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Gold Mining in South America.*

BY J. H. CURLE.

A relatively small figure, equal to 2½ millions sterling, was in 1904 South America's share of the world's output of 71 millions of gold. Among the States Brazil yielded most, followed by Colombia, the Guianas, Venezuela and Peru. Chile, Ecuador and Bolivia yielded a little gold, but almost none came from Uruguay, Paraguay, or the Argentine.

There is reason to think that this small output of gold does not represent South America's true place as a gold-mining region, and that in those States containing the Andean ranges, especially the eastern slopes of these ranges, there is material for a new goldfield of great magnitude and value. The field so indicated stretches from Colombia, through Ecuador and Peru, to Bolivia, and in this latter State includes what is often considered to be the richest metal-mining country in the world. Why one should not consider the field as potentially continuing down through the Chilian and Argentine Andes is not easy to explain. Certainly both these districts, so far as explored, have as yet yielded no gold deposits of much value; but the area is so vast, and the exploratory work that has been done so superficial, that one is not justified in writing them off as of inferior value. In Terra del Fuego, at the extreme south of the continent, valuable placer deposits have been worked for years, and there is no sufficient reason for believing that no payable gold occurs between that point and Bolivia, which lies probably 2,000 miles to the north.

As regards the "economic factor" in South America, the two drawbacks to an active policy of exploration and subsequent expenditure of capital are unstable government and lack of transport. Of these I am inclined to place the latter as the more formidable. I do not infer that, on the whole, South American governments are becoming more stable, but some are better than others. The countries which ought particularly to be explored for gold are Bolivia and Peru, in each of which the trend of government for some time past has been satisfactory. Brazil is also a country demanding attention. Here we already have the evidence of the St. John del Rey—the oldest English gold mining company—which has worked in the country for over 70 years, and of several other gold mines established a number of years ago. I fancy that the attitude of the Brazilian government toward these mines has been a fair one. Where they are seriously affected is in the fluctuating rate of exchange; that, however, is hardly to be laid at the door of bad government, while the recent rise in the milreis, which has cut heavily into the mine's profits, is really a tribute to the country's general prosperity. The mining laws of South American States are, on the whole, a greater drawback than any actual misgovernment of the States, for in the hands of unscrupulous officials they can be so interpreted as to be made instruments of blackmail. The laws in a number of cases require revision. In this respect it is to be noted that the mining law of Bolivia is the best of them all, and that the essential requirement of a sound title is there more easily acquired than elsewhere.

Lack of transport is a more tangible drawback. Much of what is probably the richest mineral country in South America has as yet barely been explored, and the building of roads and railways into such territories is not work which financially poor governments, such as Bolivia and Peru, can at present contemplate. Any great scheme of exploration undertaken by British capital would most surely have to be followed up by heavy expenditure on roads and railways, with actual gold production probably deferred for years, a procedure which most financiers would not view with favor. Strategically, from the mining point of view, a railway of great value is now being built. This is a continuation by the Argentine government of their Central Northern line, which before long will reach the Bolivian border. Eventually—and I expect facts will justify the finding of the money for this at an early date—this line will be continued to join up with the railway now running into Bolivia from the Pacific coast, and a great stretch of rich mining country, now lying untouched for lack of transport, will be brought within the economic sphere.

The interest of British capital in South American gold mines is at present quite small; indeed, the number of mines in the whole country, outside of placer workings, is limited. The only standard mine is St. John del Rey, in Brazil, which has been one of the most persistent quartz lodes in the history of mining. There are still large reserves in this mine in the lowest workings, at below 3,000 ft., although a definite falling off in value seems to have set in. Given a normal rate of exchange, the life of the mine would still, in the ordinary course of events, be long and profitable; but with the milreis at over 17d., as it now is, the profits cannot but be much reduced. In the same district are the Ouro Preto and Sao Bento mines. These have also large and persistent deposits, although of considerably lower grade. Here, with a normal exchange, small profits ought to be earned, but not with the present rate.

The Frontino & Bolivia mine in Colombia once earned considerable profits, but some years ago went wrong. There has been an improvement lately, but the reserves are too small to speak of the future with any certainty. Probably the best mine in South America, as it is certainly the richest, is owned in New York. This is the Peters mine, discovered last year in the forest of British Guiana. The outcrop takes the form of a great bunch of quartz. A small amount of work exposed some 20,000 tons, and it was reported that the average value of this, in free gold, was £14 a ton. I have not yet heard whether these figures have been confirmed. The Americans also own in Peru what has been a sensational mine—the Santo Domingo, belonging to the Inca Company, of Philadelphia. This is on the eastern slopes of the Andes, in an almost inaccessible spot, where machinery is conveyed over a lengthy and precipitous mountain track on muleback. Some time ago this mine was yielding as much as £25,000 a month from 10 stamps, and remained highly productive for several years.

