Hill	2	Mohawk	67
Granby, Nev.	.....	Mont. C. & C. (new)	2
Greene Gold	1½	Nevada	11
Greene G. & S.	1¾	North Butte	65½
Greenw'r & D. Val.	75	Old Colony	.....
Guanajuato	3	Old Dominion*	31¾
Guggen. Exp.	168	Osceola	106¾
Hanapah	¾	Parrot	15
McKinley Dar.	¾	Phoenix	1
Micmac	3½	Quincy	98¾
Mines Co. of Am.	1¾	Rhode Island	4
Mitchell Mining	2	Santa Fe	2½
Mont. Sho. C. (New)	6¾	Shannon	13¾
Nev. Utah M. & S.	4¾	Tamarack	82
Newhouse M. & S.	11¾	Trinity	16¾
Nipissing Mines	6¾	United Cop. com.	56
Old Hundred	.....	U. S. Oil	9¾
Silver Queen	7¾	U. S. Smg. & Ref.	40¾
Stewart	1¾	U. S. Sm. & Re. pd	39¾
Tennessee Cop'r	32	Utah Copper	40
Union Copper	1	Victoria	5¾
Utah Apex	5¾	Washington	.....
West Columbus	10	Winona	5¾
Wyandotte	.....	Wolverine	143
		Wyandotte	1
N. Y. INDUSTRIAL			
Am. Agri. Chem.	17		
Am. Smelt. & Ref	99¾		
Am. Sm. & Ref. pf.	97¾		
Bethlehem Steel	10		
Colo. Fuel & Iron	25		
Federal M. & S. pf.	78		
Inter. Salt	15		
National Lead	47¾		
National Lead, pf.	95		
Pittsburg Coal	.....	
Republic I. & S.	22¾		
Republic I. & S. pf.	77		
Sloss-Sheffield	48		
Standard Oil	465		
Tenn. C. & I.	.....	
U. S. Red. & Ref.	.....	
U. S. Steel	32¾		
U. S. Steel, pf	95¾		
Va. Car. Chem.	21		
Va. I. Coal & Coke	.....	
ST. LOUIS Aug. 10			
N. of Com.	High.	Low.	
Adams	40	30	
Am. Nettle	04	03	
Center Cr'k	2 50	2 25	
Cent. C. & C.	79 50	68 50	
C. C. & C. pd.	81 00	80 00	
Cent. Oil	120 00	110 00	
Columbia	4 50	2 50	
Con. Coal	27 00	25 00	
Doc Run	140 00	130 00	
Gra. Bimet	40	30	
St. Joe	16 00	14 00	

S. FRANCISCO Aug. 6		NEVADA Aug. 14	
Name of Comp.	Clg.	Name of Comp.	Clg.
COMSTOCK STOCKS			
Belcher	27	TONOPAH STOCKS	
Best & Belcher	90	Tono'h Mine of N.	11.00
Caledonia	35	Tonopah Exten.	1.25
Chollar	10	Montana Tonop'h	3.00
Con. Cal. & Va.	60	Belmont	2.75
Crown Point	26	Tonopah Midway	.75
Exchequer	35	West End Con.	.65
Gould & Curry	13	Jlm Butler	.83
Hale & Norcross	70	GOLDFI'D STOCKS	
Mexican	63	Sandstorm	44
Ophir	1 02	Kendall	3.50
Overman	13	Red Top	3.50
Potosi	11	Jumbo	3.50
Savage	63	Goldfield Mining	1.50
Sierra Nevada	33	Dia'dfield B. B. C.	26
Union	29	Atlanta	56
Utah	66	Mohawk	16.00
Yellow Jacket	1 05	Silver Pick	56
		Laguna	1.50
BULLFROG STOCKS			
Golden Anchor	12	Mont. Shoshone C.	6 00
McNamara	24	Tramps Con.	35
Montana-Pitts.ex.	09	Gold Bar	65
North Star	15	Bullfrog Mining	13
Rescue	12	Bullfrog Nat. B.	20
		Homestake Con.	.....
GOLDFI'D STOCKS			
Black Ants	05	MANHAT'N STOCKS	
Blue Bull	43	Manhattan Con.	42
Columbia Mt.	60	Manhat'n Dexter	12
Comb. Frac.	2 20	Jumping Jack	08
Conquerer	14	Stray Dog	17
Daisy	1 75	Indian Camp	08
Florence	5 30		
Frances-Mohawk	1 15	COLO. SPRINGS Aug. 10	
Goldfield Con.	8 52	Name of Comp.	Clg.
Grandma	19	Acacia	8½
Great Bend	78	Black Bell	.....
Red Hills	68	C. C. Con	.....
St. Ives	94	Dante	5¾
		Doctor Jack Pot.	6¾
BULLFROG STOCKS			
Amethyst	24	Elkton	51
Bonnie Claire	43	El Paso	36
Mayflower Con.	37	Findlay	39
Montgomery Mt.	15	Gold Dollar	6
Original	07	Gold Sovereign	4
		Isabella	20¾
MANHAT'N STOCKS			
Gold Wedge	06	Index	.....
Manhattan Mg	06	Jennie Sample	.....
Pine Nut	06	Jerry Johnson	.....
Ruby Wonder	20	Mary McKinney	50
Stray Dog	03	Pharmacist	.....
Yellow Horse	03	Portland	1 10
		Un. Gold Mines	7
		Vindicator	80
		Work	16

