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Cyanide Plant for Treating Guanajuato Ores

The Guanajuato Reduction and Mines Company Transports Pulp from the Mill to the Tanks by Means of a Pipe Line a Mile Long

BY CARLOS W. VAN LAW*

The plant illustrated in the accompanying photographs exemplifies the superior practice developed in the cyaniding of silver ores in the Guanajuato district mines. It was installed by the Guanajuato Reduction and Mines Company, and started running on March 1, 1906, with 80 stamps. The operation of the plant has been so successful during the last year that on Nov. 1, 1906, the installation of a duplicate unit was begun, which is expected to be in operation in the fall of the present year.

The Guanajuato Reduction and Mines Company, in Nov., 1903, acquired possession of two miles upon the mother vein, including the famous old Valenciana, Cata, Rayas and Mellado properties, thus embracing all of the old producers of this vein, with the exception of the Sirena, which is held by the Guanajuato Consolidated Company. An extensive unwatering program was immediately inaugurated and mine development was begun.

Ancient Dumps

The past workings on these properties, from the year 1547, have produced an enormous quantity of dumps, aggregating by actual survey nearly 2,000,000 tons and more than an equal quantity of stope fillings, both of which from preliminary sampling and actual milling returns, have been demonstrated capable of yielding a good profit. This assured product, aside from the returns of the mine development, warranted plans for a large plant, which is to be brought as rapidly as possible to a capacity of 1000 tons a day. The present 80 stamps are milling something over 7500 tons per month.

Fig. 1 is a general view of the present 80-stamp mill, with the Cata mine in the immediate background, the $1,000,000 church and the stacks of the Valenciana mine showing on the sky line. The view is taken from about the middle

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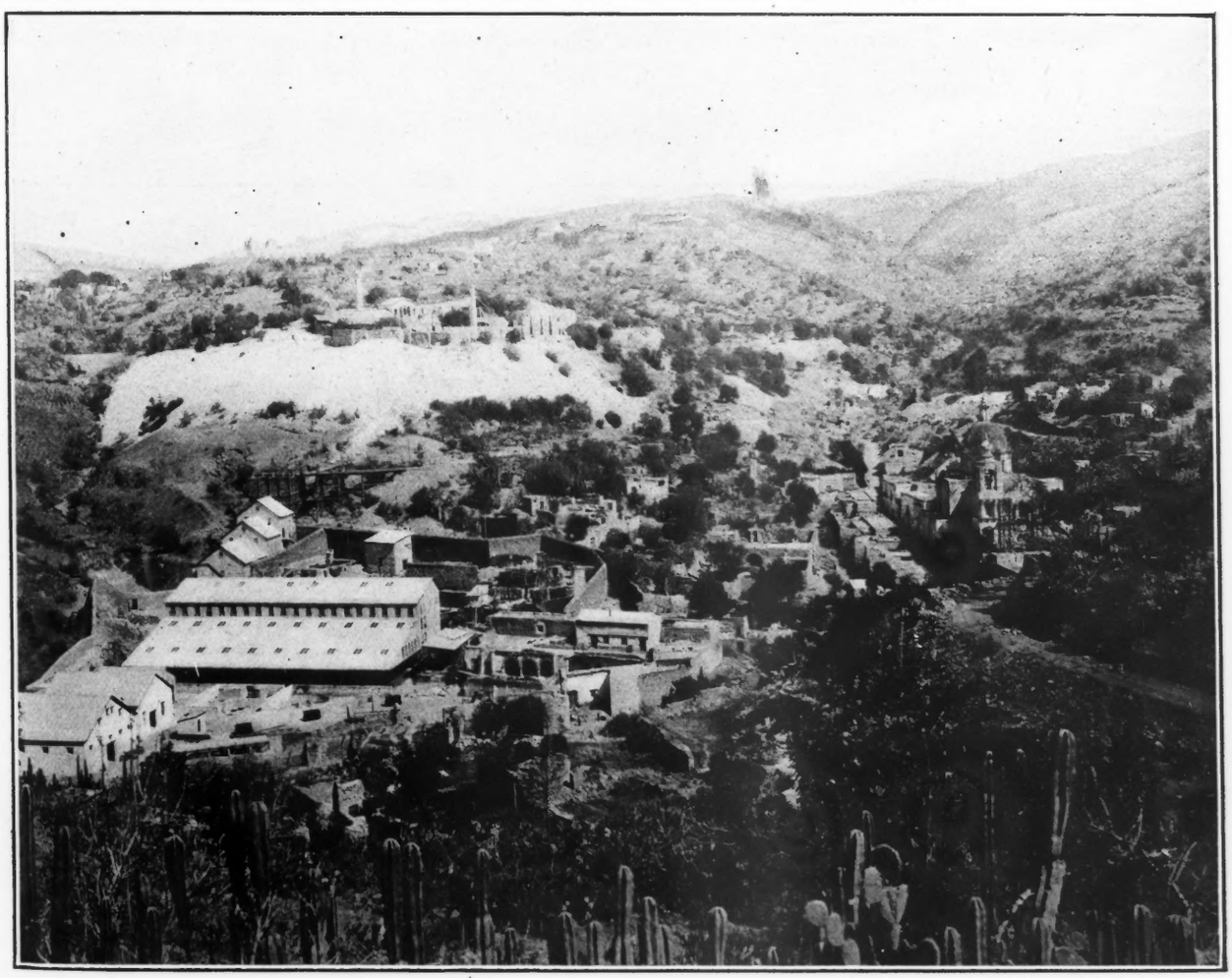

FIG. 1. GENERAL VIEW OF MILL, GUANAJUATO REDUCTION AND MINES COMPANY

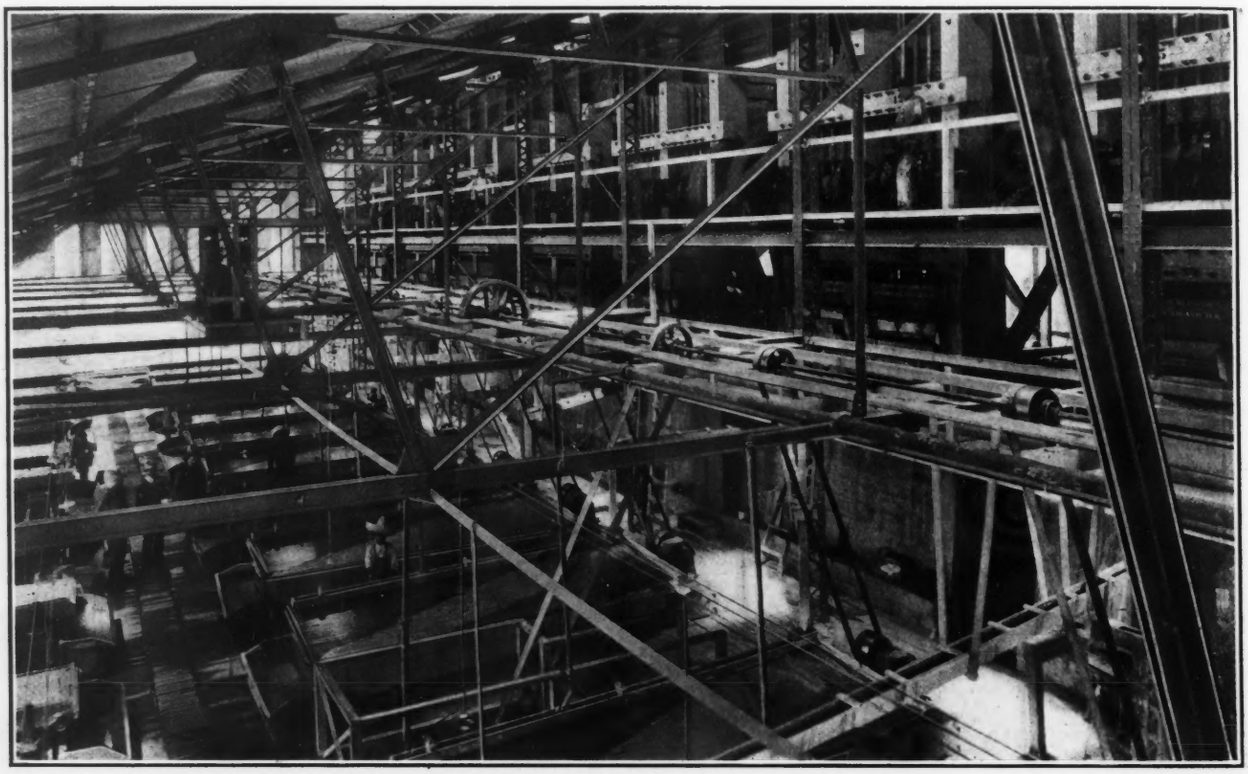

FIG. 2. INTERIOR OF STAMP MILL, GUANAJUATO REDUCTION AND MINES COMPANY

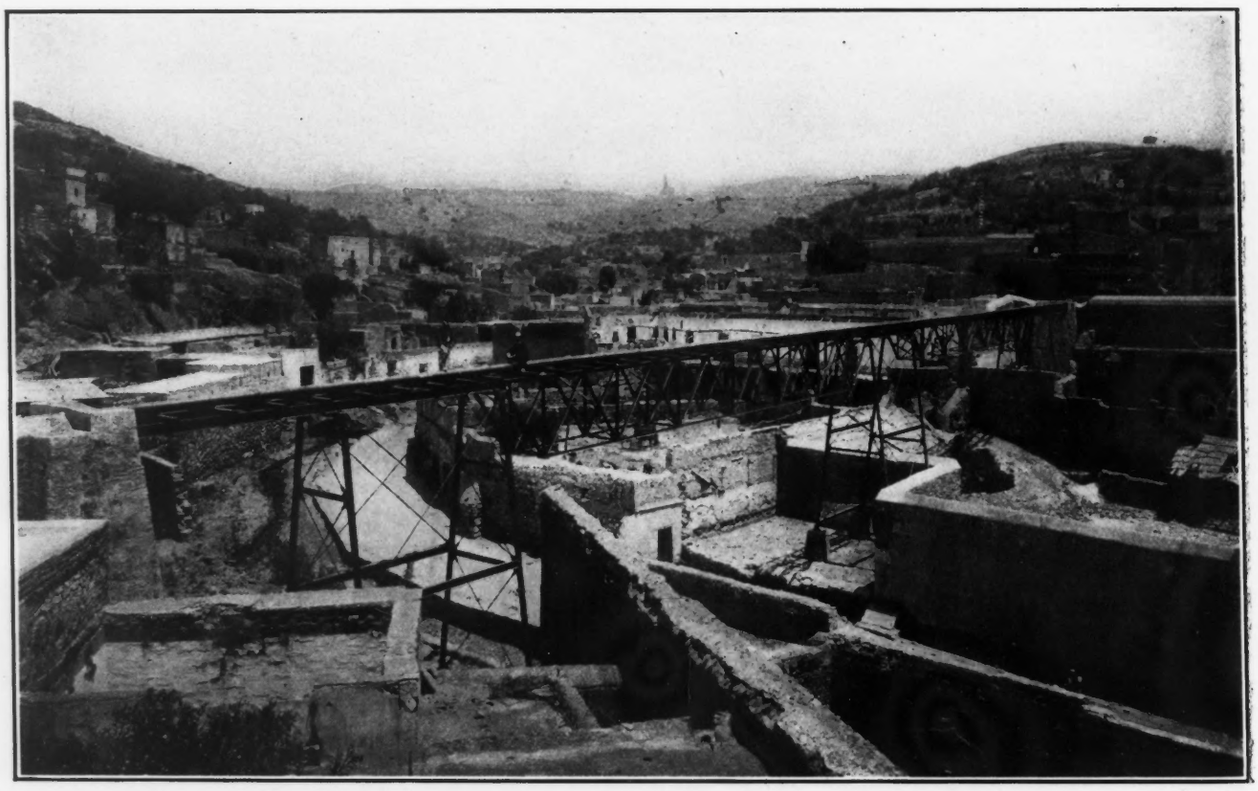

FIG. 3. ONE OF THE VIADUCTS FOR PIPE LINE CARRYING PULP TO TANKS

of the company's properties, the Rayas and Mellado lying back of the observer.

Ore is brought from the Cata mine and from the dumps of the Mellado over the railroad grade shown in the photograph, in four-ton gable-bottomed mine cars, to a bin above the crushing plant, in which plant the ore is double crushed to 1⅛-inch ring by gyratory crushers, the sorting likewise taking place on the sorting belt.

The Mill

The crushed ore is conveyed and elevated by a traveling belt and distributed into the steel bin of the mill structure, which bin has a capacity of 2500 tons of crushed ore. The ore is then passed through Challenge feeders to the eighty 1050-lb. stamps, Allis-Chalmers pattern, making one hundred 7½-in. drops per minute. The mortar is of extra heavy "El Oro" type, weighing 9000 lb., with extra broad base directly bolted to heavy concrete piers.

Battery crushing is through 26-mesh, 28-wire steel screen, the pulp being classified into coarse and fine product in spitzkasten, the entire tailings of the Wilfley tables taking the coarse product being reground in an Abbé tube mill, the reground product being again concentrated over Johnson vanners; the Wilfley tables taking the fine spitzkasten product discharge directly into the tailings launder of the mill without regrinding.

The overflows from the spitzkasten are elevated to a central spitzkasten of large size, whose bottom product is treated over Johnson vanners, the overflow going to the cyanide plant. The combined tailings of all tables are carried in a concrete launder through a tunnel under the patio to a cone house outside the grounds, where in two steel cones 20 ft. in diameter, about one-half of the water is removed and returned for mill use.

The Cyanide Plant

The mines being located upon a small branch arroyo, in which there was neither room for a large plant nor for the discharge of tailings, it became necessary to separate the crushing and concentrating plant from the cyanide plant, which it was desired to place upon the main stream of the district, a mile away, where sufficient room could be obtained for the ultimate 1000-ton plant and also for the discharge of tailings into the main river.

To effect this transferal, an 8-in. cast-iron bell and spigot pipe line joins the cone house above mentioned with the cyanide plant, being laid with extreme care upon a uniform grade of 2¼ per cent., except for the first 800 ft., which has a grade of 3½ per cent. to give an entry head into the line. To support the grade, two steel viaducts were installed, one of which is shown in Fig. 3.

At the cyanide plant a classification into sands and slimes is effected by a double-cone system, the sands being delivered through Butters' distributers into either of two receiving tanks and, after draining, discharged through six bottom-discharge gates in each tank upon conveyer belts, which elevate and convey the sands over the top of a line of 40x8-ft. leach tanks, into which the sand is showered by special distributing tripper and handled by ordinary leaching process with 15-day leach time.

FIG. 4. ARRANGEMENT OF TANKS, FLORES CYANIDE PLANT, GUANAJUATO

Agitation and Treatment

The overflows from all classifying cones pass over a trap to eliminate any sands

which may have escaped, the slimes being conducted to 36x12-ft. agitating tanks and treatment is effected by agitation and decantation. The agitation is by 6-in. Meese-Gottfried centrifugal pumps supplemented by mechanical arms. After the final wash in the slime tanks, the slimes are pumped into high settling tanks, where a final settling and decantation takes place before discharge. All decanted solutions pass through sand-filter tanks before entering the zinc room.

The zinc room contains 15 steel zinc boxes of 6 compartments each, each compartment being 4x4x3 ft. At clean-up the precipitate is flushed through the copper bottom of each compartment into steel launders to a central sump, being thence pumped through a Johnson filter press. No acid treatment is given, as nothing which will not pass a 60-mesh screen is sent into the filter press, all coarser than this being returned to the zinc boxes.

The filter-press product is dried by compressed air in the press, mixed with fluxes, and melted directly into bars without briquetting. After mixing with the fluxes the cake still retains sufficient moisture to prevent any dusting and no difficulty or loss has been had with this handling.

The zinc-box capacity was installed with the view to the double unit now being put in, there being ample zinc-box capacity for 500 tons a day of ore treated.

Efficiency of the Plant

It is interesting to note, as an indication of the mechanical perfection of the plant, that during the period from April 1, 1906, to Jan. 1, 1907, eliminating the few shut-downs of electric power, for which the company is not responsible, the total loss of possible stamp hours during the entire period constituted 83/100 of 1 per cent., and included in this are all routine stoppages of stamps for changing shoes and dies, replacements, screens and all other routine operations of whatever nature.

The transportation of 75,000 tons of ore over a distance of 5440 ft., separating the cyanide plant from the mill, during the last ten months of 1906, was effected through the pipe line above mentioned, without the least evidence of a tendency to clog or without any appreciable wear whatever upon the material of the pipe. During the ten months there was a charge of $3.57 (Mex.) for paint, which constitutes the total cost of upkeep and maintenance of the entire transportation system for the 75,000 tons.

The pulp runs in the bottom of the line freely and without pressure, the line being filled to a depth of only 1¾ in. at a capacity of 250 tons per day, running therefore as in an open launder. Many doubts were expressed as to the possibility of conveying fairly coarse pulp at the extremely small grade mentioned, of 2¼ per cent., but no difficulty whatsoever has been encountered from this cause, although, as has been said, about one-half of the water normal in ordinary concentration is eliminated before the pulp enters the line, in which it has a consistency of 4 of water to 1 of dried pulp.

Fig. 2 is an interior view of the milling plant and Fig. 4 a general view of the tankage and arrangement at the cyanide end. Fig. 3 shows one of the pipe-line viaducts.

Experience with a Cornwall Tin Mine

By Edward Walker

One of the larger mines in Cornwall that has not done so well as might have been expected is the Basset, which was converted into a limited company in 1896. For some time it has barely paid its way, and the amount carried forward to the debit of profit and loss was over £20,000 on Jan. 1, 1906. The operations during 1906 have been more profitable. The rise in the price of tin has been advantageous, and on the other hand the expenditure on wages, development, etc., has been slightly higher. The ore raised was 47,339 long tons and the extraction was 33 lb. of concentrates to the long ton. The total income was £68,000, and the expenses £54,900. After providing £3000 for depreciation, the profit of the year's work was about £10,000. Owing to the debit balance referred to, none of this profit is available for dividends. The shareholders have never received any dividend, and from time to time since the formation of the limited company, new shares have been issued. There is at present an accumulated dividend due on the preference shares amounting to over £26,000. There are also 20,000 special ordinary shares which have to receive twice their money back before the main bulk of ordinary shares receive any dividend. The outlook for these ordinary shares is therefore not very bright, but if tin remains at its present high price for a few years, their position will be much better. I refer to the Basset as one of the mines that might have been expected to do better than it has done. My reason for saying so is that the management is in the hands of Francis Oats and William James, who have had considerable experience in South Africa. It is commonly supposed (probably wrongly as I have pointed out in another place) that the Cornishman at home is out of date and ought to have his genius revived by contact with mining operations in other countries. Some people even go so far as to say that new blood entirely is wanted for the management of Cornish mines. At the Basset mines this infusion of new blood, or at any rate the infusion of new ideas gained abroad, has not done anything toward putting Cornish mining on a paying basis. This remark is not made in a captious humor, and is not intended as any reflection on the gentlemen named. It is to give a specific instance of the view I take of Cornish mining, that with tin at a low price not the greatest mining genius on earth would have produced any better results than have actually been obtained.

The Meaning of "Current Density"

By D. Tommasi*

The meaning of the words "current density" is not always well understood and the use of the expression gives rise to no little confusion. Current density plays an important part in electro-chemistry, because, by varying it, the physical and chemical properties of the substance set free by the decomposition of the electrolyte may be modified.

With a small current density the deposits are nearly always thick, very adherent and of crystalline form, while with a greater density the substances are ordinarily precipitated in the form of a powder and adhere but feebly to the cathode. Substances which are easily oxidized are deposited on the cathode in the oxidized state when the current density is small, and in the metallic state when it is large.

Ordinarily "current density" is understood to mean the quotient of the intensity divided by the surface which the current traverses; or, in other words, the number of amperes passing per unit of surface of electrode. The unit of surface adopted in electro-chemistry is generally the square decimeter; there is, however, a certain confusion as to the dimensions of the surface to which this unit is to be applied. Chemists should unite on terms convenient as a means of defining the density of the current. There are two factors, one of which, the intensity or strength of current, is to be measured, and the other, the surface, should have a common unit. How shall this last factor, the surface, be defined? Should it be applied to one cathode alone, to one anode alone, or to both electrodes together? Should it refer to one face of the electrode or to both faces?

To Smelt the Burra Copper Slag Dumps

The *Australian Mining Standard,* Feb. 13, 1907, reports the erection of a smelter at Kooringa, near the Burra copper mine. It is intended to treat about 90,000 tons of slag resulting from smelting Burra ores in by-gone days. It is stated that this slag contains from 2 to 2.5 per cent. copper.

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The Mines of the Altar District, Sonora

A Stretch of Territory on the Borders of Arizona Which Has Produced Millions in Gold and Contains Rich Placers and Ledges

BY JOHN S. ALEXANDER*

Directly south of Arizona and bounded on the west by the Gulf of California, lies the Mexican state of Sonora; and a line drawn from a point a little west of the familiar shallow angle in the international boundary, south 125 miles and thence westward to the gulf, marks off the district of Altar which thus comprises the extreme northwestern part of the Republic of Mexico, save a part of the peninsula of Lower California. The area of the district is 18,000 square miles, or about that of Vermont and New Hampshire combined.

Being a continuation of the great Colorado desert of Arizona, it presents many of the same general characteristics: a sandy plateau of 2000 ft. elevation, with a gradual fall to the gulf, and interspersed with isolated peaks and short, disconnected minor ranges of granite and other eruptives. The Sierra Madre and other associated high ranges lie to the eastward and entirely outside of the district.

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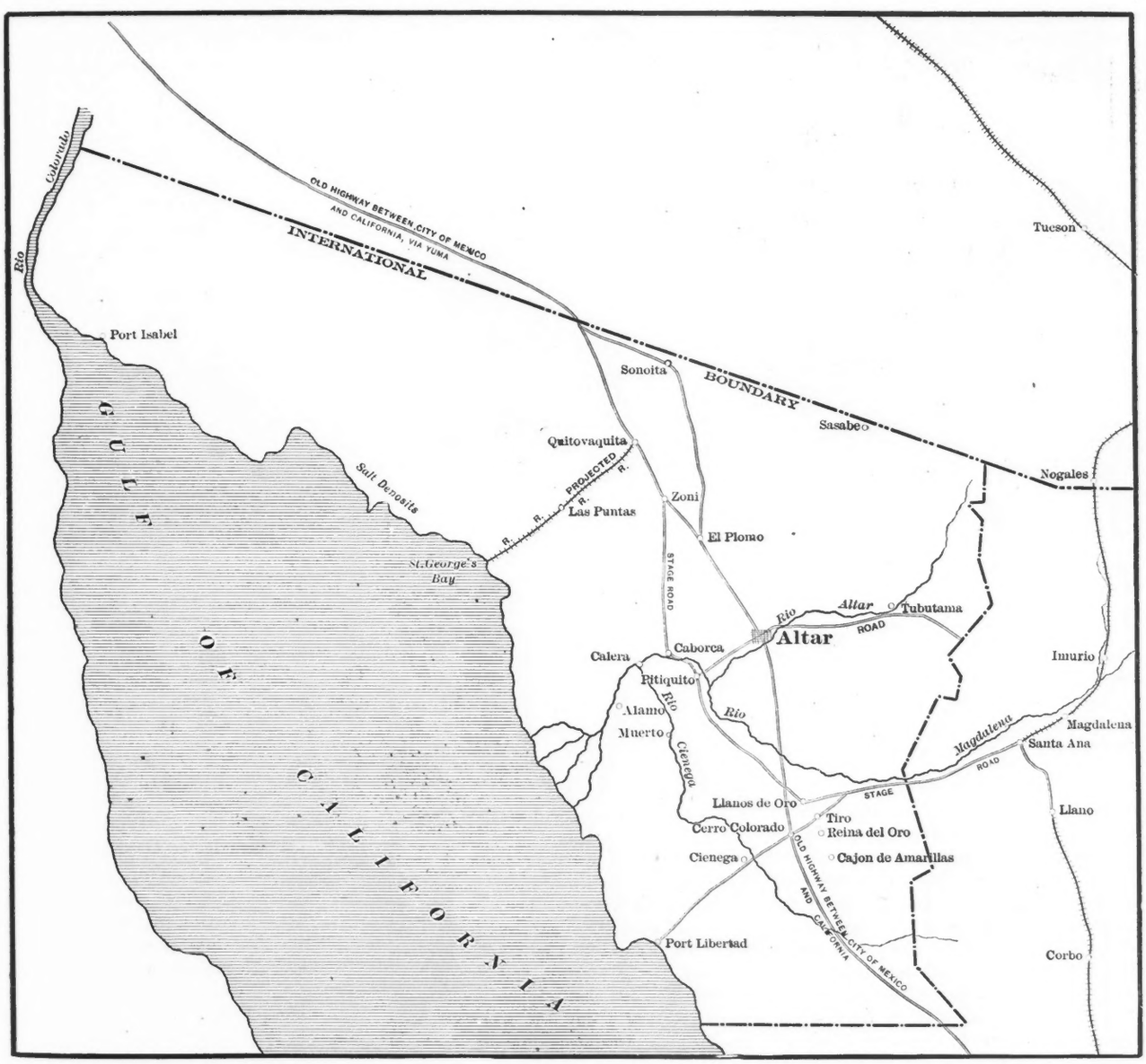
Rivers and Lines of Travel

Heading among the timbered slopes of a distant range, the important Magdalena river, by a series of long reaches and bends, carries its fertilizing waters nearly 150 miles through the otherwise arid central part of the district; until, sinking in the sand near the coast, it finds a subterranean outlet to the gulf. Cienega river, rising farther south in the same sierra, makes a long detour to the southwest and thence due north unites with the Magdalena. Another branch of the latter



MAP OF THE ALTAR DISTRICT, SONORA, MEXICO

is the Altar river, coming from the northeast. These three streams with their deep gravel beds serving as storage reservoirs, are the chief source of the water supply of the district. The great bends in their courses bring them so near to many mining districts that pipe lines of from 6 to 20 miles will effect a wide water distribution. In the north, Quitovac and Sonoita, near the Arizona line, both have good local water supplies.

It is a country of natural gravel wagon roads, almost uniformly level, so that all parts of the district can be easily reached, either from Santa Ana, on the Sonora branch of the Southern Pacific Railroad which connects the main line, at Benson, Arizona, with the port of Guaymas, or from the main line at Tucson or Gila Bend, Arizona. The competition, via Guaymas, with low water rates from all parts of the world, gives Santa Ana a much more favorable rail-freight rate, even from New York, than Arizona points.

Along the coast, beds of salt and soda deposits of value occur. A growth of unusually large mesquite trees, some miles wide and said to be 100 miles long, extends north and south, within and near the eastern edge of the district.

Gold, Silver and Copper

The Spanish archives and the Mexican mint records accord the large production of $98,000,000 of gold and silver to the Altar district. Copper is now being opened up in places; while many of the gold ledges yield copper as a by-product. Practically the whole district is within the mineralized belt, for hardly a corner of it is without its historic placer or mine.

The placers were naturally the first discovered and worked; they extend over almost the whole of the western half of the district. Undoubtedly the most important metallurgical center a century ago was Cienega, sometimes called Cieneguilla, on the river of that name. Within a short distance, was discovered, in 1799, the San Ildefonso de la Cieneguilla gold and silver mine; followed in 1803, by the neighboring San Francisco gold placer of great richness. Their chief owner was Don Francisco de Castro, who is said to have taken $2,000,000 from these properties in a very short time.

Castro's Mines

The ores from his ledge mines were brought to Cienega for smelting and treatment by amalgamation, where great slag heaps and dumps at the site of his works of a century ago are evidence of the magnitude of his operations. The primitive-looking barrel-amalgamating plant, with roasting furnace attached, shown in the photograph, is on one of these old dumps, which are still worked over for mixture with new ores.

OLD REDUCTION PLANT AT CIENEGA, SONORA

Castro also owned the remarkable Cerro Colorado, the Spanish Red Mountain, so named from the color of the oxidized surface ores, situated six or seven miles from Cienega. This is a mountain mass of soft, free milling gold ore, 550 ft. above its base; almost the entire mountain is a ledge of quartz porphyry, 2000 ft. wide. Some 900 ft. of it has been sampled and assayed averaging $4 per ton. Until quite recently, it had never been tested in depth; a shaft has been sunk 200 ft. near the base of the mountain, and a large body of $15 ore has been opened. The records of Castro's day say this was by far the greatest orebody of the locality, and that it was so wide and soft that a miner could break down 15 tons a day. It was extremely docile under treatment. In the words of the record:

"It was of a low grade, and as there was not sufficient water at the mine to treat it, and there being no facilities for transporting the ore to water (six miles) but by burros, it was seen that it could not be worked in Sonora to advantage; in some other land where it could be treated by water power arrastras, without doubt this one mine alone would be sufficient for a bonanza."

This writer of over a hundred years ago had never heard of a steam engine or dreamed that a power stamp mill, a steam force pump or spiral steel pipe would ever be possible in Sonora. However, not six miles from this Cerro Colorado mine, there is now being erected by the Llanos del Oro Mining Company, of California, a modern 100-stamp mill of the highest type of construction, obtaining its water supply, by a 14-mile pipe line, from the Magdalena river. The Llanos del Oro Company has opened, in one of the old placers, a comparatively deep lying, thick, blanket deposit of gold-bearing cemented gravel, sometimes finding several such deposits in vertical succession.

There are many other camps and mines in Altar, including Las Pintas, Quitovac, El Plomo, Caborca, El Tiro, Mina Yaqui, Reina del Oro, and Cajon de Amarillas, old records are also available describing the exodus of operators and miners from this, the nearest Mexican mining district, to California, in 1849, bringing with them Mexican methods, which became the foundation of our own mining practice and laws.

Railway Rates in Mexico

Consul J. A. LeRoy, of Durango, writes as follows concerning the Mexican railway law by which the Government has the power of regulating freight and passenger rates, as well as freight classifications, etc.

The various railway concessions have been made subject to this right of control. At intervals of four or five years revision of freight rates and classifications has been made. Freight rates have always been and still are high in almost all cases, in some very high. There has, however, been a tendency toward their gradual reduction. The revision of the present tariff has been under consideration for four or five months past. It perhaps would have been promulgated before now except for the recent operation by which the Mexican Central system was consolidated with the National Lines of Mexico, in which the Government has the majority of stock. Various interests have had their hearings in Mexico City in behalf of a reduction of freight tariffs. Some of these reductions, if granted, should exercise a direct influence upon importations from the United States.

Primitive Mexican Crushing and Dressing Plant

Simple and Inexpensive Appliances and Methods Devised Centuries Ago Are Still in Use in the Mountains of Chihuahua

BY FRANK H. PROBERT*

A number of descriptions of antiquated methods of more or less historical interest have recently been published in the columns of the technical press. Some of these processes have long since ceased to be used, but there are many places, far removed from modern transportation facilities, where such primitive means are still employed to reduce simple ores. These descriptions are not only of general interest, but frequently also suggest an idea which if carried out would be of material benefit to property holders unable to install a modern plant.

FIG. 1. WOODEN STAMPS

While traveling through the Sierra Madre Occidental of Chihuahua, Mexico, investigating certain properties in the Guadelupe y Calvo district, I saw sundry crude appliances in active operation which were yielding good returns.

Nature of the Country

Nestled in the deeply incised rocky cañons which characterize the breakdown of the Sierras toward the Gulf are a number of abandoned camps which many years ago were the scene of great activity. An occasional tunnel in the mountain side, almost hidden from view by a tangle of dense underbrush, ruins of arrastras and *planillas* bear testimony to the prosperous times of days gone by. It is seldom that one is fortunate enough to witness the operation of any of these primitive reduction works. At the camp of El Cuervo, some six days' ride on mule-back from the nearest railroad and about 30 miles from Guadalupe y Calvo, Mexicans are still extracting silver with the crudest of appliances.

The western slopes of the Sierra Madre which mark the breakdown of the Great Central Plateau of Mexico show a series of lava flows superimposed one above the other but by no means contemporaneous. It would seem that all the orebodies are confined to the andesite, which is the oldest of the igneous rock masses found. The vein systems follow definite lines of fracture in the andesites. The mineralized areas are marked wherever the andesite comes to the surface by outcrops of white quartz filling a fissure on one side of the prominent escarpments which characterize the *barranca* country.

Generally there has been marked silicification of the adjacent wall rocks of considerable lateral extent. The vein structure suggests that after the filling of the original fissures with gangue matter and accompanying silicification of wall rocks there was a later movement along the same plane, crushing the vein filling into fragments and that this breccia was later cemented. This possibly accounts for the local seggregation of the silver in bonanza streaks which are now being mined and treated by the rough methods about to be described. The silver occurs both as native silver and as sulphide (argentite) in an exceedingly fine state of division disseminated throughout the silicified andesites.

A Primitive Stamp Mill

Figs. 1 and 2 show the old wooden stamps which were driven by water power to reduce the ore to suitable size for the subsequent extraction in the *planillas*. The three wooden stems are made of 6x8 in. roughly hewn native timber. The shoes consist of ½-in. sheet metal bent to fit the stem and held on by a series of iron straps. The tappets consist of wooden plugs in the stems, which engage with a series of plugs on the shaft, and which take the place of cams in modern milling practice.

A tree trunk about 12 in. in diameter is attached to an exceedingly rough wheel made to revolve as an undershot water wheel. Round the periphery of this ill-provised shaft are a series of notches in which the plugs are inserted to lift the stamps and to afford a means of altering the drop. There is no mortar; that which corresponds to the dies of a stamp battery is a flat stone placed underneath the stamps on which the ore is shoveled and ground by the irregular dropping of the three stamps. The pulp is allowed to run into a reservoir.

I was unable to determine the capacity of this battery, but am told that it approximates about one ton per day per stamp. I think this estimate is high. At the time of visit the mill was out of commission and the ore was being reduced in a series of arrastras.

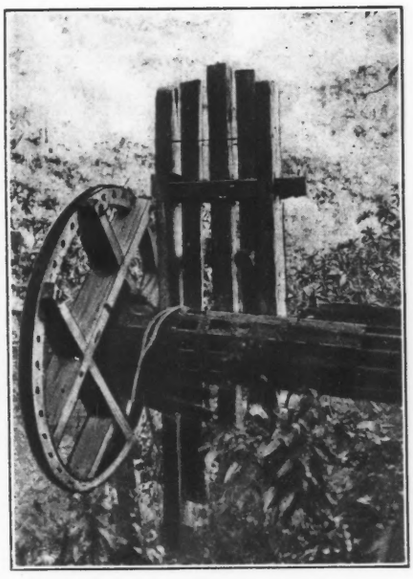


FIG. 2. STAMPS, SHOWING DRIVING GEAR

Construction of an Arrastra

Fig. 3 shows an arrastra in operation. An annulus 2 ft. deep and about 12 ft. in diameter is dug out, the walls supported by rough stonework and the bottom paved with flat-surfaced rocks. A tree trunk 10 in. in diameter is pivoted by an iron spike in the center and two radiating arms support the peripheral water wheel shown. A series of wooden vanes 12 in. apart, of the form shown in Fig. 4, are so arranged as to get the full force of the stream of water directed against them by the launder to one side. When once the arms are in motion, the water power is sufficient to keep the arms revolving, but to start it human power is often necessary. From the central axis two arms are attached to

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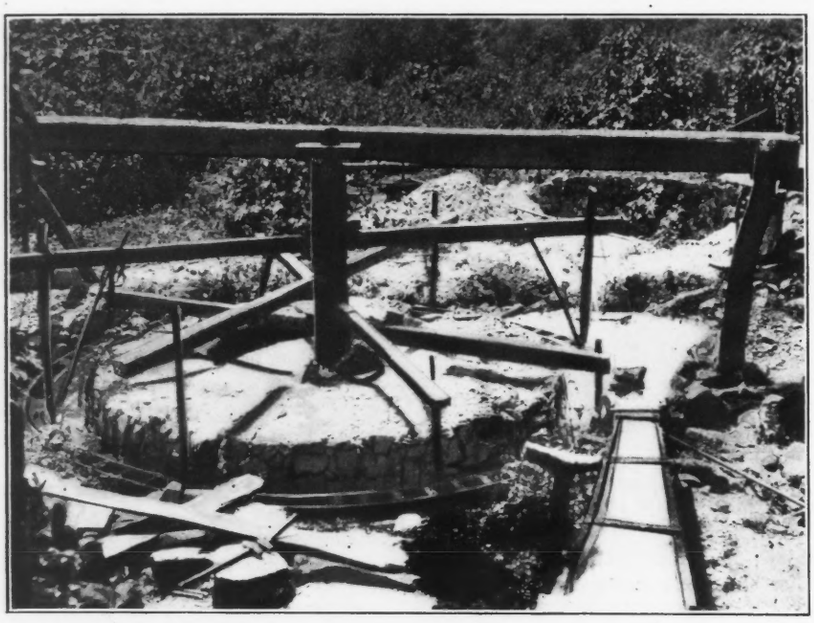


FIG. 3. ARRASTRA WITH WATER-WHEEL DRIVE

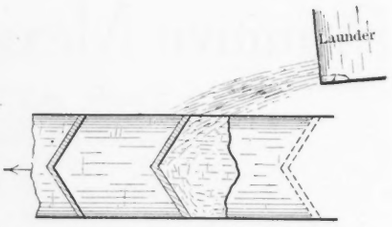


FIG. 4. BUCKETS OF HORIZONTAL WHEEL DRIVING ARRASTRA

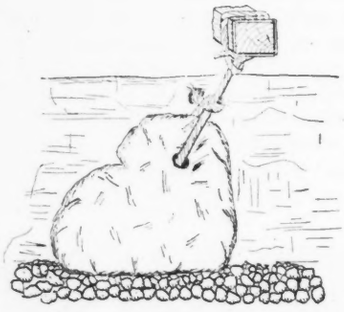


FIG. 5. MULLER OF ARRASTRA

carry the mullers. Two suitable rocks, each weighing about 600 lb., and about 18x18 in. square, are placed in the pit, holes drilled in the upper surface, tough wooden spikes inserted and lashed by rawhide thongs to the arms. The method of attachment is shown in Fig. 5.

A rough frame work supports the central axis. Ore is shoveled into the pit, a little quicksilver fed on the bed and the material is slowly ground. About 10 *cargas* of 300 lb. each are crushed per day of 24 hours. The pulp is washed through a sluice gate and allowed to settle in a settling pond.

A Primitive Concentrator

From the settling ponds the pulp is taken to one or other of two machines. The *planilla* is as crude an appliance for the concentration of metallic contents of an ore as can be imagined. It consists of a wooden floor about 6 ft. long by 4 ft. wide, having an inclination of about one in twelve. The sides and head piece are of rough boards.

The pulp from the arrastras is shoveled upon the upper end of the floor, and the *planillero* or operator, seated at the front end, facing the pulp, slowly washes out the values. He does this by throwing water from a small pool at his side by means of a horn spoon. There is some skill required even for this work: a peculiar wrist motion makes the water take a curved path across the table. The siliceous contents of the pulp flow off at the bottom of the floor with the water and the heavier metalliferous particles cling tenaciously to the upper end as concentrates. About 1200 lb. per day of twelve hours are treated and a concentration of 100 into 2½ is obtained. An analysis of the concentrates follows:

Analysis of Concentrates from the Planilla

Silver	25.390	parts per 1000.
Gold	120	grams per kg.
Silica	48.2	per cent.
Iron	20.9	per cent.
Sulphur	22.0	per cent.

Another equally primitive concentrator is shown in Fig. 6. It resembles the old-fashioned Cornish buddle and no doubt this latter appliance was copied from it. It consists of a smooth rock bed, about 16 ft. in diameter, there being a drop of 6 in. from the circumference to the center. A small cup-shaped well catches the tailings, from which they are carried off and allowed to run to waste. A wooden cylinder hollowed out from the Aliso tree, 2 ft. 6 in. in diameter, 3 ft. high and 2 in. thick, is supported on an iron pivot in the center, from the base of which a series of eight iron pipes 1 in. diameter, of unequal length, each fitted with a "rose" spray, distribute water over the bed. From a cross beam which revolves with the cylinder an ordinary gunnysack or strip of canvas is hung, which sweeps the pulp in a thin even stream over the floor. Human motive power is used. The concentrates are periodically cleaned up. A capacity of 40 cargas, or 12,000 lb. per day, is claimed, the concentration being about the same as in the *planilla*. The pulp from the arrastras is shoveled round the circumference of the bed, and the longest arm of the series of radiating pipes washes it upon the bed little by little.

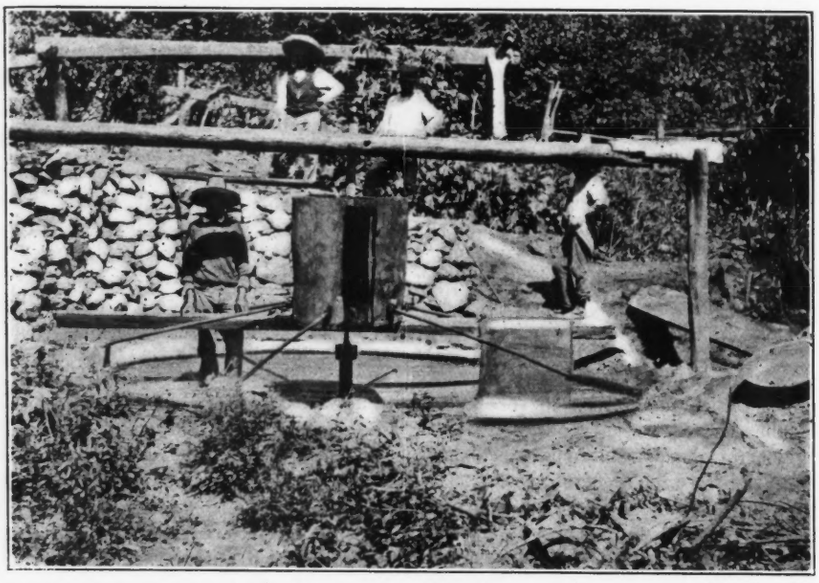


FIG. 6. ROUND-TABLE CONCENTRATOR

Heretical Vein Types in Sonora

By F. J. H. Merrill*

Our neighboring State of Sonora is rich not only in mineralization, but also in the variety of its vein types. Many of its most important deposits depart so widely from the established rules which should be followed by well ordered veins that it may be helpful to the mining public to record some observations of the writer and the conclusions which he has formed.

While there are in Sonora many quartz veins carrying sulphide ores in what may be called a normal way, there are other types which are abundant and important and deserve full recognition.

One of the most important of these is the impregnated *shear zone*. Here we have a saturation of sheared or shattered rock in a zone of fracture and displacement, with metal-bearing solutions, without the normal accompaniment of quartz, calcite or other vein stone, such as is found in a normal vein carrying metallic ores. The writer has observed this feature in rocks of different types at many many places. Good examples may be seen at Planchas de Plata, in Magdalena, where the rock is a porphyry conglomerate and the impregnation, chloride of silver; at Las Animas, in Altar, where we have an impregnation of gold and copper in limestone, and at La Marina in the same district, where there is an impregnation of gold in sheared granite gneiss. I understand from Prof. S. F. Emmons that similar conditions occur in some of the orebodies at Cananea and Nacosari.

The subject is still new to investigation and more data are needed for a complete description, but it is clear that we have here a definite and important type which the writer proposes in the near future to make the subject of detailed study and discussion. The point of interest to the miner is that no vein stone is present and consequently no very conspicuous surface evidence of the deposit. As a rule also there are no walls to the vein.

The term shear zone, as here used, is applied to areas in which the country rock is traversed by minute parallel fault fissures, only a few inches apart and without any open crevices which would hold foreign vein matter in appreciable quantity. The rock in the zone of fracture is usually much decomposed and altered by saturation with metalliferous solution.

A second important type is the barren quartz vein with rich impregnations in the inclosing country rock. The writer has seen several cases where ore deposits of importance occurred in this way. There are many large barren veins in Sonora, but few prospectors have had the necessary "nerve" to explore the inclosing country and develop such treasures as lie concealed.

There has been, however, one recent occurence which deserves attention; the development of a large and rich body of copper ore by prospectors who had the courage to tunnel 225 ft. into a mountain side without surface indications to guide them.

*Economic geologist and mining engineer, New York.

Geographic Nomenclature

The following important decisions relating to geographic names and their application were made by the United States Geographic Board, Feb. 6, 1907:

Cordilleras; the entire western mountain system of North America.

Rocky Mountains; the ranges of Montana, Idaho, Wyoming. Colorado, New Mexico, and western Texas.

Plateau region; the plateaus of Colorado river and its branches, limited on the east by the Rocky Mountains, on the west by the Wasatch range, and extending from the southern end of the Wasatch southwestward, southeastward, and eastward to the eastern boundary of Arizona, following the escarpment of the Colorado plateau, and including on the north the Green river basin.

Sierra Nevada; limited on the north by the gap south of Lassen peak, and on the south by Tehachepi pass.

Cascade range; limited on the south by the gap south of Lassen peak and extending northward into British Columbia.

Coast ranges; extend northward into Canada and southward into Lower California, and include all mountains west of Puget Sound and the Willamette, Sacramento, and San Joaquin valleys, and southwest of Mohave desert.

San Juan Mountains; include all the mountains of southwest Colorado south of Gunnison river, west of San Luis Valley, and east of the Rio Grande Southern Railroad.

Sangre de Cristo range; extends from Poncha pass, Colorado, to the neighborhood of Santa Fe, N. M., thus including the southern portion, locally known as the Culebra range.