We are now, I believe, on the verge of a great development in South American gold mining. This is going to come about, in the first place, through gold dredging, and the district which will show the finest results is that part of Bolivia toward which the Argentine government's railway extension is now heading. All reports go to show that the River San Juan de Oro, running through this district, not only carries good value in gold, but shows unique facilities for dredging. Another immense field for dredging is the Matto Grosso district of Brazil —most remote, but carrying evidence of great value. From Terra del Fuego, Argentina, Peru, the Guianas, and from the Minas and Diamantina districts of Brazil a great deal of evidence as to the existence of payable dredging areas has been obtained in the last two years. Much of this has come through worthless channels, but the residuum of properly attested evidence is sufficient for me to express the idea that gold dredging will pay in many parts of South America.

*An article published in *The Economist*, Sept. 9, 1905.

Gears, operating at extremely high speeds, often give rise to a shriek that can be avoided (*a*) by the use of gears of larger diameter, or (*b*) by the adoption of a support that will not transmit so much vibration. If neither of these two remedies gives relief, the gears are almost certain to be cut too deep or too shallow. If too deep, the resulting sound is apt to resemble a whistling, while a duller grinding hum is an indication that the gears are not meshing properly or that the teeth are not cut deep enough.

A mercurial thermometer has been used for the operation of an electric alarm to indicate low water in the steam boilers. The thermometer is placed with its bulb at the water line; when the water falls to the danger point, steam surrounds the bulb of the thermometer and makes the mercury rise and close a circuit to the bell.

Modification in Boiler Design Required by Liquid Fuel.*

BY GEORGE W. MELVILLE.†

Boiler Volume.—Consideration of the mechanics of combustion, as applied to liquid fuel, appear to show that, for the efficient burning of the latter, it is necessary to provide boilers of greater volume than are now constructed for a given horsepower.

Complete combustion requires that for every atom of carbon and for every two atoms of hydrogen there shall be at least one atom of oxygen brought in close proximity and then and there subjected to a temperature sufficient for ignition. In other words, there must be a thorough mixture and then ignition. It is doubtful if a mere mechanical mixture, however complete, could ever be perfect enough to bring about the desired result. This is well illustrated by contrasting the smoky combustion of black gunpowder, where we have a mechanical mixture, with the combustion of the so-called smokeless powders, in which the mixture is so thorough and minute that similar proportions of oxygen, carbon and hydrogen occur in each separate molecule.

In all ordinary cases of combustion, however, where we draw our supply of oxygen from the atmosphere, it is only by virtue of the property of diffusion that a sufficiently intimate mixture is attained. As to the real nature of diffusion, it is known that at ordinary temperatures the particles of oxygen in the air are moving about in every conceivable direction at velocities averaging over 1,600 ft. per second. Any one atom, however, moves only an inappreciable distance before being arrested by collision with another atom. So that, although the average velocity of the atoms is probably equal to that of a rifle ball, it still takes an appreciable time for a particle to travel even a moderate distance. It is this time element that constitutes the great stumbling block when the attempt is made to burn a large amount of combustible in a small space.

The reason why intense combustion is easily attained with a charcoal fire is that the fuel is solid at the temperature of ignition. Being solid, it can present a large surface for the oxygen to act upon, and an atom cannot break away and go up the chimney without first being united with at least one atom of oxygen.

In the combustion of hydrocarbons, on the other hand, we have the following conditions: The fuel is already on its way to the chimney before it is even partially burned. The first effect of the heat is to disassociate the carbon from the hydrogen. Whether or not the latter unites with the oxygen does not affect the soot or smoke question, since the constituents and also the products of combustion of hydrogen are alike transparent colorless gases. But in any case, the carbon, left alone in the form of an impalpable dust, is much less favorably circumstanced than that in a charcoal fire. If it were attached to a hot coal, as in the charcoal fire, so as to be capable of receiving a blast of air, its combustion would be easily accomplished. But instead of this, it is carried along by the current of gases, and unless it is given plenty of time before being cooled it will be left alone as a particle of soot.

An examination of the nature of flaming leads to similar conclusions. The luminous part of a flame is caused by the white-hot particles of carbon. These particles have been robbed of the hydrogen with which they were formerly associated, and they have not yet met the oxygen necessary for complete combustion. This process of finding, or of being found by, the oxygen requires time, and if perchance the temperature falls below that of ignition before the process is completed, the carbon will be deposited as soot or else go on up the stack as smoke along with the excess of oxygen with which it should have been united. Thus an unmistakable symbol of the conditions that are necessary in order to burn a large amount of combustible in a small space is a short flame.