New Dividends

Company.	Pay-able.	Rate.	Amt.
Amalgamated	Aug. 26	\$2.00	\$3,061,758
American Coal	Sept. 3	1 25	62,500
Am. Smelters Sec. A.	Sept. 1	1 50	255,000
Am. Smelters Sec. B.	Sept. 1	1 25	375,000
British Columbia	Sept. 4	0 40	122,000
Boston & Montana	.....	12.00	1,800,000
Bunker Hill & Sullivan	Aug. 5	0 60	180,000
Cambria Steel	Aug. 15	0 75	675,000
Camp Bird, Ltd.	Aug. 3	0 24	196,800
Doe Run	Aug. 15	0 50	29,531
Gemini-Keystone	July 29	10 00	50,000
Gen. Chemical com.	Sept. 3	2 00	148,206
Mexican Con. M. & S.	Aug. 26	0 50	120,000
Newhouse	Aug. 31	0 50	300,000
New River Coal, pfd.	Aug. 1	1 50	56,425
N. Y. & Hon. Rosario	Aug. 24	0 10	15,000
Philadelphia Gas	Aug. 1	0 75	434,296
Philadelphia Gas, pfd	Sept. 2	1 25	150,000
Tenn. Copper	Aug. 15	2 00	350,000
Uncle Sam	Aug. 10	0 02	10,000
United Copper	Aug. 6	1 75	787,500
U. S. C. I. Pipe & Fdy. com.	Sept. 2	1 00	121,063
U. S. C. I. Pipe & Fdy. pfd.	Sept. 2	1 00	121,063
U. S. Steel, pfd.	Aug. 30	1 75	6,305,497

Assessments

Company.	Delinq.	Sale.	Amt.
Alpha, Nev.	July 30	Aug. 20	\$0.05
Bader, Cal.	July 24	Aug. 13	0 05
Chollar, Nev.	Aug. 19	Sept. 12	0 10
Confidence, Nev.	Aug. 27	Sept. 17	0 20
Crown Point, Nev.	July 24	Aug. 14	0 10
Grand Pacific, Cal.	Aug. 10	Oct. 2	0 02
Mexican, Nev.	July 15	Aug. 5	0 10
Morrison, Utah	July 19	Aug. 3	0 01
Mt. Pleasant, Cal.	July 29	Aug. 19	0 03
Patterson Creek	Aug. 3	Aug. 26	0 10
Reindeer, Ida.	Aug. 18	Aug. 27	0 01
Sheba G. & S., Utah	July 30	Nov. 2	0 10
Sierra Nevada, Nev.	Sept. 4	Sept. 25	0 10
Union Con., Nev.	Aug. 12	Sept. 3	0 10
West'n Mines Co., N.	Aug. 1	Aug. 31	0 02
Zeibright, Cal.	July 15	Aug. 6	0 05

Monthly Average Prices of Metals

AVERAGE PRICE OF SILVER

Month.	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	.....	30.529	.....
September	67.927	.....	31.483	.....
October	69.523	.....	32.148	.....
November	70.813	.....	32.671	.....
December	69.050	.....	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.
January	18.310	24.404	18.419	24.825
February	17.869	24.869	18.116	25.236
March	18.361	25.065	18.641	25.560
April	18.375	24.224	18.688	25.260
May	18.475	24.048	18.724	25.072
June	18.442	22.665	18.719	24.140
July	18.190	21.130	18.585	21.923
August	18.380	.....	18.706	.....
September	19.033	.....	19.328	.....
October	21.203	.....	21.722	.....
November	21.833	.....	22.398	.....
December	22.885	.....	23.350	.....
Year	19.278	.....	19.616	.....

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	.....
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

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	5.600	6.000	16.850	19.828
February	5.464	6.000	16.031	19.531
March	5.350	6.000	15.952	19.703
April	5.404	6.000	15.929	19.975
May	5.685	6.000	16.725	19.688
June	5.750	5.760	16.813	20.188
July	5.750	5.288	16.525	20.350
August	5.750	.....	17.109	.....
September	5.750	.....	18.266	.....
October	5.750	.....	19.350	.....
November	5.750	.....	19.281	.....
December	5.900	.....	19.609	.....
Year	5.657	.....	17.370	.....

New York, cents per pound. London, pounds sterling per long ton.

AVERAGE PRICE OF SPELTER

MONTH.	New York.		St. Louis.		London.	
	1906.	1907.	1906.	1907.	1906.	1907.
January	6.487	6.732	6.337	6.582	28.225	27.125
February	6.075	6.814	5.924	6.664	25.844	25.938
March	6.209	6.837	6.056	6.687	24.563	26.094
April	6.078	6.685	5.931	6.535	25.781	25.900
May	5.997	6.441	5.846	6.291	27.000	25.563
June	6.006	6.419	5.			