Front range; includes on the north the Laramie range as far as the crossing of the North Platte, and on the south includes the Pikes Peak group.

Appalachian system; includes all the eastern mountains of the United States from Alabama to northern Maine.

Copper Deposits at Sleemanabad, India

Deposits of copper and lead ore have been discovered and are being developed by Burn & Co. and P. C. Dutt in the Jubbulpore district, Central Provinces, India, 1.5 miles from the Sleemanabad station of the East India Railway, and 40 miles from Jubbulpore. The minerals which have been identified are: Chalcopyrite, tetrahedrite, galena, pyrite and barytes, with the usual oxidized gossan accompanying these minerals.

The country rock consists of dolomite with occurrences of silicious slate and limestone of probably the same geological age as the Dharwar schists of the Kolar goldfields. The series forms a belt, with a maximum width of 7 miles, and extends for 20 miles in a northeast-southwest direction. Within this belt are the deposits at Sleemanabad.

Results of Prospecting

Seven veins uncovered have been on the property having a general strike of north, 7 deg. west, and a dip to the west of 75 deg.

A 12x8-ft. shaft was sunk on No. 1 vein to a depth of 70 ft., at which depth a 19-ft. crosscut intersected the lode. Drifts were run north and south for 50 ft., disclosing an average of 4 ft. of copper and iron pyrites disseminated through the vein rocks.

Diamond-drill exploration has proved the deposit for 800 ft. along the surface and to a vertical depth of 400 ft. A second vein, 56 ft. west of No. 1, has been explored by shallow pits for a distance of 160 ft., showing an average width of 3 ft. of copper and iron pyrites.

No. 2 and No. 3 veins have simply been uncovered. No. 5 has been opened to a depth of 45 ft. by a brick-lined shaft. At the outcrop considerable barytes was found which gave way to a conglomerate of slate, quartz, dolomite and barytes cemented together with copper pyrites and gray sulphide copper ore.

A shaft is also being sunk on vein No. 7, but the other veins on the property have not been explored.

It is stated that native labor is obtainable at the rate of from 5 to 8c. per day of nine hours for men, 4 to 5c. for women, and 3c. for boys and girls.

Coke costs £1 sterling per ton, delivered at Sleemanabad.

Antimony in New South Wales

Antimony mining in the Hillgrove and Metz districts, New South Wales, has been prosperous, says the *Australian Mining Standard*, Feb. 13, 1907. Other branches of mining have felt the shortage of labor owing to so many men being engaged in antimony mining. Two additional furnaces are being built and a suggestion is being made for the erection of a co-operative smelter. As high as £34 has been paid locally for the metal. Scheelite also is commanding high prices, over £100 being obtained in one instance. At Bowraville, too, antimony mining is progressing rapidly, and it is stated that there is room for 1000 men in this district alone.

Lead Deposits in Northern Kentucky

By R. B. Brinsmade*

The lead-fluorspar region of southwestern Kentucky is well known to geologists, but less familiar is the occurrence of workable lead veins in Owen and Henry counties within 50 miles of Cincinnati.

The countryside is hilly. Domes of 200 to 500 ft. high, separated by narrow creek beds at their bases, form the prevailing topography. The hill slopes are moderate, seldom exceeding 20 deg., and are covered with oak brush and blue grass, which give way under cultivation to the tobacco plant, as the locality is within the famous Burley tobacco region of northern Kentucky and southern Ohio.

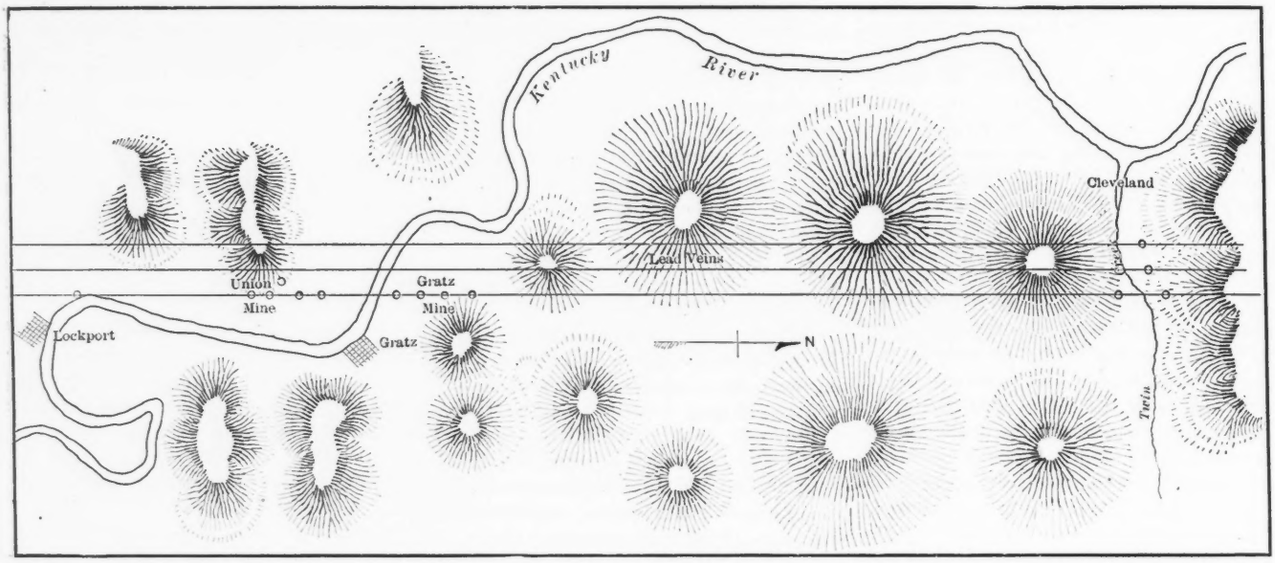


FIG. 1. MAP SHOWING POSITION OF LEAD MINES IN NORTHERN KENTUCKY

Geology of the District

The geological formation is the Cincinnati of the lower Silurian period and around the mines comprises a blue-gray limestone, horizontal and thinly bedded. There are three parallel veins 200 yards apart striking north and south at right angles to the Kentucky river about a mile below Gratz, in Owen county. The veins, indicated on the map, Fig. 1, have been traced to Lockport, 3 miles south and to Twin creek, 7 miles north, so that their known length is 10 miles, and their general character is the same, wherever explored.

The veins dip nearly vertically and vary in width from a few inches to as many feet at different points on the strike. At Lockport and Gratz only the most easterly vein has been worked, but at Twin creek there are openings on all three. The veins appear to be fissure cracks due to folding, and faulting, if it took place, must have been along the strike rather than along the dip. The filling is barite, calcite and galena; the first occurs in typical white or brownish orthorhombic prisms, the second in translucent white or yellow tablets, while the galena is in cubes, either in thin bands parallel to the walls or in isolated crystals often an inch in diameter.

The vein walls exhibit no slickensides or other signs of movement, but the filling is frozen to them as when first deposited. The absence of corrosion or other action peculiar to molten magmas and the well known solubility in hot aqueous solutions of barite, calcite and galena makes it unnecessary to go farther than water deposition as the source of the vein filling. The crystallized vein filling has few inclusions of wall rock, indicating that the fissure walls were firm at the time of deposition, but in places there are two or three mineral streaks in the limestone instead of the usual one.

The Workings

The vein outcrops at Lockport and Gratz were denuded by the Kentucky river and at their north ends by Twin creek and at these places, where mining has been done, the vein filling appears continuous along the strike, instead of in shoots as is common in this type of deposit. The showing varies, but is best in the Gratz mine on the first level, where the stoping is almost continuous for 500 ft. on a thickness varying from 6 in. to 6 ft. with an average of above 15 in. A 3 ft. width of stope, however, must be excavated for machine drilling and all the broken rock is run through the mill. Here on the 300-ft. level, the blue limestone rests on a fine-grained brown dolomite, and the vein is less regular, but sufficient depth has not yet been reached to determine what the permanent nature of the vein in the dolomite will be.

The Union was the first mine and was opened, during the high price of lead in the sixties, to a depth of 160 ft. With the rise of lead quotations 7 years ago prospecting was stimulated and the mines at Lockport and Twin creek started. The work at Lockport stopped when surface trenching to a depth of 15 ft. ceased to yield ore, but at Twin creek the Hoosier and other shafts were sunk and a small concentrater erected. As these failed to pay the machinery was sold and is now in use at the Union mill at Gratz. The part of the Gratz mine north of the Kentucky river was discovered by W. H. Miller and opened in 1900. A 325-ft. shaft has been sunk, a 100-ton concentrator has been erected. As the mill stands over the shaft, on a bluff about 200 ft. above the navigable Kentucky river, the transportation of coal, lumber and supplies, and the shipment of concentrates is cheaply effected. At the river is a duplex steam pump to lift water to the 12,000-gal. wood tank above the mill. A double-track surface tram, with independent steam hoist and balanced trucks, handles the freight from boat to mill.

Mining

The mine is opened by 3 levels, placed 100 ft. apart on the 5x8-ft. vertical shaft, that is only timbered through the surface soil. Hoisting is done by a steel bucket holding 800 lb. of ore, running without guides and detached from its ⅞-in. rope to rest on a truck for entering the drifts. The bucket is handled with a duplex 6x10-in. steam hoist and is dumped just in front of the mill crusher located at the shaft collar.

The power house for mine and mill comprises two 60-h.p. return-flue boilers of 44 in. diameter, which take their feed water from one side of a brick wall in a masonry cistern. The dirty river water enters the other side of this cistern, is filtered by the brick partition and then heated by the exhaust of the engines.

*Mining engineer, Socorro, N. M.

The mill engine is a 14x24-in. simple slide-valve engine of 120 h.p. The air compressor is a McGowan duplex of 8-drill capacity.

For drilling there are three 2¾-in. and one 2-in. Rand, a Little Jap and a 3¼-in. Ingersoll. The last is only used for shaft sinking from a tripod, the Little Jap for block-holing or squaring up, while the others are employed in drifting and stoping. The shaft sinking is by the usual center-cut and the drifting by the bottom-cut method, but the stoping system is unusual and is shown in section along the vein in Fig. 2.

Wooden chutes are placed at *a, b, c* and *d* from 40 to 50 ft. apart, and the stope bottom carried up hopper-shape, as shown, so as to leave pillars like *a b f* to protect the drift and to avoid the use of timber. These chute pillars can be finally recovered by underhand stoping. In order to save set-ups, the stope back is attacked by the sawtooth system. In stope 1—6 a

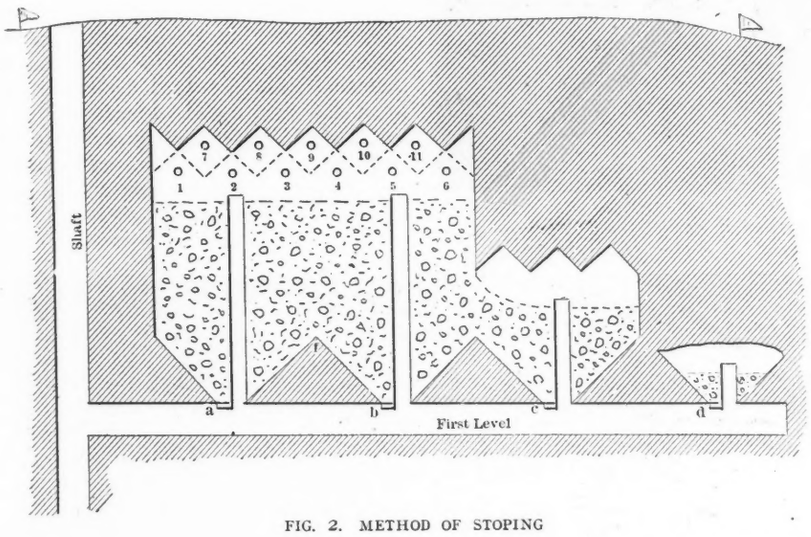


FIG. 2. METHOD OF STOPING

3-ft. drill bar would be set up for a certain round only at points 1, 2 and 6, and the drill at 2 would bore two holes above and two holes below the bar in direction 2—7, and then four more in direction 2—8, or eight in all. Holes from points 3, 4, etc., would be put in similarly.

For the next upward round the bar would be set up at points 7, 8, 9, 10 and 11, with 8 holes to be bored from each. In this way all the holes are self-cleaning uppers and a 6-ft. depth can be reached without sticking. With the flat and down holes of usual overhand benches, the calcite cubes, chipped out, would tend to wedge the drill bit and cause delay.

Enough broken ore is left in the stope to support the men at the back, for whose ingress plank mainways *a*-2, *b*-5, etc., are carried up, with entrances next the chute gates. For stoping the 30 to 40 per cent. dynamite, used in development, has been replaced by 15 per cent., as the latter is slower and makes less galena fines for the mill. The mine only runs a 10-hour day shift and the drillmen only bore, all loading and firing being done by an extra gang at night.

Milling

The mine ore without sorting is shoveled into a 14x24-in. Blake crusher, which discharges into 16x24-in. rolls. The latter feed a 12-in. rubber bucket-elevator, which lifts into an 8-ft. trommel with ⅜-in. round punched holes. The trommel oversize goes to a 5-ft. Huntington mill, but the undersize enters the roughing jig. This latter, like the finishing jig, has three 24x30-in. compartments fitted with cast-iron grate bars set crosswise and with slots ⅛ in. diameter at the top.

The tailing overflows the last compartment to waste, from which compartment only, is middling removed by side discharge into the Huntington mill. The hutch work descends to a 6-in. bucket-elevator to ascend to the finishing jig. On this latter the tails go to waste, but the hutchwork is concentrate with 78 per cent. lead, and is lifted by an 8-in. bucket elevator to a settling box for bagging and shipment.

The Huntington mill crushes through a 16-mesh screen and feeds 5 Woodbury Imperial tables on the floor below, without classification. These tables make only waste tailing and concentrate with 80 per cent. of lead. To run the mill at its capacity of 80 to 100 tons in 10 hrs. requires a hoisting engineer, a crusherman, a jigman (who also fires), and a roustabout. To mine enough ore for the mill shift takes about 25 men. The mill is crude and could undoubtedly be improved in capacity and saving by recrushing the first trommel oversize in rolls and by using classification before sending to the tables. As the barite is now in demand at a neighboring chemical works, it can be separated during milling by taking it off as middling on the jigs and tables.

The Union mill is a makeshift and the mine is only working a few men. The vein so far as opened is narrower than in the Gratz workings across the river, but like it the minimum vein thickness for profitable stoping will depend on prevailing economic conditions. The deposit as a whole will require careful supervision to be payable, even with lead at present prices.

Mining in Chihuahua

Vice-Consul C. M. Leonard reports that 1906 was a year of unusual prosperity in the Chihuahua district. Foreign capital principally from the United States, is flowing into the country in increasing amounts, large sums being invested in mines, timber lands, ranches, railroads, manufacturing and commercial enterprises, water-power schemes, etc.

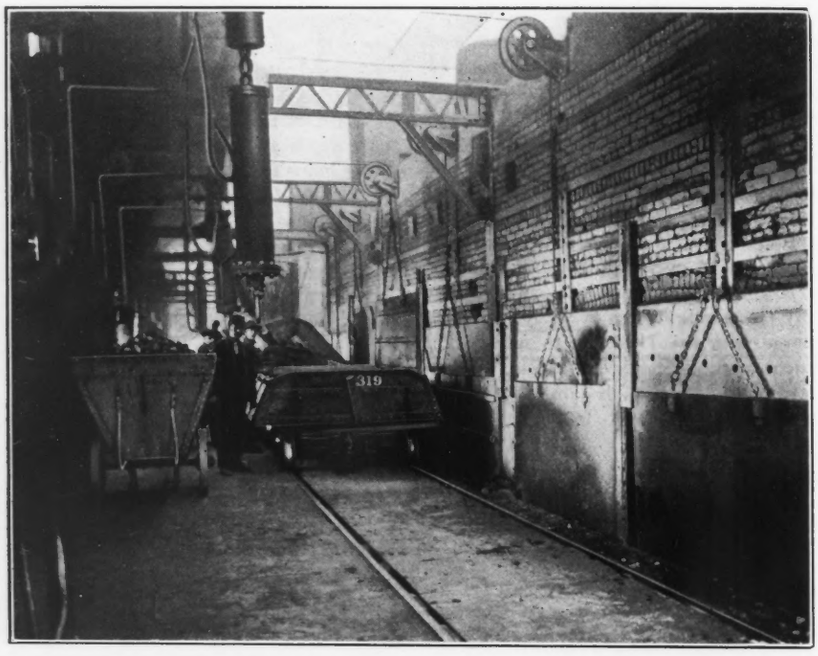
Several zinc mines were opened during 1906, and are now producing regularly. Copper exists in great quantities in the western part of the State, and only awaits railroad transportation to make these mines available. Several new gold and silver mines have been discovered. Taxes on mining claims have been reduced to $6 silver per annum per claim of 2.47 acres up to 25 claims. All over that number are taxed at the rate of $3 each. A permanent mining exposition has been opened in Chihuahua, which is maintained by the State. It contains a great variety of specimen ores.

The Kansas City, Mexico & Orient Railroad, which is being built from the former city to Topolobampo, on the Pacific coast, passing through Chihuahua from east to west, is progressing satisfactorily. Recently 62 miles of road west of Minaca were completed and trains are now operated daily. Track is laid and trains run daily to a point 76 miles east of Chihuahua. This, with the Chihuahua & Pacific Railroad, which acts as a connecting link, gives the State a continuous railroad for a distace of 278 miles from east to west. The Kansas City, Mexico & Orient Railroad has also 62 miles of road completed and under operation from Topolobampo eastward. The road will pass through a mining district rich in gold, silver, and copper. From the terminus of the Guerrero valley extension of the Chihuahua & Pacific Railroad at Temosachic, the Cananea Consolidated Copper Company is building a narrow gage road to reach its timber district. This road will eventually be built through to connect with the Sierra Madre, Rio Grande & Pacific Railroad, giving that section a direct outlet to El Paso, Tex. A silver-lead smelter is being erected in Chihuahua which will have a capacity of 800 tons daily, and employ 500 men.

According to St. Petersburg journals, new goldfields have been discovered in the Troitsk district, on the Miassae river, also on the River Oke, about 46 versts from Okinsk.

Mathewson Furnaces at the Washoe Smelting Works

An illustrated pamphlet issued by the Anaconda Copper Mining Company, and prepared by members of the staff, describes the blast furnaces of the Washoe plant. There are three furnaces, two of which are 51 ft. long and the other 87 ft. long, having a width of 56 in. at the tuyeres. The smaller furnaces have a capacity of 1600 tons, the larger 3000 tons of charge in 24 hours. The smaller furnace, here shown, is two jackets high and has water-jacketed crucibles. There are two points of discharge.

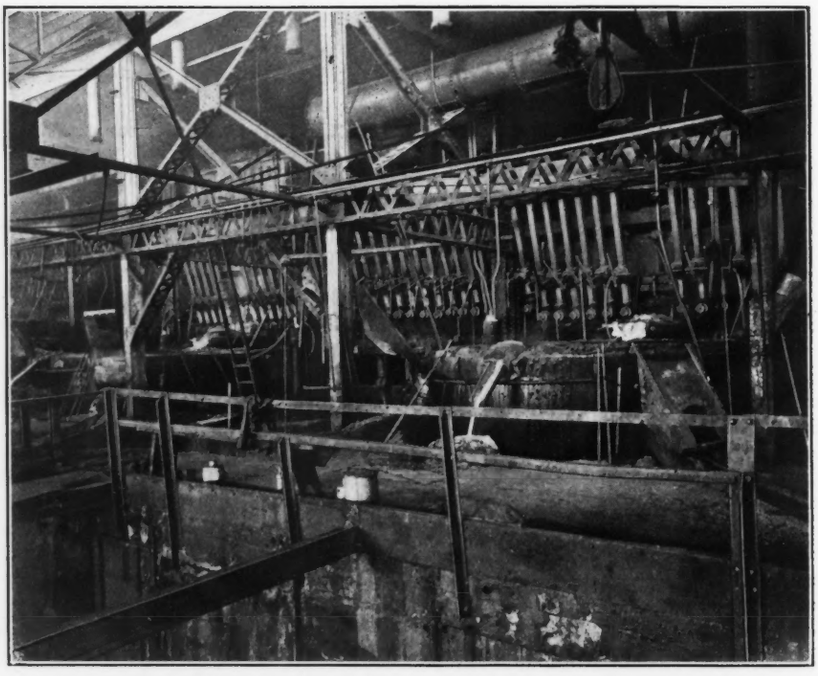


FEED FLOOR, MATHEWSON FURNACE, WASHOE SMELTING WORKS

The bottom of the center of the furnace is of silica brick, laid on water-cooled cast-iron plates, mounted on cast-iron columns and has a gradual slope to each discharge spout. The 87-ft. furnace has three discharge spouts and three settlers, but is otherwise built in the same manner as the 51-ft. furnace. The 51-ft. furnace has eighty-eight 4-in. tuyeres, and the 87-ft. furnace, 150.

The type of furnace used is the Mathewson patent blast furnace. It has increased hearth area with but two ends to bind and hold the crusts. Any crusts forming on the sides can be readily removed by allowing the furnace to run down, the crust either dropping or being readily barred. It has smaller radiating surface for the same hearth area than the smaller furnaces, uses less coke, and makes a flexible unit. Any part of the furnace can be handled as the case demands, and is susceptible of repairs without shutting down the entire furnace. Leaking water jackets may be replaced without shutting down the furnace.

It takes from 6 to 8 hours to change a jacket. The procedure is to shut off the tuyeres on the jacket to be changed and the one opposite, allowing the water to circulate until all buckstays, tuyere pipes, etc., are removed, and the jacket ready to be pulled out; this chills a wall inside the jacket strong enough to hold the contents of the furnace. The new jacket is placed in position, all connections made and the blast turned on and smelting resumed. The entire end of one furnace has been shut down, jackets changed, furnace cleaned out and operations resumed, and during this time (from ten days to two weeks) the other half of the furnace was in operation.



FIFTY-ONE-FOOT BLAST FURNACE, WASHOE SMELTING WORKS

The circulation of the water through the jackets is as follows: Each individual tier of jackets forms a complete set with two feed pipes and two discharge pipes. In the case of the tier at the crucible end, the feed enters the crucible jacket, the discharge from this going to the one immediately above, the discharge of this to the top jacket, from which it overflows to the waste pipe. The 51-ft. furnace has three 7-ft. 45-deg. unlined steel flues; the 87-ft. furnace has five. All the flues discharge into a large brick and steel dust chamber of the type adopted for the entire plant.

The furnaces are charged from both sides, the doors being raised by compressed air. A charge train consists of eighteen cars. The cars receive the weighed quantities of the various materials from storage bins placed in three rows and built of wood. Each row is 28 ft. wide, 786 ft. in length and 20 ft. deep, and is divided into a series of bins of various sizes as required by the volume of material handled. They serve to store first-class ore, coarse concentrates, lime rock, slum for briquetting, converter lining, etc., and are filled from tracks on top of the bins. All gates in bins used constantly are operated by compressed air. The charge train first takes its quota of slag, then ore, then coarse concentrates, then lime rock, then goes to the briquetting plant, where it receives its quota of briquets. Two charge cars constitute a charge, the weight of which varies from 8400 to 11,000 lb., according to its composition. The train when loaded is hauled

into the blast-furnace building, where the cars are dumped by compressed-air lifts.

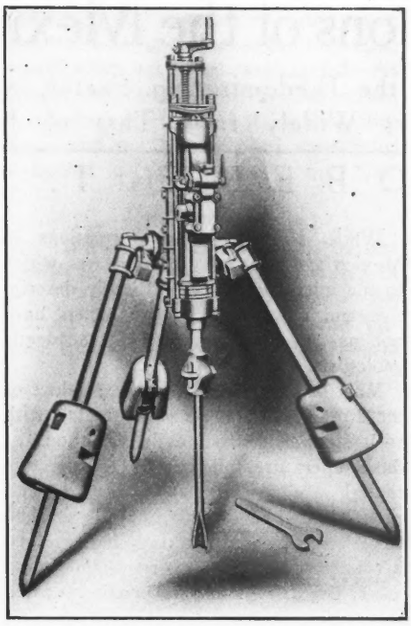
The slag and matte flow from the furnace through the discharge spouts into 16-ft. settlers. The settlers are circular and made of half-inch steel plates lined with 12-in. silica brick. The slag overflows and is granulated in water and carried in launders lined with cast iron to the dump. The matte is tapped from the settler into 10-ton, hot-metal ladles, and taken to the converter plant.

The Chicago Giant Rock Drill

The Chicago Giant rock drill, manufactured by the Chicago Pneumatic Tool Company, has a shell of the adjustable type, constructed so as to provide for double side bearing for the cylinder. The shell caps are made to take up wear in two directions with one adjustment. A removable cylinder stop is also provided in the lower end of the shell, to prevent the cylinder from slipping out in case the feed screw should be run out of the feed nut. To remove the cylinder from the shell, all that is necessary is to remove the stop first, then by turning the feed screw to run the cylinder down in until the feed screw is out of the feed nut. This allows the cylinder to be slipped out of the shell without dismantling the machine.

The cylinder is cast from a special mixture, having a tensile strength of 35,000 to 38,000 lb. The upper end is extended to form a chamber for the rotating mechanism which is of the releasing type. Three parts are used, and the pawls are reversible. The ratchet is of one piece with the rotating or rifle bar, which is extended on its upper end to fit into a chamber or recess into the upper head; this provides for holding the rotating bar in a central position and relieves the rotating mechanism of side strains.

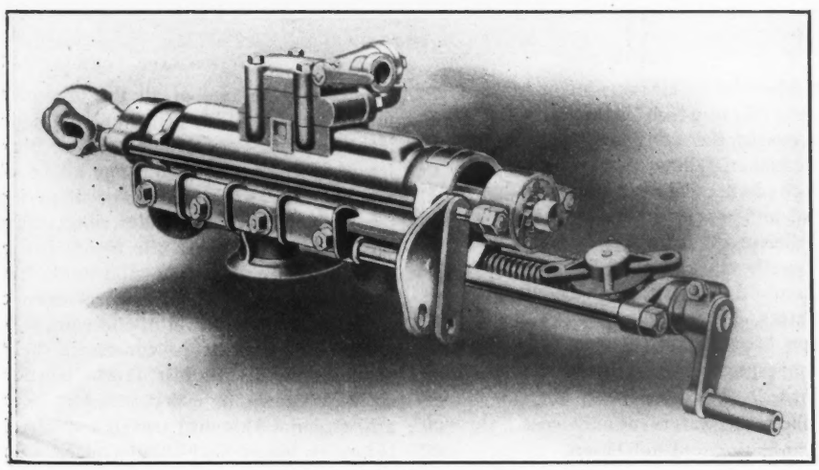
The valve motion is positive and is of the tappet or rocker type, modified to give a short stroke, the length of the stroke being at all times under the control of the operator. The supporting pin of the rocker works in renewable steel bushings and is completely inclosed, it being kept in place by caps easily removable but securely locked in place by the valve seat.



CHICAGO GIANT ROCK DRILL

An oil-reservoir chamber is provided in the valve seat and communication is made between the oil reservoir and the interior of the valve chest. The oil is led through this channel into the chest where it mixes with the operating fluid and is carried by it into the interior of the machine. One filling of the oil reservoir lasts half a shift. In case the rotating mechanism should not receive sufficient lubrication from the interior, provision is made in the upper head for oiling.

The drill does its best and most economical work when operated by compressed air, but it is also a satisfactory machine when operated by steam.



CHICAGO GIANT ROCK DRILL UNMOUNTED

Cost of Shaft Sinking at Bendigo

The cost of sinking the main shaft of the Victoria Quartz Company, at Bendigo, Queensland, from 4048 ft. vertical to 4300 ft., is published in the *London Mining Journal* as being £5 16s. per ft. W. Richard, the mine manager, reports: The cost per ft. is made up of the following items: Wages, 62s. 6d.; firewood, 25s.; timber, 13s. 3d.; explosives, 7s. 4d.; and sundries, 7s. 11d. The total cost of sinking 252 ft., £1461 15s. 2d. Two plats were cut at a cost of £81 4s. 2d. The great depths at which this work was carried out makes this statement of costs more than ordinarily interesting. The rock sunk through comprises hard slates and sandstones of Lower Silurian age. They are not so hard as the rocks in the unaltered zone at Kalgoorlie, but they do not blast so well as granites and rocks classed as greenstones. A comparison of their relative advantages is difficult to make, for even in the narrow limits of "The Golden Mile" at Kalgoorlie there are very great differences in the cost of mining in country on the eastern and on the western side of the belt, the advantage lying with those mines on the eastern side. In the Ballarat district, where the Lower Silurian series is uptitled at an angle of about 78 deg., such rocks blast very badly in shaft sinking and favorably in crosscutting.

Broken Hill Proprietary Company

Cable advices from Melbourne give particulars of the profits and progress of the Broken Hill Proprietary Company during the six months ended Nov. 30 last. The output was 2,413,066 oz. of silver, averaging 2s. 9.73d. per fine ounce, and 29,383 long tons of pig lead, averaging £16 5s. 5d. per ton. The net profit was £314,284. Developments on the 1200-ft. level are most satisfactory, the ore being equal in value to that found in the 1000-ft. level and the width of the body being greater. The ore reserves are estimated at 3,000,000 tons, which is a figure practically identical with that of two years and a half ago, when the last measurement was made. During that period 828,000 tons have been extracted. The amount raised during the last six months was 293,271 tons, which is an increase over the previous half year of 64,000 tons. The zinc-concentration plant has worked satisfactorily and produced 32,181 tons of concentrates for the half-year. The erection of the spelter plant at Wanatah has been completed, but it is not yet in operation, as several modifications are required. The cabled report also refers to the results of the recent fire and combats the somewhat alarmist reports circulated. It is probable that a good deal of ground will still fall in the open cuts from this cause, but such falls will cause no inconvenience nor danger. Further than this no trouble is anticipated.

Peculiar Formations of the Mexican Arid Region

Water Is Not the Predominating Factor, and the Surface Geology Differs Widely from That of Humid Regions

BY ROBERT T. HILL*

The two great American desert provinces of the Cordilleran region, which I have named the Chihuahua and the Sonora provinces, respectively, present many peculiar geologic formations. In fact the common, ordinary rocks appear so different in their surface aspects from those of the familiar humid region, that the traveler as well as the resident, is bewildered as to their names, their origin, and their classification.

The behavior of rocks under weathering in the arid regions, is, in general, entirely different from that observed in humid districts. A limestone, for instance, which in a semi-humid climate will slowly dissolve away under weathering, and leave its projecting fossils, in the arid region will crackle upon the surface into a breccia, weather into fantastic rain grooves called *karrenfelder,* become coated with travertine, or re-cement and re-crystallize, so that it appears as an entirely different material. Furthermore, rock waste is not carried to the sea, but is left upon the surface in new and puzzling formations.

In the present paper, a few of the more common of the aberrant formations of the desert regions will be described briefly, without going into extensive technical details.

Detrital Land-made Formations

While the marine sedimentaries and igneous rocks constitute the massive substructure of the Mexican plateau, superficial rocks occupy more extensive areas of outcrop. These materials, whether occurring as vast sheets of gravel, or gigantic sand-hills, like the Medanos of northern Chihuahua, or the flour dust of the Jiminez desert, or the reddish brown adobe clays of laguna sedimentation, or wind-blown *yeso,* are all derived from the decay of the mountains. Their extent and depth are surprising.

The deposits are sometimes consolidated and sometimes loose. They also include chemical incrustations and deposits of the type known as *caliche* and *tepetate.* These rocks as a class are the result of arid disintegration, oxidation and local transportation upon the surface, without reference to any common deposition level like the sea. They occupy all the vast stretches of desert plain between the mountains of the plateau, fill the ancient valleys, and even coat the surface of the lower slopes and valleys of the mountain rocks.

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While some of these formations in Mexico are known by local names which to the inhabitants are sufficiently descriptive and recognizable, these names have not as yet been accepted by academic geologists.

Most of this material is the product of the atmospheric processes beginning with rock shattering from daily variations of the temperature followed by gravity, torrential transportation, and wind and chemical action from evaporation. The variation of temperature shatters the hardest rock, gravity, rain and wind move, grind, sort and redeposit it, while chemical action results in solution and redeposition.

The formations thus produced grade one into the other, and often extensive formations are found which are the product of all the processes mentioned.

Shatter Formations

In the arid regions, rock as well as water constantly seeks a lower level. Upon the summit and around the base of every mountain in arid Mexico, covering its slopes, may be seen great masses of angular, freshly-broken rock resembling in its angularity the freshly-cut macadam of the road-maker. Heated to intense temperatures by the midday sun, the massive rocks are likewise chilled by the cooling nights. As a result, the solid rocks are constantly being shattered into fragments.

Fragments of this kind remain in situ on the original surfaces until removed by torrents. When breaking from the edges and faces of the cliffs, the material in accordance with the laws of gravity rolls down the slopes and hills, and is sorted into different sizes.

The Wash

The torrential rains of Mexico, especially those which characterize the afternoons of the rainy season from June to December, falling upon a surface covered with shatter débris gathers up this material and carries it onward as gravel and sediment in great muddy sheet floods to lower levels. Some of the material is also dissolved and carried in solution by the waters. The angular breccia is still further broken, and partially rounded in its tempestuous travels before being redeposited. Upon reaching the plain, the ephemeral waters usually cease, through evaporation and imbibition.

Gravitational material thus gathered up and redeposited is known as "the wash." Where torrents run down a steep slope, dikes or ridges of waste are left on each side of the streamway, resembling the débris upon the banks of an artificial ditch. Great talus fans, or "deltas" of wash are also built up at the mouths of cañons.

The talus fans and ridges themselves are reattacked by cloudbursts and their material is removed over and over upon the lower plains. Thus the wash is being worked over and over by the desert atmosphere, and spread out in level sheets.

In its progress from the mountain cliff to the plain, the rock waste is being constantly reduced. Ultimately, much of it is ground into fine rock powder. Some of this is taken into solution, some is carried on to be redeposited as silt in lagoons, but much of it dries and is picked up by the wind, and retransported and redeposited as wind-made formations.

Laguna Formations

Some of the mountain torrents, instead of drying upon reaching a lower level, empty their muddy floods into shallow ephemeral lakes, known as *lagunas,* previously described in my geographical papers, and in which the fine rock powder is deposited in layers of silt. This silt is often laid down in great quantities, forming beds several feet in thickness in a single season. Upon the drying up of the temporary lakes in which it is deposited, this laguna material is subjected to the evaporation and transportation of the winds, and in most cases is picked up and redeposited. The Rio Grande, north of Presidio Del Norte was once a laguna stream, as is the Colorado of the West today. The old Laguna deposits are nearly 700 ft. thick near El Paso.

Aeolian or Wind-made Formations

The ultimate fate of all the projecting massive rocks which constitute the popularly supposed eternal mountains of Mexico is to be converted into fine adobe silt or sand, through the process of shattering, gravity and wash above described, filling up the valleys between the mountains, as the latter are degraded, and until ultimately the mountains are worn down to reach the common level of the plain.

The rock waste is constantly being ground into desert dust (rock powder) so well known to every traveler in the arid region. This dust travels extensively before finding a final abiding place. The strong winds constantly transport the finer rock material back and forth until it

finds a final lodgment against the foliage of some desert vegetation, or friendly cliff.

In this manner, the materials filling the great valleys of the desert, ordinarily attributed to lacustral sedimentation, have been stratified until in some cases the bases of the adjacent mountains have been deeply buried. The individual wind formations are conspicuous and interesting phenomena, especially the mesquite mounds and the medanos.

The Mesquite Mounds

In traveling over the desert plains of new and old Mexico, extensive areas of low brown sand hills may be seen averaging in hight 4 or 5 ft., and seldom exceeding 30 ft. in diameter. From the tops and sides of these hills project the branches of the mesquite bush, while their sides are literally perforated with the holes of various burrowing animals. The switches which project at the top of these hills are the branches of the buried trees and are ever extending upward while the trunks (commonly miscalled roots) are constantly being buried and concealed by the sand.

While these hills increase in size through the accumulation of sand by the branches, young bushes also spring up in miniature valleys between the hills, around which other hills are started. As a result, there is a general upward growth of the surface of the land by the wind-blown sand and dust collected around this vegetation.

The Medanos

In northern Chihuahua, south of the city of El Paso, there is a vast area of sand hills resembling the dunes of Holland, and the New England and Virginia coasts. These sand hills rise, in places, to hights of 200 ft. or more and are the most striking and conspicuous objects of the landscape. They represent the wind-brought débris from the vast stretches of plain to the south and west which finds lodgment against the mountains to the north and east.

Another interesting phase of the wind-made formations is the white soil of the "flour-dust" deserts in the vicinity of Torreon. Here the surrounding mountains are composed of almost pure limestone, which grinds into exceedingly white dust resembling flour. Although to the traveler, it seems that most of this material is in the air, vast quantities of it have found lodgment in the adjacent plains of Coahuila and Zacatecas, constituting a rich soil exceedingly productive under irrigation.

The Tepetate and Caliche Family

Throughout Spanish America there are many popular terms used for important geological formations which, owing to their absence or inconspicuousness in European and North American countries, have received but little attention. Some of these names are of Indian origin and it is obviously impossible at present for the writer to enter into an etymological research as to their appropriateness.

Popular names as applied to rocks are based upon their physical qualities and not their mineral composition. As an illustration of this the word *dobe* (the American corruption of *adobe*) as shown in this article, is a name applied to any soft earth which has the power of cohesion upon drying, regardless of whether it is clay, lime or silica; just as the term marl is applied in the eastern States to the silicious glauconitic sand of New Jersey; while in Europe and the western United States it is used for calcareous or chalky

LA BRISCA FORMATION, WESTERN CHIHUAHUA

earths. The words *caliche, cantera, tepetate* and many other names used in Spanish America for aberrant superficial materials are similarly confused by Spanish speaking people. Not only this but where Americans have invaded Spanish America they have still further confused these names and their application.

The local names of these substances are immaterial further than that it is always well to conform with local usage when possible. As I shall show, however, the names have been used to denominate a variety of the general phenomena.

Telpetate, tepetate and *tipetate* are various spellings of a word which is used extensively for certain soft unconsolidated or semi-consolidated earths. In the volcanic regions of South and Central America, the name is applied to soft surface materials which are largely the oxidized soils and subsoils of volcanic ash, tuffs, lapilli or even the decomposed residual material of massive ejecta. In fact, it is applied to nearly any material which has been transported or altered from its original place or condition.

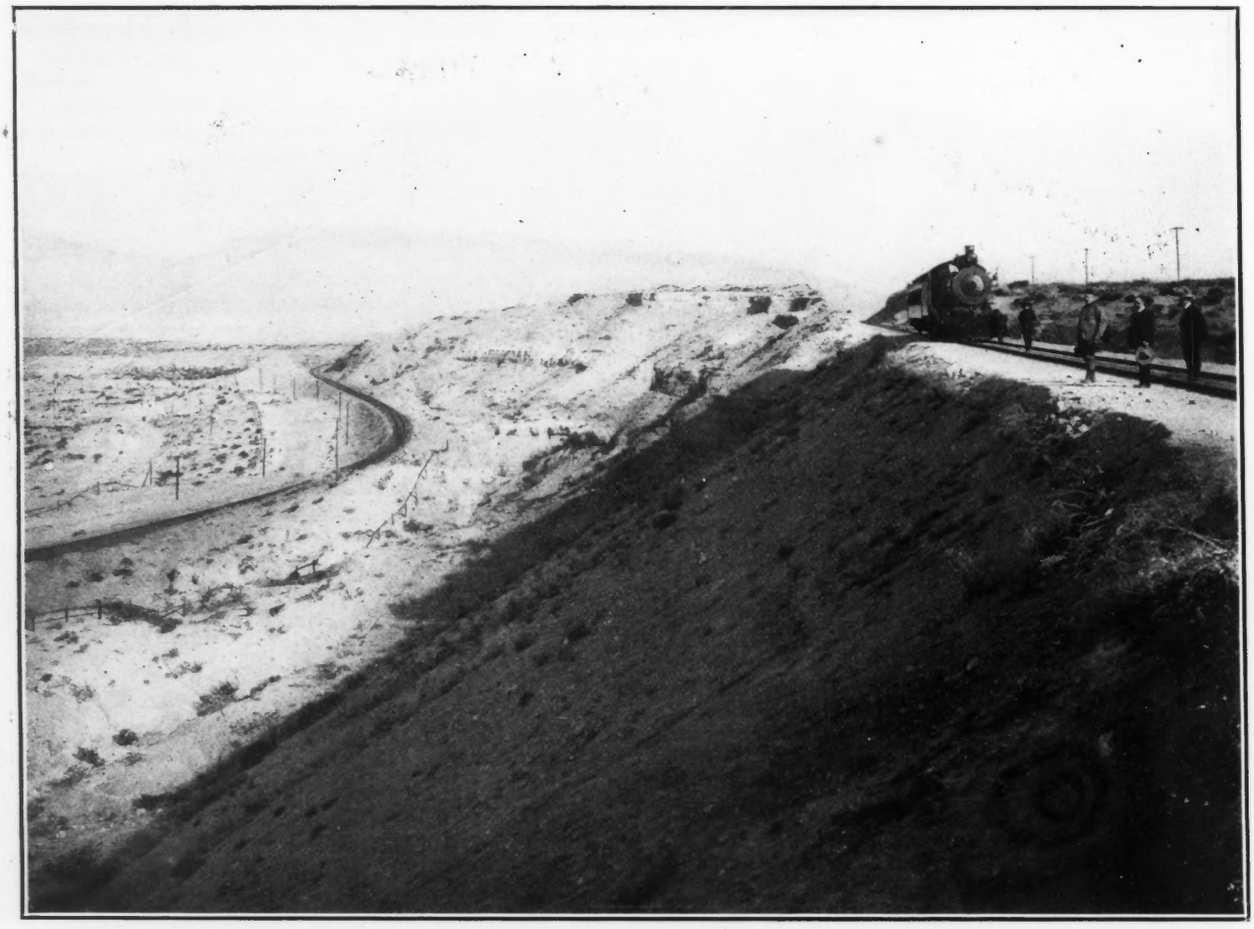
I first encountered the word *tepetate* at Monterey, Mexico, where some twenty years ago I heard it applied to a type of the calcareous material herein described, which is used in that city for mortar, cement and for building stone in the construction of buildings. In the present paper, in conformity with my previous usage, I shall continue to use the generic term *tepetate* for this class of deposit, although it may subsequently be found that it may be supplanted by a more specific one.

Formations of this general class become conspicuously notable as far north as the semi-humid plains of western Kansas. Throughout the western portion of the southern plain regions they form an extensive thickness of pan or subsoil, as may be seen along the Rock Island road from Kansas, southwestward toward the Canadian river. They become increasingly conspicuous, and extensive as one travels southward through Mexico, until upon reaching the mountains and valleys of the southern part of the republic (notably around Irapuato, Chilpancingo and other places) their white and glaring colors constitute a most conspicuous feature of the landscape.

The whole story of the *tepetate-caliche* family of rocks, with the exception of the spring river *dobes,* is summed up by the fact that in the arid region of America, where precipitation is not sufficient to produce continuous runoff to the sea, the lime taken in solution from the hot mountain rocks is deposited upon the land instead of being carried to the ocean, as in humid regions, where precipitation is sufficient to carry the runoff and its solutions to the sea.

The results of the process in the arid regions are deposits of peculiar forms of carbonate of lime of a chalky color and various degrees of texture, from a loose marl to firm limestones and conglomerates.

Why *tepetate, 'dobe,* and *caliche* assume the white, chalky texture, instead of being crystalline and translucent like travertine, stalactite and Mexican onyx, cannot here be explained. Probably a solution of this query will be found in the conditions and rapidity of deposition relative to the air of the two groups of material. Stalactite, travertine and Mexican onyx are deposited very slowly in damp caverns, and hence their crystallization is more perfect. *Tepetate, caliche* and *'dobe* are rapid precipitates in the dryer arid atmosphere.



LAGUNA FORMATIONS WITH CAP OF TEPETATE OR CALICHE, EDGE OF RIO GRANDE VALLEY AND FRANKLIN MOUNTAINS

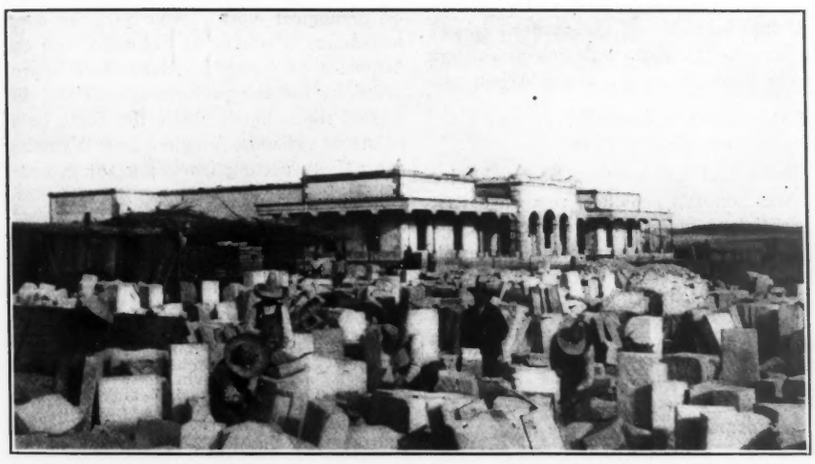
Caliche

Wherever one digs into the ground, or wherever the soil is removed by a railway at a drainage cut, throughout the southern extension of the great plains of Kan-

sas, New Mexico, and Texas, and the desert plains of Arizona, one will observe a few feet below the surface a thick formation of white mortar-like lime, marl or limestone, very similar to the surface tepetate previously described, and which is commonly called *caliche* in northern Mexico and in Arizona.