The circumstances which conduce to shortness of flame are:

1. Pure carbon fuel, because the fuel cannot leave the grate or furnace until it is burned to CO at least. In any case, it cannot deposit soot, since CO, when cooled, is a transparent gas.

2. Intimate initial mixture of oxygen with the fuel, since the more intimate the mechanical mixture the less time will it take the gases by the process of diffusion to become perfectly mixed.

3. Initial heating of the air, since the rate of diffusion decreases with temperature.

4. Large surface of fuel presented for impact of the oxygen.

The desirability of supplying a combustion chamber whose volume is at least equal to the volume of the flames seems obvious. In this connection the fact should not be overlooked that a slight increase in the volume of the combustion space acts in two ways to improve the quality of the combustion. One way—that having to do with the greater time permitted for diffusion—has already been touched upon; but apart from that, there are influences at work in consequence of which an increase in the volume of the combustion space actually diminishes the volume of the flames. This is because the temperature of the larger space is higher, and the higher temperature hastens the process of diffusion.

During the process of diffusion heat is being liberated at all points throughout the combustion space. Hence all parts of the space are being traversed by heat rays emanating from every other part of the combustion chamber. It is readily seen that the temperature within this space must, under these conditions, increase with the volume to an extent limited only by the transparency to radiant heat, and by the temperature of disassociation at which, necessarily, heat ceases to be liberated. Since the transparency of the combustion space is diminished by the presence of solid carbon (for whether black or incandescent, it is in any case opaque), it follows that the increase of temperature with a given increase of volume will be less in space filled with luminous flame than in one filled with burning hydrogen or CO.

This question of the proper size of the combustion space is further complicated by the presence and condition of the solid walls of the furnace, whether, for instance, they are themselves incandescent or merely black absorbers of heat. There seems no reasonable doubt, however, that incandescent walls will hasten diffusion and hence shorten flame.

Where it is possible for the diffusion to be completed before combustion begins, as in the Bunsen gas burner, the difficulties naturally disappear and there is readily attained a very short flame, which, moreover, is incapable of depositing soot even on a cold object.

In the case of a liquid fuel which is incapable of vaporization, the diffusion and ignition must occur simultaneously. With such a fuel there is bound to be considerable flaming. Another difficulty, and one from which all solid fuels are free, arises with this sort of fuel from the action of capilarity or surface tension. Thus, no matter how finely the liquid is pulverized, each tiny drop assumes a spherical shape and so presents the least possible surface for the impact of oxygen atoms.

From what has been said, it seems clear that a liquid fuel, such as crude petroleum, requires an ample combustion space, more, indeed, than does almost any other sort of combustible material.

As to the difficulty arising from the tendency of the gases to follow the path of least resistance and to flow, for instance, with too great velocity at the center of the space and too little at the sides, that can always be checked by means of retarders placed so as to equalize the velocity over the cross-section of the current. The difficulty, therefore, reduces itself to the mere trouble of finding out where to place the retarders, and this is obviously a question to be settled by experiment. What is true in this matter of combustion space is also largely true of the tube space. The process of diffusion, so important to combustion, continues after the combustion is complete, and must have a good deal to do with the rate at which heat is abstracted from the gases by the heating surfaces. As affecting the necessary amount of draft pres-

*Excerpt from a paper presented to the Tenth Navigation Congress at Milan, 1905.

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sure, a tube space, short in the direction of flow of gases and of large cross-sectional area, is better than one of small area and long in the direction of flow; but on account of the lesser velocity of flow through the short space the gases within it will be less thoroughly mixed by eddying, and the importance of arranging the heating surfaces so as to permeate all parts of the space will be increased.

A study of the liquid-fuel problem, from the standpoint of the practical or mechanical rather than the theoretical or chemical feature of combustion, would, therefore, show that when an assured and reasonably cheap supply of such fuel can be obtained, and when steam generators are designed for burning oil exclusively, it will be essential for the efficient and forced burning of such fuel to provide boilers of greater volume than now constructed for designated horsepowers.

Furnace Construction.—Where there is no desire to force the combustion of liquid fuel, the simple cylindrical furnace of the Scotch boiler has been found fairly suitable, particularly if an extension to the front of the furnace is made, so that complete combustion can be effected before the gases pass through the tube.