Professor Blake defined caliche[1] as "a calcareous formation of considerable thickness and volume found a few inches or a few feet, below the surface-soil, upon the broad, dry gravelly plains and mesas of the arid region." He explains the origin of caliche "by the upward capillary flow of calcareous water induced by constant and rapid evaporation at the surface in a comparatively rainless region. Unlike ordinary travertine, it is the result not of descending but of ascending currents. The *caliche* is a fine example of the formation of an extension of calcareous strata in the midst of pre-existing beds, not by metasomatic processes, but by precipitation from sources below.

It is my belief that the *caliche* of this



CUTTING CANTERA, CHIHUAHUA

type described by Professor Blake, is deposited by descending as well as ascending solutions. In the arid region, the line of permanent saturation is very deep. The earth and rocks to a depth of several hundred feet are perfectly dry, pulverulent and porous. In such cases rainfall in proceeding downward merely wets the upper stratum of soil, and soon ceases by absorption and combination. At the lower line of visible saturation, calcium carbonate is given down as *caliche*.

Tepetate of the Monterey Type

This form of limestone is the one which I have previously called *tepetate*, and its occurrence is so frequent and extensive in arid Mexico, as to constitute a conspicuous and noteworthy geological formation. It differs chiefly from *caliche* in the fact that there can be no doubt as to its superficial origin. In places this formation is a very thick and extensive, semi-indurated lime marl, coating the surface of the desert plains, especially around the margins of those Mexican deserts surrounded by limestone mountains. South of Saltillo, the constant accretion of this material around the margins of the desert is gradually encroaching upon the adobe soil from the mountains toward the centers of the valleys. The beds of this material thus deposited are conformable to the slight slopes of the margins and bottoms of the plains.

Many of the mountain masses of northern Mexico are composed of more or less pure Cretaceous limestones. These usually constitute the perimeters of great desert basins which themselves are of unconsolidated material. Besides the Cretaceous lime-rocks of the mountains, there are other lime-yielding formations.

The rainy season from July to October is marked by showers which usually fall upon the rock surfaces in the afternoon when they are hottest. The heat of the rocks undoubtedly favors solution which is likewise accelerated by the carbonic acid of the air and scant vegetation. As a result the runoff carries much carbonate of lime. Upon reaching the margin of the desert plains the runoff is usually dissipated through imbibition and evaporation and the accompanying carbonate of lime is redeposited in layers of white lime material on the surface, or in the interstices of the light loam soils and gravel, which become cemented by the lime matrix, frequently making fairly massive conglomerates, or upon flooding over sands, form grits with a calcareous matrix.

The tepetate of this type also frequently coats the edges of the strata occurring in cliffs so that they are so thoroughly calsomined that the stratification is often entirely concealed.

This is one of the factors which makes fossil finding so difficult in many excellent stratigraphic sections of the Mexican mountains. It is also sometimes deposited over the eroded slopes as blankets or sheets, especially in the form of deltas near the bases of mountains. At the copper mines near Jimulco, the whole lower face of the mountain is covered with this latter form of *tepetate*.

'Dobes of the San Antonio Type

Still another type of the tepetate group are the spring river marls locally called *'dobe*, found along the Sabinas, in Mexico, and adjacent to the spring rivers of San Antonio, New Braunfels, Austin, and elsewhere, just east of the Balcones fault line, between the Colorado and the Rio Grande, in Texas.

These spring rivers are discharges of deep-seated underground waters, which have circulated sub-horizontally through many miles of limestone, and then vertically along fault planes through from 300 to 1000 ft. of limestone. They are heavily charged with bicarbonate of lime, and with carbonic acid gas. At the outlet of the springs, the water is of a beautiful azure hue, and the bottoms are covered with a dense mass of the most exquisite aquatic vegetation. A short distance below their origin, within a mile or so, the waters become cloudy and of increasing chalky color, and begin to deposit the contained lime.

The San Antonio river is one of the most conspicuous streams of this type. Its runoff in past times has migrated considerably as attested by the topography of its wide valley between outlying bluffs below San Antonio. Over the ancient flood plains is an extensive deposit of white or slightly cream-colored marl much indurated at the surface, but quite soft upon breaking through the crust.

This marl is mostly carbonate of lime with a slight mixture of clay and silica, constituting a white, chalk, marl-like material, which at Austin, San Marcus, New Braunfels, and San Antonio, is locally called *'dobe*, although in no manner similar to the clay adobes used for the making of unburnt brick. These deposits here attain a thickness of at least 25 feet.

It is dug down with pick and shovel, and is extensively used as a road material, possessing the peculiar quality of setting upon being moistened and rolled. Excellent highways and streets are constructed of this material.

An interesting phenomena accompanying the *'dobe* banks or quarries southeast of San Antonio along the outer margin of the river valley, are the so-called "gravel beds." This gravel averages about the size of a hen's egg, and is oval in shape. Instead of being rolled and water-worn stone, however, it consists of calcareous concretions composed of regular concentric layers of lime, which have developed *in situ* in the orignal marl, and which are constantly growing in size by the downward deposition of exterior layers from

[1] "The Caliche of Southern Arizona, an Example of Vadose Circulation," by Wm. P. Blake. F. G. S. Trans. A. I. M. E., Richmond meeting.

the spasmodic circulation of water around them after each rainfall.

I have not yet had opportunity to make sufficient examination to determine the nature of the concretions further than the ascertainment of the fact that they are the gravel beds, so-called. At one place noted they were 10 to 12 ft. in thickness, and their resemblance to a bank water-worn gravel is at first very striking.

The quantity of *'dobe* thus deposited in the lower courses of the spring river of the San Antonio, is something enormous. At New Braunfels the divides of the Black Prairie, 80 ft. above the present runoff, and to a depth of 40 ft., are capped by this material, which extends for many miles down the river.

Mine Tepetate

Another interesting form of *tepetate* is that which often forms the gangue matter of the upper extension of some mineral veins. This, too, is usually a soft white earthen calcareous matter.

Not all of the precipitation which falls upon the hot mountain surfaces nor the lime taken in solution escapes as runoff, however, but much of it is disposed of by downward circulation through the cracks and fissures of the limestone, and is deposited at various depths therein. The wall rock and vein matter itself also decomposes into gouge called *jaboncilla,* and on drying developes a white efflorescent aspect. By these processes. a *tepetate*-like material becomes the gangue of the upper extension of mineral veins, and is an important feature in mining, aiding the geologist to appreciate the extent of the zones of superficial leaching.

A simple illustration of the deposition of *tepetate* in fissures, joints and sedimentation and bedding planes is seen at the south end of Mt. Franklin in the suburbs of El Paso, Texas. Here the bed-rock consists of tilted Paleozoic limestones, which do not in themselves constitute good material for calcination. The cracks and fissures between them, however, are filled with *tepetate* which has been deposited by the circulation and evaporating waters and which is mined for its lime-making qualities.

The mine and fissure *tepetate* of this type are not to be confounded with the mine waste which is also called *tepetate* by the Mexican miners.

Jaboncilla

By far the most interesting and conspicuous of the altered rocks are the substances known as *jaboncilla* and *cantera,* both of which are alteration products of the great mantles of rhyolite and andesite so extensively found throughout the republic.

Jaboncilla, which is the Mexican word for soap-like, is applied by Mexican miners to the semi-decomposed condition of andesite or any other igneous rock which is encountered in the mine workings. The igneous rock is softened and decomposed *in situ* by ground moisture into a putty, or soap-like substance without losing the form of its original crystallization. Thus some of the rocks of this material which to the eye resemble porphyry can be as easily cut as cheese with ordinary tools. *Jaboncilla* has the property of indurating upon exposure to the air and moisture, as in the instance of the material known as *cantera,* next to be described.

Cantera

Throughout the mountains of Mexico, and especially in northern Chihuahua and Trans-Pecos, Texas, the western Sierras and Sonoran province, a peculiar material, which is known as *cantera,* is met. *Cantera* is a consolidated quartz-porphyry cinder or tuff, altered and softened (as noted by Kimball) by the influence of saturating ground waters, and which sets or consolidates on exposure to the air. It oxidizes brown upon the surface, but it is white before weathering. The city of Chihuahua is constructed of this material. In fact all of the beautiful florid architectural effects of Mexico, both of the aboriginal, the Spanish and the modern epochs are due to the ease with which *cantera* can be hewn when freshly quarried.

Agglomerate Formations of the La Brisca Type

Throughout the western Sierra Madre and the Sonoran province, there are vast superficial formations of volcanic agglomerate composed of a white material, clearly rhyolitic in nature, carrying slightly rounded pebbles and angular fragments of igneous rocks.

These formations weather into peculiar and striking forms, such as pinnacled cliffs, rounded domes, pillars, etc.

This formation occupies the outer margins of old valleys which it once filled, and below which the streams have since been cut to considerable depths. It is 500 ft. in thickness along the Aros and Tutuaca rivers of Chihuahua and the San Domingo river of Sonora. It belongs to a past, but recent, geologic period.

It is popularly supposed that the La Brisca represents ancient volcanic mud flows, but I, although my observations upon it have been extensive, must confess my inability, as yet, to explain it.

The California Mining Bureau

Special Correspondence

The Promotion Committee, of Nevada county, California, in advertising the mining resources of the county, intends placing a special exhibit of gold, ores, gravel, etc., in the museum of the State Mining Bureau, in the Union Ferry building, San Francisco. Thousands of people in search of information concerning mining visit the Mining bureau annually, and many go there who are not visitors to the interior counties. Since the earthquake of last April the Bureau museum and library have been completed, and the cases for specimens and books have been put in order, so that these places are again open. There is a very large collection of ores, etc., in the museum, all properly identified and labeled. This collection is arranged both by county and by character of ore. But special exhibits arranged by the respective counties, as proposed in the case of Nevada county, would add much to the value of the collection. Other counties could well follow the lead of Nevada in this direction.

State Geologists and Commissioners of Mines

In response to several requests, we print the following list of State geologists and commissioners of mines. In the cases of Arizona, Virginia, Washington and Wyoming, it is to be remarked that there are no appropriations from which the State geologists can obtain funds to carry on geological work. However, the commissioners of mines in Colorado, and the inspector of mines in Idaho have appropriations for the performance of the duties of their offices, while the State geologists of Arizona, Virginia and Wyoming are able to accomplish important geological work.

STATE.	NAME AND ADDRESS.
Alabama	Eug. A. Smith, University, Ala.
Arizona	Wm. P. Blake, Tucson
California *a*	Lewis E. Aubury, San Francisco
Connecticut	Wm. N. Rice, Middletown
Colorado. *b*	E. Lyman White, Denver
Georgia	W. S. Yeates, Atlanta
Idaho. *c*	Robert N. Bell, Boise
Illinois	H. Foster Bain, Urbana
Indiana	W. S. Blatchley, Indianapolis
Iowa	Samuel Calvin, Iowa City
Kentucky	C. J. Norwood, Lexington
Kansas	Erasmus Haworth, Lawrence
Louisiana	G. D. Harris, Ithaca, N. Y. and Baton Rouge, La.
Mississippi	A. F. Crider, Jackson
Michigan	Alfred C. Lane, Lansing
Nebraska	E. H. Barbour, Lincoln
N. Carolina	Jos. Hyde Pratt, Chapel Hill
N. Dakota.	A. G. Leonard, Grand Forks
Maine	L. A. Lee, Brunswick
Maryland	Wm. Bullock Clark, Baltimore
New Jersey	H. B. Kümmel, Trenton
New York.	John M. Clark, Albany
Missouri	E. R. Buckley, Rolla
Ohio	J. A. Bownocker, Columbus
Oklahoma	A. H. VanVleet, Norman
S. Carolina	Earle C. Sloan, Charleston
S. Dakota.	E. C. Perisho, Vermilion
Vermont	G. H. Perkins, Burlington
Virginia	Thos. L. Watson, Blacksburg
Washington	Henry Landes, Seattle
W. Virginia	I. C. White, Morgantown
Wisconsin	E. A. Birge, Madison
Wyoming	H. C. Beeler, Cheyenne

a State mineralogist; *b* commissioner of mines; *c* State inspector of mines.

Flux for Lead Dross

A flux for reducing lead dross in a crucible is given in *Metal Industry,* March, 1907. Soda ash and charcoal are mostly used on account of the small cost. A satisfactory flux consists of soda ash, 25 parts; pearl ash (carbonate of potash), 7 parts; finely ground charcoal, 2 parts. Mix thoroughly one part dross and two parts flux, and heat in good, bright fire till fusion becomes quiet.

The Mineralization of Mexico

By F. J. H. Merrill*

The results of nearly four centuries of gold and silver mining in Mexico show that its mineral zones are among the richest in the world, and that some of its silver veins have, for a time, exceeded all others in productivity. It is therefore of interest to review briefly the geologic conditions under which its mineral wealth occurs, and to determine what broad conclusions may be drawn concerning them.

Prospecting has been carried on industriously in Mexico ever since the conquest, and probably most existing veins have at some time been examined to some extent, though various circumstances have caused many comparatively rich deposits to be left untouched. We are therefore justified in assuming that the mineral deposits are sufficiently well known to permit us to generalize on their distribution, and to form some conclusions about the general conditions of their occurrence.

Distribution of Veins

Mineral veins are most abundant along the western range of the Sierra Madre, which is nearly parallel to the eastern range as far south as 20 deg. lat., where it changes its course to east-by-south and meets the eastern range in the region of Puebla, inclosing between its branches and the national boundary to the north an irregular trapezoid with a width from east to west of about 400 miles and a length of about 1000 miles.

While mineral veins are most numerous in the western mountain range, the largest and richest veins have been found in the plateau region between the two main ranges. This condition may be regarded as indicating that the general supply of ore-making material was nearly uniform, but that along the principal mountain axes the number of fissures was greater, so that the mineralizing forces were divided; while in the less disturbed zone between the main ranges the fissures were less frequent and possibly the country rock more favorable to the formation of large orebodies.

Observations on the geology of these deposits have been accumulating for about 100 years, from the time of Humboldt's visit in 1804, to the present day. The mineral veins occur (if we may credit the mass of testimony on record) always and exclusively in some association with volcanic rocks. The ore deposits are of various kinds, influenced by the rocks in which they have been formed.

Nature of the Rocks

The prevailing country rocks in Mexico are of three principal types: 1, old granites, gneisses and schists; 2, sedimentary limestones, sandstones and shales or slates; 3, volcanic rocks of several species regarded as mainly Tertiary. In all of these types true veins occur. In the limestones (owing to their solubility and greater susceptibility to mineralizing solutions), there are also large cave deposits which are in part replacements, and various contact deposits formed at the margin of igneous intrusions.

So far as my personal observation and access to literature have permitted me to form an opinion, there is no metalliferous deposit in Mexico without some relation to volcanic rocks. To make a perfect demonstration on this point, and to show that the existing relations in this connection are all causative and not accidental, involve an extensive campaign of observation, comparison and record. The needs of science and of commerce demand such a systematic study and render it of the utmost importance and value.

Eruptive Rocks and Ore Deposits

It would be out of place here to develop arguments on the origin of ore deposits, and to trace the possible, or probable, influences of volcanic action in stimulating circulation and deposition by atmospheric or magmatic waters. The field of argumentative discourse on this subject is still well occupied. Turning therefore from the question of the relation between ore deposits and eruptive rocks, we may consider the relation of the orebodies to the country rocks in which they occur.

Gold, when unaccompanied by silver, is found mainly in the crystalline gneisses and schists which outcrop in the low country toward the Pacific coast. Through Sonora, Sinaloa, Michoacan, Guerrero and Oaxaca, outward from the eruptive zone of the Sierra Madre and below the levels of outcrop of the Mesozoic rocks over which the great volcanic sheets have been spread, is uncovered an old series of schistose crystalline rocks in which are many rich veins of gold. Too little is known to permit one to generalize on the reasons for this concentration or to speculate on the origin of the gold which occurs in the veins of other terranes associated with silver or copper. A larger volume of facts is needed.

There is, however, one broad conclusion to be drawn concerning the distribution of mineralization, to which allusion has been already made, namely, that the *largest deposits* of the precious metals *are in the Mesozoic sediments* of the central plateau of Mexico; and, while an abundance of eruptive dikes and other small intrusions suggest the relation of volcanic influences, the very large orebodies are mainly in the Cretaceous limestones and shales or slates.

Limestones inclose the great silver deposits of Santa Eulalia, Sierra Mojada, Sombrerete, Fresnillo, Catorce and Zimapan. Shales and slates inclose the bonanzas of Guanajuato,* Zacatecas and Sultepec. The rich veins in andesite of Real del Monte show that not even a change of terrane could overcome the intense mineralizing force at work in this central plateau region. In the great eruptive zone of the western Sierra Madre, where the Mesozoic sediments are largely covered by Tertiary lava flows, the mineralization has penetrated the andesites, to be covered at many points by later flows of rhyolite. Who can say that far down beneath the volcanic mountain masses of these western ranges there may not be in the buried Cretaceous beds treasure caves and bonanzas wholly out of sight at present, but perhaps in store for a future generation?

*Economic geologist and mining engineer, New York City.

*The age of the shale of Guanajuato is undetermined through lack of fossils.

Bichromate Titration for Iron

L. Brandt states (*Zeit. anal. Chem.*, 1906, XLV, 95-99) that the determination of iron by titration with bichromate solution, diphenylcarbohydrazide has the advantage over other indicators of being used in the titrating vessel, and not outside it. The method is as follows: To about 1.5 liters of water in a capacious dish are added 60—80 c.c. of dilute hydrochloric acid (sp.gr. 1.12) and 100 c.c. of a solution containing 10 grams of manganese sulphate, 55 c.c. of dilute sulphuric acid, 1:3, and 5 c.c. of phosphoric acid of sp.gr. 1.7. The iron solution which should contain 0.2—0.5 gram of iron, and 5 c.c. of a 0.1 per cent. solution of the indicator are further added, and the titration with bichromate performed. There is, at first, a bright red-violet color which finally changes sharply to the green of chromic chloride. The indicator may also be employed in the determination of chromic acid, an excess of standard ferrous ammonium sulphate solution being added, and the process completed as above described. The solution of the indicator in acetic acid should be prepared fresh every few days.

Life of Wooden Pipe Lines

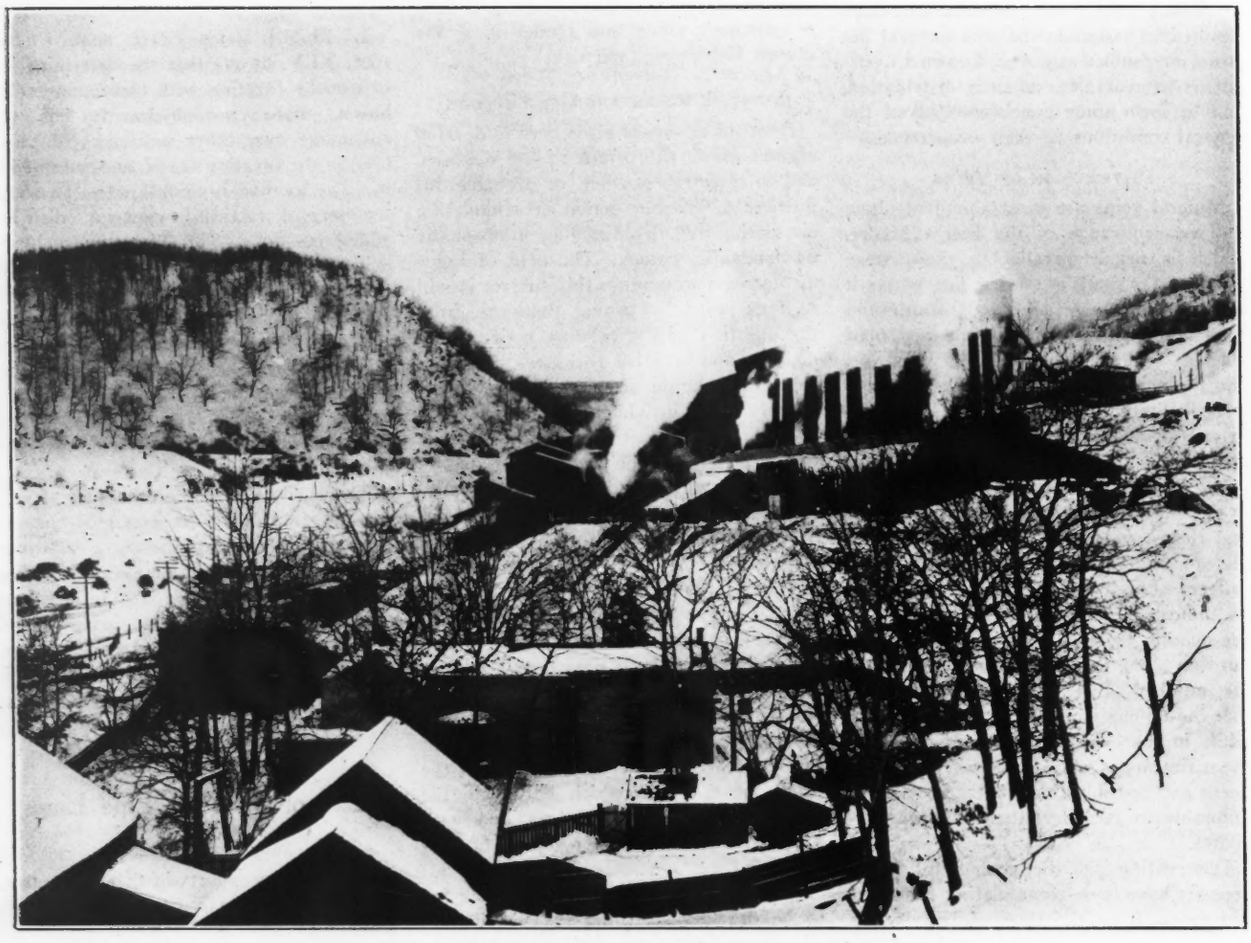
D. C. Henny reports in the *Engineering Record* (March 23, 1907) that a woodstave pipe line in Southern California, where it is exposed to atmospheric conditions more destructive than usual, required in ten or eleven years' service, the renewal of 11 per cent. of its staves and the reconstruction of 5½ per cent. of its total length. Wood pipes with earth covering laid in Butte, Mont., in 1892, subsequently have not required, according to Eugene Carroll, any replacing of staves except in one case where the earth covering was not compact.

Geology of the Buck Mountain Coal Bed

Different Degrees of Inclination Render It Necessary to Use All Methods of Anthracite Mining at the St. Clair Colliery

BY HARRY W. ALTHOUSE*

The St. Clair Coal Company operates the Buck Mountain coal bed lying at the top of the Pottsville series No. XII, of the Lykens coal measures, the basal member of the Lower Productive Coal series. The formation is a monocline for about three miles along the lowest levels of the Buck Mountain bed. Above this coal seam the north dip of the basin is inverted in the overlying coal measures comprising the Skidmore and Mammoth veins.



SURFACE PLANT, ST. CLAIR COLLIERY, ST. CLAIR, PENN.

The Coal Basins

The Mill Creek gap, cutting directly across the basin at right angles to the strike, equally divides the mine workings in the upper measures. This basin, locally, is a portion of the Mine Hill syncline extending along the southern base of a westward spur from the Broad Mountain. Along this slope the coal seams outcrop to the east. Westward some distance from the gap the Buck Mountain bed seeks cover, and arches within the mountain crest, rolling over and joining the New Castle-Heckersville basin lying to the northward. Farther westward, and in the lowest elevations of the coal bed, the seam almost merges with, the Wadesville basin to the southward. East from this point, along the trend of inversion, the deposition of the Buck Mountain coal bed did not occur, as there is no continuity with the same bed directly to the southward in the Pine Forest—Wadesville basin, although the rocks show regularly the stratagraphic succession. This is probably owing to the lack of deposition occasioned by sea currents or tidal influences upon the sedimentation from the littoral deposits of a subsiding sea coast, or more likely from the deep-sea scouring resulting from the undertow across a submarine longitudinal elevation during a local subsidence of the sea floor on either side. This, however, did not affect the laying down of the Mammoth bed, 25 to 45 ft. in thickness, and geologically 275 ft. above the Buck Mountain, as by that time the influences had been sufficiently minimized or entirely removed, at any rate, so as not to have affected the continuation of the formation in some of its coal deposition, if not all of it.

Methods of Working

This basin in the coal bed worked, and particularly along the south dip, has much the shape of a canoe, while the other side, or north dip, is entirely missing.

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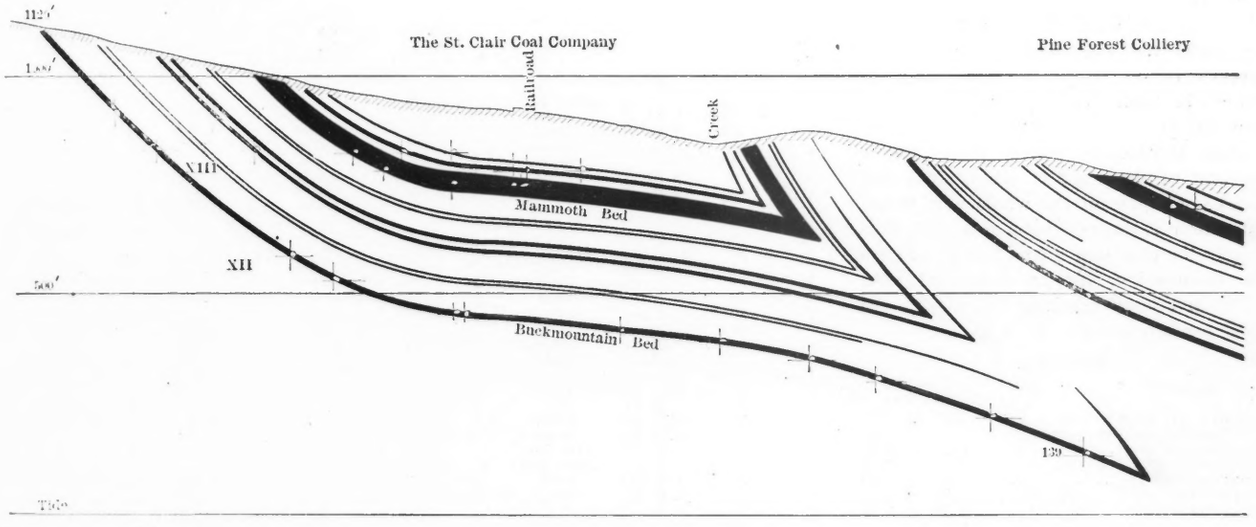
Beginning with an inclination of 25 deg., then increasing to 35, 45, 50, 60 and 75 deg., and still farther eastward to 90 deg., afterward inverting, then gradually decreasing in about the same manner, until finally a pitch of only 5 deg. is reached. Thus it will be observed that the basin becomes comparatively flat, so to speak, and presents all of the various methods that are employed for attacking the coal in the anthracite fields, consisting of slopes, shafts and drifts, and employing pitching or horizontal workings, using chute or car breasts as a means for winning the coal.

West of the Mine Hill Gap the mine workings load the coal by gravity from chute breasts on gangways. This is also the case to the eastward in the extreme upper levels, but elsewhere the coal is loaded by hand, the cars usually running into the breasts from lifts or entries opened at stated intervals as in the bituminous regions, excepting that these gangways follow a 1 per cent. contour in favor of haulage and drainage without the least regard to direction, and the breasts are driven diagonally across or square with the inclination of the seam as may best suit the purpose.

The mine workings at the Gap are operated by means of a single-track steam slope, about 1500 ft. long, having an inclination of 25 deg. across a pitch of 45 deg., and was sunk to the southeast. From the bottom of this main slope, a single-track inside slope, operated by electric hoist, nearly 1500 ft. in length, and on a pitch of about 14 deg., nearly square with the dip of the coal bed, reaches the extreme lowest limit of the Buck Mountain bed, thus making for the two slopes a combined lift of 780 ft. in vertical hight. From near the top of this underground slope, to the eastward, the formation is nearly flat, inclining 3 to 8 deg., and is worked by means of an inside plane operated by electricity.

The shaft workings, two miles east of the Mill Creek Gap, have not yet connected with the above slope workings, the coal being transported over the surface by steam locomotives on a continuous down grade of 3.2 per cent. The shaft is about 187 ft. in depth, and from near the bottom of it an inside single-track slope, 2000 ft. long, pitching about 8 deg., and in a westward direction, is operated by means of a rope hole to surface steam winding engines. From near the top of this inside slope a single-track inside plane, operated by electricity, was driven to the eastward, and about 1700 ft. long on a pitch of about 9 deg. From near this point, a water-level tunnel, 850 ft. long, was driven from both ends in order to relieve the shaft workings of all the coal above this tunnel level. From near this locality, another inside plane, single track, operated by electricity, has been driven eastward a distance of 1800 ft. on a pitch of nearly 6 deg. This plane may eventually attain a length of 3000 ft., which, with the present workings, makes a continuous system of planes and slopes of approximately 6700 feet.



SECTION, LOOKING EAST, ST. CLAIR COAL COMPANY, ST. CLAIR, PENN.

Lithology of the District

The rocks are entirely sedimentary in character and comprise arenaceous and argilaceous sandstones, with one exception, where in the Mammoth formation a trace of a calcareous deposit in the form of small shells and several concretionary masses were observed. These rocks consist of conglomerates, sandstones, shales, slates, fire-clays, and argillaceous sandstone, also as cited above, a calcareous deposit containing small shells, and many nodular concretions above the Mammoth bed, but not below it. The color varies from almost white, this with respect to the rocks, then to gray, and almost black below the Mammoth coal bed, but above this formation from light gray to almost black, buff, brown, yellow, brownish red, to nearly red and even pink.

In the very deep portions of the basin, and in the higher elevations to the eastward where the coal bed is more regular, and of greater thickness, the composition of the top is overlaid with a very hard black slate.

Higher up, where less regularity exists in the vein structure, the top is composed of an exceedingly hard, compact sandstone, which appears to show indications of metamorphism, while still higher the material forming the top of the Buck Mountain bed is very rough, coarse and uneven, and is composed mostly of conglomerate. At certain localities only, and where the sandstone and conglomerates end, and at the point where the slate formation begins, the roof material overlying the coal is found to contain many varieties of fossil remnants of ferns and plants. This feature is nowhere noticeable except at certain places where a slate top exists over the coal bed.

This is, perhaps, owing to the depths in the sea which occasioned the slate formation near the end of the deposition of this coal bed, and probably as the transporting power of the waves, currents, and wind or tides, etc., had ceased to further exert its influence in distributing portions of the ferns and plants from land areas, or low-lying shores, or a subsiding sea coast, where the waves lashed the sands as at present along our Atlantic shore line, and this probably occurred after the coal bed had been deposited from the microscopic vegetal organisms or particles which then undoubtedly grew at or near the surface of the sea, and not on its bottom.

Position of the Group

This formation lies entirely within the geologic scale, series No. XIII, as adopted for that portion of the Pennsylvanian group, and corresponds to the Al-

legheny and Kanawha formations, while that below it, the Pottsville series No. XII, 1100 ft. in thickness, containing the Lykens coal horizons, corresponds to the Pocahontas-New River formations. In this way we may correlate the Sewell and Pocahontas No. 5 coal beds of southern West Virginia, with the Lykens coal beds Nos. 2 and 3 of the Pottsville series. In like manner, the Pocahontas No. 3 or Fire Creek seam of West Virginia may be correlated with the Lykens coal bed No. 5 as developed within the Pottsville series No. XII of the southern anthracite coalfield.

Specific Gravity of Coal as a Measure of Purity

By M. S. Hachita*

The specific gravity of coal is largely influenced by the quality of the fuel and the locality in which it is found. In some instances the coal will have a specific gravity of 0.5, while in other cases, as shown in Table I, the specific gravity will amount to 1.9. It is seldom possible to obtain satisfactory results when only a portion of the seam is taken, since this does not represent the whole vein unless the latter is entirely homogeneous. It is rarely the case that a coal bed is uniform in composition, for as a general rule, slate and bony partings occur with the coal measures.

TABLE I.

Name.	Specific Gravity.
Lignite or brown coal	0.5 to 1.5
Pyropissite or wax coal	0.9
Bituminous coal	1.2 to 1.35
Semi-bituminous coal	1.3 to 1.45
Semi-anthracite	1.4 to 1.50
Anthracite	1.45 to 1.70
Meta-anthracite	1.70 to 1.90

Sampling

In the process of sedimentation, the slate or mud was mixed with coal, resulting in the formation of bone. The amount of these impurities in a coal seam differs in various parts of a section, so that in determining the specific gravity, several samples must be taken at different points in the face. In accomplishing this result, the samples should be collected wherever there are physical irregularities in the appearance of the seam; each sample representing that portion of the vein which is homogeneous. As a consequence of this condition, the thickness of those parts which are represented by the samples must enter as the weight for the calculation of the specific gravity.

If we take the "C" vein in the Table II, where the samples are numbered 1, 2, 3, etc., in the second column is found the thickness of the samples; the succeeding columns show the measured strata, the specific gravity, and the products of the specific gravity, and the thickness of the stratum. The sum of the products divided by the total thickness of the "C" seam gives the mean specific gravity of the vein, Table III.

TABLE III. MEAN SPECIFIC GRAVITY OF 12 SAMPLES.

1, C, with bone and slate	1.586
2, B, with bone and slate	1.759
3, A, with bone and slate	1.686
4, C, with bone only	1.541
5, B, with bone only	1.589
6, A, with bone only	1.686
7, C, without impurities	1.488
8, B, without impurities	1.510
9, A, without impurities	1.493
10, A, B and C, with slate and bone	1.681
11, A, B and C, with bone only	1.618
12, A, B and C, without impurities	1.495

To show the results in Table II graphically, I have plotted the specific gravity on the abscissa and the thickness on the ordinate, Fig. 1. From this diagram the extent and nature of the impurities in the different seams are readily evident.

*District engineer, Lehigh Valley Coal Company, Wilkes-Barre, Penn.

TABLE II.

Vein	No.	Thickness.	Strata.	Specific Gravity.	Specific Gravity Multiplied by Thickness.	Products Excluding Slate.	Products Excluding Slate and Bone.
	1		Sandstone.	2.829			
	2	0.2	Bone.	1.931	.3862	.3862	
	3	1.0	Coal.	1.482	1.4820	1.4820	1.4820
	4	0.4	Bone.	1.652	.6608	.6608	
	5	0.2	Slate.	2.372	.4744		
	6	0.7	Coal.	1.496	1.0472	1.0472	1.0472
	7	0.3	Bone.	1.594	.4782	.4782	
	8	0.9	Coal.	1.487	1.3383	1.3383	1.3383
	9	3.0	Slate.	2.627	5.8671	5.3927	3.8675
	10	50.0	Sandstone.	2.899			
	11	0.3	Coal.	1.542	.4626	.4626	.4626
	12	0.1	Slate.	2.454	.2454		
	13	0.3	Coal.	1.545	.4635	.4635	.4635
	14	0.5½	Slate.	2.700	1.4850		
	15	0.2½	Coal.	1.508	.3770	.3770	.3770
	16	1.1½	Bone.	1.733	1.9930	1.9930	
	17	0.9½	Coal.	1.500	1.4250	1.4250	1.4250
	18	0.2	Bone.	1.585	.3170	.3170	
	19	0.3	Coal.	1.477	.4431	.4431	.4431
	20	0.2	Slate.	2.800	7.2116	5.4812	3.1712
	21	0.2	Bone.	1.650			
	*22	2.5	Fire Clay.	2.651			
	23	3.0	Fire Clay.	2.601			
	24	0.9	Coal.	1.515	1.3625	1.3635	1.3635
	25	0.1	Bone.	1.849	.1849	.1849	
	26	0.2½	Coal.	1.500	.3750	.3750	.3750
	27	1.5½	Bone.	1.970	3.0535	3.0535	
	28	1.2	Coal.	1.481	1.7772	1.7772	1.7772
	28	0.7	Coal.	1.484	1.0388	1.0388	1.0388
	28	0.5	Coal.	1.489	.7445	.7445	.7445
	29	0.5	Bone.	2.143	1.0715	1.0715	
	30		Sandstone.	2.713	9.6089	9.6089	5.2990

*150 ft. sand stone stratum between 22 and 23.

By consulting Table II, it will be noticed that there are many varieties of bone whose specific gravities vary from 1.585 as in No. 18 to 2.143 as in No. 29. The bone of No. 18 is more highly carbonized than that of the No. 29 class, therefore we cannot consider that No. 18 and No. 29 bones are of the same quality, nor can we afford to ignore this fact.

Practical Application

To find how much of No. 18 is combustible matter and how much ash is not an easy matter unless we make a chemical analysis. But if we want to know approximately how much of this is coal and how much ash, it becomes a simple matter providing we know the mean specific gravities of the seam and the earthy portions contained. In Table II, take No. 4 for an example; its specific gravity is 1.652, while the average of No. 1 and No. 9 is 2.728. Now let X equal weight of that portion of No. 4, which is coal. Then $(1-X)$ equals the remaining portion of No. 4, which is earthy matter. The sum of the products of the weight of coal in No. 4 times its specific gravity, which is 1.488, (see Table III), and the weight of the earthy matter in No. 4 times its specific gravity, which is 2.728, gives the specific gravity of sample No. 4, that is: $1.488\ X + (1-X)\ 2.728 = 1.652$. Solving the equation for X, we have

$$X = \frac{1.076}{1.240} = 0.8677+,$$

or bone No. 4 contains 86.77 per cent. of coal and 13.23 per cent. of earthy matter. In the same way, it has been found that No. 29 contains 47.18 per cent. of coal, and 52.82 per cent. of earthy matter.

Tests with Small Sizes

From these results we can readily see that bone No. 4 is almost twice as rich in coal as the sample No. 29. In other words No. 4 is almost as good as coal. In this connection, I have made tests with small sizes of coal. A 20-lb. sample of pea, and 10-lb. sample each of buck, rice and barley, were treated; the results of calculations as above are shown in Table IV.

TABLE IV.

Sample.	Weight of Coal in Air, lb.	Weight of Coal in Water, lb.	Specific Gravity.	Earthy Matter Over Normal Per Cent. of Ash.
Pea	20	10⅛	1.539	4.11
Buck	10	3 5/16	1.509	1.69
Rice	10	3 10 1/16	1.576	7.10
Barley	10	3 9 1/16	1.562	5.97

This method of the physical analysis of small sizes of coal is valuable, as it gives quick results, and can be done anywhere with little or no expense for apparatus. The only necessary equipment consists of an ordinary spring balance, two dish pans and a tub of water large enough to hold the pan. Only a little skill is required in securing the results. A general arrangement of the apparatus is shown in Fig. 3.

The Jolly Balance

In determining the specific gravity of the samples selected, and securing the results shown in Table II, I used a Jolly's balance, as the size of the samples was small. This apparatus is not generally used in the coal fields. It consists of a mirrored meter-stick *c*, shown in Fig. 2; No. 20 double watch-glass pans *f*; tumbler *h*, and lengthening rod *a*; the meter-stick *c* is firmly fastened in the screw tripod, *eee*.

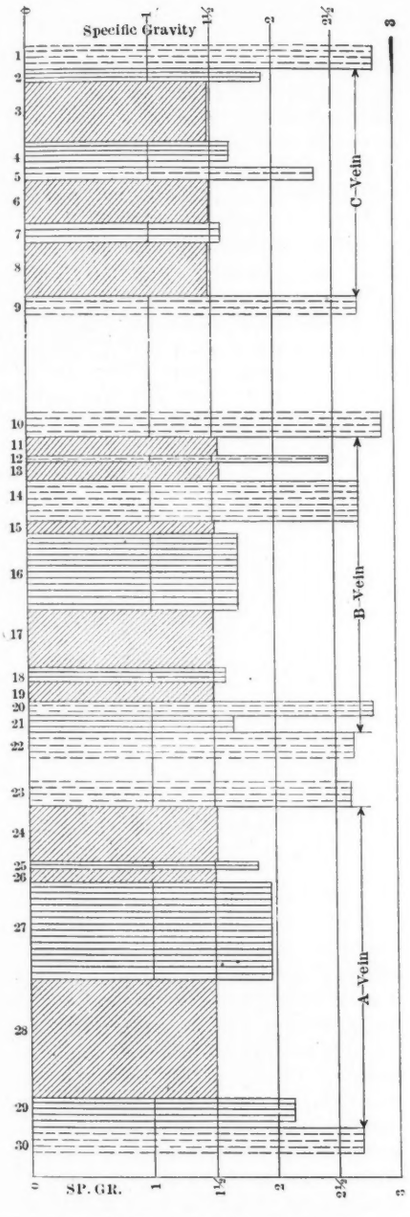


FIG. 1. GRAPHIC DIAGRAM OF RESULTS IN TABLE II

In manipulating the apparatus, it is necessary to adjust the screws *eee* so that the meter-stick *c* stands vertical; then hang the wire spring *d* so that the spring and the meter-stick are parallel. Hang the watch glasses *f*, having the lower one under the water in *h*; then unscrew *d* so that you can either raise or lower the rod *a*, until the index *b* is about 5 in. below the upper end of the meter-stick, by moving the platform *m*, which slides along *c*. Then take the initial reading at the index *d* on the meter-stick; the line of sight in reading the graduations must be normal to the meter-stick.

The initial reading equals say 27 mm. Then unscrew *d* and lower *m* about 15 in.; after this, place a sample (about the size of a bean) on *f*, the upper pan; then move *m* until the lower pan is the same depth under the water as before, then read the graduations, say 125 mm. Remove the sample from the pan, and put it in the lower pan, which is in water; then raise *m* until the lower pan is submerged to the proper depth, and read the graduations as before, say 64 mm. The specific gravity of the sample may be calculated as follows:

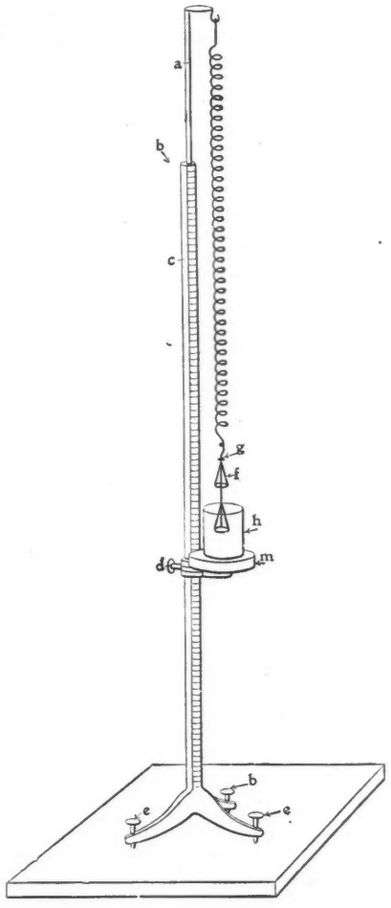


FIG. 2. THE JOLLY BALANCE

$$Sp.Gr. = \frac{weight\ of\ sample\ in\ air}{loss\ of\ weight\ in\ water}$$

$$= \frac{125 - 27}{125 - 64} = \frac{98}{61} = 1.6065.$$

In determining the specific gravity of pea, buck, rice coals, etc., the samples taken are necessarily heavy and bulky, therefore we cannot satisfactorily use a Jolly's balance for this purpose. I would suggest for heavy samples the use of a spring balance and two pans as previously described.

The principles involved in the use of this apparatus are about the same as those with the Jolly balance. The only difference is that resulting from the use of a spring balance instead of the wire spring, Fig. 2, and the reading on the balance is pounds instead of elongation. The calculation for specific gravity is identical whether we use elongation or pounds as the unit.

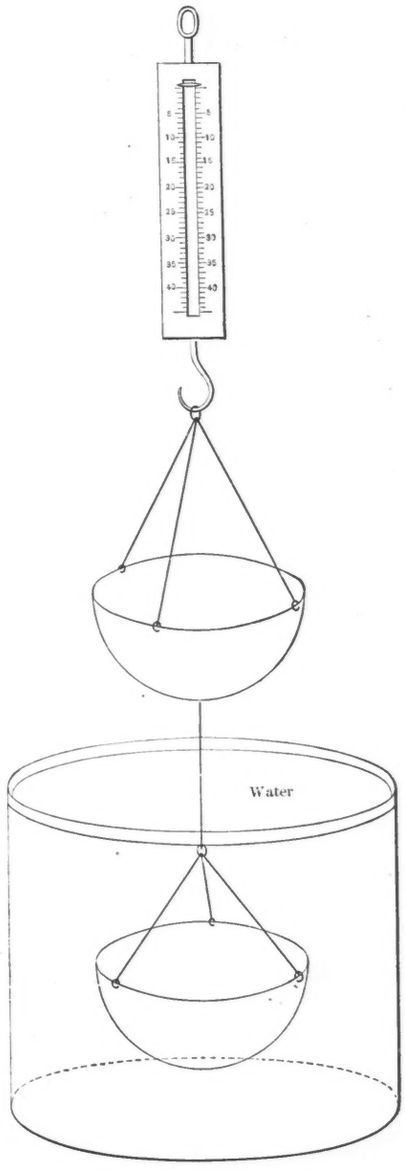


FIG. 3. ARRANGEMENT OF APPARATUS

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

The State of Arkansas produced 1,875,569 tons of coal in 1906, as compared with 1,971,144 tons in 1905.