With the water-tube boiler, the problem becomes a more complicated one, at least so far as economy is concerned. Where the gases pass through the tubes, as in the case of the Scotch boiler, the resulting friction is sufficiently great to cause the gases to be abstracted of sufficient heat to produce a comparatively low temperature at the base of the stack. Where the gases pass around the tubes, as in the case of a water-tube boiler, there is but little impeding of the flow, and as a result stack temperatures are comparatively high. When burning oil in bent-tube types of boilers, combustion is often only completed near the top rather than near the base of the stack or funnel.

The question of baffling of gases in a water-tube boiler is one of supreme importance, for not only does it concern the economic efficiency, but the endurance of the boiler itself. The straight-tube water-tube boiler ought, however, to possess special advantages for the burning of oil by reason of the fact that it is possible to secure a combustion chamber of considerable volume, so that complete combustion of the fuel can be effected.

Scotch marine boilers, on account of their contracted volume of furnace, produce difficulties in the introduction of oil, and by reason of the small cubical space permissible for combustion purposes it is requisite that careful study should be given to the disposition of the brickwork in, or surrounding, a furnace. It is, of course, quite possible to spray the oil at once into the metallic fire-box or furnace of the Scotch boiler, the flame impinging on the cold surfaces of the steel plates; but although this is often done, yet it cannot in any case be recommended as good practice. For successful combustion of oil, it is requisite that the issuing oil spray should not too early in its progress of combustion strike the chilled or comparatively cold surfaces of the metal work. Carefully designed oil-burning furnaces require that the furnaces should be either partially or wholly bricked around.

The fact of heated brickwork is in itself a very great advantage in aiding combustion, and of still greater use in insuring perfect continuity of the heat supply, especially when burners tend to act in gusts, as they often do under improper action of the pumps, or where there is dirt or water in the oil supply.

The brickwork surrounding the interior of the Scotch furnace ought not to constitute a serious loss to thermal effect, because the brick itself early becomes incandescent and transmits a large portion of its heat directly to the metal in a steady and continuous flow.

Various forms of brick construction may be used in the cylindrical furnace. For example, the furnace may be lined throughout and the brickwork also extended well into the combustion chamber in order to protect the back connection from the direct impact of flame. The burner may be fitted in the middle of the fire door, spraying directly into the furnace and utilizing the whole volume of the latter for combustion. Again, the combustion chamber may be bricked, the bridge wall left in place, the standard forms of grate bars left intact, and the top of the bars paved with fire-brick, having interstices between the bricks. The furnace, however, should not be lined, in order to retain the maximum volume. By this plan the oil-burning installation can be readily removed and the furnace prepared for the use of coal. Again, the furnace may be fitted with a small wagon-top arch at the usual location of the bridge wall, and behind the arch, space be left for a combustion chamber. The latter and the furnace should be lined with fire-brick, excepting over the arch in order to avoid checking the gas flow there. This plan insures an intimate mixture of flame and gases, but shortens the active length of the furnace. The latter disadvantage may be met by extending the front of the furnace by a projecting casting, suitably lined. Other modifications in furnace design are essential in the use of mechanical burners, when compressed air or steam is not employed and the air for combustion requires to be fed in heated, rotating currents.

Water-tube boilers have usually somewhat greater volume in their fire-boxes than the furnaces of the Scotch boilers; consequently the opportunities are greater to arrange the brickwork to suit the peculiar conditions required by oil fuel. With most of these boilers, it is quite customary to put the burners into the fire doors or the spaces which would have been ocupied by fire doors. As a matter of fact, it would often be better to put the burner at the back of the boiler and fire toward the front of the furnace, as by this means the larger end of the furnace would receive the gases of combustion at the point where the greatest expansion was taking place.

Owing to the fact that all the gauges, fittings and connections are on the front of the boiler, it becomes an advantage to have the burner also, therefore, located on the front rather than on the back, where it would be practically inaccessible.

As with Scotch boilers, various modifications of furnace construction are possible or desirable. The grate bars may be removed and the burners fitted in the front to spray into the entire volume of the furnace. Again, the burners may spray over a paved grate, set with fire-brick having openings for air. The advantage of this is the fitness of the furnace for the use of coal; its disadvantage is the reduction in furnace volume. Again, the grate bars may be removed and the bottom of the furnace constructed of a thin layer of brickwork, so arranged that the impinging of the hot gases and the effects of radiation cause the floor to be heated to a considerable temperature. The air entering for combustion and passing under this floor, is quickly heated, thus increasing the efficiency of the furnace. Many other modifications are possible. The furnace may be fitted with a flat arch or a series of wagon-top arches, with or without a combustion chamber behind the arch. A hot-air floor may be added, the front of the furnace extended, as noted for Scotch boilers, and, if necessary, special spiralized air-heating devices fitted.

Chinese in Canadian Mines.

Consul Dudley writes from Vancouver (*Daily Consular Report*, No. 2346, Aug. 28, 1905) about the employment of Asiatics in the mines of British Columbia. He says:

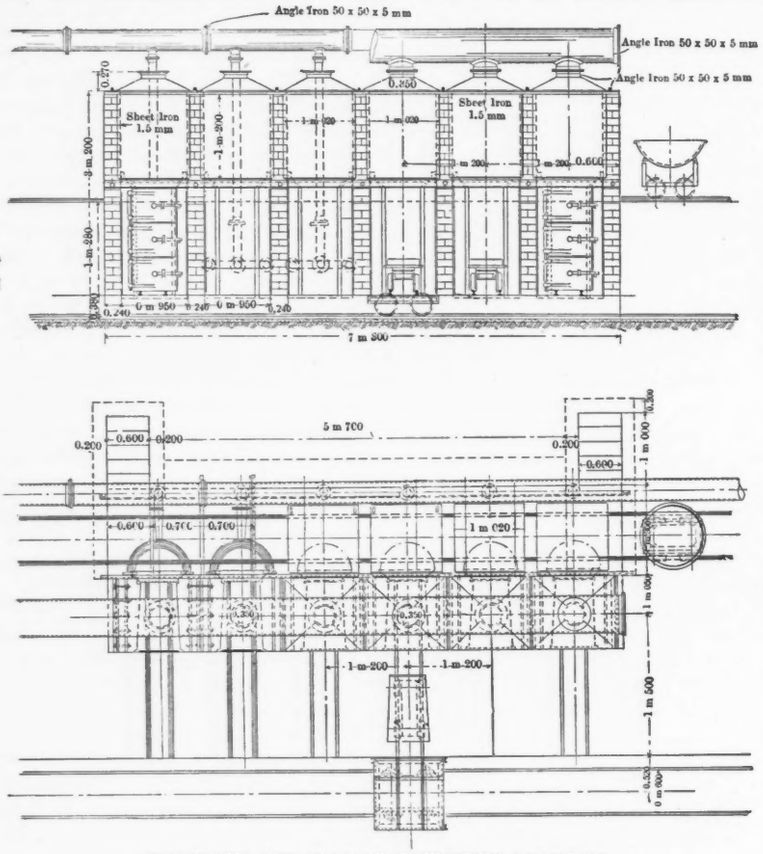
"Some time ago the British Columbia parliament enacted a law forbidding the employment of Chinamen in mining underground. The Wellington Colliery Company, desiring to test this law, continued to employ Chinamen in underground work, whereupon an agreed case was submitted to the courts, and passed finally to the privy council in London, England, the court of last resort. The judicial committee of the privy council has handed down a decision in favor of the colliery company. The committee sustained the contention of the company that it could send its employees to any portion of its property. Similar acts, relating to both Chinese and Japanese, have previously been disallowed by the Dominion Government; and in one case Downing street decided against a law very similar to the one just acted upon."

The side pole and bracket construction is usually about the cheapest substantial form of trolley-wire suspension for electrically-operated tramways.

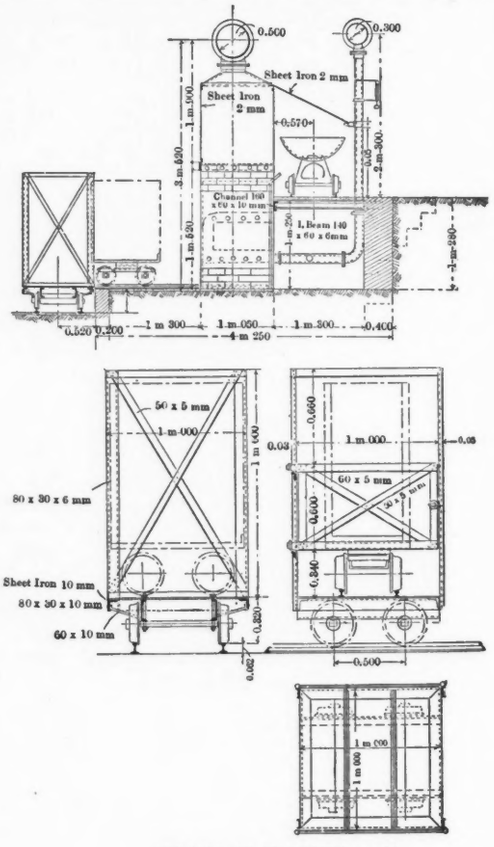
The Bormettes-Method of Lead and Copper Smelting.