The State of Pennsylvania has produced more than one-half the entire coal output of the United States during the past century.

The average temperature in the interior of our coal mines is about 57 deg. F., or practically the same as the average yearly temperature on the surface.

Careful observation seems to indicate that as a general rule, coal seams are thicker in the trough or depression, and thinner over the succeeding roll or hill.

One advantage that results from extracting the entire coal seam, and not generally considered, is that when the overlying strata breaks to the surface, any gases that may be contained in the measures are let out.

In rope haulage or hoisting it is always well to remember that when you double the speed you double the amount of wear on the rope; for this reason, where conditions will permit, it is better to increase the load than the speed.

In lighting coal mines it is found that 1 h.p. will produce about 180 c.p. with glow lamps and about 1000 c.p. with arc lamps. It is usual to allow ten to twelve 16-c.p. 60-watt glow lamps per i.h.p. at the engine of a generating set.

The mining laws of West Virginia, which have lately been revised, now make it unlawful for any miner, after he has exploded 50 in. or more of powder in any one or more holes, to return to his room within 20 min. with a naked lamp.

In order to prevent the dangerous practice of tamping with coal dust, the various State laws should provide that in mines where suitable material for tamping cannot easily be secured, the operators be compelled to provide clay at convenient points, for tamping shots.

At present, there are more than 50,000 mines in the United States; these mines of all kinds, use approximately $20,000,000 worth of timber each year. The timber used by the average bituminous coal mine each year costs $2170; the average expenditure for timber by each anthracite mine is $20,524.

In one of the large bituminous districts, during the past year, it is safe to say that several large companies have received a profit on their coal not exceeding 6c. per ton. Since this was a year of great general prosperity, it appears that the producing companies have not benefited in proportion to other similar industries.

Headgear pulleys should not be too heavy, or their tendency to continue revolving when the speed of the rope is being reduced will wear the rope. The usual diameter of a headgear pulley is 120 times the diameter of the rope. For underground haulage, a satisfactory figure for the minimum diameter is 50 times the diameter of the rope.

Firedamp explosions by shot firing in dangerous mines can be minimized by employing powerful detonators. The fulminating portion of the detonator should be properly inclosed, as only such caps as do not suffer leakage can be relied on. Another advantage gained by the employment of detonators is increased efficiency. It is estimated that the explosive force is increased as high as 10 per cent. by good detonation.

Wire ropes before use should be stored in a dry place, upon timbers, and oiled frequently. When not galvanized, protection should be applied in the form of a suitable grease free from ingredients which might cause corrosion. Any broken wires should be bent backward and forward until they break off at the point where they disappear into the rope; this is more satisfactory than to cut them off with a pair of pliers.

Recent experiments in England have shown that in order to lessen the smoke thrown off when domestic fires are first lighted it is only necessary to sprinkle powdered limestone from a small hand scoop on the surface of the fire. It is said that when this is done the diminution of smoke becomes instantly apparent, and in a few minutes the fire is clear and nearly smokeless, with a strong underheat. The powdered limestone can be obtained at trifling cost, and is quite clean in its application.

Approximately two-thirds of all the accidents that occur in coal mines, result from falls of roof and sides. These figures show that accidents of this sort have largely increased during the past decade. This unfortunate condition seems to be largely the result of exploding heavy charges of powder, which often fractures the sides and roof of an entry or chamber, and from the use of mining machines which prevent proper timbering at the face, because when many posts are placed, it is difficult to move the machines about.

Practical experience shows that to generate the power for lighting a mine it is always best to have a separate dynamo and to use it for the purpose of lighting only. When the current for lighting purposes must be taken from power circuits, it should be remembered that about 250 volts is practically the highest with which any incandescent lamp will work successfully, and when a higher voltage is used, the lamps must either be run two or more in series or to employ a transformer. It should be remembered that when two or more lamps are run in series they cannot be lighted separately, but must be switched on or off all together.

That a careless engineman may ruin a wire rope by jerking when slack is present is practically and carefully demonstrated by recent dynamometer tests made in England by Cradock & Co., with the following results:

	Tons	Cwt.
Cage and 4 cars weighed by machine	5	1
Cage and 4 cars lifted gently	5	3
Cage and 4 cars lifted with 3-in. slack chain	3	10
Cage and 4 cars lifted with 6-in. slack chain	10	10
Cage and 4 cars lifted with 9-in. slack chain	12	10

One way to obviate the strain when starting to hoist is to mount the pulley pedestals upon springs similar to those of railway cars. One other method is to have a sleeve link, with a pin passing through it, placed between the cage and the cap; alternate layers of india rubber and sheet iron are threaded upon the pin and kept together by a double lock nut. The disks of rubber are compressed and the strain relieved when the load is lifted.

It is sometimes the custom to begin firing shots at the head of an entry and to continue lighting the shots against the air. When such shots are tamped on the fuse, which latter is cut different lengths, it is the common method to light many shots before any one explodes. Under these conditions, the shots may explode simultaneously or in rapid succession, which causes carbon-monoxide gas to accumulate rapidly in the mines, so that should any of the shots be misplaced and result in a blow-out or windy shot, the sheet of flame that results is likely to cause an explosion. For this reason the mining laws of the State of Indiana will likely be revised so that the maximum charge of powder will be limited to 6 lb., and the number of shots to be placed at any one time in any working place will not be allowed to exceed two. It is also recommended that the shots lighted in one room be exploded before shots are lighted in the adjoining room, and that no drill bits be used exceeding 2½ in. in diameter.

Metallics

A broken pick-handle is generally due to carelessness or else to strong muscles and a weak head.

Several moils should be kept in each stope for a moil is a very handy tool. At many mines moils are made conspicuous only by their absence.

A turn-sheet is quicker than a turn-table. Turn-tables about mills and mines are generally in great need of overhauling. No good turn-table for underground work has as yet been seen by the writer.

At some mines the mouths of the chutes are made too small. It is inevitable that in breaking hard ore some of it will break in large boulders. It is far cheaper to have a good, large mouth to the chute and break the boulders in a breaker than to have a miner break them with a sledge.

A miner should have several weights of single-jack hammers to choose from. The common weight of single-jack used is from 3¾ to 4 lb., but some miners prefer a 3¼-, a few even a 4½-lb. hammer. Some prefer a small handle, others a large handle. The tool should suit the miner, not the miner the tool.

Liquid ammonia reacts violently on solid nitrogen peroxide; if ammonia gas be slowly brought into contact with the peroxide, the reaction proceeds more smoothly. Nitrogen peroxide also acts on ammonium salts, though heating to 100 deg. Centigrade in sealed tubes is then necessary to complete the reaction.

A board or any other object should never be nailed in a shaft. The nails rust away or are eaten away by the mine water and the object held by the nails drops unexpectedly and a fatal accident may result. When it is absolutely necessary to use nails in a shaft, only copper nails should be used, for copper resists mine water better than iron.

A miner doing much picking should be given two picks, one light, one heavy. Each is suited to a certain kind of work; a heavy pick to prying and similar work, a light one to picking down the roof. In soft, talcy ground a pick with a chisel point is the best, for the picking consists rather in chopping out the ground than in picking proper.

A running board should be placed between the rails on all main tracks where men are used to tram the cars. This plank should be wide enough to so nearly fill the space between the rails that it is impossible for a person's foot to become caught between the rail and the plank. It is better to prevent than to cure an accident. Many accidents have resulted from men's feet getting caught between the rails and the running board.

An engine of the best design, working with superheated steam and run well, will give only 17 per cent. thermic yield, whereas numerous tests on gas engines show that 32 per cent. indicated and 27 per cent. effective can easily be obtained. These facts, having been fully established, should lead mining engineers to consider carefully the advantages of gas engines for operating central generating stations from which power for almost all purposes could be cheaply and efficiently transmitted to all works, whether surface or underground.

The use of chlorine under moderate pressures is possible only if the gas be perfectly dry, in which condition it does not attack any of the ordinary metals. For compressing the gas satisfactory results are obtained by the use of ordinary metal reciprocating pumps with displacement plungers and oil-seals. The chlorine can be dried by means of zinc chloride. For lubricating purposes and for the oil-seals, chlorine-proof whole oil is used, which is prepared in the following manner: Good sperm-whale oil is treated with chlorine until chemical action (indicated by rise of temperature) ceases, and is then treated with zinc oxide to neutralize acidity. Of many oils tried, the treated whale oil was the only one to prove quite satisfactory.

Even in so small a matter as driving a wedge when blocking timbers, there is a right and a wrong way of doing it. This applies to sawed wedges, and not to shaved wedges such as are used in some camps where there is no saw-mill at the mine. These wedges are sawed from scrap blocks left over from framing timbers. The grain of timber is generally approximately parallel to its length; so when one of the blocks from it is sawed into wedges, one cut must cross the grain more than the other. Therefore one side of the wedge is rougher than the other. When it is desired to draw the timber while driving the wedge the rougher side of the wedge should be against the timber; when it is desired not to draw the timber, the smoother side of the wedge should be next the timber.

The ores purchased by a zinc smelter will be of various kinds. Few will correspond exactly with the ore which it is aimed to charge into the furnaces. Some will be higher in zinc; others will be lower. Some will be too high in iron, others too high in lime. The very desirable ores can perhaps be purchased only at a small margin. The deficiency must then be made up from the price of the less desirable ore. Inasmuch as the various kinds of ore may not be bought contemporaneously, the smelter effects this balancing in price by arbitrary additions to the returning charge on certain kinds of ore, according to the percentage of objectionable impurities contained. It may be necessary under certain contingencies to put a less advantageous charge into his furnaces, when the cost of smelting will be directly increased and the percentage of metal extraction decreased, by greater destruction of retorts, higher zinc tenor of the residues, or some other factors which have a powerful influence on the ledger.

The most inefficient machine used in mining is the air compressor, considered together with its pipe lines, rock drills and air-driven pumps. The system of centralization of plant has in most cases almost everything to recommend it, but in the instance of air compressing plant the advantages of this principle are considered doubtful by some good engineers. The high losses due to cooling and forcing air along miles of piping, with the attendant innumerable little leaks, leave little but a poor result to be expected, and expectation in this particular is more than realized. Decentralization in air compressing and distribution is recommended by H. S. and G. A. Denny, who prefer in all instances small unit air compressors placed as near as possible to the machines they operate, and electrically driven. By adopting this scheme, use can be made of the heat created by the act of compression, and pipe losses are reduced to a minimum. The comparative efficiencies would be, roughly, the difference between the losses in conveying air through pipes to the working place, and that in conveying current through the connecting wires to the motors.

Many men are killed in mines by falling into chutes. This is easily avoided by placing a grizzly over the chute. This not only prevents such accidents, but it also prevents the dumping into the chute of boulders too large for the chute doors or too large for the ore crushers. When these grizzlies are used chutes seldom have to be blasted, and besides they hang up less frequently. In case the placing of the grizzly at the top of the chute interferes with dumping cars into it, the grizzly can be placed in timbered stopes on the set of timbers below the level, while, if the chute is a mill-hole, stulls can be put across the hole three or four feet below the top, and the grizzly placed on top of the stulls. A grizzly can be easily made by tightly wedging into place a series of 5x10-in. timbers separated from one another by 8-, 10-, or 12-in. blocks for spacers. These wedges should never be nailed, as owing to the timber's absorbing moisture and swelling it soon becomes somewhat difficult to knock out the wedges and remove the grizzly when it is desired to do so. Nails only make it still harder. It is not a bad scheme to use such a grizzly over the chutes in stopes where the ore breaks large. It effectually prevents the rolling into the chute of "round-heads." The chute is a serious temptation to a mucker who has been "pounding his brains out" on a round-head for a quarter of an hour. The grizzly described can be quickly taken out and put in another place.

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Contents

**Illustrated.*

The Mining Industry of Mexico

The prominence of Mexico in the mining world and its importance as a field for American enterprise and investment are sufficient reason for the large share of our space which we devote this week to that country. The first mining boom to affect this continent concerned the deposits of Mexico and although mining has been carried on actively for nearly four centuries, and the production of silver exceeds that of the United States, it is believed that the development of the mineral resources of the Republic has been only begun.

The extension of railroad lines through the western part of the Republic is certain to prove a great stimulus to mining in the territory affected. The development of water power also promises to be of great benefit to the industry. Movements are on foot to supply several of the historic camps with electric current from power stations upon neighboring streams. Guanajuato is the first to secure the benefit of cheap electric power; Pachuca is now also to have current transmitted from a power station at no great distance, and a company recently formed has undertaken extensive work on the Durango river and will carry power to the city of Durango and to the mines of Sombrerete, and will have a reserve capacity for other purposes.

There is abundance of undeveloped water power along the slopes from the central plateau to the low country which borders the coasts, and the rainfall in the northern desert regions is sufficient to drive many mills if properly stored and utilized. Many of the large operations scattered throughout the Republic may and probably will be connected with sources of cheap power produced in this way.

With the substitution of cheap water power for imported fuel, the industry will be relieved of its greatest handicap. Mexico deserves all the attention which it is receiving from mining men, and will continue to be of especial interest for years to come.

Copper Placers

There is prospect of a new development in mining, which is of great interest both technically and commercially. This is the exploitation of alluvial deposits of native copper. In Alaska, at the head of White river, and at the head of Copper river, above Fairbanks, there are gravel deposits containing native copper in large nuggets, the latter comprising some huge masses. The amount of copper available in this form appears to be large, but the extent of the deposits has not yet been accurately determined. On Copper river these placers run up into the copper deposits in place. On White river, the sources of the placer copper appear to be covered by the glacial ice, and the erosion seems to be still going on from the flow of the glaciers.

It is expected that steps to work these copper placers will be taken in the near future. The working season will be rather short, but the means for working, either by dredging or by ordinary hydraulic mining, can be quickly installed, and upon the completion of the railway, which is planned to open the Copper river country, a considerable supply of copper may be quickly looked for from this source. The technical interest in the subject pertains to the fact that, so far as we are aware, these are the only copper placers of the world, and their exploitation will extend to copper a class of mining which heretofore has been practically confined to gold and tin stone.

Supervision Necessary Underground

A correspondent calls attention to the too common neglect of the underground operations of mining on the part of those in charge. Most mines, he says, are well equipped above ground and no trouble or expense is spared to secure efficiency at the surface, but underground everything is left to the foreman and the shift bosses. The result is that the work which should be performed with the greatest care is commonly carried on in an unsystematic and slipshod manner.

Underground operations require even more careful supervision than the processes which are conducted in the open in the light of day. It is no disparagement of mine foremen as a class to say that they, like all other members of the human species, are subject to the deadening effects of routine. If they are allowed to go their own way without the occasional stimulus of criticism or encouragement, in a few months or years, they naturally settle into a comfortable rut which is usu-

ally the path of least resistance and is always the deadly enemy of efficiency and progress.

Nothing that requires continued effort can be trusted to run itself, and the mine superintendent who expects to get the best results must give matters underground a fair share of his attention. Thousands of little evils which would vanish before a moment's application of common sense, accumulate and clog the wheels, if there is nobody who calls attention to them. The superintendent appreciates the need of an occasional letter of inquiry from the home office; a periodic prodding is quite as necessary and wholesome for his subordinates.

More Flotation-process Litigation

The end of litigation in the matter of the flotation process or processes is not yet. Scarcely has the legal contest between the Delprat and Potter interests come to an end before another battle of the law appears in view.

This time the contestants are to be the proprietors of the Elmore patents, including the vacuum process, and the Minerals Separation Syndicate. The Elmore company claims that the Minerals Separation Syndicate patents are infringements of its old oil flotation patent, and the rival corporation claims that the Elmore vacuum patent is a modification of its own patents.

The Minerals Separation Syndicate claims to have been the first to patent the use of small quantities of oil and acid to facilitate the flotation of sulphides by means of bubbles, and holds that the vacuum process is only a modification and subject to its original patent. The Elmore interests hold that their original oil-flotation patent covers all later modifications. The Delprat and Potter processes make no use of oil, but it seems that the holders of the Elmore patents profess to claim all flotation methods.

In the meantime the different processes are being adopted for actual service, and the rights and claims of patentees and mill-owners are becoming more and more involved. A legal tangle rarely fails to retard the development of any useful idea, and there is no reason to believe that this case will prove an exception. The process of separation by flotation early gave promise of great utility.

The "Mineral Resources"

The "Mineral Resources" of the United States, the annual statistical publication of the Geological Survey, made its appearance last week. The tardiness of this publication is due largely to the Government printing office, which is blamable for many of the faults that are charged commonly to the Geological Survey and other Government technical bureaus. Formerly this was a serious matter, especially in connection with the "Mineral Resources;" but the officials of the Geological Survey have come to a thorough appreciation of the value of timeliness in their statistical reports, which we have always urged, and have now adopted the expedient of publishing their figures, as soon as ready, first in the press bulletins and then in pamphlet form. In the latter way practically the whole of the present volume of the "Mineral Resources" received publication during 1906, a large part of it as early as midsummer. Through its press bulletins the Survey has already published the statistics of cement production for 1906. We understand that its other statistics are all well advanced and will be published at early dates. The Survey is to be complimented upon its activity in this respect, and fairness requires that it be relieved from charges of dilatoriness that is due, not to it, but to the Government printing office, over which no one but Congress has much control.

Wash-houses at Coal Mines

Among the many reformatory movements that coal-mine managers will eventually be obliged to consider is the installation of proper wash-houses and other hygienic facilities to provide for increased comfort and cleanliness among the men.

We venture the statement that less than 10 per cent. of the coal mines in this country have made provision for the miners to wash before going home, and surely those employed in this industry have a greater need for such an installation than any other class of labor.

The model wash-houses of this country, are found at the iron mines of Michigan, where in some instances each miner not only has a locker in which to hang his clothes, but shower baths with hot and cold water are provided, and other facilities for the comfort of the men. Colliery operators should pay more attention to this important matter. If they do not, there will be inevitably a demand for legislation compelling them to do so.

CONGRESS FAILED at its last session to take action on the bill introduced, under the inspiration of the President's recommendation, for withdrawing and leasing the public coal lands. Consequently, the latter, which had been withdrawn from entry by executive order, remain in statu quo under that order. However, the order has been modified and about half the area of land withdrawn from entry has been thrown open again. In the original order of withdrawal all the lands were included which were thought to be valuable for their coal resources. Since that time the Geological Survey has been engaged upon a study of the question and has determined that certain portions of the land are non-coal bearing or are of too little value as coal lands to be considered at the present time, and such areas have properly been thrown open again.

THE PRODUCTION OF aluminum in the United States in 1906 was 14,350,000 lb. It is expected that the output in 1907 will be twice as much, and that the output of 1908 will double that of 1907. Aluminum has often been spoken of as a possible competitor of copper, but up to the present time its production has been too small to make it a matter of serious consideration in that respect. However, it appears as if conditions may be different by 1908. Few realize that, outside of iron, steel and copper, perhaps no other metal has the possibilities before it that aluminum has.

THE STATISTICS OF THE Lake Superior iron ranges, which were the subject of editorial comment in the JOURNAL of March 2, p. 439, and of March 9, p. 484, were collected and prepared by the *Iron Trade Review* of Cleveland, which has performed this important service to the trade for a number of years. It was through oversight and not by intention that the statistics were not accompanied by the customary acknowledgment to the source whence they were obtained.

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

Mine Timbering

Since the invention of the square-set little progress has been made in mine timbering. Indeed, it is such an unapproachable subject at present that timbering is considered mainly a matter of judgment acquired after long experience about mines. Mining men have devoted little effort to the study of the subject.

Mr. Storms has written a pamphlet on mine timbering and frequent articles describing the routine of the timbering at different mines appear in the mining periodicals, but little has been written on the subject. I do not think one can figure on this subject as a problem in pure mathematics, but I do believe that nature has to a great extent solved this problem for us, and that, if mining men would make a systematic study of the subject and its underlying principles, data might be obtained to give some notion of the support required in underground workings.

Stopes cave until they assume a self-supporting arched or dome shape. This small local dome remains comparatively unchanged, in the writer's opinion, as long as the forces acting on the roof are those due to this stope alone. But as mining progresses, other stopes are opened up. These affect one another. One stope caves, throwing upon the roof of other stopes a sudden load, the elastic limit of the rock is passed, and with it the nature of the force changes. No longer is it the simple load of the simple stope which characterizes the scaling or caving stage, but as the loads are suddenly thrown upon the roof, the subsidence assumes a faulting nature.

This last stage is shown at Virginia City, Nevada, where the fault scrap several feet in hight caused by mining operations outlines the outcrop of the Comstock lode. The same conditions may be observed at the United Verde mine in Oregon, also to a less extent at Butte, Mont., where from time to time there is a cracking of walls in houses resting on apparently solid ground. It is this stage which is at present causing trouble at Broken Hill, in Australia, and also at a certain coal mine in New Zealand, in which mining in the part under the ocean had to be abandoned. This stage has been the subject of some study by the colliery engineers of England and France, and some data on it have been contributed to different societies.

I believe that, except in a few cases of running ground so weak that spiling is necessary, the theory of ground caving until it catches itself up is all nonsense. I have been in several caved stopes and have in all of them been able to worm my way to the top of the pile of caving, where in every case a dome-like cavity remained. I believe it is always there in the caving stage, for the following reason: In anything but running ground a large stope opening is necessary before caving begins and this opening is so large that the roof assumes a self-supporting arch shape before the caving fills the stope. Besides, the caving action is progressive, and when the caving begins to fill the stope it so supports the walls that caving ceases.

There are many circumstances affecting the shape of the dome in the same rocks such as joints, fissures, and faults, as well as local variations in the amount of silicate in the rock. As long as these variations are small their effect upon the shape of the arch will also be small. If the jointings are small in extent compared to that of the stope or opening they will cause only minor variations in the shape of the dome easily taken care of by the factor of safety used in calculations. If the fault plane is strong it becomes the ruling factor. In certain mines at Butte, Mont., the stopes cave without any warning and kill many men because the roof approaches an unsuspected fault which cuts off the ground. Many caved stopes elsewhere are due to the same cause. I am inclined to think that all caves without warning by scaling of the roof or the taking of weight by timbers are due to this cause. Some one about a mine should study the important faultings and thus prepare for unsuspected faults that cut the orebody.

The only way to test the possibilities of this theory that nature has solved the problem is by a study of the shape of the self-supporting dome whenever a stope caves. It is comparatively safe to enter after they have become fairly quiet. Then the shape of the dome, the position of the jointings, inclination of the strata or other circumstances should be noted. Many facts may be obtained by observing the shape of roofs of stopes that do not cave, but especially are these data to be obtained at mines where the caving system is in use.

It will probably be found that the crushing and transverse strengths of the rock are the main factors in determining the shape of the arch and possibly it may be well to have crushing tests made on the rock. The first thing is to find out whether there is any hope of reaching a solution of the problem.

CLAUDE T. RICE.

Bisbee, Ariz., March 1, 1907.

Draining Adjoining Mines by Means of Diamond Drill Holes

In the Oct. 13 issue of the JOURNAL H. B. C. asks how to unwater the old workings of a mine 500 ft. deep through a new shaft only 150 ft. distant. Some time ago I had occasion to drill a horizontal hole from the bottom of an 800-ft. shaft. When the hole had reached a length of 700 ft. the bit broke into a water course that produced a pressure of 210 lb., nearly equal to that produced by a 500-ft. head We drilled beyond this water course 260 feet.

The water course, or vein was full of broken quartz and sand and this stuff washed into the hole in quantities. When we were drilling there was not so much water coming out of the hole, not more than the pumps could handle, but when we were drawing rods the pumps could not keep it down, and by the time the bit was on the bottom of the hole the water would be up to the knees of the drill men. We did not dare put on a valve and shut off the water for fear of the debris from the water course filling up the hole. The hole was washed so badly at this point that it must have been as large as a drift. At any rate it allowed the rods to vibrate so much that they finally broke off, and recovering them was a pretty job.

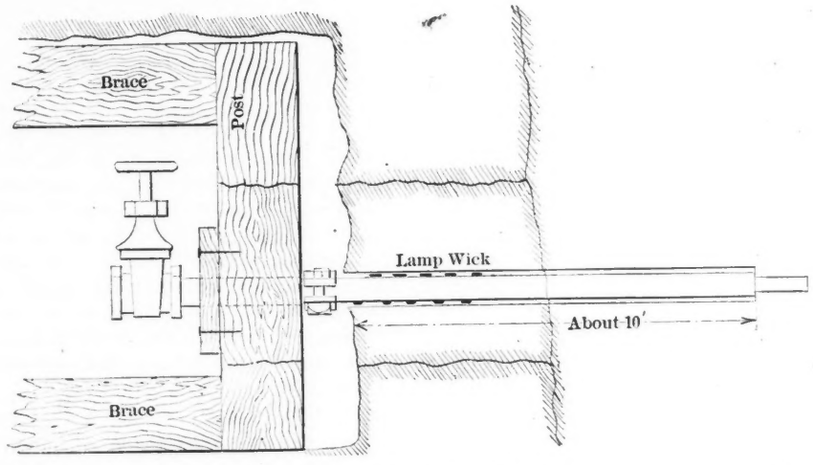
When we got through with this hole we placed a dry pine plug as near to the water course as possible, which shut off nearly all of the water; we then used the hole to pull our rods into while we were drilling another hole opposite to the first, this second hole was drilled to a length of 800 ft., so that the drill men had no need to break joints until the last 100 ft., a great saving of time.

I would advise H. B. C. if he has no diamond drill, to give a contract at so much per foot to someone who has one. The smallest size drill will do this job easily. Start the hole at a point low enough to tap the old workings at the lowest place so as to make one job of it. We will suppose that the rock between the old and new workings is reasonably solid, and will not require casing.

The next thing to be done is to place two posts—8 by 8 in. is large enough—

6 in. apart, the opening between being toward the drill hole. To these posts nail a piece of 2-in. stuff about 10 in. wide and high enough on the posts so that the center will be in line with the center of the hole, the posts must be hitched in or braced to the opposite wall.

The drill being now in position, the operator uses a 2 7/16-in. bit set with carbon, with which he drills through the 2-in. plank and beyond into the rock. Screwed to the bit is a piece of 2-in. casing, long enough to drill into the rock a foot or two before it is out of the wood, thus giving the hole a straight course. If he were to drill into the hard rock 10 ft. more, that would be still better. By this time he has selected a first-class piece of 2-in. pipe threaded on the outer end and long enough to project beyond the plank 1 in. when it is hard on the bottom; he holds the stand pipe hard on the bottom while a pair of common pipe



POSTS, PLANK AND CASING IN PLACE

clamps are placed back of the posts and on the pipe.

Before the stand pipe is placed on the bottom, say within 2 ft., candle wick, such as is used in miners' torches, should be wound around it like a spiral care being taken not to bunch it or ruffle it while it is being inserted into the hole. If this job is done neatly the drill runner will find that he will have to use a large block of wood as a battering ram to get the pipe on the bottom. While the drilling is in progress any leakage around the bottom of the pipe will soon stop by the cuttings from the bit borne in by the water and cementing the space between the pipe and the rock as far back as the wicking. The arrangement is shown in the accompanying drawing.

The operator is now ready to proceed with the drilling, which is best performed with a 1½- or a 1¾-in. bit. When the bit breaks through into the water the machine should be moved away so as to give the men room to work, for they will have a strenuous time until they get the rods out. They will most likely have to snub the cyanide process would prove superior them with a rope passed around the posts.

I have successfully solved this problem several times in the manner described, and would caution the drill man to make the hole for the stand pipe no larger than just sufficient to get it into place without injuring it. JAMES HUMES.

Basin, Mont.

Chlorination of Gold Ore

Will you inform me to what extent the process of extracting gold or copper from ore by means of chlorine gas is employed in the United States at the present time? Also, is it employed successfully or otherwise, and how does it compare in efficiency with the cyanide process? If chlorine gas could be laid down in liquid form at a mine at 5c. per lb., of which 3 lb. would treat a ton of ore, would there be a gain over the cost of chlorine gas as now produced and used for this purpose?

J. S. G.

Worcester, Mass., March 9. 1907.

A good deal of gold is produced in the United States by the chlorination process, although the process has never attained wide-spread application. It has been employed chiefly in the Black Hills, South Dakota, and on a small scale at certain gold mines in the South, for the treatment of stamp-mill sulphurets in California, and for the treatment of crude ore, especially on the Cripple Creek district, Colorado. The last has been, and is at present, by all means the most important application of the process in the United States.

In the treatment of the ore of Cripple Creek, there was for many years a strong rivalry between the chlorination process and the cyanide process, which resulted in favor of the former, and for several years the United States Reduction and Refining Company, commonly known as the "Mill Trust" has employed only the chlorination process. However, it is probable that a more modern application of to barrel chlorination, and reverse the previous result. This opinion is held by at least one excellent authority, and a new, large cyanide plant, which is shortly to go into operation, will throw some practical light on the subject.

The subject of chlorination versus cyanidation has been repeatedly discussed in the JOURNAL. We refer our correspondent especially to an article by Philip Argall in the JOURNAL, Nov. 24, 1904, page 821.

In that article, Mr. Argall states that the charge of chemicals for barrel chlorination calls for practically 5 lb. of chlorine for each ton of ore treated. He says further, "One pound of cyanide, costing 20c., will do the same work, showing quite clearly that barrel chlorination is more wasteful and extravagant; however, we have the important ratio established—1 lb. of cyanide to 5 lb. of chlorine—and hence chlorine must be produced electrolytically for 4c. per pound at the barrels to equal cyanide in cheapness, and would even then have to be used in open tanks in the form of chlorine water to approach the working cost of cyanide."

The Most Economical Degree of Concentration in Ore Dressing

Will you please give in the JOURNAL, as soon as possible, an algebraic formula or equation, which will indicate the most economical percentage of silica (or gangue) to allow to go into the concentrate in ore dressing, taking into account the loss in the tailings caused by cutting out silica from the concentrate, and also the freight on the silica to the smelter and the cost of smelting, etc. There is probably some general expression which will meet this case. (Signed) B. W. C.

Monterey, Mexico, March 13, 1907.

There is no formula covering the above case, and it would be impossible to deduce one, because the conditions vary with almost every ore. With some ores it is possible to carry the concentration up to nearly pure mineral with a comparatively small loss; in other cases, the elimination of the last portion of the gangue would lead to a large loss. Obviously, the result would be affected very much by the physical character of the ore; whether coarsely crystalline, or finely crystalline; whether the mineral be tough or brittle, etc.

An important factor in increasing the wear of wire-hoisting rope is what is known as lash. This may be caused by the fact that the shaft is not exactly vertical; it may also be due to the striking of the rope upon timbers or to a jerky handling of the cages by the hoisting engineer

New Publications

PROBLEMS OF THE PANAMA CANAL. By Brig.-Gen. Henry L. Abbot. Pp. 269, illustrated. 6x8½ in.; cloth, $2. New York, 1907: The Macmillan Company.

MODERN AMERICAN LATHE PRACTICE. By Oscar E. Perrigo. Pp. 424; illustrated. 6x9 in.; cloth, $2.50. New York, 1907: Norman W. Henley Publishing Company.

PRINCIPLES OF COPPER SMELTING. By Edward Dyer Peters. Pp. 612; illustrated, 6x9 in.; cloth, $5. New York, 1907; Hill Publishing Company.

This work, which has just appeared, will be reviewed at length in a later issue of the JOURNAL.

LONG DISTANCE ELECTRIC POWER TRANSMISSION, BEING A TREATISE ON THE HYDRO-ELECTRIC GENERATION OF ENERGY; ITS TRANSFORMATION, TRANSMISSION AND DISTRIBUTION. By Rollin W. Hutchinson, Jr. Pp. 345; illustrated. 5x7½ in.; cloth, $3. New York, 1907: D. Van Nostrand Company.

Contents: Laws of Hydraulics. Applied hydraulics. Hydraulic machines and accessory apparatus. Generators, switches and protective devices. Laws governing transmission of energy. The transmission line. Transformers. Motors. Converters. Practical plants. Distinctive features of prominent long distance transmissions.

NEW JERSEY. ANNUAL REPORT OF THE STATE GEOLOGIST FOR THE YEAR 1905. H. B. Kümmel, State Geologist. Pp. 338; illustrated. 6x9 in.; board covers Trenton, 1906: State Printers.

Contents: Administrative report. Part I—Changes Along the New Jersey Coast, by Lewis M. Haupt. Part II—A Brief Sketch of Fossil Plants and the Flora of the Cliffwood Clays, by Edward W. Berry. Part III—The Chemical Composition of the White Crystalline Limestones of Sussex and Warren Counties, by H. B. Kümmel, with Analyses by R. B. Gage. Part IV—Lake Passaic Considered as a Storage Reservoir, by C. C. Vermeule. Part V—A Report on the Peat Deposits of Northern New Jersey. Part VI—The Mining Industry, by H. B. Kümmel. List of publications.

CANADIAN MINING JOURNAL. Vol. I, No. 1, Illustrated; paper, 9x12 in. $2 per year. Published fortnightly by Mines Publishing Company, Ltd., Montreal and Toronto, Canada. J. C. Murray and H. Mortimer-Lambe, Editors.

This publication, with which is incorporated the *Canadian Mining Review*, purchased from the estate of B. T. A. Bell, made its initial appearance March 15, 1907. Mining news, under special correspondence, is confined to the Dominion of Canada, to the mineral industry of which the new magazine is to be chiefly devoted. One of the features of the first number is an interesting cover design which shows a specimen of ore from the Cobalt district, Ontario, and reproduces, in natural colors, cobalt and nickel "bloom," and the mixture of the two, smaltite and native silver.

FIFTEENTH ANNIVERSARY OF THE INTERNATIONAL CORRESPONDENCE SCHOOLS, 1891-1906. Pp. 155; illustrated. 7x10½ in.; paper. Scranton, 1907: International Correspondence Schools.

The anniversary exercises described in this volume were attended by a large number of prominent engineers, educators, manufacturers and professional men. The object of the exercises was not only to mark the fifteenth anniversary of the International Correspondence Schools, but also to furnish an opportunity to explain to the guests the methods of correspondence instruction. Many of those invited could not attend, and it was chiefly to give them the benefit of the information brought out during the proceedings that the souvenir volume was issued. It contains the addresses delivered during the exercises and the portraits of many of those in attendance.

MODERN STEAM ENGINEERING IN THEORY AND PRACTICE. By Gardner D. Hiscox, with Chapters on "Electrical Engineering," by Newton Harrison. Pp. 487; illustrated. 6x9 in.; cloth, $3. New York, 1907: Norman W. Henley Publishing Company.

Contents: Historical Steam and its properties. Generation of steam. Types of boilers. Boiler-chimney and its work. Heat-economy of the feed-water. Injector and steam-pump. Incrustation in boilers and its remedy. Steam above atmospheric pressure. Flow of steam through orifices, nozzles and pipes. Superheated steam and its work. Adiabatic expansion of steam. Indicator and its work. Steam-engine proportions. Slide valve and valve gear. Corliss engine. Compound engines. Triple and Quadruple expansion engines. The steam turbine. Mechanical refrigeration engineering. The elevator and its working. Cost of power. The engineer and his duties. "Electrical Engineering." The dynamo and its regulation. Testing and motors. The switchboard and storage batteries. Lighting and lamps.

REPORT OF THE BUREAU OF MINES OF ONTARIO. PART I, 1906. T. W. Gibson, Deputy Minister of Mines. Pp. 218; illustrated. 6x9 in.; paper. Toronto, Ont.; Public Printers.

This publication covering the operations of 1905, while a valuable record of a year of remarkable progress in the mining industry of Ontario, has been anticipated, so far as its very comprehensive statistical features are concerned, by the publication of more recent figures. It may, however, be noted in passing, as an evidence of the rapid growth of the mining interests of the province, that the total production of 1905, then a record figure, was $17,809,226; an increase of 54 per cent. over the preceding year, while the output for 1906 rose to $22,221,808, an increase of about 25 per cent. A detailed statistical review gives a series of tables showing the progress made during recent years in the various branches. A report by Mining Inspector E. T. Corkill, deals with the condition and operations for the year of all the working mines in Ontario. In addition the volume as usual embraces several scientific papers of practical interest.

EINFUHRUNG IN DIE METALLOGRAPHIE. Paul Goerens, Dept. Ing. Assistent am eisenhütten männischen Institut der Kgl. Techn. Hochschule Aachen. Pp. 185; illustrated. 6½x9½ in.; paper, 10 marks. Halle a. S., 1906, Wilhelm Knapp.

This introduction to metallography of 185 pages is divided into four main sections. The first deals with the physical properties of matter and takes up allotropy and cooling curves, embracing the measurement and recording of temperature, which is set forth in a clear and concise manner. The second section deals with the physical chemistry of solutions, fused salts and alloys. Starting out with the salt-ice freezing point curves and the water-iron chloride series, we are shown the different systems into which cooling and freezing-point curves can be grouped. The phase rule and critical curves are brought in. Binary alloys are next taken up in detail under the two headings: (a) No chemical compound is formed, i.e., the alloys form, a series of solid solutions or eutectiferous series; (b) chemical compounds are formed.

This section is specially valuable for it brings together from widely different sources a vast number of freezing-point and equilibrium curves of the various binary alloys and explains their constitution.

The third section deals with the practical metallographic microscopy, polishing development of structure, the Martens stand (made by Carl Zeiss), the La Chatelier microscope, photography, all of which have been given many times before and to our mind in a much better way.

The fourth section on the metallography of iron and its alloys is a short and clear exposition of the constitution of iron-carbon series of alloys, and is illustrated by a number of splendid photomicrographs showing the various constituents.

Taken as a whole, the book will prove a valuable addition to literature both in the works and the laboratory, for we are now waking up to the fact that the old rule-of-thumb days are past, and that scientific research must in future be our guide, that we must get down to the constitution of alloys to understand their properites.

Personal

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

Wilbur E. Sanders, of Butte, Mont., is visiting in New York.

John R. Stanton, of New York, has gone to the Lake Superior country, where he will remain for several weeks.

A. J. Huneke has returned to Butte, Mont., from Cuba, where he spent some time inspecting a copper property.

Harold C. E. Spence, of Steeple Rock, N. M., has arrived in New York from Europe, where he has been traveling for the past year, accompanied by his wife.

H. H. Taft, a mining engineer of Denver, Colo., is directing diamond drill operations on the property of the Butte & Summit Valley Company, in Butte, Montana.

John M. Cameron, formerly of the Lake country and Arizona, has taken the management of the property of the Butte Central & Boston Copper Company, in Butte, Montana.

F. N. Flynn, superintendent of the White Knob smelter, at Mackay, Idaho, has resigned that position, to accept the management of La Rose mine, at Cobalt, Ont., to date from April 1.

W. R. Bauder, of Ishpeming, Mich., has been appointed chief engineer for a group of mines on the Mesabi range, operated by Pickands, Mather & Co. His headquarters will be at McKinley, Minnesota.

Capt. James Chynoweth resigned as superintendent of the Centennial and Allouez mines, in the Lake Superior copper district, on April 1, and leaves for Globe, Ariz., to give his personal attention to work on the Superior & Boston property, of which he is president. His retirement is greatly regretted.

John F. Munn, who has for several years been associated with the Davis-Calyx Drill Company, also with the Cincinnati Core Drilling Company, is now connected with the Cyclone Drill Company, of Orrville, Ohio. Mr. Munn has had a large experience with core drills in various parts of the country.

Jesse F. Wellborn has been chosen by the board of directors of the Colorado Fuel and Iron Company, to succeed the late Frank J. Hearne, as president of the company. Mr. Wellborn entered the service of the company as a clerk 17 years ago, and at the time of President Hearne's death was vice-president and sales and traffic manager.

Peter Henraty, president of District 21, United Mine Workers of America, embracing Arkansas, Missouri, Kansas, Texas, and Indian Territory, who was a delegate to the constitutional convention for the new State of Oklahoma, has announced his candidacy for the office of State mine inspector of the new State, subject to the Democratic primaries. Under the constitution as framed, this office is elective.

Obituary

A telegram from El Paso, Tex., reports that Benjamin Sadtler died suddenly in that city, March 29, while on his way to Denver from Sonora, Mexico, where he had been engaged in professional work. He was at one time a professor in the Colorado State School of Mines, and for years past had held high rank as a metallurgist, making a specialty of the treatment of zinc ores.

John Chiatovich, one of the oldest mining pioneers in the Tonopah field, died at his home in the Silver Peak camp, Nevada, on March 11, aged 66 years. The deceased had resided in southwestern Nevada for nearly forty years, and was the discoverer of some of the best mines in the Silver Peak district. By means of a small mill, erected at the Peak thirty years ago, he extracted a comfortable fortune from the high-grade gold ore which the mine produced. Four months ago he disposed of his principal interests for $40,000, and was just beginning to enjoy the fruits of his labors. He was highly respected by all who knew him. He leaves a wife and five children to mourn his death.

Societies and Technical Schools

Case School of Applied Science—The new catalog of this institution at Cleveland, O., has been published. It contains full information about the various departments and courses of study; also a list of the alumni.

Industrial

Owing to the rapid growth of its business, the Traylor Engineering Company has found it necessary to increase again its offices and engineering quarters, and, to that end, has secured the twenty-third floor of the new United States Express Building, corner of Rector and Trinity place, New York. The new suite consists of 14 separate offices, in addition to a large drafting and engineering department. The company will be in the new quarters about April 10. The phenomenal growth has made it also necessary to enlarge the official force, and the several departments are now in charge of the following gentlemen: President, Samuel W. Traylor; vice-president, Bruce W. Traylor; assistant treasurer, Frank W. Hopkins; general sales manager, Theron H. Tracy; assistant sales manager, William J. Roberts; general superintendent, Edwin J. Smith; chief engineer cement, stone, coal crushing and briquetting machinery department, George J. Mashek; chief engineer metallurgical department, P. E. Van Saun. In addition to the above officers and officials of the company, its field men, acting as superintendents of metallurgical plants, are: Smith McKay, H. A. Hillman, Charles Fryberger, H. A. Mackey, Carl Roberts, Mitchell Roberts, J. T. Colthart and M. D. Hayes. Recent additions to the factory capacity at Allentown, Penn., are: A new boiler and smelting equipment shop, power plant, pattern storage building, factory and machine shop addition, and 1500 ft. of extra track facilities. Recent orders now under course of construction are a 200-ton concentrating plant for the Central Mines Development Company, near Butte, Mont.; 600-ton electro-magnetic separating plant for the Salisbury Steel and Iron Company, Dolgeville, N. Y.; 80-ton stamp and cyanide plant for California; 100-ton concentrating plant for the Cobalt Central Mines Company, of Ontario.

Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

Scully Steel and Iron Company, Chicago, Ill. Stock List. Pp. 144, illustrated, indexed, paper, 4½x7 in. March and April, 1907.

The Denver Fire Clay Company, Denver, Colo. Bulletin No. 24. Clay Crucibles, Scorifiers, Muffles, etc. Pp. 4, illustrated; paper, 3x6 in.

The Anaconda Copper Mining Company (foundry department), Anaconda, Mont., is revising and bringing its machinery catalog files up to date, and would be glad to receive catalogs from manufacturers of machinery, tools and power equipments of all kinds.

Construction News

Angels, California—The Lightner Mining Company will add 20 stamps to its mill. Alexander Chambers, Angels, Calaveras county, Cal., is superintendent.

Williamsburg, Kentucky—The Mt. Morgan Coal Company is preparing to open coal mines near Williamsburg and will need machinery. M. H. Murray, Williamsburg, Ky., is general manager.

Dry Branch, Georgia—The Atlanta Mining and Clay Company is preparing to make large additions to its plant, including a washer and other machinery. Y. A. Gresham, Atlanta, Ga., is general manager.

Bingham, Utah—The Bingham Argentine Copper Company has begun to develop a mine, and will need hoists, drills, etc. A. T. Wright, Ogden, Utah, is president; William Iglehart, Salt Lake City, secretary.

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

March 28—The rainstorms throughout California have been exceptionally heavy and have resulted in floods in the mountain counties and along the base of the foothill region. A great deal of damage has been done in various towns, notably at Stockton and Oroville. At the latter place two dredges owned by the Indiana Gold Dredging Company have been swept away, a loss of $90,000. Several buildings of the Ashburton Dredging Company, near Folsom, were destroyed, and the men deserted the dredge, but it still remains secure. The famous Bowman dam in Nevada county, one of the reservoirs of the North Bloomfield Mining Company, is reported to have collapsed. Power plants of the big electric power companies and of various mining companies have been put out of business for a time. One of the worst disasters reported is the destruction of the Government débris dam at Daguerre Point on the Yuba river. The dam is known as barrier No. 1 of which a series were to be built to control the hydraulic-mining débris in the upper river. It was filled level to its crest with gravel and sand amounting to several million cubic yards. The dam was built of piles and concrete, and was a mile long and 16 ft. high. It was supposed that the gravel impounded would always remain there, but now doubtless much of it will find its way to the lower river. Hydraulic miners were not allowed to dump débris behind this dam, which was intended only to check the débris already in the river. Thus far a part only of the dam has gone out, but the rest is expected to follow. The warm rains melted some 8 ft. of snow in the mountains.

The Cherokee Diamond Mining Company of America is incorporated in Reno, Nevada, to hunt for diamonds in the old hydraulic mine in Butte county, California, formerly operated by the Cherokee Hydraulic Mining Company. "Tex" Rickard, the Goldfield, Nev., promoter, obtained 2000 acres of this ground after visiting the Cooney diamond prospect near Oroville. Several small diamonds were found years ago in the hydraulic washing of the Cherokee company, but no systematic search was ever made.