BY ALFREDO LOTTI.*

It is well known that, in order to obtain a proper fusion in lead and copper ore-smelting, it is not only advantageous, but often indispensable, that a suitable proportion of slag be added to the charge. In the treatment of copper matte in the converter, the total quantity of slag must be re-smelted, inasmuch as it always retains a notable quantity of the metal; while in the smelting of lead ore in the blast-furnace, the addition of slag is mainly intended to facilitate the operation, avoiding the use of strong air pressure and thus diminishing the loss of lead.



ELEVATIONS AND PLAN OF CONVERTING CHAMBERS.



DETAILS OF TRANSFER CARS.

The proportion of slag required sometimes amounts to 30 to 35% the weight of the ore.

Inasmuch as the slag is usually added in lump form, cold, its original heat (about 400 calories per kilogram) is completely lost and an intimate mixture with the charge cannot be obtained. For this reason, I have studied the agglomeration of lead and copper ores with fused slag, employing a variable proportion according to the nature of the ore treated. In the majority of cases, and with some slight modifications in each particular case, by incorporating the dry or slightly moistened mineral with the predetermined quantity of liquid slag, and by rapidly stirring the mixture, so as to secure a proper subdivision of the slag and the mineral, there is produced a spongy material, largely composed of small pieces, together with a simultaneous evolution of dense fumes of sulphur, sulphur dioxide and sulphur trioxide. By submitting this spongy material to an air blast, the sulphur of the mineral is burned, the temperature rising in the interior of the mass to a clear red heat. Copious fumes of sulphur dioxide and trioxide are given off, and at times a yellowish vapor of sulphur, which condenses in drops, especially if the ore is pyritous.

At the end of from one to three hours, according to the quantity of sulphur contained in the material under treatment and the amount of the air pressure, the desulphurization of the ore, so far as it has come in contact with the air, is completed, and the mass, now thoroughly agglomerated, forms a spongy but compact block. It is then only necessary to break it up and smelt it with the requisite quantity of flux and coke. The physical condition of the material is very conducive to a rapid and economical smelting, while the mixture of the sulphide, sulphate and oxide leads to a favorable reaction in the furnace.

In employing this method, it sometimes happens that ores rich in sulphur produce during the smelting a little more matte than when the ordinary system of roasting is employed. In such instances, in order to avoid or to diminish the cost of re-treatment of the matte, it is best to agglomerate a portion thereof with the crude mineral and the slag. This has the advantage of oxydizing the matte, which acts as a ferruginous flux in the smelting.

The system described above leads to considerable economy, especially in roasting, as the heat of the scoria, together with that given off in the combustion of the sulphur, is almost always sufficient for the agglomeration and desulphurization of the mineral; while, moreover, it reduces the cost of smelting in the blast-furnace. Although the primary desulphurization is only partial (about 50%), it continues in the blast-furnace, since the mineral, agglomerated with the slag, assumes a spongy form and thereby presents an increased surface to the action of the air. The sulphur also acts as a fuel and does not produce an excessive quantity of matte.

The system will prove especially useful in the treatment of argentiferous lead ore, since by avoiding the calcination in a reverberatory furnace, loss of silver is diminished. It appears, however, that, contrary to the reactions which occur in the Huntington-Heberlein process, a calcareous or basic gangue is not favorable to this process, if the proportion be too great.

The following comparison has been made in the case of an ore containing 62 to 65% of lead, 16 to 17% sulphur, 10 to 11% zinc, 0.4% copper and 0.222% silver, in which connection it is to be remarked

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that the results are in general the better the less zinc contained in the ore.

Ordinary Method.—Roast - reduction. Cost per 1,000 kg. of crude ore:

1. Roasting in reverberatory furnace:		
Labor	$0.70	
Fuel	1.50	
Repairs and supplies	.05	
		$2.25
2. Smelting in water jacket:		
Labor	$1.01	
Fuel	2.20	
Repairs and supplies	.03	
Fluxes	.50	
		$3.74
Total		$5.99