Salt Lake City

March 28—The Utah legislature, during its late session, passed a bill appropriating $2000 for a mining exhibit at the Jamestown exposition. It is said the Guggenheim Exploration Company, has been seeking an option on the property of the Lead King Mining Company, located in the Duck Creek, Nevada, district.

Amended articles of incorporation of the Eureka-Swansea Mining Company, have been filed. The capital stock has been increased from 50,000 to 100,000 shares, and Provo, Utah, has been selected as headquarters. Jesse Knight is president of the corporation.

The Ohio Copper Company has a large force of men engaged in putting in the foundations for its mill in the lower part of Bingham. It is estimated that the total cost of the plant will be around $250,000.

Articles of incorporation of the Seminole Mining Company have been filed. The corporation owns property in the Deep Creek mining district, in western Utah, and the officers are: Clyde H. Wilson, president; William F. Wilson, vice-president; Frank L. Wilson, secretary and treasurer, with headquarters in Salt Lake City.

Much interest is being aroused again in the Stateline mining district in Iron county, and the camp is taking on some of its old-time activity. The Johnny and Ophir mines are to be operated again.

The ore and bullion settlements reported last week by Salt Lake banks, reached a total of $602,000.

Denver

March 29—Success has crowned the efforts of the Vindicator and Findley companies of Cripple Creek, to extract the values of their low-grade ores at their test plant in the Lillie shaft-house and the statement is made that after a plant of 200 tons daily capacity is completed, for which plans are being prepared, even $3.50 ore will be located at a profit. The experiments have been conducted by H. A. Shipman.

Organization papers have been filed by the Cañon City Mica Mills and Mining Company, capitalized for $50,000. The company expects to build a mill at Cañon City for the treatment of this product, the first of the kind in Colorado.

Advices from Guadalajara, Mexico, indicate the consolidation of the Cabrera and American mines in the Hostotipaquillo district and the Virginia & Mexico Mine and Smelter corporation will take these properties and construct reduction works of 200 tons daily capacity. The management will be in the hands of Jesse Scobey, mining engineer, of Denver, who has effected the consolidation.

Scranton

April 2—Commissioner C. P. Neill has notified the Conciliation Board that he has resigned his position as umpire. The board expressed its regrets, and will ask Judge Gray to appoint a successor. Before resigning Mr. Neill, who has been appointed by President Roosevelt to study the emigration problem in Europe, handed down four important decisions in cases which have been referred to him.

The most important was that dealing with the "bony" question from Plymouth, which has attracted the attention of the board and the umpire for the past two years. It was alleged that the contract provided that if there were coal underlying the bone a sufficient thickness to justify its being separated and loaded, then the miner was not entitled to yardage, but where the coal underlying the slate or bone was not of sufficient thickness to warrant its being separated and loaded into the car, the miner is to be paid the established rate of 55c., regardless of the thickness of the bone. This was the final award of the umpire, who also provides that the company is to have the right to order that the bone and coal shall be loaded into the car and sent to the surface as coal.

London

A fortnight ago, I mentioned that the ill-fated Avino Mines of Mexico was to be reconstructed so as to provide an assessment that would realize £60,000. These funds are required to carry out Mr. Nichols's development work and to provide further plant. The proposition, when it was put to the meeting of shareholders this week, met with considerable opposition, and the directors were forced to withdraw the scheme for further consideration. The dissentient shareholders voiced a grievance which is one of long standing —that the information, both financial and technical, is very incomplete. Before going further they wish that another examination of the mine should be made, for there is a general spirit of distrust of all the reports that have ever been made on the mine. Hitherto, the engineers and metallurgists responsible for the doings at Avino have been Americans. The proposition is that an Englishman should be sent over to inspect, and I do not see that the directors could do better than send over their recently appointed colleague, Edward Hooper, to restore confidence in the board and the mine.

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

YAVAPAI COUNTY

Congress Consolidated—This company, which has been one of the largest gold producers in the territory, is again producing bullion; 20 stamps are now running steadily and it is reported that 20 more will be dropping in a short time.

Golden Idol—This company is installing tanks for a cyanide plant at its property in the Cherry Creek district, 25 miles east of Prescott. A large amount of ore is on the dump awaiting the completion of the mill.

Marcus—This property, 10 miles east of Congress, is being worked by leasers, who report a strike of rich gold ore.

Mount Tritle Copper Company—This company is now shipping ore from its mines, 10 miles south of Prescott, to the Humboldt smelter. The ore shipped is high-grade copper ore carrying some values in gold and silver.

United Arizona Copper Company—This company, a Kansas City corporation, has bought the Mahoney copper claims, situated in the Black Rock Mining district. and will begin development. This property has over 1000 ft. of development work, all of which shows an ore carrying copper, gold and silver values, copper predominating. The surface croppings extend for a distance of 3000 ft., and are from 5 to 50 ft. wide. The company will proceed with the sinking of a two-compartment shaft, and will go to a depth of 500 ft. before any crosscutting or drifting is done.

California

EL DORADO COUNTY

River Hill—At this mine, Placerville, Thomas Clark, manager, the shaft has now reached a depth of 1500 ft. At the 700 level it connects with the 2300-ft. tunnel, which drains the upper levels. The mine is equipped with a 20-stamp mill. The shaft is the deepest in the Mother Lode, in El Dorado county.

INYO COUNTY

Copper—H. G. McMahon, of Rhyolite, and George A. Webster, of San Francisco, have acquired a half interest in the McMahon copper claims in Greenwater district.

Southern Belle—This property is the first one of the county gold mines to be listed on the San Francisco Stock Exchange. The mine has a 10-stamp mill, electric hoists, air-compressor and a generally good equipment.

KERN COUNTY

Gold Peak—Superintendent Black states that the reported sale of this mine to the Guggenheims is incorrect.

Discovery—E. W. Hamilton, of Willow Springs, has found a large body of gold-bearing ore on the edge of the Mohave desert, nine miles from the springs.

SIERRA COUNTY

Primrose—Arrangements are being made for resumption of work on this mine at Hog cañon, near Downieville. The 10-stamp mill will be repaired.

TUOLUMNE COUNTY

Red Gravel—In this claim, above Columbia, the Yankee Hill Mining Company, while hydraulicking, has uncovered a strong vein of auriferous quartz.

App—The specimen rock discovered in this mine at Quartz Mountain, was taken from the 18-in. hanging-wall vein, at the 1100 level. W. A. Nevills is the owner of the mine, and H. M. Pease, the superintendent.

El Oro—A strike of rich ore has been made near the surface of this mine at Tuolumne. The ledge is narrow, and is owned by Paul F. Greene.

Colorado

LAKE COUNTY—LEADVILLE

Bartlett Tunnel—A few years ago this tunnel, in the Sugar Loaf district was driven into the mountain 1200 ft. and cut the Bartlett vein, from which some excellent ore was taken. A new company, with Fred Berger, of Colorado Springs, at the head, has taken hold of the Bartlett and will drive the tunnel another 1000 ft. into the mountain to cut other veins. Machinery is now arriving on the ground and buildings are being erected.

Leadville District Mining and Milling Company—This company, composed of Georgetown capitalists, is erecting a mill east of the Arkansas Valley smelter for the purpose of treating the dump of the Ibex mine. The main building will be 48x120 ft. The system to be adopted is a light concentration, by reducing three tons of dump material to two tons of concentrates; after the ore is crushed it will pass through rolls, thence to jigs; the slimes will be handled by a Card table. The new plant will be operated by electricity. In the past few months the company has done considerable work prospecting the dumps, driving tunnels and upraises and the results were satisfactory. In addition to this several carloads were sent to mills at Denver as tests. It is estimated that the dumps of the Ibex contain over a million tons and the bulk of them will be treated at the mill. The work is under the immediate supervision of Frank H. Graham, who states that the mill will be running in May.

St. Kevin District—Phil Baker and George Baker are working the Amity and shipping high-grade sulphurets. Redmond Cody, on the Griffith, is doing considerable work to connect with a large body of zinc, which can now be worked to a profit. Nat McCoy, on the Wilkesbarre, is taking out a good grade of ore.

Tuscon—The work to date on the orebody proves it to be 160 ft. wide and 15 ft. thick, with the length still unsettled. The ore is an intimate mixture of lead and zinc sulphides running from 8 to 12 lead and from 25 to 30 per cent. zinc. The ore shipped at present from the mine, about 50 tons daily, comes from development work in drifting and upraising, no stoping is being done. The shaft is 971 ft. deep and development work is being carried on from the 950-ft. level.

Indian Territory

CHOCTAW NATION

Hailey-Ola Coal Company—On Wednesday evening, March 20, while the shots were being fired in this company's mine No. 4, near Wilburton, a strong gas-feeder was shot into and fired. The fire gained headway so rapidly as to get beyond control, anl the mine was flooded and sealed. Early Friday morning the same company's machine shop at Haileyville burned to the ground.

Kentucky

LETCHER COUNTY

Letcher Coke and Railroad Company—This company has been organized to develop a tract of 16,000 acres of land. Several mines are to be opened, 500 coke ovens built, and 16 miles of railroad constructed. J. J. Phillips and James Dunn, Jr., of Cleveland, Ohio, are the organizers of the company.

Missouri

MADISON COUNTY

North American Lead Company—In our issue of March 16, page 544, it was stated

that this company's new smelter at Fredericktown was turning out blister copper containing 4 to 6 per cent. of nickel and cobalt. We are informed that the proportion is not correct. The average ore runs about 6 per cent. copper and 3 per cent. cobalt and nickel.

Montana

BUTTE DISTRICT

None of the Amalgamated subsidiary companies resume development work until the question of wages for miners and surface men is finally determined. Committees of the union have accepted the offer, which is $4 a day of 8 hours for miners while copper is 20c. per lb. or more, $3.75 while the price is between 20 and 18c., and $3.50 below 18c. On March 26 the men voted, by a large majority, to accept this offer, which ends the trouble for the present.

Butte Coalition—The Minnie Healey, Cora and Rarus mines, of this company, are yielding about 1000 tons of ore a day, mining in the two former having been resumed on a more extensive scale than formerly during the last few weeks. Two or three bodies of good ore have been opened in the lower levels of the Minnie Healey recently, and are yielding an average of 350 tons a day.

North Butte—The company is gradually increasing its production, but has almost reached the limit under present conditions, between 1300 and 1400 tons a day. The vein of the Edith May, which is one of the good producers at the 1600, is developing into a bonanza at the 1800. No attempt has been made to make this level yield largely, for it is the desire of the company to install modern conveniences for extraction and raising before mining the ore on a large scale.

Nevada

EUREKA COUNTY

Richmond-Eureka—The railroads are doing a little better as regards the amount of ore they are handling for this company, but are not yet up to the mark by any means.

NYE COUNTY-BULLFROG

Tramps Consolidated—The Denver ledge has been cut in the winze below the fourth level. The vein was found to be faulted to the east about 10 ft. About 10 ft. of ore has been penetrated and the average value of the vein material is good. The management has resolved to sink the shaft another 100 ft. in order to open out and develop this portion of the lode. Crosscutting east and west has been started from the end of the main south drift. This drift is out 400 ft. from the cross-cut tunnel and is in ore of milling grade all the way.

Frances—The shaft has reached a depth of 45 ft. and is in ore all the way. The average value for the whole width of the shaft is $28. Some samples consisting of a mixture of talc and granulated quartz, recently taken from the east side of the shaft, assayed $82 per ton. The vein appears to be of great width. It is proposed to continue the shaft to the 100-ft. level before starting crosscuts and drifts, to develop the vein.

New Jersey

WARREN COUNTY

A new cement company has taken an option on 623 acres of land between Hainesburg and Columbia, containing a large deposit of cement material, and well situated for railroad connections.

Cook Iron Mine—The Franklin Iron Company has taken a lease of this mine, near the Kishpaugh mine. The shaft will be unwatered and new hoisting machinery placed.

Pennsylvania

ANTHRACITE COAL

Philadelphia & Reading Coal and Iron Company—This company's statement for February and the eight months of its fiscal year from July 1 to Feb. 28 is as follows:

	February.	Eight Mos.
Earnings	$3,519,341	$25,326,849
Expenses	3,320,532	23,920,804
Net earnings	$ 198,809	$ 1,406,045

For the eight months there was an increase of $1,465,606 in earnings; an increase of $1,673,459 in expenses; and a consequent decrease of $207,853 in net earnings.

COKE

H. C. Frick Coke Company—This company has concluded the purchase of new electrical equipment for four of its different coal-mining operations in the Connellsville district. These equipments, which comprise main and sub-station apparatus, are intended for use in the operation of coal-mining machinery. They include rotary converters, transformers, engine-type generators and switchboard apparatus, all of Allis-Chalmers design. At Collier, in Fayette county, a sub-station will be installed with apparatus consisting of a 200-kw. Allis-Chalmers rotary converter, three 75-kw. oil-filled self-cooled transformers and switchboard. At York Run, in the main power station, additional switchboard equipment will be installed. At Dearth two 200-kw. Allis-Chalmers engine-type generators will be added to the present equipment of the power plant. At Ronco two more 200-kw. Allis-Chalmers engine-type generators, with suitable switchboard, will be added. The main station at Phillips, Penn., will be supplied with two 100-kw. Allis-Chalmers engine-type generators and switchboard.

South Dakota

LAWRENCE COUNTY

Homestake—Grading is well under way for the new pattern shop to be erected. Extra crushers will be put in at the Ellison hoist and the ore crushed to a greater fineness, and coarser screens used in the stamp batteries. This will be sufficient for the amalgamating process. For the tailings which go to the cyanide plants, a pulverizing plant will be added just below the Ellison.

Siegler Ground—A blanket of ore was discovered on this ground adjoining the Eleventh Hour. The face of the ore is 30 ft. thick and it will average better than $5 a ton. The Eleventh Hour will begin prospecting at once to catch this shoot.

Utah

IRON COUNTY

Big Fourteen—The owners of this property, at Stateline, have encountered some rich ore on the Sunflower claim. There are 8 in. of high-grade ore, while 3 ft. of the vein runs very well.

Ophir—This property is to become active again and a force of about 20 men will be put to work April 15. The property was equipped with a mill several years ago, but with equipment not suitable for the economic treatment of the ore.

Washington

WHITMAN COUNTY

Mizpah Copper—At this mine, in Hoodoo district, the manager reports that a crosscut has penetrated the vein 33 ft., at a depth of 50 ft. and over, but has not reached the hanging wall. The company has let a contract for a tunnel to be driven 500 ft. The ore shows well in copper.

Canada

ONTARIO—COBALT DISTRICT

Shipments of Cobalt ore over the Timiskaming & Northern Ontario Railway for the week ending March 23, were: O'Brien mine, 128,570 lb.; Buffalo, 40,000; Trethewey, 200; total, 168,770 lb. The small shipment of the Trethewey was made to the German-Canadian Smelting and Refining Company, Toronto, for experimental purposes.

South America

BRITISH GUIANA

Exports of gold from the colony for the two months ended Feb. 28, were $228,358 in 1906, and $176,069 in 1907; a decrease of $52,289. Exports of diamonds this year were 541 carats, valued at $3985.

Metal, Mineral, Coal and Stock Markets

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

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, April 3—In the West the approach of spring, open weather and an improvement in the railroad situation, have combined to relieve the trade. At the same time, operators are beginning to prepare for the opening of the Lake trade. There is still some friction over railroad rates, though the Indiana trouble has been settled.

In the East there has been nothing to interfere with the regular course of spring trade. Coal is moving freely and the trade is quiet, though a fair volume of business is reported.

Coal-traffic Notes

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to March 23 were as follows, in short tons:

	1906.	1907.	Changes.
Anthracite	1,188,924	1,188,087 D.	837
Bituminous	8,586,283	8,353,763 D.	232,520
Coke	2,896,977	3,120,047 I.	223,070
Total	12,672,184	12,661,897 D.	10,287

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the year to March 23 were 292,541 tons.

New York

Anthracite

April 3—The hard-coal market shows the usual activity at this time of the year and contracts are being closed quite rapidly. All-rail trade is moving considerable coal; but water trade, especially lighterage business, is not as active as expected, as consumers have considerable March stocks on hand. Small steam sizes still remain extremely scarce. Prices are as follows: Broken, $4.25; egg, stove and chestnut, $4.50; buckwheat No. 1, $2.50; pea, $3; rice, $1.85; barley, $1.50; all f.o.b. New York harbor points.

Bituminous

The Atlantic seaboard soft-coal trade is quiet and first contracts are now being filled; a certain portion of the trade is taking on anthracite coal at April prices and with such trade bituminous is for the moment being slighted. Vessels are carrying anthracite coal to the ports along the Sound and this side of Cape Cod, and this also affects the soft-coal market at these points.

Contracts have been fairly well closed for this part of the season. The far East is quiet and is not taking on much coal, although it is believed that consumers have not large stocks.

New York harbor trade is quiet, with very little demand and not much surplus coal at tidewater. Prices are $2.75 f.o.b. New York harbor shipping ports for good grades of steam coal. All-rail trade is being pushed and prices are $1.10@1.25 f.o.b. mines for ordinary steam grades. Vessels in the coastwise market are in fair supply and brokers and captains are endeavoring to charter at the present rates to arrive, which indicates that they think spring weather will soon reduce freight rates. We quote rates from Philadelphia on large vessels at $1@1.10 to Boston, Salem and Portland, and $1.10@1.15 to Portsmouth. From New York harbor the rate on small vessels is $1 to the first named ports.

Birmingham

April 1—Coal operations in Alabama hardly suffer from the warm weather for some time yet. The demand is just as urgent right now as it has been at any time this year and every car that can be secured is being used.

Edgar Adler, who was vice-president and general manager of the Birmingham Iron Company, announces that he and his two brothers have withdrawn from that company, and H. M. Atkinson, P. S. Arkwright and James Bonneyman, of Atlanta, Ga., are in control as president, vice-president and acting manager respectively. The Messrs. Adler have purchased 3600 acres of coal land from the University of Alabama for $100 per acre.

Chicago

April 1—The trade in bituminous coals, though large in volume, continues to suffer from low prices. It is impossible to keep out of the city any proportion of the supplies from the mines of Illinois and Indiana so as to regulate supply to demand. In consequence coal accumulates on tracks, and has to be sold at a sacrifice.

Anthracite business for April is starting off well under the announcement of the 50c. discount for the month. Retailers report that the prospects are better for consumers laying in stocks of coal early this year than for several years past. Sales of anthracite in March were, as usual, dull, though the cool weather of the last two or three days has brought many orders for piecing-out lots.

Illinois and Indiana run-of-mine sell at $1.50@2.25, with lump and egg ranging $1.75@2.50, and screenings about $1.50. Prepared sizes are weak and fine coals are strengthening.

Hocking Valley coal is quiet at about $3 for lump. Smokeless is weak because of large shipments that could not be readily absorbed by the market, and brings 25@30c. under the circular price of $3.35 for run-of-mine. Eastern coals generally are in comparatively light demand.

Contracts for the coming year are being made perhaps more freely than a year ago at this season, but there is a disposition on the part of consumers to hold off, in the belief that the previous years' low prices in the open market will be repeated.

Cleveland

April 2—The railroads have been contemplating an advance in coal rates from mines to lake ports. The rate was advanced 5c. a short time ago, making $2.55 on Pittsburg coal to Cleveland, after which a differential of 5c. was added. The latter, however, has not gone into effect, and talk of changing the first advance and the differential into a straight 10c. advance had died away. The cold snap has again tied up the channels on the lakes and from indications, navigation will not open until April 15. There is little coal afloat here in comparison with other ports. The market is quiet with normal supply on track.

Coke is quiet and firm. Floods have had little effect on the market, as a number of ovens were banked at the time. Furnace coke is contracted for at $2.90@3; foundry coke $3.50@3.60 at ovens.

Pittsburg

April 2—The principal event in the coal trade this week was the opening of shipments to the lakes for the northwestern markets. Contracts for the season so far placed exceed all previous years. One large independent interest, that had sold a part of its production to the Pittsburg Coal Company for this trade, has closed a contract with another large lake shipper for all of its surplus coal. All the mines were idle yesterday on account of the celebration of the establishment of the eight-hour workday in the mines, but most of them resumed this morning, and all are expected to be running full tomorrow. There is no complaint of a shortage of railroad cars. Prices remain firm on a basis of $1.15@1.25 for mine-run coal at the mine. The Monongahela

River Consolidated Coal and Coke Company made some large shipments by river to lower ports, and the pools and harbor are practically cleaned up. There is a good supply of empty coal boats and barges, and the river mines will be kept running steadily for several months.

Connellsville Coke—Coke prices stiffened a little this week; the minimum quotation for furnace coke is $2.85, and $3 is named for deliveries running through the last half. Foundry coke remains at $3.50@3.75 for any delivery. The *Courier* gives the production in the Connellsville field for the week ending March 23, at 285,740 tons, and in the lower Connellsville region at 103,210 tons, a total of 388,950 tons. The total shipments aggregated 13,333 cars, distributed as follows: To Pittsburg, 4494 cars; to points west of Connellsville, 7946 cars; to points east of Connellsville, 893 cars.

Foreign Coal Trade

April 3—Exports of coal and coke from the United States for the two months ended Feb. 28 are reported by the Bureau of Statistics as follows:

	1906.	1907.	Changes.
Anthracite	259,367	313,693	I. 54,326
Bituminous	1,060,288	1,135,759	I. 75,471
Total coal	1,319,655	1,449,452	I. 129,797
Coke	117,159	129,967	I. 12,808
Total	1,436,814	1,579,419	I. 142,605

The exports do not include coal bunkered, or sold to steamships engaged in foreign trade. The coke exported went chiefly to Mexico and eastern Canada; the distribution of the coal was as follows:

	1906.	1907.	Changes.
Canada	924,159	972,535	I. 48,376
Mexico	177,837	179,590	I. 1,753
Cuba	123,825	119,980	D. 3,845
Other W. Indies	54,577	84,890	I. 30,313
Europe	6,332	11,720	I. 5,388
Other countries	32,925	80,737	I. 47,812
Total	1,319,655	1,449,452	I. 129,797

The exports to Europe were chiefly to Italy; those to other countries, to South America. The exports to Canada—67.1 per cent. of the total in 1907—were, in detail, as follows:

	1906.	1907.	Changes.
Anthracite	253,565	304,771	I. 51,206
Bituminous	670,594	667,764	D. 2,830
Total	924,159	972,535	I. 48,376

There was an increase in anthracite, but a small loss in bituminous coal.

Iron Trade Review

New York, April 3—The iron and steel markets have been comparatively quiet, so far as new business is concerned. Contracts are mainly closed well into the year, and purchasers seem disposed to hold back a little, and wait developments. Some of them are also beginning to count the cost of materials more closely than they were inclined to do a few months ago. The increasing difficulty of financing new enterprises is also a factor. This does not interfere with current work at the mills, which are receiving specifications on contracts freely and are not in a position to promise early deliveries on new orders, except in a few cases. Probably the waiting attitude, which is not unusual at this time of year, will not last very long.

Baltimore

April 2—Exports for the week included 5383 tons rails and 167 tons splice-bars to Buenos Aires.

Imports for the week included 216 tons spiegeleisen, 1674 tons ferromanganese, and 251 casks ferrosilicon. Imports of iron ore were 10,920 tons from Cuba, and 4400 tons from Spain; 15,330 tons in all. One cargo, 2500 tons iron pyrites, was received from Spain; and 745 tons copper pyrites from Chile.

Chicago

April 1—The iron market remains quiet, but there are signs of firmness all along the line. Southern iron especially is strengthening; there is little talk of $18 Birmingham for No. 2, and $18.50@19 is said to be obtained on some contracts for second-half delivery. Northern iron is quoted at $23.50@24 for second half delivery. For quick-delivery lots there is a wide range of prices, but Southern at about $22, and Northern at about $26 represent the average price. Contract sales are not large in number or in tonnage, but they represent a steady demand.

Coke is quiet, with the demand fairly good and supplies not too large. The best Connellsville sells for $6.50, with West Virginia 25@40c. lower.

Cleveland

April 2—Iron is in strong demand owing to the fact that several furnaces are out of blast. Prices are unchanged. Some sellers report spot at $26, but sales are being made under that figure. Bessemer is quoted at $21@21.50 and No. 1 Northern at 22.50 for future delivery.

Old material is scarce and in strong demand. The market stands with $25@26 for old iron rails; No. 1 R. R. wrought, $17@18.

Philadelphia

April 2—Sales of pig iron are very small and interest in the market has subsided, but the consumption of all kinds of iron continues at maximum limits. There is very little iron to sell for what is regarded as early delivery, and there appears to be less inclination among the larger consumers to rush into the market for late deliveries. Quotations are strong, and buyers are not inclined to bid any higher even for special accommodations. Basic iron is not selling, as there is none to sell, but it is wanted. Forge iron is doing remarkably well, and buyers are on the watch for iron for third-quarter delivery. Gray forge is quoted from $22.25 for remote, as high as $23.50 for early delivery. Low phosphorus is quoted at $26@26.50, according to delivery.

Steel Billets—Quotations are rather nominal, the highest figure quoted this week being $33. There is a moderate amount of business in forging steel, and the qualities sold average $26.

Pittsburg

April 2—There is nothing in the iron and steel markets to indicate weakness in any line, but there is every evidence that the mills and furnaces will be kept busy throughout the year. In finished lines considerable new business in steel rails, plates, bars, tin-plate and merchant pipe is being booked, and the mills are well filled with specifications. The Carnegie Steel Company yesterday booked orders for 20,000 tons of standard steel rails and also received inquiries for 60,000 tons. Despite the fact that the National Tube Company will not name new discounts before June 1, it is still receiving large orders for pipe, subject to the new prices and for delivery in the third quarter. It has been announced semi-officially that the leading producer cannot guarantee delivery before June 30. The Youngstown Sheet and Tube Company has sent out a new card, naming 74 and 5 per cent. as the extreme discount for large lots. This is $4 a ton above the prices recently withdrawn, and, it is believed, fixes the price to be named later by the National Tube Company. Although the plate mills are crowded with business, orders continue to come in, but mills in this district cannot guarantee delivery. One large interest has declined an order of 5000 tons. The eastern mills seem to be in a position to take on new business for prompt shipment and readily get 2c., which is $6 a ton above the established price of 1.70c. The Carnegie Steel Company, which was behind in its deliveries of plates to car and shipbuilding interests, is now in a position to catch up, as it has its new 72-in. plate mill at the Homestead works in full operation.

Pig Iron—The demand for pig iron for early delivery is greater than last week, but no large tonnages have been sold, owing to limited supply. Two small lots of No. 2 foundry were sold today for prompt delivery at $25.25, Valley. Late last week bessemer iron aggregating about 3000 tons for April and May delivery sold at $23, or $1 a ton above the price paid recently. The Midvale Steel Company has bought 3500 tons of bessemer iron for third-quarter delivery at $22. This price is 50c. a ton above the price named early in the year by the furnaces for second-half delivery. For the fourth quarter the

furnaces are ready to sell at $21, Valley. There is no doubt that the Steel Corporation will exercise its option on 14,000 tons placed with the Bessemer Pig Iron Association for delivery in May at $22. Gray forge is quoted nominally at $21.35 @21.85, Pittsburg.

Steel—There is no change in the steel market. Billets continue scarce, bessemer being quoted at $29.50 and open-hearth at $32. Plates are firm at 1.70c. and merchant steel bars at 1.60c.

Sheets—Demand continues heavy, and for prompt delivery premiums are offered ranging from $1 to $2 a ton. Black sheets are still quoted at 2.60c. and galvanized sheets at 3.75c. for No. 28 gage.

Ferro-Manganese—The market is strong, and quotations continue at $75@76 for prompt delivery.

Metal Market

NEW YORK, April 3

Gold and Silver Exports and Imports

At all United States Ports in February and year

Metal.	Exports.	Imports.	Excess.
Gold:			
Feb. 1907 ..	$1,027,058	$ 3,275,933	Imp. $2,248,875
" 1906 .	8,486,330	2,079,683	Exp. 6,406,647
Year 1907..	3,477,130	6,546,438	Imp. 3,069,308
" 1906..	14,227,995	4,685,392	Exp. 9,542,603
Silver:			
Feb. 1907 ..	4,223,970	3,693,061	Exp. 530,909
" 1906 ..	6,435,129	4,480,449	" 1,954,680
Year 1907 ..	8,990,935	7,350,102	" 2,640,633
" 1906 ..	13,951,797	9,167,160	" 4,784,637

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 Mar. 30 and years from Jan. 1

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$ 4,500	$ 139,642	$ 529,543	$ 73,725
1907.....	1,721,926	3,049,259	9,311,459	578,746
1906.....	3,140,925	2,062,985	18,373,802	503,261
1905.....	31,935,270	3,974,111	9,335,041	677,437

Exports of gold for the week were to the West Indies; of silver to London and Paris. Imports of gold for the week were from Holland and the West Indies; of silver from Mexico and Central America.

The joint statement of all the banks in the New York Clearing House for the week ending March 30 shows loans $1,056,545,200, an increase of $6,555,600; deposits, $1,019,817,300, an increase of $17,672,700, as compared with the preceding week. Reserve accounts show:

	1906.	1907.
Specie.....	$177,895,000	$195,659,700
Legal tenders.....	78,308,900	72,425,900
Total.....	$256,203,900	$268,085,600
Surplus.....	$5,131,275	$13,131,275

The surplus over legal requirements shows an increase of $8,421,825, as compared with the previous week.

Specie holdings of the leading banks of the world, March 30, are reported as below, in dollars:

	Gold.	Silver.	Total.
Ass'd New York	.....	.....	$195,659,700
England.....	$174,986,210	.....	174,986,210
France.....	520,840,785	$195,913,715	716,754,500
Germany	172,195,000	57,395,000	229,590,000
Spain.....	77,175,000	125,240,000	202,415,000
Netherlands....	25,727,000	28,823,000	54,550,000
Belgium.	16,636,665	8,318,335	24,955,000
Italy.....	162,305,000	24,928,000	187,233,000
Russia.....	592,565,000	27,685,000	620,250,000
Aust.-Hungary.	226,880,000	62,125,000	289,005,000
Sweden.....	20,805,000	.....	20,805,000

The banks of England and Sweden report gold only. The New York bands do not separate gold and silver in their reports.

Shipments of silver from London to the East are reported by Pixley & Abell as follows, for the year to March 21:

	1905.	1906.	Changes.
India.....	£ 4,761,910	£3,601,910	D. £ 1,160,000
China.....	.....	.....	.....
Straits..	.....	85,050	I. 85,050
Total.....	£ 4,761,910	£3,686,960	D. £ 1,074,950

Imports for the week were £10,000 from the West Indies, $177,000 in bars, and £106,000 in Mexican dollars from New York; a total of £293,000.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars.....	$0.50½	$0.53½
Peruvian soles and Chilean.....	0.46	0.51
Victoria sovereigns.....	4.485	4.87
Twenty francs.	3.85	3.89
Spanish 25 pesetas...	4.78½	4.80

SILVER AND STERLING EXCHANGE.

March.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	April.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
28	4.83	66	30⅝	1	4.83½	65⅝	....
29	4.83	66	....	2	4.84½	65¾	30½
30	4.83	65⅝	30 7/16	3	4.84½	64¾	30

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

Other Metals

Daily Prices of Metals in New York.

March-April.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
28	25 @25¼	24½ @25	97¾	40¾	6.00	6.75 @6.80	6.60 @6.65
29	25 @25½	24 3/16 @25	.....	40⅝	6.00	6.75 @6.80	6.60 @6.65
30	25 @26	24½ @25	.....	40¼	6.00	6.75 @6.80	6.60 @6.65
1	25 @26	24¼ @25	.....	40⅜	6.00	6.75 @6.80	6.60 @6.65
2	25 @25¼	24 @25	97	40½	6.00	6.75 @6.80	6.60 @6.65
3	25 @25¼	24 @25	92	40	6.00	6.75 @6.80	6.60 @6.65

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 quotation on spelter are for ordinary western brands; special brands command a premium.

Copper—The market is erratic and uncertain, partly because of the absence of demand from consumers and partly from the effect of the tremendous decline in London. The low price for standard there makes it possible for refiners to buy it and sell electrolytic against it for lower prices than yet rule here. On the other hand, several large American interests are still holding electrolytic at the equivalent of 25c., but are making no sales, while other interests are offering at much lower figures. As a further confusing feature in the situation, the Calumet & Hecla is reported to have made during the last week a considerable sale at 26c., but it is to be remarked that this special brand frequently sells at a variance from general market conditions. Quotations at the close are irregular at 25@25½c. for Lake; 24@25c. for electrolytic, and 23@23¾c. for casting.

The dumping of holdings by frightened speculators and bear sales have induced declines in the London standard market from day to day, and the close is cabled as very weak at £92 for spot, £94 for three months'.

Statistics for the second half of March show an increase in the visible supplies of 1700 tons.

Copper Sheets—The base price of copper sheets is 32c. per pound.

Copper Wire—The base price of copper wire, No. 0000 to No. 8, is 27¼@27½c. per pound.

Tin—While at the beginning of the week, on account of a rise in the London market, the demand here had become a little more active, 40½ being paid for spot tin, the weaker advices received from abroad at the close scared off prospective buyers, and the domestic market closes weak and nominal at 40c. London closes at £183 for spot, £181 for three months'.

Statistics for the month of March show a decrease in the visible supplies of 100 tons.

Visible stocks of tin on April 1 are reported as follows, in long tons:

	In Store.	Afloat.	Total.
Great Britain.....	2,803	3,716	6,519
Holland.....	1,835	183	2,018
United States.....	1,845	2,748	4,593
Total.....	6,483	6,647	13,130

United States stocks do not include those at Pacific ports. The total is 1282 tons greater than on April 1, last year.

Lead—The market is unchanged at 6c. New York.

The London market has been somewhat better throughout the week and quotations have advanced slightly from day to day, the closing being 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 is dull and again slightly lower. Sales here are on a basis of 5.95@5.97½c. for Missouri brands.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of March 16, that the price of lead is 92.50 reales per quintal, silver being paid at 14 reales per ounce. Exchange, 27.63 pesetas to £1. The price of lead, on current exchange, is equal to £18 14s. 10d. per long ton, f.o.b. shipping port, Exports for the week were 1066 tons desilverized and 50 tons antimonial lead.

Spelter—The market is very dull. Offerings are on a somewhat more liberal scale, but buyers have so far not been attracted by the lower quotations. The market closes dull at 6.75@6.80 New York, 6.60@6.65 St. Louis.

The London market has shown some resiliency, and prices have gone back at the close to £26 for good ordinaries, £26 5s. for specials.

Zinc Sheets—The base price is now $8.60 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 600-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 pounds.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of March 16, that the market is quiet. Exports for the week were 3400 tons blende to Antwerp; 2400 tons blende and calamine to Stettin.

Antimony—The market is still dull, and quotations are nominal. Ordinary brands, 22¼@22½c; Hallett's, 23½c.; Cookson's, 24½c.

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.

Platinum—The market has fluctuated rather sharply and prices are a little uncertain. The latest quotation shows a considerable fall, being $33 per ounce for ordinary metal. Scrap is correspondingly lower.

Quicksilver—Current prices in New York are $41 per flask of 75 lb. for large quantities and $42 for smaller orders. San Francisco prices are $38@39 per flask, according to quantities, for domestic orders, and $37@37.50 for export. The London price is £7 per flask, but £6 16s. 3d. is quoted by jobbers.

Aluminum—For ton lots, or over, prices are: No. 1, over 99 per cent. pure metal, 40c. per lb.; No. 2, over 90 per cent., 37c. Small lots 1 to 3c. per lb. higher, according to size.

Imports and Exports of Metals

Copper—Exports of copper from the United States for the two months ended Feb. 28 are reported as below by the Bureau of Statistics of the Department of Commerce and Labor, in long tons, of 2240 lb. each:

	1906.	1907.	Changes.
Great Britain	3,051	3,663	I. 612
Belgium	402	289	D. 113
France	6,027	5,067	D. 960
Italy	938	1,407	I. 469
Germany and Holland	16,571	12,694	D. 3,877
Russia	662	360	D. 302
Other Europe	1,844	1,110	D. 734
Canada	269	246	D. 23
China	600	...	D. 600
Other countries	28	17	D. 11
Total metal	30,392	24,853	D. 5,539
In ores and matte	1,333	564	D. 769
Total	31,725	25,417	D. 6,308

The total decrease was 19.9 per cent. The actual quantity of ore and matte exported this year was 10,088 tons, of which 8845 tons went to Canada, 1100 tons to Mexico, 123 tons to Germany and 20 tons to Great Britain.

Imports into the United States of copper and copper material for the two months ended Feb. 28, with re-exports of foreign metal, are reported as follows; the figures give the contents of all material in long tons of fine copper:

	Metal.	In ore, etc.	Total.
Mexico	6,554	2,638	9,192
Canada	1,287	990	2,277
Great Britain	4,068	.....	4,068
Japan	270	.....	270
South America	.....	576	576
Other countries	2,908	4	2,912
Total imports	15,087	4,208	19,295
Re-exports	78	....	78
Net imports	15,009	4,208	19,217
Net imports, 1906	11,818	3,941	15,759

The total increase in the net imports this year was 3458 tons, or 21.9 per cent. This heavy increase was chiefly in the imports from other countries. The actual tonnage of ores and matte imported from Mexico this year was 14,168 tons; from Canada and Newfoundland, 30,856; from South America 5304 tons.

The exports and the net imports compare as follows:

	1906.	1907.	Changes.
Exports	31,725	25,417	D. 6,308
Net imports	15,759	19,217	I. 3,458
Excess, exports	15,966	6,200	D. 9,766

This shows a decrease of 61.2 per cent. in the excess of exports this year.

Tin—Imports of tin into the United States for the two months ended Feb. 28 were as follows, in long tons:

	1906.	1907.	Changes.
Straits	3,430	2,435	D. 995
Australia	50	98	I. 48
London	4,919	3,322	D. 1,597
Holland	95	194	I. 99
Other Europe	190	176	D. 14
Other countries	3	1	D. 2
Total	8,687	6,226	D. 2,461

This shows a decrease of 28.3 per cent. in the total imports this year.

Lead—Imports of lead into the United States in all forms, with re-exports of imported metal, are reported as below for the two months ended Feb. 28, in short tons, of 2000 lb. each:

	1906.	1907.	Changes.
Lead, metallic	1,776	2,195	I. 419
Lead in ores and base bullion	14,951	8,925	D. 6,026
Total imports	16,727	11,120	D. 5,607
Re-exports	7,055	2,673	D. 4,382
Net imports	9,672	8,447	D. 1,225

Of the imports this year 8054 tons were from Mexico, and 793 tons from Canada. Exports of domestic lead were 40 tons in 1906, and 70 tons in 1907; an increase of 30 tons this year.

Spelter—Exports of spelter from the United States for the two months ended Feb. 28 were 1508 short tons in 1906, and 185 tons in 1907; a decrease of 1323 tons. Exports of zinc dross were 2539 short tons in 1906, and 2383 tons in 1907; a decrease of 156 tons. Exports of zinc ore were 4517 tons in 1906, and 4046 tons in 1907; a decrease of 471 tons.

Imports of spelter for the two months were 257 short tons in 1906, and 192 tons in 1907; a decrease of 65 tons.

Antimony—Imports of antimony into the United States for the two months ended Feb. 28 were as follows, in pounds:

	1906.	1907.	Changes.
Metal and regulus	1,397,176	2,069,109	I. 671,933
Antimony ore	82,777	444,294	I. 361,517

There was a large increase this year, both in metal and in ore.

Nickel—Imports of nickel ore and matte into the United States for the two months ended Feb. 28 were 2020 tons in 1906, and 2067 tons, containing 2,720,105 lb. metal, in 1907. The metal contents were not reported last year.

Exports of nickel, nickel oxide and nickel matte for the two months were 1,819,954 lb. in 1906, and 1,662,283 lb. in 1907; a decrease of 157,671 lb. this year.

Platinum—Imports of platinum into the United States for the two months ended Feb. 28 were 2284 lb. in 1906, and 1853 lb. in 1907; a decrease of 431 lb. this year.

Quicksilver—Exports of quicksilver from the United States for the two months ended Feb. 28 were 165,981 lb. in 1906, and 132,466 lb. in 1907; a decrease of 33,515 lb. this year.

Aluminum—Exports of aluminum from the United States for the two months ending Feb. 28 were valued at $19,384 in 1906, and $66,264 in 1907; an increase of $46,880 this year.

New York Metal Exchange—At the annual meeting, April 1, the exchange elected the following officers: President, Robert M. Thompson; vice-president, Adolph Lewisohn; treasurer, Robert L. Crooke; managers, B. Hochschild, H. W. Hendricks, L. Nachmann, G. E. Behr, W. Jay Ives, George W. Jaques, J. H. Lang, L. Vogelstein; arbitration committee, J. Langeloth, Morton B. Smith, Edwin J. Keane, E. A. Caswell, Paul Koning.

Missouri Ore Market

Joplin, Mo., March 30—The highest price paid for zinc was $52.50 per ton on an assay basis of $48 to $51 per ton of 60 per cent. zinc. The average price for the week was $48.80.

The highest price paid for lead was $85

per ton, with medium grades selling from $81 to $83 and the average price $81.96.

The three months of the year 1907, ending today, mark an increase of 13,330 tons zinc and 3000 tons lead compared with the first three months of 1906, and the combined value of both minerals is $1,171,000 greater than last year. The highest price for zinc a year ago was $49.50 per ton and for lead $87 per ton, one being higher today and the other lower.

Following are the shipments of zinc and lead from the various camps of the district for the week ending March 30:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	3,215,100	1,052,830	$123,543
Joplin	2,090,310	379,720	68,865
Galena-Empire	1,518,800	239,440	47,027
Alba-Neck City	1,496,940	46,630	40,821
Prosperity	383,580	307,950	22,214
Duenweg	681,350	114,950	21,745
Granby	725,000	90,000	19,600
Aurora	720,860	37,900	15,765
Badger	535,080	.. ....	13,912
Spurgeon	399,880	51,470	8,785
Carthage	250,750	5,530	6,755
Oronogo	155,780	18,380	4,354
Sherwood	137,390	15,350	3,926
Carl Junction	132,040	1,870	3,289
Baxter Springs	117,780	.....	2,773
Zincite	103,090	3,570	2,620
Stott City	105,560	.....	2,586
Reeds	47,510	....	1,163
Totals	12,816,810	2,365,590	$409,743
Three months	156,083,950	23,950,190	$4,698,113

Zinc value, the week, $312,798; 3 months, $3,698,720
Lead value, the week, 96,945; 3 months, 999,393

Average prices for ore in the district, by months, are shown in the following table:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January	47.38	45.84	January	75.20	83.53
February	47.37	47.11	February	72.83	84.58
March	42.68	48.66	March	73.73	82.75
April	44.63	.....	April	75.13	.....
May	40.51	.....	May	78.40	.....
June	43.83	.....	June	80.96	.....
July	43.25	.....	July	74.31	.....
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., March 30—It now appears that the price of 60 per cent. ore has reached the top notch of the season and those who have been talking $60 ore, do not expect to hold for higher prices. Nearly all the ore produced sold on a $50 basis for 60 per cent. zinc, and one producer reports receiving $50.50.

The camps of the district loaded ore for the week ending March 30 as follows:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville	323,350	.....	...
Buncombe-Hazel Green	740,000	.....	.....
Linden	495,130	46,020	.....
Rewey	227,000	.....	.....
Galena	204,000	50,000	.....
Benton	202,500	.....	.....
Mineral Point	87,100	.....	.....
Cuba City	85,440	.....	.....
Livingston	50,000	.....	.....
Total for week	2,414,520	96,020	.....
Year to Mar. 30	21,492,814	989,200	143,160

The problem of sufficient labor is still unsolved and the numerous new plants that are starting up almost daily, increase the demand. The old question of car service still confronts the shippers and is a controlling factor as far as prompt shipment is concerned. This condition works no material hardship; it only compels the building of extra ore-bins to store the concentrates.

Chemicals

New York, April 3—On March 30 a fire at the Laurel Hill works of the General Chemical Company damaged one of the eight sets of sulphuric-acid towers and destroyed several adjoining buildings. The loss was estimated at about $30,000, but will not seriously affect the output of the plant.

Copper Sulphate—The market continues strong and the demand is unabated. Prices remain at $7.50 per 100 lb. for carload, and $7.75 for jobbing lots.

Exports of copper sulphate from the United States for the two months ended Feb. 28 were 4,646,454 lb. in 1906, and 2,870,519 lb. in 1907; a decrease of 1,775,925 lb. The exports this year contained about the equivalent of 320 long tons of copper.

Nitrate of Soda—The market is strong and the demand continues good. Spot prices are quoted at $2.70 per 100 lb. with 96 per cent. for all positions of 1907 at $2.50. The price for 95 per cent. salts is $2.45, for both 1907 and 1908.

Heavy Chemicals—Imports of heavy chemicals into the United States for the two months ended Feb. 28 are reported as follows, in pounds:

	1906.	1907.	Changes.
Bleaching powder	20,920,467	21,046,401	I. 125,934
Potash salts	28,049,436	50,879,489	I. 22,830,053
Soda salts	3,812,716	3,922,345	I. 109,629

Exports of acetate of lime were 13,056,053 lb. in 1906, and 16,860,287 lb. in 1907; an increase of 3,804,234 lb. this year.

Phosphates—Exports of phosphates from the United States for the two months ending Feb. 28 were, in long tons:

	1906.	1907.	Changes.
Crude	162,990	124,801	D. 38,189
All other	3,439	3,330	D. 109
Total	166,429	128,131	D. 38,298

The chief exports this year were 40,677 tons to Germany; 22,774 to France; 19,252 to Great Britain; 12,039 to Italy.

Sulphur—Imports of sulphur and pyrites into the United States for the two months ended Feb. 28 were, in long tons:

	1906.	1907.	Changes.
Sulphur	21,411	12,525	D. 8,886
Pyrites	95,760	90,581	D. 5,179

Estimating sulphur contents of pyrites, the total imports of sulphur were 59,715 tons in 1906, and 48,757 tons in 1907; a decrease of 10,958 tons.

Barytes—All grades are very scarce and market is practically bare of good qualities. We quote American ground at $14.50@21, with foreign floated at $19.50 @22.50. The demand for barytes is strong.

Manganese Di-oxide—Dealers are behind in their deliveries from three to four months and premiums are freely offered for prompt or spot delivery. The scarcity of the material makes quotations simply nominal. We quote 3@6½c. per lb. according to manganese content.

Conditions in the manganese ore market are similar, and dealers are not willing to sign contracts when they are uncertain about obtaining the ore.

Mining Stocks

New York, April 3—The stock market has again been subject to many fluctuations, with occasional advances, but a general downward tendency. Dealings during the week have been largely professional, the public having apparently made up its mind to stay out for a while. Mining shares have followed the general trend, and have been lower, without much special activity. The immediate outlook is not promising, although money is comparatively easy for the time.

Boston

April 2—After the sharp depression, shares have shown resiliency and recovered quite sharply the past week, although they are far below the high prices recorded earlier in the year.

Trinity has recorded the greatest proportionate advance the past week. From a close at $18 a week back, it sold fractionally below that, but touched $31.50 Monday with reaction to $27 tonight. Amalgamated rose $8.50 to $93.75 in the period, settling but a fraction from this. North Butte spurted $9 to $92.50, closing $2 below this, and Butte Coalition rose $4.75 to $28.50, closing at $27 tonight.

The annual meeting of the Centennial Copper Mining Company as held and Calumet & Hecla people stepped into the directory, according to program, leaving but two of the original Centennial directors on the board. Calumet & Hecla owns 46,000 shares of stock. The annual report for 1906, showed a net gain of $77,136 for the year and the total surplus Dec. 31 was $340,310. The Osceola annual meeting has been again adjourned to April 16, owing to court proceedings. The Calumet & Arizona annual report shows net earnings of $4,827,873 for 1906, out of which was paid $2,600,000 in dividends. The total surplus Dec. 31 was $4,666,133. The Balaklala underwriting syndicate had to take all but about 10 per cent. of the new issue of stock.

The Old Dominion is expected to de-

clare a quarterly dividend of $1 in June. The Champion mine last week paid its fourth $1 dividend this year.

As indicating interest in curb securities total dealings on the Boston curb last month were over 3,277,100 shares or 1,000,000 greater than for February, which was the record.

Colorado Springs

March 30 — The trading on the local stock exchange has been decidedly dull during the entire week. Prices have remained stationary and the volume of business has not been large, but the sales have been fairly well distributed through the entire list, El Paso being the most favored.

STOCK QUOTATIONS

NEW YORK	Apr. 2
Name of Comp.	Clg.
Alaska Mine	1⅝
Am.Nev.M.&P.Co.	3⅛
Amalgamated	92¾
Anaconda	63½
Balaklala	9⅝
British Col. Cop.	8
Buffalo Cobalt	2⅜
Butte & London	2⅛
Butte Coalition*	27
Butte Cop. & Zinc	5¾
Cobalt Contact	⅛
Colonial Silver	3
Cum. Ely Mining	9¾
Davis Daly	14½
Dominion Cop	5½
El Rayo	5
Foster Cobalt	1⅝
Furnace Creek	1⅝
Giroux Mine	8⅛
Gold Hill	2⅛
Greene Gold	1¾
Greene G. & S	1¾
Greenw'r & D.Val.	95
Guanajuato	4
Guggen. Exp.	265
Hanapah	⅛
McKinley Dar.	1⅛
Micmac	4¼
Mines Co. of Am.	1¾
Mitchell Mining	4¼
Mont.Sho. C.(New)	10½
Nev. Utah M. & S.	4
Newhouse M. & S.	20⅞
Nipissing Mines	13
Old Hundred	3¼
Silver Queen	1⅛
Stewart	2⅝
Tennessee Copper	39
Union Copper	½
Utah Apex	5¾
West Columbus	11

N. Y. INDUSTRIAL	
Am. Agri. Chem.	20
Am. Smelt. & Ref.	122⅞
Am. Sm. & Ref., pf.	105½
Bethlehem Steel	13¼
Colo. Fuel & Iron	35¼
Federal M.& S., pf.	85¾
Inter. Salt	15
National Lead	59½
National Lead, pf.	99
Pittsburg Coal	12
Republic I. & S.	26
Republic I.& S.,pf.	82¾
Sloss-Sheffield	53
Standard Oil	499½
Tenn. C. & I.	137½
U. S. Red. & Ref.	15
U. S. Steel	35½
U. S. Steel, pf.	98¾
Va. Car. Chem.	29½
Va. I. Coal & Coke	65½

ST. LOUIS	Mar. 30	
N. of Com.	High.	Low.
Adams	.40	.25
Am. Nettie	.08	.06
Center Cr'k	2.25	1.90
Cent. C. & C.	65.75	63.50
C.C. & C.pd.	78.50	77.50
Cent. Oil	125.00	110.00
Columbia	5.00	4.50
Con. Coal	27.50	25.00
Doe Run	170.00	160.00
Gra. Bimet.	.25	.20
St. Joe	17.50	16.00

BOSTON	Apr. 2
Name of Comp.	Clg.
Adventure	4
Allouez	55
Am. Zinc	40½
Arcadian	8
Atlantic	15
Bingham	20
Boston Con.	25⅜
Calumet & Ariz.*	165
Calumet & Hecla*	870
Centennial	33½
Con. Mercur	.38
Copper Range	81
Daly-West	16
Franklin	19⅛
Granby, New	130
Greene Con*	25
Isle Royal	20½
La Salle	17
Mass	6
Michigan	16⅛
Mohawk	80½
Mont. C. & C.(new)	2¼
Nevada	14½
North Butte	90½
Old Colony	1¼
Old Dominion	53¾
Osceola	135
Parrot	23
Phoenix	1⅞
Quincy*	124
Rhode Island	7¼
Santa Fe	3½
Shannon	19¾
Tamarack*	113
Trinity	28
United Cop., com.	59
U. S. Oil	9¾
U. S. Smg. & Ref.	55¾
U.S.Sm.& Re.,pd.*	44½
Utah Copper	62¼
Victoria	8⅛
Washington	2
Winona	9
Wolverine	161
Wyandotte	1¾

*Ex. Div. †Ex. Rights.

BOSTON CURB	
Ahmeek	90
Ariz. Com	25½
Black Mt.	6
Cananea Cent.	30
East Butte	11½
Hancock Con.	
Keweenaw	9
Majestic	3½
Raven	1⅞
Shawmut	.90
Superior	
Superior & Pitts.	21½
Troy Man.	2⅜

LONDON	Apr. 3
Name of Com.	Clg.
Dolores	£1 12s 6d
Stratton'sInd.	0 3 9
Camp Bird	1 4 9
Esperanza	2 2 6
Tomboy	1 6 3
El Oro	1 7 6
Oroville	0 18 1½
Somera	0 6 3
Utah Apex	1 5 0
Ariz.Cop.,pfd.	3 15 0
Ariz.Cop.,def.	3 12 6

Cabled through Hayden, Stone & Co., N. Y.

S. FRANCISCO	Mar. 27
Name of Comp.	Clg.
COMSTOCK STOCKS	
Belcher	.47
Best & Belcher	1.40
Caledonia	.35
Challar	.09
Con. Cal. & Va	.97
Crown Point	.28
Exchequer	.75
Gould & Curry	.23
Hale & Norcross	.70
Mexican	.65
Ophir	2.25
Overman	.17
Potosi	.12
Savage	.78
Sierra Nevada	.65
Union	.57
Utah	.04
Yellow Jacket	.75
TONOPAH STOCKS	
Golden Anchor	.30
McNamara	.46
Montana-Pitts.ex.	.21
North Star	.34
Rescue	.14
GOLDFI'D STOCKS	
Black Ants	.10
Blue Bull	.46
Columbia Mt.	.97
Comb. Frac.	4.15
Conquerer	.21
Daisy	2.05
Florence	3.50
Frances-Mohawk	1.10
Goldfield Con.	8.00
Grandma	.24
Great Bend	1.00
Red Hills	.30
St. Ives	1.45
BULLFROG STOCKS	
Amethyst	.41
Bonnie Claire	.36
Mayflower Con.	.43
Montgomery Mt.	.27
Original	.17
MANHAT'N STOCKS	
Gold Wedge	.11
Manhattan Mg.	.12
Pine Nut	.19
Ruby Wonder	.30
Stray Dog	.32
Yellow Horse	.06

NEVADA (Weir Bros. & Co., New York)	Apr. 3
TONOPAH STOCKS	Clg.
Tono'h Mine of N.	17.50
Tonopah Exten.	3.75
Montana Tonop'h	3.45
Belmont	4.50
Tonopah Midway	1.75
West End Con.	1.40
Jim Butler	1.05
GOLDFI'D STOCKS	
Sandstorm	.53
Kendall	.40
Red Top	4.00
Jumbo	4.00
Goldfield Mining	1.37
Dia'dfield B. B. C.	.36
Atlanta	.70
Mohawk	17.00
Silver Pick	1.18
Laguna	1.47
BULLFROG STOCKS	
Mont. Shoshone C.	10.25
Tramps Con.	1.20
Gold Bar	1.10
Bullfrog Mining	.27
Bullfrog Nat. B.	.41
Homestake Con.	1.15
MANHAT'N STOCKS	
Manhattan Con.	.75
Manhat'n Dexter	.25
Jumping Jack	.17
Stray Dog	.31
Indian Camp	.16

COLO. SPRINGS	Mar. 30
Name of Comp.	Clg.
Acacia	10½
Black Bell	
C. C. Con	5½
Dante	5½
Doctor Jack Pot	
Elkton	56
El Paso	42½
Findlay	67
Gold Dollar	7
Gold Sovereign	6¾
Isabella	24⅝
Index	
Jennie Sample	6½
Jerry Johnson	4½
Mary McKinney	
Pharmacist	6½
Portland	1.18
Un. Gold Mines	8
Vindicator	87
Work	17½

New Dividends

Company.	Payable.	Rate.	Amt.
Am. Smg. & Ref., com	Apr. 15	$1.75	$875,000
Anaconda, Mont.	Apr. 18	1.75	2,100,000
Central Coal & Coke	Apr. 15	1.50	76,875
Central Coal & Coke, pfd.	Apr. 15	1.25	23,438
Champion Copper, Mich.	Mar. 29	1.00	100,000
Columbus Con., Utah	Apr. 6	0.20	60,000
Daly Judge, Utah	Apr. 12	0.37½	112,500
Esperanza, Mex	Apr. 22	1.32	600,600
Inter. Nickel, pfd	May 1	1.50	131,123
Nipissing, Ont	Apr. 20	0.15	180,000
Nova Scotia Steel & Coal	Apr. 15	1.50	74,555
Penna. Salt Mfg	Apr. 15	3.00	180,000
Philadelphia Co	May 1	0.75	434,296
Quartette Mg	Mar. 30	0.01½	15,000
Tenn. Coal, Iron & R.R.	May 1	1.00	225,536
Tenn. C. I. & R.R., pfd.	May 1	2.00	4,960
Tonopah Co., Nev.	Apr. 22	0.35	350,000
United Copper	Apr. 29	1.75	787,500
U. S. Red. & Ref., com.	Apr. 15	0.87½	656,250
U. S. Red. & Ref., pfd.	Apr. 15	0.87½	656,250
U. S. Sm., Ref. & Mg.	Apr. 15	0.87½	656,250
U. S. Sm., Ref. & Mg., pfd.	Apr. 15	0.87½	656,250
Utah Con	Apr. 15	1.50	450,000
Va.-Carolina Chem., pf.	Apr. 15	2.00	360,000
Vulcan Detinning, pfd.	Apr. 20	1.25	18,750
Work	Apr. 1	0.01	15,000

Assessments

Company.	Delinq.	Sale.	Amt.
Alpha, Nev.	Apr. 3	Apr. 24	$0.05
Arizona Prince, Cal.	Mar. 25	Apr. 20	0.04
Caledonia, Nev.	Apr. 10	May 1	0.10
California, Cal.	Apr. 3	Apr. 20	0.05
Con. Cal. & Va., Nev.	Mar. 21	Apr. 11	0.25
Gould & Curry, Nev.	Apr. 10	May 1	0.10
Hale & Norcross, N.	Apr. 3	Apr. 30	0.15
Herkimer Gravel, C.	Mar. 29	Apr. 15	0.04
Julia, Nev.		Apr. 4	0.03
Lloyd-Searchlig't,N.	Mar. 29	Apr. 18	0.01
Mexican, Nev.	Apr. 3	Apr. 25	0.15
Naildriver, Utah	Mar. 30	Apr. 24	0.03
Oro Blanco, Cal.	Feb. 25	Apr. 22	0.03
Posey Canon, Cal.	Apr. 1	Apr. 15	0.01
Quincy, Jr., Idaho			0.10
St. Joe, Utah	Mar. 28	Apr. 16	0.02
Yellow Jacket, Nev.	Apr. 13	May 22	0.10

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	67.510	29.854	31.365
April	64.765		29.984	
May	66.976		30.968	
June	65.394		30.185	
July	65.105		30.113	
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

	NEW YORK.				LONDON.	
	Electrolytic		Lake.			
	1906.	1907.	1906.	1907.	1906.	1907.
January	18.310	24.404	18.419	24.825	78.869	106.739
February	17.869	24.869	18.116	25.236	78.147	107.356
March	18.361	25.065	18.641	25.541	81.111	106.594
April	18.375		18.688		84.793	
May	18.475		18.724		84.867	
June	18.442		18.719		83.994	
July	18.190		18.585		81.167	
August	18.380		18.706		83.864	
September	19.033		19.328		87.831	
October	21.203		21.722		97.269	
November	21.833		22.398		100.270	
December	22.885		23.350		105.226	
Year	19.278		19.616		87.282	

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

AVERAGE PRICE OF TIN AT NEW YORK

Montn.	1906.	1907.	Month.	1906.	1907.
January	36.390	41.548	July	37.275	
February	36.403	42.102	August	40.606	
March	36.662	41.313	September	40.516	
April	38.900		October	42.852	
May	43.313		November	42.906	
June	39.260		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	15.922	19.703
April	5.404		15.959	
May	5.685		16.725	
June	5.750		16.813	
July	5.750		16.525	
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		5.931		25.781	
May	5.997		5.846		27.000	
June	6.096		5.948		27.728	
July	6.006		5.856		26.800	
August	6.027		5.878		26.938	
September	6.216		6.056		27.563	
October	6.222		6.070		28.075	
November	6.375		6.225		27.781	
December	6.593		6.443		27.938	
Year	6.198		6.048		27.020	

New York and St. Louis, cents per pound. London in pounds sterling per long ton.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

ABRASIVES—		
Bort, good drill quality, carat		$85.00
Carborundum, f.o.b. Niagara Falls, powd	lb.	.08
Grains	"	.10@.17
Corundum	"	.07@.10
Crushed Steel, f.o.b. Pittsburg	"	.05¾@.06
Emery, in kegs: Turkish flour	"	.01¼@.02½
Grains	"	.03½@.04½
Naxos flour	"	.01½@.02½
Grains	"	.03½@.04½
Chester flour	"	.01½
Grains	"	.03½@.04½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½@.01¾
Grains, in kegs	"	.02½@.02¾
Garnet, per quality	sh. ton	25.00@35.00
PumiceStone, Am. Powd. 100 lb.		1.60@2.00
Italian, powdered	"	.01¼@.01½
Lump, per quality	"	.03@.20
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.05@.25
Rouge, per quality	"	.05@.30
Steel Emery, f.o.b. Pittsburg	"	.07¼@.07¾
ACIDS—		
Acetic 28%	lb.	.02¼@.02½
Boric	"	.09¾@.10
Hydrofluoric, 30%	"	.02¾@.03
" 48%	"	.06
" 60%	"	.10
Hydrochloric acid, 20°, per lb		1.25@1.50
Nitric acid, 38°	per lb.	4.25@4.62½c.
Sulphuric acid, 50°, bulk, per ton		$12 up.
60°, 100 lb. in carboys		.85@1.12½
60°, bulk, ton		16.00@18.00
66°, 100 lb. in carboys		1.00@1.25
66°, bulk, ton		18.00@20.00
Oxalic	"	.08½@.09
ALCOHOL—Grain	gal.	2.46¼
Refined wood, 95@97%	"	.70@.75
ALUM—Lump	100 lb.	$1.75
Ground	"	1.85
Chrome Alum	lb.	.03¼@.03¾
ALUMINUM—Sulphate, com'l.	"	1.25@1.60
AMMONIA—24 deg.	lb.	.04½@.05½
" 26 "	"	.04¾@.05¾
AMMONIUM—		
Bromide	lb.	.23
Carbonate	"	.07½@.08
Muriate grain	"	.06½@.06¾
Lump	"	.09½@.09¾
Sulphate, 100 lb		3.00@3.12½
Sulphocyanide com	"	.30
" " chem. pure	"	.40
ANTIMONY—needle, lump	lb.	.13½@.14
ARSENIC—White (nominal)	"	.07¼@.07¾
Red	"	.06½@.07
ASPHALTUM—		
Barbadoes	per ton.	40.00@80.00
West Indies	"	20.00@60.00
Egyptian	lb.	.08@.14
Gilsonite, Utah ordinary	per ton.	50.00
Trinidad	"	30.00@40.00
California	"	20.00@35.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton.	30.00@35.00
Powdered, 80@90%	lb.	.02@.02½
Chloride com'l	ton.	37.50@40.00
Nitrate, powdered, in casks	lb.	.06
Sulphate (Blanc Fixe)	"	.02¾
BARYTES—		
Am. Ground	sh. ton.	14.50@21.00
Floated	"	22.00
Foreign floated	"	19.50@22.50
BISMUTH—Sub-nitrate	lb.	1.50
BLEACHING POWDER—35%, 100 lb.		1.30@1.50
BLUE VITRIOL—(copper sulphate), carload, per 100 lb		7.50
BONE ASH	lb.	.02½@.03
BORAX	"	.07½@.07¾
CALCIUM—Acetate, gray	"	2.35@2.40
Acetate, brown	"	1.60@1.65
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. N. Y.	"	16.00@18.00
CEMENT—		
Portland, Am. 500 lb.	bbl.	1.55@1.60
Foreign	"	2.25@2.90
"Rosendale," 300 lb.	"	.85
(in sacks)		.65
Slag cement	"	.75@1.25
CHROME ORE—		
New Caledonia 50% ex. ship N. Y.	per lg. ton	17.50@20.00
Bricks, f.o.b. Pittsburg, M.	"	175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	"	8.00@9.00
Foreign	"	11.50@17.50
COBALT—Oxide	lb.	2.50
COPPERAS—Bulk	100 lb.	$0.55
In bbls	"	.65@.75
In bags	"	.60@.70
CRYOLITE	lb.	.06½
FELDSPAR—Ground best	sh. ton.	7.00@15.00
FIRE BRICK.		
American	per M.	30.00@40.00
Imported	"	26.00@45.00
St. Louis No. 1	"	16.00
" No. 2	"	14.00
Extra	"	20.00@23.00
FIRE CLAY.		
St. Louis mill	per ton	2.50
FLUORSPAR—		
Domestic f.o.b. shipping port:		
Lump	sh. ton.	8.00@10.00
Ground	"	11.50@13.50
Gravel	"	4.25@4.50
Foreign crude ex. dock		8.00@10.00
FULLER'S EARTH—Lump	100 lb.	.80@.85
Powdered	"	.85@.90
GRAPHITE—		
American, ore, common	lb.	.01@.10
Artificial	"	.06
Ceylon, common pulv	"	.02½@.03½
Best, pulverized	"	.04@.06
German, com. pulv	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian, pulverized	"	.01@.02
GYPSUM—		
Fertilizer	"	7.00
Rock	lg. ton.	4.00
INFUSORIAL EARTH—		
Ground Am. best	lb.	.01¾
French	lg. ton.	56.00
German	lb.	.02½@.02⅝
LEAD—Acetate (sugar of)	lb.	.07¾
Nitrate, com'l	"	.08½@.09
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	7.00@8.00
Calcined, powdered	sh. ton.	30.00@40.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	100 lb.	.80@1.15
Sulphate (Epsom salt)	100 lb.	.75@1.00
MANGANESE—		
Crude powdered:		
70@75% binoxide	lb.	.03
75@85% binoxide	"	.03½
85@90% binoxide	"	.05
90@95% binoxide	"	.06½
Ore, 80%-85%	sh. ton.	35.00@45.00
MARBLE—Flour	sh. ton.	9.50@10.00
MINERAL WOOL—		
Slag, ordinary	"	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
MONAZITE SAND—		
Guar. 9% with 5% Thorium oxide, nominal	lb.	.08 and up.
NICKEL—		
Oxide, crude, lb. (77%) for fine metal contained		.47
Sulphate, single	lb.	.16@.20
" double	"	.10@.12
NITRATE OF SODA—100 lb. 96% for 1907		2.50
95% for 1908		2.45
95% for 1909		2.40
96% is 5c higher per 100 lb.		
OZOKERITE—best	lb.	.14@.17
PAINTS AND COLORS—		
Litharge, Am. powdered	"	.07½@.07½
English glassmakers'	"	.08½@.08½
Lithopone	"	.04½@.05
Metallic, brown	sh. ton.	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½@.03
French, washed	"	.01½@.02½
Paris green, pure, bulk	"	.21@.23
Red lead, American	"	.07½@.07½
Foreign	"	.08½@.08½
Turpentine, spirits bbl., per gal.		.75@.78
White lead, Am., dry	lb.	.06⅝@.06⅝
American, in oil	"	.07½@.07⅝
Foreign, in oil	"	.09⅝@.10
Zinc white, Am. extra dry	"	.05⅝@.05½
Foreign, red seal, dry	"	.07½@.07½
Green seal, dry	"	.07½@.08½
PHOSPHATES—Acid	.65@67½c per unit	
*Fla., hard rock		7.50
land pebble 68%		4.50
†Tenn., 78@80%		6.50@7.00
78%		5.50
75%		5.00
68@72%		4.50
‡So. Car. land rock		6.00
" " river rock		
POTASSIUM—		
Bicarbonate crystal	lb.	$0.8½@.09
Powdered or granulated	"	.09@.09½
Bichromate, Am.	"	.08½@.08½
Scotch	"	.11
Bromide	"	.16
Carbonate (80@85%)	"	.03½@.04
Caustic, ordinary	"	.04½@.05
Elect. (90%)	"	.05½
Chloride (muriate), 100 lb.		1.90
Chlorate, powdered	"	.09½@.09½
Crystals	"	09@09½
Cyanide (98@99%)	"	.18@.19
Kainite, long ton, bulk, 8.50; bags, 9.50.		
Permanganate	lb.	10@10½
Prussiate, yellow	"	.16@.16½
Red	"	.33@.38
Sulphate	100 lb.	2.18½@2.21½
PYRITE—		
Domestic, non-arsenical, furnace size, f.o.b. mines	per unit	11@11½c
Domestic, non-arsenical, fines, per unit, f.o.b. mines		10@10½c.
Imported non-arsenical, furnace size, per unit		.13@.13½
Imported, arsenical, furnace size, per unit		12@12½c.
Imported fines, arsenical, per unit.		8½@9c.
" " non-arsenical, per unit		10½@11c.

Pyrite prices are per unit of sulphur. An allowance of 25c. per ton is made when delivered in lump form.

SALT—N. Y. com. fine 280 lb.	bbl.	.72@1.18
N. Y. agricultural	sh. ton.	3@4.40
SALTPETER—Crude	100 lb.	3.75@4.00
Refined, crystals	"	5.25@5.75
SILICA—		
Ground quartz, ord'ry	sh. ton	13.00@15.00
Silex	"	13.00@30.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Nitrate, crystals	oz.	.43½@.45½
SODIUM—		
Acetate	lb.	.04@.04¼
"Alkali," per 100 lb., 58/48		.80@.87½
Bicarb. soda, per 100 lb		1.20@1.50c.
Soda, caustic, per 100 lb., 76/60		1.80@1.90
" " powdered		.02¾@.03½
Salt cake, per 100 lb		.65@.85
Soda, monohydrate, per lb		1¼c.
Bichromate	lb.	.06½@.06¾
Bromide	"	.16
Chlorate, com'l	"	.08½@.09
Cyanide, ("100% KCN")	"	.18@.19
Hyposulphite, Am	"	1.35 up
German	"	1.60@1.70
Phosphate	100 lb.	1.80@1.90
Prussiate	"	.11@.11½
Sal soda, f.o.b. N. Y	100 lb.	.70@.75
Foreign, f.o.b. N. Y.	"	.80@1.00
Silicate, com'l	100 lb.	.75@1.15
Sulphate, com'l, (Glauber's salt)	100 lb.	.45@.50
" " calcined		.65@.85
STRONTIUM—Nitrate	lb.	.08½@.08¾
SULPHUR—		
Louisiana (prime) to New York, Boston or Portland	lg. ton	22.12½
To Philadelphia or Baltimore	"	22.50
Roll	100 lb.	1.85@2.15
Flour	" "	2.00@2.40
Flowers, sublimed	" "	2.20@2.60
TERRA ALBA—French & Eng.	100 lb.	.90@1.00
TALC—Domestic	sh. ton.	15.00@20.00
French, best	"	20.00@25.00
Italian, best	"	35.00@40.00
TIN—Bi-chloride, 50%	lb	.12 up
Crystals	"	.25 up
Oxide, lb		.47@.49
URANIUM—Oxide	"	3.50
ZINC—Metallic ch. pure	"	.15
Chloride solution, com'l	"	.02½@.04
Chloride, granular	"	.04½@4½
Dust	"	.05½@.06½
Sulphate	"	.02½@.02¾

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.

DIVIDENDS.

Metal and Mining Companies—U. S.

Name of Company and Location.		Authorized Capital	Shares. Issued.	Par Val.	Dividends. Total to Date.	Latest. Date.	Amt.
Alaska Mexican, g.	Al'ka	$1,000,000	180,000	$ 5	$1,572,381	Jan. 1907	$ .50
Alaska Treadwell,g.	Al'ka	5,000,000	200,000	25	9,235,000	Jan. 1907	1.00
Alaska United, g.	Al'ka	1,000,000	180,200	5	306,340	Jan. 1907	0.30
Amalgamated, c,.	Mont	155,000,000	1,530,879	100	47,523,030	Feb. 1907	2.00
Am.Sm.&Ref.,com.	U. S.	50,000,000	500,000	100	9,625,000	Apr. 1907	1.75
Am. Sm. & Ref. pf.	U. S.	50,000,000	500,000	100	23,588,053	Apr. 1907	1.75
Am. Smelters, pf. A	U. S.	17,000,000	170,000	100	1,430,000	Mar. 1907	1.50
Am. Smelters. pf. B	U. S.	30,000,000	300,000	100	2,625,000	Mar. 1907	1.25
Anaconda,c.	Mont	30,000,000	1,200,000	25	34,850,000	Apr. 1907	1.75
Annie Laurie, g.	Utah	5,000,000	25,000	100	465,061	July 1905	.50
Arizona, c	Ariz	3,775,000	3,682,520	.....	6,182,361	Apr. 1906	.05
Atlantic, c	Mich	2,500,000	100,000	25	990,000	Feb. 1905	.02
B. & H., l. z.	Mo	400,000	400,000	1	40,000	Dec. 1905	.01
Beck Tunnel, g.s.l.	Utah	100,000	1,000,000	0.10	455,000	Feb. 1907	.40
Bingham & N.H.,c.g	Utah	2,000,000	226,000	5	22,600	Sept. 1906	.10
Boston & Montana.	Mont	3,750,000	150,000	25	47,875,000	Nov. 1906	12.00
Bull.Beck.&Cham.g	Utah	1,000,000	100,000	10	2,548,400	Mar. 1907	.10
Bunker Hill & Sull.	Ida	3,000,000	300,000	10	8,406,000	Mar. 1907	.60
Butte Coalition,c.s.	Mont	15,000,000	1,000,000	15	1,300,000	Mar. 1907	.50
Calumet & Arizonac	Ariz	2,500,000	200,000	10	7,000,000	Mar. 1907	5.00
Calumet & Hecla,c.	Mich	2,500,000	100,000	25	101,400,000	Mar. 1907	20.00
Camp Bird, g., s.	Colo	5,500,000	820,000	5	3,587,500	Jan. 1907	.24
Carisa, c.g.	Utah	500,000	500,000	1	55,000	Nov. 1906	.01
Central Eureka, g.	Cal	400,000	398,425	1	778,921	Mar. 1906	.07
Columbus Con. c.	Utah	1,500,000	300,000	5	105,000	Apr. 1907	.20
Combi'tion Co.G'f'd	Nevada	400,000	320,000	1	688,000	Sept. 1906	.15
Con. Mercur, g.	Utah	1,000,000	1,000,000	1	1,205,000	Dec. 1906	.02½
Continental, z. l.	Mo	550,000	22,000	25	187,000	Jan. 1907	.50
Copper Range Con.	Mich	38,500,000	383,781	100	4,558,896	Apr. 1907	2.00
Creede United, g.	Colo	2,000,000	1,625,000	1	214,053	July 1906	.00½
Cripple Creek Con.g	Colo	2,000,000	2,000,000	1	180,000	Mar. 1905	.00½
Daly Judge, g. s. l.	Utah	300,000	300,000	1	225,000	Apr. 1907	.37½
Daly West, g. s. l.	Utah	3,600,000	180,000	20	5,607,000	Mar. 1907	.60
De Lamar, g. s.	Ida	400,000	67,180	5	2,926,370	May 1905	.72
Dillon, g.	Colo	1,250,000	1,250,000	1	21,875	July 1905	.01
Doctor Jack Pot.	Colo	3,000,000	3,000,000	1	268,000	July 1906	.00½
Doe Run, l.	Mo	10,000,000	59,062	100	1,228,320	Mar. 1907	.50
Elkton Con., g.	Colo	3,000,000	2,500,000	1	1,841,960	Feb. 1907	.01½
El Paso, g.	Colo	2,500,000	2,450,000	1	1,022,750	June 1906	.01
Fed. Sm., com.	Idaho	10,000,000	60,000	100	2 048,750	Mar. 1907	5.00
Federal Sm., pf.	Idaho	20,000,000	120,000	100	2,651,250	Mar. 1907	1.75
Findley, g.	Colo	1,250,000	1,250,000	1	325,000	Aug. 1906	.01
Frances-Mohawk,g	Nevada	1,000,000	1,000,000	1	141,000	Dec. 1906	1.10
Gemini-Keystone	Utah	500,000	5,000	100	1,850,000	July 1906	10.00
Gold King Con	Colo	5 750,370	5,750,370	1	1,407,504	May 1905	.01
Gold Sovereign	Colo	2,000,000	2,000,000	1	10,000	Jan. 1905	.00½
Grand Central, g.	Utah	250,000	250,000	1	1,131,000	Jan. 1907	.06
Gwin Mine, Dev., g.	Cal	1,000,000	100,000	10	35,000	Mar. 1906	.25
Hecla, s. l.	Idaho	250,000	1,000,000	0.25	870,000	Mar. 1907	.02
Homestake, g.	S. D	21,840,000	218,400	100	22,134,840	Mar. 1907	.50
HornSilver,g.s.c.z.l	Utah	10,000,000	400,000	25	5,602,000	Mar. 1907	.05
Inter'l Nickel, pf.	N. Y.	12,000,000	87,415	100	655,613	May 1907	1.50
Iron Silver.	Colo	10,000,000	500,000	20	4,000,000	Apr. 1907	.20
Jamison, g.	Cal	3.900 000	390,000	10	258,970	Jan. 1907	.03
Jerry Johnson.	Cal	2,500,000	2,500,000	1	61,700	Apr. 1906	.03
Kendall, g.	Mont	2,500,000	500 000	5	1,080,000	Mar. 1907	.03
Liberty Bell,g. s.	Colo	700,000	130,551	5	110,857	Jan. 1906	.15
Lightner, g.	Cal	125,000	102,255	1	295,694	Aug. 1905	.05
Mammoth, g. s. l.	Utah	10,000 000	400,000	25	2,080.000	Oct. 1906	.05
Mary McKinney, g.	Colo	1,500,000	1,304,252	1	762,629	Jan. 1907	.03
Mohawk, c.	Mich	2.500,000	100,000	25	900,000	Jan. 1907	4.00
Mont. Ore Purch.	Mont	2,500,000	80,833	25	9,437,274	Jan. 1907	15.00
Monument, g	Colo	300,000	300,000	1	27,124	Apr. 1905	.01
New Century, z., l.	Mo	300,000	300,000	1	211,500	Nov. 1906	.01
New Idria, q	Cal	500,000	100,000	5	900,000	Apr. 1907	.20
New Jersey Zinc	U. S.	10,000,000	100,000	100	8,400,000	Feb. 1906	3.00
North Butte	Mont	6,000,000	400,000	15	4,200,000	Mar. 1907	2.00
North Star, g	Cal	2,500,000	250,000	10	1,336,989	Mar. 1907	.20
Northern Light,g.s.	Utah	2,000,000	400,000	5	20,000	Feb. 1904	.05
Old Dominion Cop.	Ariz	7,500,000	281,589	25	280,843	May 1906	.50
Old Gold	Colo	2,101,150	2,101,150	1	10,506	Mar. 1906	.05
Ophir, g. s	Nevada	302,400	100,800	3	1,797,400	July 1904	.25
Osceola, c	Mich	2,500,000	96,150	25	6,362,600	Jan. 1907	6.00
Parrot, c,s.	Mont	2,300,000	229,850	10	6,692,724	Mar. 1907	.25
Pennsylvania, g.	Cal	5,150,000	51,500	100	284,925	July 1905	.10
Platteville, l. z.	Wis.	20,000	500	40	89,500	Oct. 1905	10.00
Portland, g.	Colo	3,000,000	3,000,000	1	7,267,080	Jan. 1907	.04
Quincy, c	Mich	3,750,000	110,000	25	16,965,446	Mar. 1907	4.50
Rob Roy, z.	Mo	15,000	15,000	1	9,600	May 1906	.03
Rocco Homest'k,l.s.	Nevada	300,000	300,000	1	112,000	Dec. 1905	.02
Sacramento, g, q.	Utah	5,000,000	1,000,000	1	245,000	Nov. 1906	.00½
Salvator, g. s. l.	Utah	200,000	200,000	1	6,500	Aug. 1904	.01
St. Joseph, l.	Mo	20,000,000	1,000.000	10	5,108,357	Mar. 1907	.15
Silver Hill, g s	Nevada	108,000	108,000	1	59.400	Feb. 1906	.05
Silver King, g. s. l.	Utah	3.000,000	150,000	20	10,675,000	Dec. 1906	.33½
Shannon, c.	Ariz	3,000,000	300,000	10	300.000	Mar. 1907	.50
Snowstorm, s. l.	Ida	1,500,000	1,500,000	1	135,000	Jan. 1907	.03
Spearfish, g.	S. D	1,500,000	1,500,000	1	165,500	Jan. 1905	.01½
Standard Con., g. s.	Cal	2 000,000	178,600	10	5,139,061	Mar. 1907	.10
Stratton'sIndepend	Colo	5.500,000	1,000,007	5	4,895,865	Apr. 1906	.12½
Tamarack, c	Mich	1.500,000	60,000	25	9,180,000	Jan. 1907	3.00
Tennessee, c.	Tenn	5,000,000	175,000	25	1,093,750	Jan. 1907	1.25
Tomboy, g. s.	Colo	1.750,000	300,000	5	900.000	June 1906	.48
Tonopah of Nev.	Nevada	1,000,000	1,000,000	1	3,000,000	Apr. 1907	.35
Tonopah Belmont	Nevada	2,000,000	1,295,007	1	259,000	Jan. 1907	.10
Tonopah Ext'nsion	Nevada	1,000,000	928,433	1	278,530	Apr. 1906	.15
Tonopah Midway	Nevada	1 000,000	1,000,000	1	300,000	Jan. 1907	.05
Uncle Sam, g.s.l.	Utah	500,000	500,000	1	130 000	Oct. 1906	.01
United Cop. com.	Mont	75,000,000	450,000	100	5,175,000	Apr. 1907	1.75
United, c. pf	Mont	5 000,000	50,000	100	1,350,000	Nov. 1906	3.00
United, z. l., com	Mo	500,000	92,400	5	27,450	Oct. 1903	.05
United, z. l., pf	Mo	500,000	19,556	25	247,680	Jan. 1907	.50
United, (Crip'le C'k)	Colo	5,000,000	4,009,100	1	280,071	Apr. 1905	.00½
United Verde, c.	Ariz	3,000,000	300,000	10	17,085.322	Dec. 1904	.75
Un.States,pf.g.s.c.l*	Utah	37.500,000	750,000	50	3,281,250	Apr. 1907	.87½
U.S. Red. & Ref. Pf	Colo	4,000.000	39,458	100	887,130	Apr. 1907	1.50
Utah, g.(Fish Sp'gs)	Utah	1,000,000	100,000	10	243 000	Jan 1907	.03
Utah Con., c.	Utah	1,500,000	300,000	5	6,486,000	Apr. 1907	1.50
Victoria, Utah	Utah	250,000	250,000	1	77,000	Jan. 1907	.04
Vindicator Con., g.	Colo	1,500,000	1,500,000	1	1,560,000	Jan. 1907	.03
Wolverine, c.	Mich	1,500,000	60,000	25	4,050,000	Apr. 1907	10.00
Work, g	Colo	1,500,000	1,500,000	1	90,000	Apr. 1907	.01
Yankee Con	Utah	500,000	500.000	1	140,000	Jan. 1907	.03

*Previous to consolidation $1,436,250 were divided.

Coal, Iron and Other Industrials—United States.

Name of Company and Location.		Authorized Capital.	Shares. Issued	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Ala. Con., C. & I., pf.	Ala	$2,500,000	24,638	100	$905,265	May 1905	$1.75
Allis-Chalmers, pf.	U. S.	25,000,000	200,000	100	3,213,750	Feb. 1904	1.75
Amer. Ag. Chem., pf.	U. S.	20,000,000	181,530	100	7,375,870	Apr. 1907	3.00
American Cement.	Pa.	2,000,000	200,000	10	1,028,000	Jan. 1907	.40
American Coal.	Md	1,500,000	50,000	25	2,195,000	Mar. 1907	7.50
Associated Oil.	Cal	21,000,000	21,000,000	1	630,000	Aug. 1905	.01½
Bethlehem Steel, pf.	Pa.	15,000,000	150,000	100	900,000	Nov. 1906	.75
Cambria Steel.	Pa.	50,000,000	900,000	50	8,212,500	Feb. 1907	.62½
Caribou Oil.	Cal	100,000	80,000	1	56,000	July 1905	.07
Central C. & C., com.	Mo	5,125,000	51,250	100	1,921,875	Apr. 1907	1.50
Central C. & C., pf.	Mo	1,875,000	18,750	100	1,265,626	Apr. 1907	1.25
Central Oil	W. Va.	1,500,000	60,000	25	182,500	May 1904	.25
Claremont Oil.	Cal	500,000	450,000	1	58,500	June 1905	.01
Col. & Hock. C. & I.	Ohio	7,000,000	69,244	100	173,086	Feb. 1905	.25
Consolidated Coal	Ill.	5,000,000	50,000	100	350,000	July 1904	1.00
Consolidation Coal.	Md.	10,250,000	102,500	100	8,801,650	Feb. 1907	3.50
Crucible Steel, pf.	Pa.	25,000,000	250,000	100	1,000,000	Sept. 1906	1.50
Empire S. & I., pf.	N. J.	5,000,000	25,000	100	637,500	Jan. 1907	3.00
Fairmont Coal,	W. Va.	12,000,000	120,000	100	1,384,000	Feb. 1907	3.00
Four Oil.	Cal	500,000	300,000	1	105.406	July 1905	.01
General Chem. Com.	U. S.	12,500,000	74,103	100	1,745,125	Mar. 1907	2.00
General Chem., pf.	U. S.	12,500,000	100,000	100	4,540,178	Apr. 1907	1.50
George's C'k Coal	Md	2,500,000	22,000	100	1,188,000	July 1904	3.00
Imperial Oil	Cal	1,000,000	100,000	100	880,000	July 1905	.20
International Salt.		30,000,000	182,280	100	927,060	Dec. 1906	1.00
Jeff. & Cl'f C. & I., cm	Pa.	1,500,000	15,000	100	330,000	Aug. 1905	5.00
Jeff. & Cl'f. C. & I., pf	Pa.	1,500,000	15,000	100	825,500	Aug. 1906	2.50
Kern River Oil.	Cal	2,000,000	20,000	100	39,500	May 1905	.13
Lehigh Coal & Nav.	Pa.	14,345,650	346,897	50	24,920,891	Nov. 1906	2.00
Maryland Coal,pf.	Md	2,000,000	18,850	100	1,517,160	Dec. 1906	4.00
Monon R. Coal, pf.	Pa.	10,000,000	100,000	100	3,154,945	Jan. 1906	.97
Monte Cristo Oil.	Cal	500,000	500 000	1	120,000	July 1905	.01
National Carbon, pf.	U. S.	4,500,000	45,000	100	2,047,500	May 1905	1.75
National Lead, com.	N. Y.	15,000,000	149,054	100	1,788,648	Jan. 1907	1.00
National Lead, pf.	N. Y.	15,000,000	149,040	100	16,062,508	Mar. 1907	1.75
Nat'l Steel & Wire,pf.	N. Y.	5,000,000	25,778	100	631,561	May 1906	1.75
New Central Coal	Md.	1,000,000	50,000	20	330,000	Nov. 1906	.40
New River Coal, pfd.	W. Va.	4.000,000	3,761,700	100	564,255	Nov. 1906	1.50
Pacific Coast Borax.	Cal	2,000,000	19,000	100	2,086,500	Aug. 1905	1.00
Peerless Oil.	al	1,000,000	92,000	10	396,320	May 1906	.14
Penna. Salt.	Pa.	3,000,000	60,000	50	14,528,000	Apr. 1907	3.00
Penna. Steel.	Pa.	25,000,000	168,214	100	7,026,995	Nov. 1906	3.50
Phila. Gas, com	Pa.	28,953,029	579,061	50	6,684,142	Nov. 1905	.75
Phila. Gas, pf.	Pa.	5,744,813	114,896	50	1,583,505	Mar. 1905	1.25
Pittsburg Coal, pf.	Pa.	32,000,000	297,010	100	11,434,962	Apr. 1905	1.75
Pocahontas Coll., pf.	W. Va.	1,500,000	15,000	100	437,500	Feb. 1907	1.50
Republic I. & S., pfd.	Ill.	25,000,000	204,169	100	4,136,612	Apr. 1907	3.75
Sloss-Sheffield, com.	Ala	7,500,000	75,000	100	750,250	Oct. 1906	2.50
Sloss-Sheffield, pf.	Ala	20,000,000	67,000	100	3,177,250	Mar. 1907	1.25
Standard Oil.	U. S.	100,000,000	970,000	100	334,035,000	Mar. 1907	15.00
Tenn. C. & I., com	Tenn	22,553,600	225,536	100	2,906,425	Feb. 1907	1.00
Tenn. C. & I., pf.	Tenn	248,000	2,480	100	380,090	Feb. 1907	2.00
Texas & Pacific Coal.	Texas	2,000,000	20,000	100	1,930,000	Mar. 1905	2.00
Thirty-three Oil.	Cal	500,000	100,000	5	430,000	July 1905	.10
Union Oil	Cal	10,000,000	100,000	100	1,118,766	May 1905	.50
U. S. SteelCorp.,cm.	U. S.	550,000,000	5,083,025	100	63,500,028	Mar. 1907	.50
U. S. Steel Corp., pf.	U. S.	360,281,100	3,603,141	100	174,844.308	Feb. 1907	1.75
Va. Carolina Ch., pf.	U. S.	20,000,000	180,000	100	11,820,869	Apr. 1907	2.00
Westmoreland Coal.	Pa.	3,000,000	60,000	50	8,580,000	Oct. 1905	2.50

Canada, Mexico, Central and South America.