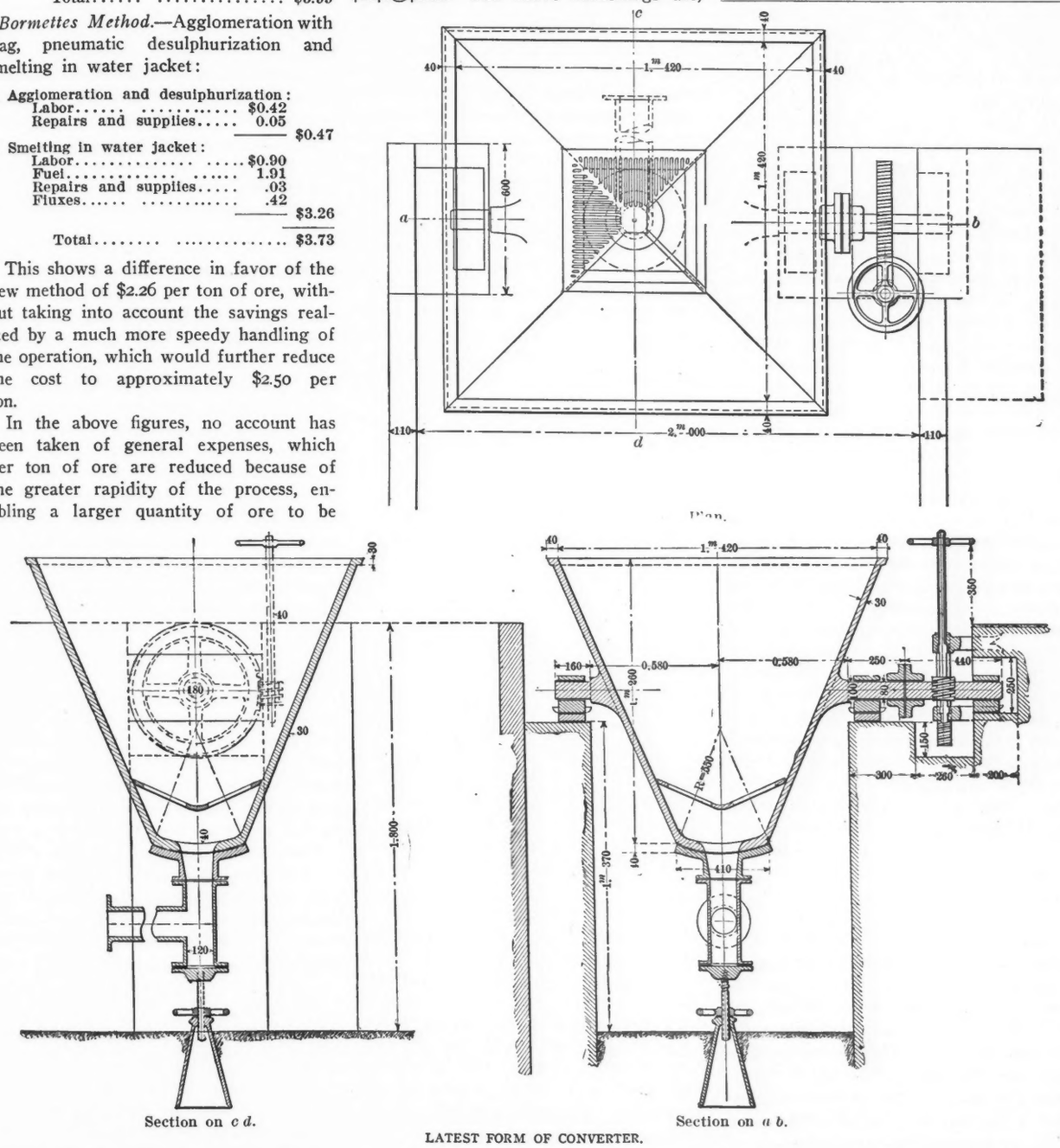
Bormettes Method.—Agglomeration with slag, pneumatic desulphurization and smelting in water jacket:

1. Agglomeration and desulphurization:		
Labor	$0.42	
Repairs and supplies	0.05	
		$0.47
2. Smelting in water jacket:		
Labor	$0.90	
Fuel	1.91	
Repairs and supplies	.03	
Fluxes	.42	
		$3.26
Total		$3.73

This shows a difference in favor of the new method of $2.26 per ton of ore, without taking into account the savings realized by a much more speedy handling of the operation, which would further reduce the cost to approximately $2.50 per ton.

In the above figures, no account has been taken of general expenses, which per ton of ore are reduced because of the greater rapidity of the process, enabling a larger quantity of ore to be smelted in a given time. Making allowance for this, the saving will amount to an average of $2.40 per 1,000 kg., a figure which will naturally vary according to the prices for fuel, labor, and the quantity of matte which it may be necessary to retreat. If the quantity of matte does not exceed 10% of the weight of the ore, it can be desulphurized by admixture with the ore, without use of other fuel. If, however, the proportion of matte rises to 20 parts per 100 parts of ore (a maximum which ought not to be reached in good working), it is necessary to roast a portion of it. Under unfavorable conditions, consequently, the saving effected by this process may be reduced to $2@$2.20 per 1,000 kg., and even to as little as $1.40@$1.60. The above reckonings are, however, without taking any account of the higher extraction of lead and silver, which is one of the great advantages of the Bormettes process.