Name of Company and Location.		Authorized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Amistad y Conc'rdia.	Mex	$480,000	9,600	50	$258,064	Jan. 1905	$1.71
Buffalo, s.	Ont.	1,000,000	900,000	100	81,000	Apr. 1907	.03
Butters' Salvador, g.	Salv	750,000	150,000	5	600,000	Apr. 1905	.25
Cariboo McKin'y, g.	B. C.	1,250,000	1,250,000	1	546,837	Feb. 1904	.04
Consolidated M & S.	B. C.	5,500,000	48,338	100	473,255	Feb. 1907	2.50
Copiapo, c.	Chile	1,125,000	112,500	10	3,000,900	Oct. 1904	1.20½
Crow's Nest Pass	B. C.	3,500,000	140,000	25	1,581,148	Apr. 1906	.62½
Dominion Coal, com.	N. S.	15,000,000	150,000	100	2,100,000	Apr. 1907	1.00
Dominion Coal, pf.	N. S.	3,000,000	30,000	100	3,330,000	Jan. 1905	4.00
Dos Estrellas, g. s.	Mex	150,000	3,000	50	1,020,555	July 1905	13.65
El Oro, g. s.	Mex	5,750,000	1,080,000	5	2,708,800	July 1904	.18
Esperanza, s. g.	Mex	2,275,000	455,000	5	6,121,049	Apr. 1907	1.32
Foster Cobalt, s.	Ont.	1,000,000	1,000,000	1	50,000	Jan. 1907	.05
Granby Con.	B. C.	15,000,000	1,350,000	10	2,158,630	Mar. 1907	.30
Greene Con. Copper.	Mex	8,640,000	864,000	10	5,814,200	Mar. 1907	.40
Greene Con. Gold.	Mex	5,000,000	500,000	10	300,000	July 1905	.20
GreenGold-Silv'r,pfd	Mex	3,000,000	300,000	10	120,000	Mar. 1907	.40
Guanajuato	Mex	3,000,000	540,000	5	74,250	Oct. 1906	.07½
Guggenheim Expl.	Mex	17,000,000	105,000	100	3,172,500	Apr. 1907	2 50
Kerr Lake, s.	Ont.	3,000,000	600,000	5	210,000	Oct. 1906	.10
LeRoi No. 2, g.	B. C.	3,000,000	120,000	25	716,400	Feb. 1907	.24
McKinley-Darragh,s	Ont.	2,500,000	2,000,000	1	100,000	Mar. 1907	.02
Mexican Coal & Coke	Mex	5.000,000	50,000	100	600,000	Dec. 1905	3.00
Mex. Con. M. & S. Co.	Mex	2,500,000	240,000	10	360,000	Feb. 1907	.50
Mines Co. of Am.	Mex	2,000,000	2,000,000	1	2,545,000	Mar. 1907	.02
N. Y. & Hond. Ros.	C. A.	1,500,000	150,000	10	2,257,000	Feb. 1907	.20
Nipissing, s	Ont.	6,000,000	1,200,000	5	960,000	Apr. 1907	.15
North Star.	B. C.	1,500,000	1,300,000	1	351,000	Dec. 1904	1.00
N. S. St. & Coal, com.	N. S.	5,000,000	49,703	100	788,600	Nov. 1904	2.00
N. S. St. & Coal, pf.	N. S.	1,030,000	10,300	100	375,950	Apr. 1907	1.50
Penoles*	Mex	250,000	2,500	100	7,813,375	Dec. 1906	20.00
Platanillo.	Mex	500,000	206,989	1	5,580	Sept. 1906	.00½
Reco, g. s. l.	B. C.	1,000,000	958,000	1	327,082	Apr. 1906	.02
Silver Queen, s.	Ont.	1,500,000	1,500,000	1	130,000	Jan. 1907	.08
Slocan Star.	B. C.	500,000	500,000	1	575,000	Dec. 1904	.05
St. Eugene Con.	B. C.	3,500,000	3,202,000	1	402,120	Oct. 1905	.02
Tezuitlan Copper.	Mex	1,000,000	10,000	100		Apr. 1907	2.00
Tilt Cove, c.	N. F.	1,000,000	89,000	2	21,360	Jan. 1905	.48
Tretheway, s	Ont.	1,000,000	1,000,000	1	80,000	Mar. 1907	.04
Tyee, c.	B. C.	940.000	180.000	5	136.800	Dec. 1904	.24

*Mexican Currency.

THE MINING INDEX.

The editors of this paper read all the important publications of the world that relate to mining and the treatment of minerals. This index is published as a reference for all interested and to make it impossible for readers of the ENGINEERING AND MINING JOURNAL to miss any important article published anywhere.

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BAUXITE

2772—BAUXITE INDUSTRY of the South. Edw. K. Judd. (Eng. and Min. Journ., Mar. 23, 1907; 1½ pp.) Outlines the occurrence of the ore, distribution of the mining industry, and the mining methods used in this Georgia-Alabama bauxite field, with a few notes on methods of cleaning and drying the ore. 20c.

CEMENT

2773—CEMENT BURNING—Zementbrennen im Drehrohrofen. (Tonindustrie-Zeit., Feb. 16, 1907; 1 p.) Gives some notes on the operation of revolving kilns for burning cement clinker, and points out especially the saving in fuel which results from burning finely crushed marl and coal in this type of furnace. 40c.

2774—PORTLAND CEMENT—Aus Pommerns Ziegel-, Zement- und Kalkindustrie. H. Hirsch. (Tonindustrie-Zeit., Mar. 7 and 12, 1907; 5 pp.) Describes the equipment of the "Stern" portland cement factory at Stettin in Finkenwalde, Germany, outlining the very modern methods and appliances to be found there. Also gives account of the "Quistorp" cement works in Lebbin, near Wollin, Pommerania. 60c.

CLAY

2775—BENTONITE in the Rocky Mountain Region. A. Lakes. (Min. Rep., Mar. 7, 1907.) Brief note on the occurrence of this peculiar hydrous silicate of alumina in the Rocky Mountain region. 20c.

2776—COLORADO—Whiteware Possibilities of Colorado Raw Materials. S. Geysbeek. (Trans. Am. Ceramic Soc., Vol. VIII, 1906; 13 pp.) Gives analyses of various characteristic clays and kaolins of Colorado, and describes the methods of mining the famous Denver fireclay.

2777—KAOLIN—Kaoline und feuerfeste Erzeugnisse in Russland. (Tonindustrie-Zeit., Feb. 21, 1907; 2½ pp.) Notes on the distribution and production of kaolin and refractory materials in Russia. 20c.

2778—KENTUCKY—Note on a High-Alumina Flint Clay. F. Greaves-Walker. (Trans. Am. Ceramic Soc., Vol. VIII, 1906; 3½ pp.) Describes briefly some occurrences of fire clay in Kentucky with notes on the character of several of the principal varieties.

2779—MINING—The Preparation of Clay for Dry Press Brick Manufacturing. E. Ogden. (Trans. Am. Ceramic Soc., Vol. VIII, 1906; 11 pp.) Describes the occurrence and mining of the clay deposits of Terry Co., Ohio, and the method of preparing the clay for the manufacture of bricks.

2780—ROCK DECOMPOSITION and Clay Formation in the Laboratory. A. S. Cushman. (Trans. Am. Ceramic Soc. Vol. VIII, 1906; 17 pp.) Description of the methods used and the results obtained in a series of laboratory experiments made for the purpose of kaolinizing orthoclase, with the idea of obtaining exact information upon natural processes of rock decomposition.

COAL AND COKE

2781—ACCIDENTS—Causes and Prevention of Disasters in Mines. G. Farmer. (Cassier's Mag., Feb., 1907; 8 pp.) Reviews briefly the statistics of notable colliery explosions, and discusses in considerable detail causes of explosions and practical methods by which they may be prevented. 40c.

2782—BELGIUM—Rapports Administratifs. Extraits des Rapports de O. Ledouble, A. Pepin, V. Lechat et J. Julin. (Ann. des Mines Belg., T. XII, 1 livr., 1907; 25 pp.) Extracts from administrative reports, giving a summary of conditions in the Belgian mining industry, covering accidents, developments, etc.

2783—CANADA—Western Coal Resources. J. C. Gwillim. (Can. Min. Journ., Mar. 15, 1907; 3 pp.) Mentions briefly the occurrence of coal in a few of the principal fields in British Columbia, and describes the equipment and operation of the International Coal and Coke Co., at Coleman. 20c.

2784—COAL CUTTING—Ueber das Schrämverfahren Patent Neukirch. Seyboth. (Glückauf, Feb. 23, 1907; 11 pp.) Describes the Neukirch system of coal-cutting which consists in fastening cutting edges in the strands of an endless wire rope. Tabulated data of the efficiency of the machine and method of laying out work are given. 40c.

2785—COAL FORMATION—Die fossilen Kohlen. E. Donath. (Oest. Zeit. f. B. u. H., Feb. 23, Mar. 2 and 9, 1907; 12 pp.) An inquiry into the process of coal formation, reviewing the results obtained and the opinions held by various investigators, with an account of work done by the author. $1.00.

2786—COAL HANDLING—Fördereinrichtungen vor Ort auf englischen und amerikanischen Steinkohlengruben. (Glückauf, Mar. 2, 1907; 3 pp.) A description of English and American practice in using belt conveyors for transporting coal underground, with resultant lessened handling cost. 40c.

2787—COAL HANDLING—Handling the Coal Output in Southern Illinois. E. J. Wallace. (Eng. and Min. Jour., Feb. 23, 1907; 1½ pp.) Describes the successful operation of the novel method of providing passenger transportation between coal mines and adjacent towns along with the moving of freight, as practiced on the Coal Belt Railway of Illinois. 20c.

2788—COAL MINING—Formula for Mining Thin Seams of Coal. M. S. Hachita. (Eng. and Min. Journ., Feb. 2, 1907; ½ p.) Derives a mathematical formula for breast and chamber workings in thin coal seams. 20c.

2789—COAL MINING—Large Coal Mine Outputs. F. C. Keighley. (Mines and Min., Mar., 1907; 1½ pp.) Discussion of some of the causes which fix the limit to which development of coal mines for large outputs can be carried. 20c.

2790—COAL MINING—Removing Pillars in Coal Mines. W. Hardy. (Min. Wld., Mar. 9, 1907; 1 p.) Abstract of paper read before the Coal Mining Institute, giving notes from the author's experience on various methods of robbing pillars in coal mines. 20c.

2791—COAL MINING—The Technics of Coal Mining. G. H. Winstanley. (Min. Engineering, Mar., 1907; 3½ pp.) Continuation of article previously indexed, dealing in this instalment with the principles of applied mechanics in mining. 20c.

2792—COAL STORAGE and Coal Conveying Systems. F. Koester. (Power, Apr., 1907; 6 pp.) Describes some of the modern methods employed in handling fuel for large power stations in this country and abroad. 20c.

2793—COAL STORAGE Under Water at Hawthorne, Ill. (Eng. and Min. Journ., Mar. 23, 1907; 1½ pp.) Describes the construction of concrete coal storage pits of the Western Electric Co. of Chicago, with a brief discussion of the losses in heating value of coal which is stored in open air. 20c.

2794—COKE—Census of Manufactures, 1905: Coke. (Bull. 65 of the Dept. of Com. and Labor, Bur. of the Census, 1907; 55 pp.) Gives the statistics of the production of oven coke in the United States, and describes the present state of the coking industry at the principal producing fields.

2795—COKE—Die Beurteilung von Koks nach seinem Aussehen. A. Thau. (Glückauf, Mar. 9, 1907; 6 pp.) A discussion of the principles by which the quality of coke may be judged quickly and with reasonable certainty without chemical analysis. 40c.

2796—COKE—Manufacture of Coke from Western Coal. R. S. Moss. (Min. Wld., Mar. 16, 1907; 1 p.) Discusses the reasons for the failure of the St. Louis coal-testing plant successfully to coke Western coals, and describes the successful procedure used by the author to accomplish this end. 20c.

2797—DAM—Air-tight Dam for Underground Mine Fires. M. Delafosse. (Eng. and Min. Journ., Mar. 2, 1907; ½ p.) Abstract of paper read before the Société de l'Industrie Minérale, Paris, showing a method of constructing an air-tight dam, which can be used to seal off affected portions of workings in gaseous mines. 20c.

2798—DAMS IN COAL MINES. Richard Lee. (Eng. and Min. Journ., Feb. 23, 1907; ½ p.) Describes the construction of wooden dams for isolating portions of workings that are filled with water, these dams having the advantage of being more flexible than masonry and becoming tighter during use on account of swelling. 20c.

2799—DIAMOND DRILLING—Cost of Diamond Drilling in Coal Measures. W. F. Murray. (Eng. and Min. Journ., Feb. 23, 1907; ½ p.) A consideration of various features of prospecting for coal by diamond drills, with a statement of conditions which influence cost. Actual data of cost of drilling in three districts in Colorado are included. 20c.

2800—ELECTRIC MACHINERY—L'Electricité dans les mines. Beyling. (Ann. des Mines Belg., T. XII, 1 livr., 1907; 27 pp.) Continuation of lengthy serial previously mentioned in the Index, this instalment outlining a series of experiments to determine the efficiency of wire cloth as a means of preventing the transmission of flames in gaseous mines, with special reference to protecting electric machines from igniting gas by sparking.

2801—ELECTRIC POWER—The Use of Electricity in Anthracite Mining. H. M. Warren. (Eng. and Min. Journ., Feb. 2 and Mar. 2, 1907; 3½ pp.) Discusses some of the reasons why electricity is being introduced so extensively in coal mining and compares the advantages of modern equipment over obsolete methods. 20c.

2802—ENGLISH COLLIERIES—Number Four Pit—Baryton Domain Collieries, Cumberland, England. R. P. Cowen, (Journ. Can. Min. Inst., Vol. IX, 1906; 11 pp.) Gives details of equipment, development and surveying as practiced at this English mine.

2803—HAULAGE—Altering the Surface Haulage at a Small Colliery. J. Foster. (Journ. Brit. Soc. Min. Students, Feb., 1907; 4½ pp.) Describes a method used in making surface alterations in this Staffordshire colliery where surface arrangements made it impossible to install systematic endless rope haulage.

2804—HAULAGE—The Lubrication of Pit Tubs. H. Palmer. (Journ. Brit. Soc. Min. Students, Feb., 1907; 7½ pp.) Describes the construction and action of various types of lubricators employed on the axles and bearings of English mine wagons.

2805—HYGIENE—Hygiène des Charbonnages. (Annales des Mines de Belgique, Tome XII, 1 livr., 1907; 60 pp.) An illustrated description of the important advances in installing hygienic quarters for miners in the coal region of Liege, with illustrations of the wash rooms, baths, dressing rooms and other devices which show very humanitarian treatment of employes.

2806—ILLINOIS COAL TESTS. H. B. Dirks. (Eng. Rec., Feb. 23, 1907; 1 p.) Gives the results of various boiler tests upon different samples of Illinois coal; also a test of its gas producing powers. 20c.

2807—INDIANA—Methods of Mining in Indiana Coal Fields. F. W. Parsons. (Eng. and Min. Journ., Mar. 23, 1907; 3½ pp.) Describes briefly the methods of mining now practiced by the chief producers in Indiana. 20c.

2808—MINE GASES—Coal Mine Gases and Barometric Pressure. F. W. Parsons. (Eng. and Min. Journ., Mar. 2, 1907; 2½ pp.) Shows how changes in atmospheric pressure appear to be the common cause of colliery explosions, and discusses the frequent occurrence of accidents on Mondays. 20c.

2809—PENNSYLVANIA—The North Shaft Mine of the Susquehanna Coal Co. at Nanticoke, Pa. E. E. Winter. (Journ. Can. Min. Inst., Vol. IX, 1906; 11 pp.) An outline of the equipment and methods of working used at this Pennsylvania coal mine.

2810—PUMPS—Electrically Driven Colliery Pumps. A. Gradenwitz. (Eng. and Min. Journ., Mar. 9, 1907; 2 pp.) Discusses the advantages of the three-phase system as applied to driving pumps at this Belgian colliery, and describes in detail the construction of the motors and their connections which are especially designed to resist moisture. 20c.

2811—RESCUE APPARATUS—"Aerolith." Ein neuer Atmungsapparat. (Oest. Z. f. B. u. H., Mar. 9, 1907; 2½ pp.) Illustrated description of the construction and methods of wearing the new "Aerolith" portable respiration apparatus, designed to be used in rescue work in collieries. 40c.

2812—SAFETY LAMP—The Wolf Safety Lamp. L. H. Hodgson. (Trans. Min. Inst. of Scotland. Vol. XXIX, Part 2; 4½ pp.) Describes the construction of this safety lamp, which will give indications of fire damp when only ¾ of 1 per cent. is present in the air.

2813—SAFETY LAMPS—Acetylene Safety Lamps. L. H. Hodgson. (Trans. Min. Inst. of Scotland. Vol. XXIX, Part 2; 2½ pp.) Brief account of the construction of some acetylene safety lamps, with costs of operating.

2814—SHAFT SINKING—Note sur l'Enfoncement des Siéges Nos. 6 et 7 des Charbonnages de Bascoup. L. Larsimont. (Rev. univ. des Mines, T. XVII, 1907, 1 Trimestre; 12 pp.) A set of notes upon the progress made in sinking two shafts at the Bascoup coal mine in France, describing the means adopted in penetrating through sand and water-bearing strata. $1.

2815—SUPPLY OF COAL—How Long will the Coal Reserves of the United States Last? M. R. Campbell. (Indus. Wld., Mar. 16, 1907; 4 pp.) An investigation into the distribution, quality and uses of various coal deposits in the United States, with a view to estimating the time that they will last. 20c.

2816—TIPPLE—New Steel Tipple of A. L. Keister & Co. at the Lincoln Mine, Waltersburg, Pa. (Mines and Min., Mar., 1907; 1½ pp.) Describes the method of handling the coal on the surface of this Pennsylvanian mine. Illustrated. 20c.

COPPER

2817—BRASS CASTINGS. J. L. Jones. (Foundry, Feb., 1907; 6 pp.) Outlines the principles to be followed in selecting molding sands and the amounts of the various metals to be used in producing various grades of brass. 20c.

2818—BRITISH COLUMBIA COPPER COMPANY'S MINE and Smelter. F. G. Wickware. (Journ. Can. Min. Inst., Vol. IX, 1906; 42 pp.) Describes the orebodies of this Canadian copper mine, and gives a history of mining development and smelting methods used there at present.

2819—CALIFORNIA—Trinity Copper Mine in California. Kirby Thomas. (Min. Wld., Mar. 2, 1907; 2 pp.) History of the development of this California copper mine, in Shasta Co., with brief description of the ore body, and geology of the district surrounding the mine. 20c.

2820—CANADA—Further Observations Relative to the Occurrence of Deposits of Copper Ore on the North Pacific Coast and Adjacent Islands, from the Southern Boundary of British Columbia to the Alaskan Peninsula. W. M. Brewer. (Paper read before the Toronto meeting. Can. Min. Inst., Mar., 1907; 13 pp.) Describes the classes of copper ore occurrences in the various districts of the North Pacific coast, and enumerates some of the chief producing mines.

2821—COPPER TUBES—Ein neues Verfahren zur elektrolytischen Herstellung nahtloser Kupferrohre. E. Krause. (Zeit. f. angew. Chem., Feb. 22, 1907; 3 pp.) Describes in considerable detail this new process for making seamless copper tubes by electrolytic means, with illustrations of apparatus and formula for electrolyte. 40c.

2822—COPPER WIRE—Hard Drawn Copper Wire. T. Bolton. (Elec. Rev., Lond., Jan. 25, 1907; 2 pp.) Sums up the chief points in the present specifications for standards of copper wire, criticises them as not being practical, and suggests new standards as a result of many experiments on properties of wire. 40c.

2823—MONTANA—Washoe Smelter, Anaconda, Montana. (Bol. de la Soc. Nac. de Mineria, Nov., 1906; 10 pp.) A description of the organization, equipment and operations carried on at the Washoe smelter at Anaconda.

2824—NEVADA—Low-grade Copper Deposits at Ely, Nevada. W. S. Bullock. (Eng. and Min. Journ., Mar. 16, 1907; 3 pp.) Brief descriptions of the various mines in this copper camp, with an account of the methods of mining, and the concentrating and smelting works. 20c.

2825—NEVADA—The Old Camp of Ward, Nevada. H. R. Plate. (Min. and Sci. Press, Mar. 2, 1907; 1 p.) Brief account of the geological formations of this mine, and a description of the present state of the workings. 20c.

2826—NORTH CAROLINA—Copper in North Carolina. Richard Eames, Jr. (Eng. and Min. Journ., Mar. 23, 1907; ½ p.) Describes briefly several notable occurrences of copper in this State. 20c.

2827—ONTARIO—The Bruce Mines, Ontario, 1846—1906. H. J. C. Williams. (Paper read before the Can. Min. Inst., Toronto meeting, Mar., 1907; 19 pp.) Discusses the history of these famous copper mines and gives brief notes on the geology of the district, and the method of treating the ore.

2828—PERU—Region cuprifera de Cachicachi, Provincias de Tarma y Jauja. F. G. Fuchs. (Boletin de Minas, Lima, Peru, Jan. 21, 1907; 5½ pp.) A description of the physical, geological and mineralogical features of the copper district of Cachi-cachi, in the provinces of Tarma and Jauja, Peru.

2829—PYRITIC SMELTING—Lo que es la fundicion piritica. (Bol. de la Soc. Nac. de Mineria, Nov. and Dec., 1906; 5½ pp.) Continuation of article, discussing the composition and temperatures of formation of the typical slags and silicates obtained during pyritic smelting operations at Mount Lyell, N. S. W.

2830—PYRITIC SMELTING—Notes and Comments on the Pyritic Process of Mount Lyell, Tasmania. R. Nicholls. (Journ. Chem. Met. and Min. Soc. of South Africa. Jan., 1907; 2 pp.) Discussion by members of the Society of the above paper, which was previously mentioned in the Index. 60c.

2831—QUEENSLAND—The Cloncurry District. (Queens. Gov. Min. Journ., Jan., 1907; 2 pp.) General and superficial account of present conditions in this Queensland copper field. 60c.

2832—QUEENSLAND—The O. K. Copper Mine, North Queensland. R. L. Jack. (Queens. Gov. Min. Journ., Jan., 1907; 3½ pp.) Report of the engineer who examined this property, giving a description of the principal ore bodies, and the development which has been done on them, with statement of the ore reserves and prospects of future work. 60c.

2833—SERVIA—Les Mines and Usines de Bor. (L'Echo des Mines, Mar. 11, 1907; ½ p.) Gives a brief account of the situation, equipment, organization and present condition of the Bor copper mine in Servia. 20c.

2834—SIBERIA—Mining and Smelting in Southern Siberia. H. E. West. (Eng. and Min. Journ., Mar. 9, 1907; 3 pp.) Gives an account of the visit of the author to the Spassky Zavod copper smelter in Southern Siberia, describing the nature of the mineral deposit, and the means of transport from the Yuspennsky copper mines to the smelter. 20c.

2835—UTAH—The Sierra Madre Copper Region. (S. L. Min. Rev., Feb. 28, 1907; 3 pp.) General description of the physical, geographical and geological features of this Utah copper district, with brief references to the various producing mines in the region. 20c.

2836—WYOMING—Platinum-Copper Ores in Wyoming. (Min. Rep., March 7, 1907; 1½ pp.) Describes the location and ores in this noted Wyoming copper mine, and discusses briefly the metallurgy of the ores, which is complicated by the presence of platinum with the copper. 20c.

DIAMONDS

2837—SOUTH AFRICA—The Pniel Estate. Geology and Possibilities Described. W. Bleloch. (So. Afr. Mines, Feb. 9, 1907; 2½ pp.) Describes the geology of this African diamond district, gives a few notes on the river diggings, and discusses the probability of finding other payable diamond deposits in the region. 40c.

GOLD AND SILVER

2838—ALASKA—The Year 1906 in the Klondike District. J. P. Hutchins. (Eng. and Min. Journ., March 15, 1907; 2 pp.) Reviews mining progress during 1906 in this district, showing how the large-corporation plan is displacing the individual miner. 20c.

2839—ARIZONA—The Vulture Mine, Arizona. C. W. Purington. (Min. and Sci. Press, March 9, 1907; 2 pp.) Describes the mineralogical and geological features of this Arizona gold-mining camp, discussing also the genesis of the ore deposits. 20c.

2840—ARIZONA—Tombstone, Arizona, Restored. R. B. Brinsmade. (Mines and Min., March, 1907; 3½ pp.) Describes geological mining and milling conditions in Cochise county, with remarks on new developments of some of the old mines and the introduction of the cyanide process. 20c.

2841—ASSAY of Silver Bullion by Volhard's Method. E. A. Smith. (Instn. of Mg. & Met., Bull. No. 29, Feb. 14, 1907, and No. 30, March 14, 1907; 11 pp.) Discussion by members of the Institution of the above paper, which was previously mentioned in the Index, together with author's reply.

2842—BRITISH COLUMBIA—Cassiar and the Berry Creek Mine. C. Phillips-Wooley. (Can. Min. Journ., March 15, 1907; 1½ pp.) Describes mining operations at this placer in British Columbia, with brief notes on the results of some of the clean-ups. 20c.

2843—CALIFORNIA—The East Country of the Mother Lode. J. A. Reid. (Min. and Sci. Press, March 2, 1907; 1 p.) A description of the character of the ore deposits, and the results of the microscopical examination of the various country rocks and minerals which occur at the Shady Run mine in the Mother Lode. 20c.

2844—COBALT—Mines and Mining at Cobalt. W. G. Miller. (Can. Min. Journ., March 15, 1907; 4 pp.) Account of the history of the discovery of this camp, together with description of the geology and of the veins and their contained ores. 20c.

2845—COLORADO—The Gold Prince Mine and Mill. G. P. Scholl and R. L. Herrick. (Mines and Min., March, 1907; 8½ pp.) A very complete account of methods of mining on the Sunnyside lode, Colorado, describing in detail the concentrating process and the apparatus in use in the mills. 20c.

2846—COLORADO—The Maple Leaf Mine, Colorado. A. Lakes. (Min. Wld., March 9, 1907; 1 p.) Describes the mineral occurrences and geological features of this gold mine in the Gunnison district of Colorado. 20c.

2847—CYANIDATION at Copala, Mexico. L. N. B. Bullock. (Min. and Sci. Press, March 16, 1907; 1 p.) Describes briefly the methods used in cyaniding in this Mexico plant, where the briquetted product, incorporated with flux, is smelted without regrinding. 20c.

2848—CYANIDATION—Cyanide Works' Clean-up Practice. J. E. Thomas. (Journ. Chem. Met. and Min. Soc. of South Africa, Dec. and Jan., 1907; 4 pp.) Discussion by members of the Society of the above paper, which was previously mentioned in the Index. $1.

2849—CYANIDATION—Electrolytic Precipitation of Cyanide Solutions. C. P. Richmond. (Eng. and Min. Journ., March 16, 1907; 3½ pp.) Describes this process as perfected at the San Sebastian mine, at San Salvador, having the advantage of separating the copper in marketable form from the gold. 20c.

2850—CYANIDATION—Metallurgical Chart of Operations in the Mill of the Butters Copala mines in Sinaloa, Mexico. (Min. and Sci. Press, Feb. 16, 1907; 1 p.) Graphic representation of the work accomplished in this mill, showing the consumption of reagents, flow of pulp and time of treatment. 20c.

2851—CYANIDATION—Mr. Lamb and the Butters Filter. E. H. Nutter. (Min. and Sci. Press, Feb. 16, 1907; 1 p.) Contains replies to the objections made to this author's first paper on the subject of filter presses, in the light of additional information received. 20c.

2852—CYANIDATION—The Bulifrog Cyanide Mill. E. R. Ayres. (Eng. and Min. Journ., Feb. 23, 1907; 2½ pp.) Describes the course of operations by which the ore is treated in this Nevada mill, with elevations of the plant. 20c.

2853—CYANIDE PROCESS—Methods of Precipitation in the Cyanide Process. A. P. Busey, Jr. (Colo. Sch. of Mines Bull., Jan., 1907; 21 pp.) Discusses the principal methods of precipitating values from cyanide so-

lutions, with notes on the factors to be observed in obtaining the most efficient results. 60c.

2854—CYANIDE PROCESS—Recommending the Cyanide Process. H. F. A. Riebling. (Min. Rep., Feb. 28, 1907; 1 p.) Points out some precautions to be observed before accepting the results of favorable cyanide tests upon small-sized samples, which ordinarily would justify the erection of a large cyanide plant. 20c.

2855—CYANIDE TESTS on Timiskaming Ores. J. J. Robertson. (Journ. Can. Min. Inst., Vol. IX, 1906; 5½ pp.) Describes and discusses the results of cyanide tests made upon dump ore which contained native silver, nickel and cobalt.

2856—FRENCH GUIANA—Placer Mining in French Guiana. L. Delvaux. (Eng. and Min. Jonrn., March 2, 1907; 3½ pp.) Describes the dredging for gold on the Elysee placer, which has been highly successful, and gives an account of the new installation, which promises still better results. 20c.

2857—GENESIS OF ORE DEPOSITS—Pockets in the Upper Portion of Gold Veins. G. W. Kimble. (Min. and Sci. Press, March 16, 1907; 1½ pp.) Description of the occurrence of enriched pockets of ore at the intersection of dikes with quartz veins on the siopes of Mt. Thompson, Eldorado Co., Cal. 20c.

2858—GOLD DREDGING PRACTICE in Centrai Otago. H. R. Macdonald. (N. Z. Mines Rec., Dec. 17, 1906; 6 pp.) Continuation of articie previously indexed, discussing in this instalment various gold-saving devices, methods used in cleaning up, and the system of elevating tailings. 40c.

2859—GOLD MILLING—The Milling of Gold Ores. (L. A. Min. Rev., March 16, 1907; 1 p.) Describes the evolution of stamp-mill appliances and milling practice from early times to the present day in the West, and especially in California. To be continued. 20c.

2860—HYDROELECTRIC POWER — The Highest Hydroelectric Transmission Plant in the World, Caylloma Silver Mines, Peru. (Min. Journ., Feb. 23, 1907; 1½ pp.; and Engineer, London, Feb. 22, 1907; 2 pp.) Gives a brief history of the silver mines of Caylloma, with a description of the installation of an electric-power plant to supply power for compressors and pumps. 40c.

2861 — IDAHO — Progress in the Coeur d'Alene. (Min. and Sci. Press, Feb. 23, 1907; 2½ pp.) Enumerates the principal mills in this silver-lead district and describes briefly their present state of development. 20c.

2862—IDAHO—The Lincoln Gold Mine of Pearl, Idaho. (S. L. Min. Rev., Jan. 30, 1907; 2 pp.) Outlines the mine and mill equipment and the mill practice at this Idaho gold mine, with a few notes on the character of the ore. 20c.

2863—MEXICO—Mining Conditions in the Mountains of Chihuahua. J. B. Farish. (Eng. and Min. Journ., Feb. 2, 1907; 5 pp.) General description of mining conditions in this Mexican field, outlining some of the difficulties of operating. 20c.

2864 — MINE AIR — Witwatersrand Mine Air: Recent Investigations. J. Moir. (Journ. Chem. Met. and Min. Soc. of So. Africa, Dec. and Jan., 1907; 9½ pp.) Continued discussion of the above paper by members of the Society. $1.

2865—NEVADA—Preliminary Account of Goldfield, Bullfrog and Other Mining Districts in Southern Nevada. F. L. Ransome, with Notes on the Manhattan Disctrict by G. H. Garrey and W. H. Emmons. (Bull. No. 303, U. S. Geol. Surv.; 98 pp.) Gives a general account of the geology of these regions, with a description of the form and development of ore deposits, and a brief account of milling operations as they now exist.

2866—NOVA SCOTIA—Gold in Nova Scotia. (Industrial Advocate, Feb., 1907; 11 pp.) Review of gold-mining conditions in all of the principal districts of Nova Scotia. 20c.

2867—ORE RESERVES—Notes on the Estimation and Valuation of Ore Reserves. W. R. Tait. (Journ. Chem. Met. and Min. Soc. of South Africa, Jan., 1907; 4½ pp.) Discusses briefly several methods of sampling ore in place, and gives specimen calculation sheets and examples in calculating tonnages and values. 60c.

2868—PLACER MINING — L. Kingsbury. (Ores and Metals, Feb. 20, 1907; ½ p.) Gives the results of the author's experience in placer mining in Summit Co., Colo., and describes the use of vibrating riffles as a means of catching black sand and flake gold. 20c.

2869 — PLACER MINING. W. J. Wimer. (Ores and Metals, Feb. 20, 1907; ½ p.) Brief comments on the action of certain forms of gold which are not readily caught in the usual methods of placer mining. 20c.

2870—PLACER MINING—Loss of Gold in Placer Mining. D. H. Stovall. (Min. and Sci. Press, Feb. 23, 1907; 1 p.) Discussion of the efficiency of the various types of sluices and riffles for saving gold, showing that a riffle which causes boiling of the current results in considerable loss in values. 20c.

2871—PRODUCTION OF GOLD—The Increased Production of Gold and Its Relation to the Standard of Value. A. E. Outerbridge, Jr. (Cassier's Mag., March, 1907; 6 pp.) Discussion of the distribution of gold in the arts and in the commercial world, and an analysis of the effect which increased production has had upon purchasing power. 40c.

2872—SAMPLING AND ASSAYING a Car of Bonanza Ore. L. M. King. (Min. and Sci. Press, Feb. 23, 1907; 1 p.) A very interesting account of the results of sampling and assaying a car of rich ore from the famous Hayes and Monette lease at Goldfield, tabulating and comparing the results obtained by three independent assays. 20c.

2873—SHAFTS—The Big Shafts of Guanajuato. T. A. Rickard. (Min. and Sci. Press, Feb. 9, 1907; 3½ pp.) Historical account of the construction and unwatering of these shafts at Guanajuato, Mexico. 20c.

2874—SILVER-LEAD SMELTING PRACTICE. T. S. Austin. (Min. and Sci. Press, Feb. 23 and March 16, 1907; 3½ pp.) Discussion of the physical characteristics and the chemical composition of various slags obtained in silver-lead smelting, and their relation to the satisfactory reduction of the metals. Gives aiso notes on furnace operation, with reference to quantity of fuel, amount of blast and mechanical condition of the charge. 40c.

2875—SLIME TREATMENT. E. Parrish. (Min. and Sci. Press, Feb. 9, 1907; 1½ pp.) Notes on the design and operation of a horizontal revolving filter of the continuous type to be used in the treatment of slimes in the cyanide process. 20c.

2876—SLIME TREATMENT—The Homestake Slime Plant. M. Ehle. (Mines and Min., March, 1907; 5½ pp.) Describes the present system of treating the very low-grade slime coming from the Homestake piant, with notes on the Merrill automatic filter presses. 20c.

2877—SOUTH AFRICA — Conditions Met with in South African Mining. J. H. Pitchford. (Eng. and Min. Journ., Mar. 9, 1907; 4 pp.) Address delivered before the mining students of the Univ. of Cal., describing the mining conditions on the Rand and in the Transvaal, with notes on methods of ore treatment and mine development. 20c.

2878 — SOUTH AFRICA — Jumpers Gold Mining Company. (S. A. Mines, Jan. 19, 1907; 1 p.) Statement of various methods in use for promoting labor efficiency in this South African mine, and describing the new contract system of working. 20c.

2879—SOUTH AFRICA—Latest Developments at the Village Deep. (S. A. Mines, Feb. 2, 1907; 1 p.) Sums up the present state of operations at this South African mine, giving a few notes on underground developments, labor employed, and the sampling and sorting process now in use. 20c.

2880 — TAVENER PROCESS. L. A. E. Swinney. (Instn. Min. and Met., Bull. No. 29, Feb. 14, 1907; 3 pp.) Author's reply to the discussion of his paper of above title.

2881—TUBE MILLS—The Computation of the Crushing Efficiency of Tube Mills. S. H. Pearce and W. A. Caldecott. (Journ. Chem. Met. and Min. Soc. of South Africa, Jan., 1907; 4 pp.) Discussion by members of the Society of the above paper, which was previously mentioned in the Index. 60c.

2882—YUKON TERRITORY — Recent Developments in Mining in the Southern Yukon D. D. Cairnes. (Paper read before the Can. Min. Inst., Toronto meeting, March, 1907; 9 pp.) Outlines the present state of mining conditions in the White Horse district of the Yukon.

GRAPHITE

2883—CANADIAN GRAPHITE. H. P. H. Brumeli. (Paper read at Toronto meeting, March, 1907, of the Can. Min. Inst.; 20 pp.) Discusses the history, origin and character of graphite in Canada, with notes on the methods of mining it, its uses, and statistics of production.

2884—GRAPHITE and Its Uses. (Bull. Imperial Institute, Vol. IV, No. 4, 1906; 7 pp.) Notes on the chemical and physical characters of graphite, uses and mode of occurrence, and methods of concentration. To be continued. 40c.

IRON AND STEEL

2885—AUSTRIA—Die Eisen- und Stahlgewinnung in Innerösterreich, speziali am steirischen Erzberge im Mittelalter. A. Müllner. (Oest. Zeit. f. B. u. H., Feb. 9, 1907; 2 pp.) Conclusion of article previously mentioned in the Index. 40c.

2886 — BLAST FURNACE — The Lackawanna Steel Co.'s New Furnace. (Iron Tr. Rev., Feb. 21, 1907; 7 pp.) Very interesting account of the construction of stack No. 7 for this steel company, during which many interesting and difficult engineering problems were solved. 20c.

2887—BLAST FURNACE GAS—The Utility of Cleaning Blast Furnace Gas. H. G. Scott. (Min. Journ., Jan. 26, 1907; ½ p.) Abstract of paper read before the Cleveland (England) Institute of Engineers, reviewing briefly the reasons which make it advisable to clean blast-furnace gas before using it in engines. 40c.

2888 — BLAST FURNACE LABORATORY NOTES. C. B. Campbell. (Iron Age, Feb. 21, 1907; ½ p.) Gives simple and rapid procedures for the analysis of cinder and the determination of manganese and silicon in pig iron. 20c.

2889 — BLAST FURNACE PLANT — The New Blast Furnace Plant of the Frodingham Iron and Steel Company. (Iron and Coal Tr. Rev., Jan. 25, 1907; 2½ pp.) An account of the construction of the first modern plant for producing iron and steel in the North Lincolnshire district of England. 40c.

2890 — BLAST FURNACE PRACTICE — Die Lürmann'sche Schlackenform und der Betrieb der Hochöfen. F. W. Lürmann. (Stahl u. Eisen, Feb. 6, 1907; 2 pp.) Describes and illustrates the Lürmann slag tuyere, and discusses the advantages of this device, which is designed to overcome difficulties resulting from fluctuations in blast pressure. 40c.

2891 — BLAST FURNACE PRACTICE — Improved Dust Catcher at Pulaski Furnace. J. J. Howard. (Iron Age, Feb. 28, 1907; 1 p.) Describes a device for removing dust from furnace gases, by means of which the gases are given a whirling motion so that the particles of dust are thrown out against the sides of an improved dust catcher. 20c.

2892—CAST-IRON PIG BED. W. A. Jenkins. (Foundry, March, 1907; 1½ pp.) Describes the design and construction of a cast-iron pig bed which is to be used to take care of surplus iron after a heat, or to receive small amounts of iron which are too dull to pour. 20c.

2893—COLORADO FUEL AND IRON COMPANY—Steel Making at Pueblo. Lawrence Lewis. (Eng. and Min. Journ., Feb. 2, 1907; 2 pp.) Describes the reconstructed plant of the Colorado Fuel and Iron Co., with notes on the bessemer and rail departments and the capacity of the plant. 20c.

2894—CORROSION OF IRON. R. O. E. Davis. (Chem. Engr., Feb., 1907; 2 pp.) Gives the results of an inquiry as to the various causes of the rusting of iron, coming to the conclusion that rusting takes place with water and oxygen, but not with water and carbon dioxide. 40c.

2895—CRYSTALLIZATION — Cenni sulla cristallizzione degli acciai, cause e remedi. G. V. Bianchetti. (Rassegna Mineraria, Feb. 11, 1907; 1½ pp.) A brief contribution to the subject of crystallization in steel, with some notes on its cause and remedies therefor. 40c.

2896—CUPOLA FURNACE—Bau und Betrieb der Kupolöfeu. C. H. Jaeger. (Stahl u. Eisen, March 6, 1907; 4 pp.) A consideration of the effects which the design, construction and operation of a cupola furnace have upon the quality of the output. 40c.

2897—ELECTRIC SMELTING—La electrosiderurgia en Espana. (Madrid Cientifico, Feb. 20, 1907; 1 p.) Describes an electric furnace in the steel plant of Araya, Spain, which is equipped with novel electrodes. 20c.

2898—FOUNDRY—A Modern Gray Iron Foundry. (Foundry, March, 1907; 6 pp.) Very compiete account of the novel features of design and construction of this modern foundry, describing the unique molding methods practiced there. 20c.

2899—FOUNDRY—Die Chemie in the Eisengiesserei. M. Orthey. (Metallurgie, Feb. 8, 1907; 6½ pp.) Discusses the applications of chemistry to iron founding, giving specific purposes for which chemical analysis is essential. 40c.

2900—FOUNDRY IRON—The Characteristics of Foundry Iron G. Hailstone. (Foundry, March, 1907; 10 pp.) Paper read before the Brit. Fdymen's Assn., Jan. 19, 1907. Gives a resume of the micro-constituents of foundry iron, the results of mixing different grades, and some of the causes of defective castings. 20c.

2901—GAS ENGINES—Körting Gas Engines at the Shelton Iron Works, Stoke. (Engineering, Feb. 15, 1907; 2½ pp.) Describes in great detail the design and operation of

the gas engines at this British iron works. 40c.

2902—GERMAN IRON INDUSTRY, the Mechanical Development of. J. H. Cuntz. (Eng. Mag., March, 1907; 15 pp.) Describes the very modern installations of machinery, ovens, furnaces and handling apparatus which have resulted in great efficiency in the German iron industry. 40c.

2903—HEAT TREATMENT—The Latent Heat of Recalescence in Iron and Steel. F. K. Bailey. (Phys. Rev., Feb., 1907; 20½ pp.) Records the results of a very complete set of experiments undertaken to investigate the properties and changes in iron and steel at their recalescent point. 80c.

2904—IRON ORE TREATMENT—Utilizing Impure Iron Ores. (Min. Wld., March 16, 1907; 2 pp.) Describes the crushing and concentration of low-grade iron ores and the apparatus used in handling and briquetting them, according to the Gröndal process. 20c.

2905—JAPANESE GOVERNMENT STEEL WORKS. (Iron Age, Mar. 21, 1907; 2½ pp.) Notes on the work accomplished in the development of steel works by the Japanese government during the last five years, describing the equipment of the plant and the recent opening of iron mines within the Islands. 20c.

2906—MARTIN PROCESS—Beitrag zur Metallurgie des Martinprozesses. T. Naske. (Stahl u. Eisen, Feb. 6, 13 and 20, 1907; 16 pp.) Continuation of article previously mentioned in the Index, containing a further discussion of the investigations to determine the influences and behavior of manganese and phosphorus during the process of refining the pig iron. 80c.

2907—MECHANICAL EQUIPMENT FOR STEEL WORKS—Maschinelle Einrichtungen für das Eisen-Hüttenwesen. F. Frölich. (Zeit. des Vereines deutscher Ingenieure, Feb. 9, 1907; 7½ pp.) Continuation of lengthy serial which was previously mentioned in the Index. 40c.

2908—MINING METHOD—Grab System of Mining at the Grant Mine, Buhl, Minn. (Iron Tr. Rev., Mar. 14, 1907; 2½ pp.) Describes the apparatus used in this open system of mining; gives the capacity and comparative costs of the process, and enumerates some of the advantages. 20c.

2909—NICKEL-IRON ALLOYS. Das Nickeleisen. Bericht über die Verhandlungen auf dem Kongress des Internationalen Verbandes für die Materialprüfungen der Technik in Brüssel 1906. (Stahl u. Eisen, Feb. 6, 1907; 3 pp.) Describes the making of various alloys of pure nickel and iron and the tests which were made of the strength and properties of those alloys which contained from 16 to 30 per cent. nickel. Also tests upon iron-nickel alloys, contaminated by carbon, manganese, etc. 40c.

2910—ONTARIO—Iron Mining in Northern Ontario. A. B. Willmott. (Can. Min. Journ., Mar. 15, 1907; 1½ pp.) A review of the results accomplished by exploration for iron ore in Ontario. 20c.

2911—OPEN-HEARTH FURNACE. A Russian. W. M. Carr. (Iron Tr. Rev., Mar. 7, 1907; ½ p.) Describes an acid open-hearth furnace used in Russia, interesting because it is used both in malleable iron and steel melting, frequently alternating between the two. 20c.

2912—OPEN-HEARTH FURNACES—Thermal Efficiency of Open-Hearth Furnaces. J. W. Richards. (Electrochem. and Met. Ind., Mar., 1907; 4 pp.) Continuation of the author's series of articles on "Metallurgical Calculations," discussing the various sources of heat consumption and heat losses in open-hearth practice. 40c.

2913—OPEN-HEARTH STEEL—Making Open Hearth Steel at Pueblo. Lawrence Lewis. (Eng. and Min. Journ., Feb. 23, 1907; 4½ pp.) Describes the design and construction of the basic and acid furnaces of the Colo. Fuel and Iron Co., the operations of charging hot and cold metal, and the disposition of the products. 20c.

2914—OPEN-HEARTH STEEL RAILS. B. Talbot. (Engineering Times Supplement, Feb. 13, 1907.) Discusses the comparative economies and possibilities of the open-hearth and the bessemer processes for producing steel rails, and discusses the reasons for the displacement of the bessemer product. 20c.

2915—PIG IRON—The Economical Production of Pig Iron. H. Allen. (Iron Tr. Rev., Mar. 14, 1907; 2½ pp.) A study of the usual conditions existing in the blast furnace, with theoretical and mathematical discussion of the factors necessary for maximum efficiency in smelting. 20c.

2916—PROSPECTING for Iron Ore in the Torbrook Iron District, Annapolis County, Nova Scotia. W. F. C. Parsons. (Journ. Can. Min. Inst., Vol. IX, 1906; 3 pp.) Brief notes on the indications of iron ore obtained from a series of bore-holes in Annapolis Co., Nova Scotia.

2917—QUEBEC—Iron Mining Possibilities in the Province of Quebec. Fritz Cirkel. (Paper read before the Can. Min. Inst., Toronto meeting, Mar., 1907; 10 pp.) Account of a few of the principal iron mines of Quebec, with brief notes on the methods of ore concentration used by each.

2918—ROLLING MILLS—Electrically Driven Rolling Mills. G. M. Brown. (Mechan. Engr., Feb. 16, 1907; 3 pp.) Discusses the application of electricity to the heavy and exacting work of driving main rolls. To be continued. 40c.

2919—RUSSIAN STEEL MAKING—Das Hüttenwerk der Metallurgischen Gesellschaft zu Taganrog. L. Fortunato. (Oest. Zeit. f. B. u. H., Feb. 9 and 16, 1907; 7 pp.) Conclusion of article previously mentioned in the Index, dealing in these instalments with the rolling of the steel, and the construction of the rolls, and considering mathematically the effect of expansion of the rolls upon the product. 60c.

2920—SEGREGATION—Ueber Saigerungserscheinungen in Stahlblöcken. J. E. Stead. (Metallurgie, Feb. 8, 1907; 4½ pp.) Enumerates a series of facts relating to segregation and liquation in steel billets accumulated during the long experience of the author, and sums up the conclusions to be drawn from them. 40c.

2921—SMELTING—Die Bewertung der Eisenerze. M. Drees. (Stahl u. Eisen, Mar. 6, 1907; 4½ pp.) A discussion of methods of estimating the amounts of coke and fluxes needed to smelt various iron ores, and the influence of the cost of these substances upon the value of the ore. 40c.

2922—STEEL WORKS—Modern Equipment in Old Plants. H. M. Lane. (Iron Age, Mar. 14, 1907; 4 pp.) Describes the development of molding machinery in an Ohio foundry, with a few notes on early molding machine practice, and its present status in this plant. 20c.

2923—STEEL WORKS—The Krupp Works. (Engineer, Lond., Feb. 15, 1907; 2 pp.) Continuation of article, containing in this instalment the description of the second group of the Krupp works, which includes 6 blast furnaces, steel works and rolling mills. 40c.

2924—SULPHUR IN STEEL—Ueber die Gewichtsbestimmung des Schwefels im Stahl, (Centralblatt der Hütten u. Walzwerke, Feb. 15, 1907; 1 p.) A review of the influence of sulphur on steel and a brief comparison of the relative merits of some of the chief methods now in use for determining sulphur in steel. 40c.

2925—SWEDEN—Zwei schwedische Eisenerzfelder. (Bergbau, Feb. 7, 1907; 1 p.) A short description of the size and character of the Swedish iron ore deposits, with comments on the composition of the principal ores. 40c.

2926—TENNESSEE—Soft Iron Ore in Tennessee. Edw. K. Judd. (Eng. and Min. Journ., Mar. 23, 1907; ½ p.) Brief description of the present condition of the soft iron industry in this State. 20c.

2927—TESTING—Feststellung von Untersuchungsmethoden über die Homogenität von Eisen and Stahl behufs eventueller Benützung bei Abnahme. (Metallurgie, Feb. 22, 1907; 6 pp.) A very thorough review of the work done by the Commission of the International Society for Testing Materials, undertaken to investigate present methods of testing the homogeneity of iron and steel, with a view to removing the existing difficulties in testing practice. 40c.

2928—TITANIUM—The Fusibility and Fluidity of Titaniferous Silicates. L. C. Lennox and C. N. Cox, Jr. (Colo. College Publication, Engineering Series, Vol. I, No. 1: 21 pp.) Gives the results of experiments to determine the possibility of obtaining fusible and fluid mixtures of titanium ores in the blast furnace, and gives several examples of computing charges to be used in smelting titanic iron ores.

2929—TITANIUM IN IRON—Die kolorimetrische Bestimmung des Titans und ihre Anwendbarkeit neben Eisen. P. Faber. (Chem. Zeit., Mar. 13, 1907; 2 pp.) Describes experiments undertaken to develop an accurate colorimetric method of determining titanium and outlines the procedure to use. The method is intended especially for titanium in pig iron. 20c.

2930—VELOCITY OF GASES—Direkte Messung der Geschwindigkeit heisser Gasströme. R. Vambera and F. Schraml. (Stahl u. Eisen, Mar. 6, 1907; 4½ pp.) Describes the use of Pitot tubes as applied to the direct determination of the velocity of hot gases and discusses the mathematical features of the problem. 40c.

2931—ZINC PLATING—Verzinkungs-Selbstkosten-Berechnung von Blechen. W. Schwarz. (Stahl u. Eisen, Feb. 27, 1907; 2 pp.) A discussion of methods of calculating costs of covering plates with zinc, giving specimen tables for cost keeping. 20c.

LEAD

2932—IDAHO LEAD MINES in 1906. R. N. Bell. (Eng. and Min. Journ., Feb. 2, 1907; ½ p.) Enumerates the chief lead mines of Idaho and work done by them during 1906. 20c.

2933—LEAD SMELTING Works of Port Pirie. G. D. Delprat. (Eng. and Min. Journ., Mar. 16, 1907; 3½ pp.) Portions of a paper read before the Aus. Inst. of Min. Engrs., Sept., 1906, describing the processes and furnaces used in smelting lead ores from Broken Hill, N. S. W., with some notes on the refining and preparation of the bullion for the market. 20c.

MANGANESE

2934—GERMANY—Mangan im Grundwasser der Breslauer Wasserleitung und die Frage der Abschiedung des Mangansulfates aus demselben. H. Luhrig and A. Blasky. (Chem. Zeit., Mar. 9, 1907; 2½ pp.) Discusses the occurrence of considerable amounts of manganese in the ground water in and around Breslau, Germany, and reviews possible methods of extracting the manganese from the water as sulphate. 40c.

2935—ORE DEPOSITS—On the Association of Gibbsite with Manganese Ore from Talevadi, Belgaum District, and on Gibbsite from Bhekowli, Satara District. L. L. Fermor. (Records, Geol. Survey of India, Vol. XXXIV, Part 3, 1906; 4½ pp.) Tabulates the results of examinations of specimens of associated gibbsite with manganese ore, and discusses the significance of the analyses.

2936—VIRGINIA—The Crimora Manganese Mine. E. K. Judd. (Eng. and Min. Journ., Mar. 9, 1907; 1 p.) A description of the location and geology of the ore deposits of this Virginia manganese mine, giving also an account of the method of mining and concentrating the ore. 20c.

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2940—SOUTH AMERICA—Les Pétroles dans l'Amérique du Sud. M. Frochot. (Journ. du Pétrole, Mar. 1, 1907; 4 pp.) Discusses the geological and geographical aspects of petroleum in South America and outlines the probable origin and formation of the oil. 40c.

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RARE MINERALS

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results of tests made to devise a way of efficiently separating it in marketable form. 40c.

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TIN

2947—ASSAYING—The Assay and Analysis of Tin Ores and Other Stanniferous Materials. P. J. Thibault. (Aust. Min. Stand., Jan. 16 and Feb. 13, 1907; 2 pp.) The first instalments of a monograph on the metallurgy of tin, describing three standard methods for the dry assay of tin ores, giving amounts and character of flux to be used in each case. 60c.

2948—CORNISH TIN MINING. H. E. West. (Min. and Sci. Press, Feb. 9 and 16, 1907; 4 pp.) Description of the methods of mining employed in this famous tin field, with some discussion of costs of mining and ore treatment.

2949—CORNWALL—Revival of the Mining Industry in Cornwall. Edward Walker. (Eng. and Min. Journ., March 9, 1907; 6 pp.) First of a series of articles, showing how new enterprise and modern methods are likely to restore many of the old abandoned properties to the list of producers. 20c.

2950—TASMANIA—Report on Cox's Bight Tin Field. W. H. Tweivetrees, Gov. Geologist. (Published by John Vail, State Printer, Tasmania; 18 pp.; 1 map.) Enumerates the principal producing mines in this field, with brief descriptions of the present state of development work.

TUNGSTEN

2951—GERMANY — Ueber ein kürzlich aufgeschlossenes Wolframerzgangfeld und einige andere neue Aufschlüsse in sächsischen Wolframerzgruben. R. Beck. (Zeit. f. prak. Geol., Feb., 1907; 9 pp.) Discusses some mineralogical and geological features of a few deposits of tungsten ore in Saxony. 40c.

ZINC

2952—ARKANSAS—Dodd City, Ark., Zinc Fields. (Min. Wld., Feb. 23, 1907; 1½ pp.) Describes the present state of the zinc mining industry in this comparatively unknown Arkansas field, and enumerates the present producing mines of the district. 20c.

2953—CALAMINE DEPOSITS—Les Gites calaminaires de l'Algerie et ceux de la Sardaigne. (Gazette des Mines, Feb. 1, 1907; 2 pp.) Describes and compares the geological and mineralogical features of the calamine deposits of Algeria and Sardinia. The same article is given in *Rassegna Mineraria*, Mar. 1, 1907. 40c.

2954—COLORADO—The Zinc Industry in Colorado. (Min. Rep., Feb. 28 and Mar. 7, 1907; 4 pp.) An account of the zinc industry in Colorado and statistics of production and value since 1902. Deals with the character of ores and methods of concentration. 40c.

2955—ELECTROMETALLURGY OF ZINC. Woolsey McA. Johnson. (Electrochem. and Met. Ind., Mar., 1907; 1½ pp.) Paper read before the Am. Electrochem. Soc., Jan. 30, 1907. Briefly mentions the various electrical devices for concentrating and reducing zinc ores, with a comparison of electric furnace smelting with distilling from retorts. 40c.

2956—HOISTING in Small Zinc Mines in Wisconsin. G. S. Brooks. (Eng. and Min. Journ., Feb. 23, 1907; 1 p.) A discussion of present conditions in the small zinc mines of Wisconsin, comparing the relative merits of cage-car and tub systems, and considering the operating and first costs of each system. 20c.

2957—SMELTING — Gattierung von Zinkblende und Galmei. F. Juretzka. (Metallurgie, Feb. 8, 1907; 6 pp.) Discusses very briefly the historical aspect of zinc smelting practice, and gives in detail the present state of the art of reducing zinc from mixtures of calamine and blende; also discusses the principles which govern the composition of the mixtures to be smelted. 40c.

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2959 — ZINC MINING in Mississippi Valley. E. Hedburg. (Min. Wld., Mar. 2, 1907; 1 p.) Short review of the present condition of zinc mining in this region, and a few notes on certain special occurrences of zinc ore in Arkansas. 20c.

ECONOMIC GEOLOGY—GENERAL

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2968—MINOR MINERALS—Notes on Lawsonite, Columbite, Beryl, Barite and Calcite. A. S. Eakle. (Univ. of Cal. Pub., Vol. V, No. 6, Jan., 1907; 14 pp.) Describes the occurrences of these minerals, gives the results of measurements of various crystals and illustrations of special forms. 20c.

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2970—ROCK EROSION—The Decomposition of the Feldspars. A. S. Cushman and P. Hubbard. (U. S. Dept. of Agriculture Publication, Jan. 30, 1907; 29 pp.) Monograph published by the Dept. of Agriculture dealing with the chemical factors which result in the decomposition of feldspars.

2971—SICILY—Die geologischen und tektonischen Verhältnisse der Erziagerstätten Nordost-Siziliens. B. Lotti. (Zeit. f. prak. Geol., Feb., 1907; 4 pp.) An account of a few prominent geological and technical aspects of the lead, zinc, copper and iron ores in northeast Sicily. 40c.

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2987—EXPLOSIVES—L'ordonnace ministérielle anglaise du 17 décembre 1906 suivie d'une note comparative sur les explosifs de sureté autorisés en Angleterre et en Belgique. J. Daniel. (Ann. des Mines Belg., T. XII, 1 livr., 1907; 17 pp.) A discussion of the leading features of the English mining ordinance of Dec. 17, 1906, comparing the Belgian and English codes with respect to regulations regarding the use and storage of explosives.

2988—GERMAN MINING METHODS—Die Pribramer Fülliörter. H. Stefan. (Oest. Zeit. f. B. u. H., Feb. 9, 1907; 3 pp.) A discussion of the relation which the arrangement and design of shafts, stations and workings have upon the winning of ore from deep mines, as shown by the works at the Pribram mine in Germany. 40c.

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2994—MINE REPORTS—Simple Language in Mine Reports. T. Bakewell. (Eng. and Min. Journ., March 9, 1907; 1 p.) Gives several very valuable hints from the author's experience in preparing mine reports, and includes a copy of a proposed form of report, which is free from many of the usual faults. 20c.

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2996—MINING LAW—A Question of Mining Law. (Min. and Sci. Press, Feb. 16, 1907; 1 p.) Gives an interesting discussion of the settlement of a dispute upon conflicting locations of mining claims. 20c.

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3002—SAFETY MEASURES in Mining. D. Macaulay and L. G. Irvine. (Journ. Chem., Met. and Min. Soc. of South Africa, Dec., 1906; 16 pp.) Reply of authors to the discussion of their papers of the above title, which were previously mentioned in the Index. 60c.

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3014—VENTILATION—Die Wetterführung der Zeche Pluto, Schacht Wilhelm, zu Wanne. J. Jacobs. (Bergbau, March 14, 1907; 2 pp.) Gives a summary of the general principles of ventilation, and discusses in detail the ventilating methods used in the Wilhelm shaft of the Pluto mine in Germany. 20c.

ORE DRESSING

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3016 — BELT ELEVATORS for Ore and Water. Edw. S Wiard. (Eng. and Min. Journ., March 23, 1907; 5 pp.) Discusses the proper care of large belt elevators and gives many notes on repairs and renewals, taken from the author's large experience. 20c.

3017 — CONCENTRATION — Aufbereitung armer Zink- und Bleierze der Wilhelmsglückgrube. H. Niedner. (Zeit. des Oberschlesischen B. u. H. Vereins, Jan., 1907; 8 pp.) A complete illustrated description of the appliances and the methods in use in the Wilhelmsglück mine for concentrating the low-grade lead and zinc ores of the district. 40c.

3018—CRUSHING—A Breaking Piece for a Swinging-Jaw Rockbreaker. G. E. Brown. (Instn. of Min. and Met., Bull. No. 29, Feb. 14, 1907; 1 p.) Brief discussion of the above paper, which was previously mentioned in the Index.

3019—DENSITY OF PULP — A New Method for Obtaining the Density of Settled Sand. D. I. R. Simpson. (Journ., Chem., Met. and Min. Soc. of South Africa, Dec., 1906; 1 p.) Describes a very simple and unique means of arriving at the true tonnage of pulp in settling tanks by a novel method of obtaining its density. 60c.

3020 — ELECTROSTATIC SEPARATION. J. M. McClave. (Bull., Colo. Sch. of Mines, Jan., 1907; 2 pp.) Brief review of the principles upon which is based the electrostatic method of ore concentration. 60c.

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3022 — MILLING — L'Enrichissement des Minerals Sulfurés Mixtes de Broken Hill (Australie). E. Lemaire. (Genie Civ., March 9, 1907; 5 pp.) Detailed account of the concentrating process in use in milling the ores at Broken Hill, N. S. W., with a description of some of the flotation processes. 40c.

3023—NEW SOUTH WALES—Mining and Metallurgy at Broken Hill, New South Wales. R. Stokes. (Min. Wld., March 2 and 9, 1907; 4½ pp.) Very complete account of the present condition of ore dressing in the silver-lead mines of Broken Hill, with two flow sheets of mills. 40c.

3024—SCREEN—A Revolving Screen with Outside Feed. (Eng. and Min. Journ., Feb. 2, 1907.) Describes the construction of a new trommel, on which the pulp is fed to the outside and the fines pass into the interior. 20c.

METALLURGY—GENERAL

3025—BLAST FURNACE—Divergences in the Development of the Blast Furnace. L. S. Austin. (Mines and Min., March, 1907; ½ p.) Brief history of the progress that has taken place in the development of blast furnaces, with an outline of the changes in design which have come into use. 20c.

3026—COBALT ORES—Method of Smelting Cobalt Ores. H. W. Hixon. (Eng. and Min. Journ., March 2, 1907; 1 p.) Paper presented for discussion at the Toronto meeting, 1907, of the Can. Min. Inst., describing a proposed method for smelting cobalt ores, based upon a roast, followed by smelting with galena and subsequent conversion of the matte and speiss which are obtained from the first reduction. 20c.

3027—COLORADO—The Progress of Metallurgy in Colorado. H. C. Parmelee. (Bull. Colo. Sch. of Mines, Jan., 1907; 17½ pp.) Outlines the present state of metallurgy in Colorado, with notes on the mill buildings, power generation and special devices in use. 60c.

3028—DEPRECIATION of Smelting Plants. R. Anstee. (Eng. and Min. Journ., March 16, 1907; ½ p.) Further discussion upon this question, showing the bearing which the first cost of plants has upon the selection of the proper equipment. 20c.

3029—ELECTROCHEMISTRY—L'Industrie Electrochimique Francaise. R. Pitaval. (L'Echo des Mines, Feb. 18, 1907; 1 p.) A brief review of the progress of the electrochemical industry during 1906 in France, showing how deficient rainfall threatens lack of water power for the coming year. 40c.

3030—FUELS—Comparison of Oil and Coke as Fuel for Melting Precipitates. (Mines and Min., March, 1907; 1 p.) Enumerates the various advantages and disadvantages of oil and coke as a fuel in metallurgical practice, and shows the advantage of oil both as to cost and convenience. 20c.

3031—METALLURGICAL CALCULATIONS —The Use of Graphic Formulas in Metallurgical Calculations. D. H. Browne. (Paper read before the Toronto meeting, Can. Min. Inst., March, 1907; 20 pp.) Outlines methods whereby the record of a particular ore during smelting may be tabulated and reduced to graphic form. 20c.

3032 — METALLURGICAL PROGRESS — Recent Developments in Metallurgy. S. F. Kirkpatrick. (Can. Min. Journ., March 15, 1907; 2 pp.) Reviews improvements in furnaces and in methods of smelting, and discusses the effect which these have had upon production. 20c.

3033—ORE REDUCTION—Dry Air in Ore Reduction. J. H. Hart. (Min. Wld., March 16, 1907; 1 p.) Discussion of the efficiency of dry-air blast in smelting and also of the standard means in use for drying air. 20c.

3034—ORE REDUCTION—Leistungen metallurgischer Oefen. (Metallurgie, Feb. 22, 1907; 12 pp.) A tabulation which compares all the essential features relating to power consumption and smelting efficiency in all the chief reduction plants of the world. 40c.

3035—ORE SELLING—The Adjusting of Ores. L. S. Austin. (Eng. and Min. Journ., Feb. 2, 1907; 1 p.) Contains a schedule and chart by means of which ores may be mixed so as to secure the maximum selling price. 20c.

3036—SLAG—Slag-Casting Machine. L. S. Austin. (Min. and Sci. Press, March 2, 1907; 1½ pp.) Describes the construction and operation of this slag-casting machine, with several cuts of important details. 20c.

3037—SMELTER FUMES — Condensation of Sulphurous Fumes. (Eng. and Min. Journ., March 9, 1907; ½ p.) Sums up briefly three standard methods of removing sulphurous fumes from smelter smoke. 20c.

3038—SMELTER FUMES — The Smelter Smoke Problem. F. W. Traphagen. (West. Chem. and Met., March, 1907; 12 pp.) Gives the results of an investigation undertaken to determine the exact amount of damage done by smelter smoke to soil, crops and live stock, giving the results of many analyses of soil which was exposed to the action of smelter fumes. 60c.

3039—SMELTING WORKS—The Location of Smelting Works. Herbert Lang. (Eng.

and Min. Jouru., March 23, 1907; 2½ pp.) A comparison of the advantages of terraced and level sites for a smelter, showing how the advantages of gravity have been overestimated, and coming to the conclusion that large smelters of the future will be built on level ground. 20c.

3040—SULPHIDE ORES—Ueber sulfatisierende Röstung der sulfidischen Erze. (Zweite Mitteilung.) R. Vondracek. (Oest. Zeit. f. B. u. H., Feb. 23, 1907; 1½ pp.) Second instalment of article previously indexed, summing up the results of the experiments, and giving analyses of the roasted products. 40c.

3041 — WATER SUPPLY — An Electrical Indicator for Water Tanks. C. H. Glasser. (Eng. and Min. Journ., Feb. 2, 1907; ½ p.) An automatic device for showing on the furnace floor the level of water in the distant supply tanks. 20c.

MINING AND METALLURGICAL MACHINERY

3042—ACCIDENTS — Unter welchen Umständen is die Berührung einer elektrischen Anlage gefährlich? H. Zipp. (Chem. Zeit., Feb. 20, 1907; 2½ pp.) A very complete discussion of the conditions under which an electric shock is dangerous to life, with brief remarks on accidents of this character in German mines during 1905. 20c.

3043—AIR COMPRESSOR—Clearance in a Compressor and Its Relation to Volumetric Efficiency. D. W. Hering. (Compressed Air, Feb., 1907; 2 pp.) Conclusion of article previously indexed. 20c.

3044—AIR COMPRESSORS—The Hurricane Valve for Piston-Inlet Air Compressors. Frank Richards. (Eng. and Min. Journ., Feb. 23, 1907; 1 p.) Outlines the advantages and describes the working of this special pistou valve for air compressors. 20c.

3045 — BLASTING — Spitter for Blasting Fuse. E. W. Walker. (Mines and Min., March, 1907; ½ p.) Describes a device for spitting fuses which is of especial value in wet shafts. 20c.

3046—BLOWING ENGINE—The Nordberg Piston Blowing Engine. F. A. Halsey. (Eng. and Min. Journ., March 23, 1907; 4½ pp.) Describes in detail the construction of one of these engines, with special attention to the problem of valve openings, which must be made very large in order to avoid friction losses. 20c.

3047—BOILER SETTING. J H. Gwathmey. (Lead and Zinc News, Feb. 11, 1907; 1½ pp.) Considers different types of boilers, the best methods of constructing foundations for them, and means of placing boilers thereon. 20c.

3048—BOILERS—A Comparison of Boiler Types. M. T. Goss. (Min. Rep., Feb. 21, 1907; 1½ pp.) Discussion of various types of boilers with regard to their efficiency and low cost of maintenance. 20c.

3049—CENTRIFUGAL PUMP. E. N. Percy. (Journ. Elec., Power and Gas, Feb. 23, 1907; 2 pp.) Brief description of the theory of the centrifugal pump, with some practical notes on details of design, which will result in smooth running and high efficiency. 20c.

3050—COAL CONSUMPTION of Boilers. N. A. Carle. (Power, April, 1907; 2 pp.) Brief discussion of some of the principles regarding coal consumption of boilers, with several examples relating to this subject and their solution. 20c.

3051—DIAMOND DRILLS. James Humes. (Eng. and Min. Journ., Feb. 23, 1907; 1 p.) Gives some of the experiences of the author in adopting diamond drills for underground exploration, outlining the plan of work and the method of distributing the holes. 20c.

3052—DRILL—History and Present Status of Air Hammer Drill. H. L. Sinclair. (Ores and Metals, March 5, 1907; 2½ pp.) Paper read before the Colo. Sci. Soc., Feb. 2, 1907, reviewing the development which has taken place in the construction of air hammer drills, and pointing out the changes which have been made in recent years in methods of breaking ground, as a result of which operating costs have been materially reduced. 20c.

3053—DRILL TESTS—Recent Rock Drill Tests on the Rand. (Min. Journ., March 2, 1907; ½ p.) Editorial discussion of the results of tests of stoping drills on the Rand, undertaken to determine whether they could economically replace native and Chinese hand drilling. 40c.

3054—DRILLS — Ueber Hammer-Gesteinbohrmaschinen, insbesondere diejenige von H. Flottmann & Co. Herbst. (Glückauf, Feb. 9, 1907; 7 pp.) Describes and illustrates the construction and operation of hammer rock drills, with special reference to the Flottmann type, and outlines briefly various special considerations which govern the use of this kind of drill. 40c.

3055—ELECTRIC DRILLS. H. B. Barnes. (Bull. Colo. Sch. of Mines, Jan., 1907; 2 pp.) Comparison of the design and principle of operation of several standard types of electric drills. 60c.

3056—ELECTRIC FURNACE: Its Evolution, Theory and Practice. A. Stansfield. (Can. Engr., March, 1907; 2 pp.) Conclusion of the series of articles on the above subject, which have been previously mentioned in the Index, giving the author's opinions as to the future developments of the electric furnace. 20c.

3057 — ELECTRIC FURNACE — Quelques applications récentes du four électrique en métallurgie. (Compt. rend. Soc. de l'Industrie minérale, March, 1907; 17 pp.) Contains a very detailed review of the European establishments which use electric furnaces and gives notes on recent applications of electric-furnace practice to metallurgy.

3058—ELECTRIC FURNACE—Ueber elektrische Oefen älterer und neuer Systeme. G. A. Pummer. (Oest. Z. f. B. u. H., March 2 and 9, 1907; 9 pp.) Discusses various types of electric furnaces and describes several plants where much attention is paid to electro-metallurgy, with a few notes on the efficiency of some systems in use. 40c.

3059—ELECTRIC POWER—La Electricidad en las Minas. E. Guarini. (Bol. de la Soc. Nac. de Mineria, Nov., 1906; 9½ pp.) A series of remarks upon the application of electricity to various uses in mines, and some of the economies which may be expected of electric installations.

3060 — ELECTRIC POWER TRANSMISSION—An Insulating Hanger for Electric Wires in Tunnel and Mine Work. J. W. Henderson. (Mines and Min., March, 1907; 1 p.) Describes the construction of this insulator, for which the advantage is claimed of efficiency of insulation and economy of manufacture. 20c.

3061—ELECTRICAL WINDING PLANTS. A. Gradenwitz. (Eng. and Min. Journ., Feb. 2, 1907; 2½ pp.) Describes several standard systems of electric hoisting in German mines, with details of their arrangement. 20c.

3062—ELECTRICAL WINDING PLANTS, The Economy of. W. C. Mountain. (Elec. Rev., London, Jan. 18, 1907; 1 p.) Gives the results of a test of a winding plant made at the Village Deep mine on the Rand, from which were obtained figures bearing on the economy of this method of hoisting. 40c.

3063—FAN—Tests of a Mine Fan. J. B. Thomson. (Trans. Min. Inst. of Scotland, Vol. XXIX, Part 2: 4 pp.) Describes several tests on a Capell fan and tabulates the results obtained.

3064—FURNACE — The Construction and Operation of a Deville High Temperature Furnace. A. F. Greaves-Walker. (Trans. Am. Ceramic Soc., Vol. VIII, 1906; 10 pp.) Describes the design and operation of this type of coke furnace, which is applicable to the accurate and quick testing of the refractoriness of clay products.

3065—GAS ENGINES—Design, Construction and Application of Large Gas Engines in Europe. F. E. Junge. (Power, Feb., 1907; 3½ pp.) Continuation of lengthy serial previously indexed, dealing in this instalment with rules for testing gas producers and engines. 20c.

3066—GAS ENGINES—Schwierigkeiten im Betriebe der Gasmaschinen und ihre Beseitigung. F. Selige. (Stahl u. Eisen, Feb. 13, 1907; 7 pp.) Describes some of the principal weaknesses of gas engines, and the various modifications of designs which will overcome or diminish them, and also considers the effect of poor quality of gas and remedies for this condition of affairs. 40c.

3067—GAS POWER—Gas, Gas Engines and Gas Producers. J. S. Gray. (Can. Soc. Civ. Engrs., advance proof, Feb. 28, 1907; 12 pp.) Describes the theory of producer gas, gives some notes on the design of a plant, and compares the efficiency of steam and producer gas as sources of power.

3068—GAS POWER—The Working of a Suction Gas Plant. A. J. Stevens. (Min. Journ., Jan. 26, 1907; 1 p.) Paper read before the South Wales Inst. of Engineers, summing up the considerations which led to the adoption of a suction gas plant, and giving data on the consumption of coal, oil, water, etc. 40c.

3068a—HOISTING ENGINES—Etude des Relations qui Doivent Exister entre un Cable et la Machine d'Extraction sur laquelle il est place. M. Rodde. (Bull. Soc. de l'Ind. Minérale, T. VI, 1 livr. of 1907; 30 pp.) A very complete consideration of various principles applying to hoisting ropes and their engines in regard to efficiency of power consumption.

3069—HOISTING PLANT — Proper Consideration of a Hoisting Plant. D. H. Stovall. (Ores and Metals, March 5, 1907; ½ p.) Outlines briefly some of the principles which determine the size of the shaft and headhouse for a new mine. 20c.

3070—HOISTS—Zur Kritik neuerer Sicherheitsapparate an Dampffördermaschinen. Hoffmann. (Glückauf, Feb. 16, 1907; 11½ pp.) A discussion of the relative merits of security devices for electric and steam hoists, with comments on the workings of some of the more recent inventions of safety appliances for steam hoists. Illustrated. 60c.

3071—HYDRO-ELECTRIC POWER—The Shawinigan Hydro-electric Power Plant. W. C. Johnson. (Cassier's Mag., March, 1907; 16 pp.) Describes the latest developments and extensions at this Canadian power station, with details on the construction of the transmission line for power and water. 40c.

3072—LUBRICATION—Bearings and Their Lubrication. F. L. Davies. (Elec. Wld., Feb. 2, 1907; 1½ pp.) A few practical hints which should be observed in the proper care and lubrication of bearings of all types. 20c.

3073—METAL WORKING MACHINERY—Census of Manufactures, 1905. (Bull. 67 of Dept. of Com. and Labor, Bur. of the Census, 1907; 20 pp.) Gives statistics of the metal-working machinery industry in so far as they relate to the manufacture of power machines and the tools and parts necessary for them.

3074—PROSPECTING DRILLS. W. Dickson. (Journ. Can. Min. Inst., Vol. IX, 1906; 8 pp.) Description of several types of diamond drills, methods of running them, and the ordinary routine of sinking prospecting holes.

3075 — PUMPING PLANT — Electrically Driven Centrifugal Pumping Plant at the Tywarnhaile Mine. W. R. Thomas. (Paper read before the Instn. Min. and Met., Feb. 21, 1907; advance sheets; 7 pp.) Gives the details of unwatering this Cornwall mine by the aid of electrically driven pumps, the power being generated by gas producers.

3076—SMOKE PREVENTION in the Power House. C. H. Benjamin. (Cassier's Mag., Feb., 1907; 13 pp.) Very complete discussion of the theory of coal combustion, with detailed descriptions of the principal types of automatic stokers, with their advantages and disadvantages. 40c.

3077—SMOKE PREVENTION—The Suppression of Industrial Smoke, with Particular Reference to Steam Boilers. A. Bement. (Journ. West. Soc. Eng., Dec., 1906; 59½ pp.) Reprint of the above paper, which was read before the West. Soc. of Eng., Oct. 17, 1906, together with lengthy discussion by various members. 40c.

3078 — STEAM ENGINES — Hints on the Considerations which Determine the Position of Steam Engines. C. Hurst. (Min. Engineering, Feb., 1907; 1 p.) Gives a few notes on various features which will determine the proper location of the power engine, derived from the practical experience of the author. 40c.

3079—STEAM PIPE COVERINGS—Heat Non-Conducting Coverings for Steam Pipes. D. R. Maclachlan. (Mechan. Wld., Feb. 9 and 16, 1907; 10 pp.) An account of a series of experiments to determine the efficiency of non-conducting coverings for steam pipes, taking account of the value of different thicknesses of covering when used with pipes of varying diameters and with varying steam pressures. 60c.

3080—SURVEYING—The Verschoyle Pocket Transit. W. D. Verschoyle. (Eng. and Min. Journ., March 2, 1907; 1 p.) Describes the construction of this novel pocket instrument, and gives one or two interesting cases where it was used to very good advantage 20c.

3081—VENTILATION—Underground Fans as Main Ventilators. J. Tonge. (Mines and Min., 1907; 1½ pp.) A reply by the author to some criticisms which were made on one of his previous articles dealing with this same subject. 20c.

3082—WATER SOFTENING—W. D. Collins. (Eng. Rec., Feb. 16, 1907; 1 p.) Gives the results of a series of attempts to find a method of water analysis which might be used by a person without special chemical training, in order to devise a scheme of treatment to soften hard water. 20c.

3083—WATER SOFTENING—The Present Status of the Art of Water Softening. G. C. Whipple. (Cassier's Mag., March, 1907; 21 pp.) Review of the art of water softening, with descriptions of the most important de-

vices now in use for preparing water for steam generation. 40c.

3084—WATER SOFTENING—The Softening of Boiler Feed Waters. Wm. Bettel. (So. Afr. Mines, Feb. 2, 1907; 1 p.) Contains some practical notes on the best methods of water softening for boilers, together with the procedure which the author considers best for this purpose. 20c.

3085—WELDING Frames with Oil. C. J. Morrison. (Am. Engineer, March, 1907; 1 p.) Discusses the application of the oil burner to the welding of heavy castings in place, thereby obviating the necessity of stripping the machine or engine. 20c.

3086—WINDING—Effects of Acceleration on Winding Torques, and Test of Tarbrax Electrical Winding Plant. G. Neuss. (Trans. Min. Inst. of Scotland, Vol. XXIX, Part 2; 6 pp.) Gives an account of the tests made on this winding plant, and discusses and interprets the results obtained.

3087—WIRE ROPES—Some Notes on an Electrical Apparatus for Ascertaining the Cross Sectional Area of Wire Ropes. C. McCann. (Journ. Transvaal Inst. Mechan. Engrs., Jan., 1907; 2 pp.) Describes an invention by which a continuous record of the diameter of a wire hoisting rope may be obtained, and designed to prevent the breaking of such rope, or to locate the cause if such an accident has occurred. 60c.

3088—WOOD PIPE—Method of Construction and Use. R. B. Lloyd. (Cal. Journ. Technology, March, 1907; 3½ pp.) Describes the process of constructing several forms of wooden pipe, with notes on the use of preservatives for the metal banding. 20c.

3089—WOODEN STAVE PIPE. A. Swickard. (Cal. Journ. Technology, Jan., 1907; 2 pp.) The various causes of decay in wooden pipe are discussed and the advantages of wooden pipe over steel in various localities are briefly considered. 20c.

3090—WOODEN STAVE PIPE—Additional Information on the Durability of Wooden Stave Pipe. (Proc. A. S. C. E., Jan., 1907; 12½ pp.) Discussion by members of the Society of the above paper, which was previously mentioned in the Index.

3091—ACETYLENE. H. C. Biddle. (Cal. Journ. Technology Jan., 1907; 8 pp.) Contains a short history of the application of calcium carbide and acetylene for illuminating; describes the manufacture of carbide at Niagara Falls, and discusses the chemistry of acetylene. 20c.

3092—ACID MANUFACTURE — Jahresbericht über die Industrie der Mineralsäuren und des Chlorkalkes. K. Reusch. (Chem. Zeit., Feb. 23, 1907; 3½ pp.) A review of the progress of the chemical industry in Germany in so far as it relates to mineral acids, discussing the effects of prices of raw materials upon production and selling prices. 20c.

INDUSTRIAL CHEMISTRY

3093 — ELECTRIC FURNACE — Electric Heating and its Application to the Fusion and Firing of Refractory Materials. R. S. Hutton. (Trans. Eng. Ceramic Soc., Vol. V, Part 2, 1905-6; 11 pp.) Brief summaries of the results of using the electric furnace in the production of carborundum, artificial graphite, magnesia and silica glass.

3094—ELECTROLYSIS — McDonald Electrolytic Bleach and Caustic Soda Plant. J. R. Crocker. (Electrochem. and Met. Ind., Feb., 1907; 1 p.) A detailed description of the electrolytic plant of this Pennsylvanian company for the production of caustic soda, which is notable for its construction that allows the automatic handling of nearly all the solutions used. 40c.

3095—ELECTROPLATING—Elektrolytische Reinigung der Metalle vor dem Galvanisieren. (Deutsche Metall-Industrie-Zeitung, Jan. 26, 1907; ½ p.) Describes a process of cleaning metals by electrolysis in preparation for galvanizing. The metal to be cleaned is suspended in a special bath and the current turned on. The evolved bubbles of gas then clean the surface of the metal thoroughly.

3096—SILICIDES—An Investigation of the Borides and the Silicides. O. P. Watts. (Bull. Univ. of Wis., No. 145, Nov., 1906; 58 pp.) Presents the results of experimental investigation of these chemical compounds, which have become of scientific and commercial importance through the utilization of the electric furnace. 40c.

3097—SULPHURIC ACID — Studien über das Verhalten von Eisenoxyden zu Zinkblende. C. A. Graumann. (Metallurgie, Feb. 8, 1907; 8 pp.) Describes the apparatus used, the manipulation, and the results obtained in a series of experiments undertaken to determine an efficient means of utilizing pyrite cinder which is contaminated with zinc. 40c.

3098—SULPHURIC ACID—Tower Fillings. J. M. Liebig. (Chem. Engr., Feb., 1907; 8 pp.) Translation from *Zeit. f. Angew. Chem.*, Oct. 26, 1906. A valuable paper on the material adaptable for the filling of Glover towers in sulphuric acid manufacture, and the methods of setting special chemical tiling. 40c.

ANALYTICAL CHEMISTRY

3099—ASSAYING—Blacksmith's Forge as an Assay Furnace. W. R. Wade. (Eng. and Min. Journ., March 2, 1907; ½ p.) Describes a very ingenious use of the forge for assaying purposes, and describes the fusion and cupellation as it was carried out in this apparatus. 20c.

3100—ASSAYING—Notes on the Separation of Gold, Silver and Platinum. H. Carmichael. (Publication of the B. C. Assayers' Inst., Nov., 1906; 1 p.) Describes the results of a series of tests upon the solubility of various alloys of gold, platinum and silver in nitric and sulphuric acids of different strengths. 20c.

3101—ASSAYING—Some Notes on Assaying. C. H. Fulton. (West. Chem. and Met., Jan., 1907; 9½ pp.) Continuation of article previously indexed, dealing in this instalment with the theory of cupellation, giving many directions for avoiding loss by spitting and like means, and discusses the effect of various impurities in the lead button. 60c.

3102 — COPPER-TIN ALLOYS — Kupfer, Zinn und Sauerstoff. E. Heyn and O. Bauer. (Zeit. f. Anorg. Chem., Band 45, Heft 1; 16 pp.) A long and interesting account of experiments to determine the behavior of oxygen on copper-tin alloys, describing the furnaces and apparatus used, the methods developed for producing various alloys, and giving a concise summary of the conclusions arrived at.

3103 — ELECTROLYSIS — Elektroanalyse der Metalle. A. Fischer. (Zeit. f. angew. Chem., Jan. 25, 1907; 4½ pp.) A supplementary article to the paper by Prof. Förster which appeared previously in this periodical. The author of the present contribution is disappointed at the narrow field covered by Prof. Förster, and gives descriptions of many new electrolytic separations of metals. 40c.

3104—GOLD AND THALLIUM ALLOYS—Ueber Gold- Thalliumlegierungen. M. Levin. (Zeit. f. Anorg. Chem., Band 45, Heft 1; 7 pp.) An account of experiments undertaken to determine the chemical properties of gold and thallium alloys. The studies were carried out by determining the cooling curves of various different alloys of the two metals.

3105—MANGANESE DETERMINATION—Ueber die Manganbestimmung bei Anwesenheit von Wolfram. G. V. Knorre. (Stahl u. Eisen, March 13, 1907; 3 pp.) Discusses the effect of tungsten upon the accuracy of the usual methods of determining manganese, and outlines the modifications to be used when tungsten is present. 40c.

3106—METALLOGRAPHY—Ueber die Anwendung der thermischen Analyse in abnormen Fällen. G. Tammann. (Zeit. f. Anorg. Chem., Band 45, Heft 1; 7 pp.) A description and discussion of the method of thermal analysis, whereby the composition of fusible masses of crystalline substances is established without any mechanical separation. The process is an application of the study of cooling curves.

3107—MINERALS—Tables for Determining Economic Minerals. (Chem. Engr., Feb., 1907; 3 pp.) Continuation of article previously indexed, giving notes on the characteristic reactions given by various metals when their minerals are tested in the open tube. Also a list of borax bead reactions. 40c.

3107a—TIN AND ARSENIC—Versuche über die elektrolytische Trennung von Zinn und Arsen. A. Lampen. (Chem. Ind., Mar. 15, 1907; 1 p.) Gives the results of some investigations upon the accuracy of an electrolytic method of separating and determining tin and arsenic. 40c.

3108 — VOLUMETRIC ANALYSIS — On Technical Volumetric Methods in General. V. H. Gottschalk. (West. Chem. and Met., Feb., 1907; 10½ pp.) An inquiry into the factors which are of chief importance in determining the accuracy of a volumetric method, such as the nature of the indicator, conditions of titration, and proper manipulation of measuring instruments. 60c.

3109—VOLUMETRIC ANALYSIS—Studie über Indikatoren. E. Salm. (Chem. Zeit., Feb. 2, 1907; ½ p.) Discusses some of the inaccuracies of volumetric processes, due to the dissociation of strong salts upon the indicators in acidimetry and alkalinity. 40c.

3110—ZINC — Die Elektrolytische Zinkfällung unter Anwendung Rotierender Elektroden. T. S. Price and G. H. B. Dudge. (Elektro. Zeit., Feb., 1907; 4½ pp.) A complete summary of a series of experiments made upon zinc sulphate solutions, to precipitate zinc electrolytically upon a rotating cathode. The results of varying many factors connected with the analyses are tabulated concisely and briefly discussed. 40c.

MATERIALS OF CONSTRUCTION

3111—CEMENT-MORTAR—The Effect of Mica on Cement-Mortar. W. N. Willis. (Cement Age, Mar., 1907; 2½ pp.) Records briefly the results of some experiments made to determine the injurious effect of mica in coarse and fine sands to be used for concrete. 20c.

3112—CEMENT-MORTAR—Ueber Ausdehnung von Portlandzementmörtel im Süsswasser und im Meerwasser. S. Kasai. (Tonindustrie-Zeit., Mar. 2 and 9, 1907; 5 pp.) Sums up the results of many tests made to determine the expansion of portland cement mortars when mixed and hardened with fresh and salt water. 40c.

3113—CONCRETE—Physical Test on Concrete. E. H. Beckstrand. (S. L. Min. Rev., Feb. 15, 1907; 2 pp.) Describes the results obtained from a series of experiments made on full size reinforced concrete beams, and upon cement briquets and cubes all made from Utah cement. 20c.

3114—CONCRETE—The Fatigue of Concrete. J. L. Van Ornum. (Proc., A. S. C. E., Dec., 1906; 26 pp.) Very complete article dealing with the strength of concrete as determined by repetition and time tests, with a short discussion as to the value of the curves obtained.

3115 — CONCRETE CONSTRUCTION — Practical Hints for Concrete Constructors. W. J. Douglas. (Eng. News, Dec. 29, 1906, and Jan. 24, 1907; 9 pp.) Contains a very large number of hints and rules for success in concrete work, selected from a long experience by a practical concrete engineer. 40c.

3116—PORTLAND CEMENT—The Chemistry and Testing of Portland Cement. C. H. Desch. (Eng. Times, Feb. 28, 1907; 2 pp.) Discusses the theory of the various tests which are now in use for determining the quality of portland cement. 20c.

3117—REINFORCED CONCRETE—Electrolytic Corrosion of Iron and Steel in Concrete. A. A. Knudson. (Proc., Am. Inst. Elec. Engrs., Feb., 1907; 15 pp.) Gives the result of a set of investigations to determine the amount of corrosion which takes place in the reinforcement steel of concrete, and which is occasioned by electric current. Illustrations of various examples of corroded steel taken from structures are given. 60c.

3118—REINFORCED CONCRETE—Steel for Reinforced Concrete. J. S. E. de Vesian. (Eng. Times, Feb. 21, 1907; 1 p.) Few notes on certain requisite properties which all steel should possess, in order to make safe reinforcement for concrete. 20c.

3119—REINFORCED CONCRETE—Tests of Bond Between Concrete and Embedded Steel Bars. (Engineering-Contracting, Feb. 13, 1907; 1½ pp.) Gives the results of tests to determine the strength of the bond between the concrete and the reinforcing steel, describing the methods of testing, and tabulating the results of the tests. 20c.

3120—REINFORCED CONCRETE — The Mechanics of Reinforced Concrete. C. B. Wing. (Journ. Assn. Eng. Societies, Feb., 1907; 22½ pp.) Discusses the development of formulæ for calculating stresses in reinforced concrete, also the principles and methods to be used in their application. 40c.

3121—REINFORCED CONCRETE BEAMS. Tests on. Ernest A. Moritz. (Bull. Univ. of Wis., No. 148, Jan., 1906; 73 pp.) Gives in compact form the reports of tests on reinforced concrete beams which have been made during the past three years in the laboratory for testing materials of the University of Wisconsin. Describes the apparatus used, various methods of reinforcing, and gives tabulated data of results, together with many diagrams. 40c.

3122—SAND-LIME BRICK—Tests of L. N. Reeve. (Journ., Worcester Poly. Inst., Jan., 1907; 5 pp.) Gives the results of tests upon sand-lime brick of various compositions and fillers. 40c.

3123—WROUGHT PIPE—Materials and Properties of Wrought Pipe. F. N. Speller. (Proc., Eng. Soc. W. Penn., Jan., 1907; 21 pp.) Describes the manufacture of wrought iron pipe, and discusses with considerable detail the principal characteristics of pipe material, the corrosion of iron and steel, and gives the results of torsion tests of butt-welded pipe. 40c.