	Ordinary Method.	Bormettes Method.
Coke, per cent of the charge	14	12
Blast pressure, water gauge	15 to 20 cm.	12 to 14 cm.
Tons of charge smelted per 24 hr.	20	25
Tons of ore smelted per 24 hr.	8	10
Lead assay of slag	0.80 to 0.90%	0.20 to 0.40%
Matte fall, % of ore charged	5 to 10	10 to 15
Lead extraction	90%	92%
Silver extraction	95%	98%



LATEST FORM OF CONVERTER.

The technical results obtained in the smelting of an ore of the above mentioned composition are as follows:

The higher extractions of lead and silver are explained by the fact that the loss of metals in roasting is reduced, while, moreover, the slags from the blast-furnace are poorer than in the ordinary process of smelting. The economy in coke results from the greater quantity of

sulphur which is utilized as fuel, and from the increased fusibility of the charge for the blast-furnace.

The new system of desulphurization enables the charge to be smelted with a less quantity of fresh flux, by the employment in its place of a greater proportion of foul slag. The reduction in the necessary amount of flux is due not only to the increased fusibility of the agglomerated charge, but principally to the fact that in this system the formation of silicates of lead (which are produced abundantly in ordinary slag roasting) is almost nil. It is therefore unnecessary to employ basic fluxes in order to reduce scorified lead.

The losses of metal in the desulphurization are less than in the ordinary method, because the crude mineral remains only a short time (from one to three hours) in the apparatus for desulphurization and agglomeration, and the temperature of the process is lower. The blast-furnace slags are poorer, because there is no formation of silicate of lead during the agglomeration.

The Bormettes method, in so far as the treatment of lead ore is concerned, may be considered a combination process of roast-reaction, of roast-reduction, and of precipitation-smelting. It is not, however, restricted to the treatment of lead ore. It may also be applied to the smelting of pyritous copper-bearing ores. In an experiment with cupriferous pyrites, containing 20 to 25% sulphur, it succeeded in agglomerating and smelting them without use of any fuel for calcination, effecting a perfect smelting, analogous to pyrite smelting, with the production of a matte of sufficient degree of concentration.

The first cost of plant installation is very much reduced by the Bormettes method, inasmuch as the ordinary roasting furnaces are almost entirely dispensed with, apparatus being substituted for them which cost only one-third or one-fourth the expense of ordinary furnaces. The process presents the advantage, moreover, of being put into immediate operation, without any expenditure of excess fuel.

The apparatus required in the process is illustrated in the accompanying engravings. The apparatus for desulphurization and agglomeration consists of a cast-iron box, composed of four vertical walls, of which two incline slightly toward the front. These inclined walls carry the air boxes. The other two walls are formed, the one in front by the doors which give access to the interior, and the other in the rear by a straight plate. The whole arrangement is surmounted by a hood. The four pieces when assembled form a box without bottom. Several of these boxes are combined as a battery. The pots in which the agglomeration and desulphurization are effected are moved into these boxes on suitable cars, in the manner shown in the first engraving. A later and more improved form is shown, however, in the second engraving.

This process, which is the invention of A. Lotti and has been patented in all the principal countries, is in successful use at the works of the Société Anonyme des Mines de Bormettes, at Bormettes, La Londe (Var), France. Negotiations are now in progress with respect to its introduction elsewhere in Europe.

The Lancelot Tin-Bismuth Lode, Queensland.*

The Lancelot lode at Silver Valley (Herberton district, Queensland) is a true fissure vein, striking about 55° west by north, and dipping south at 73°. The outcrop is traceable on the surface for over 2,000 ft. as a copper lode, and has been worked at shallow levels for this metal in several places. The copper ore is payable only where secondary concentrations of oxidized ores have accumulated. Small quantities of tin are usually associated with the copper, but except in the vicinity of the present workings the lode does not carry payable tin at the surface. It is thought highly probable that tin will be found below the copper when the lode is opened up in depth. This has been found to be the case with similar lodes in Cornwall and elsewhere, and indications obtained up to date at the Lancelot are in favor of this theory.

The present tin workings are situate at the northwest end of the lode outcrops. To the northwest of the workings, the old slates and sandstones in which the lode occurs are overlaid by conglomerates of younger age than the lode. It is therefore impossible to say at present how far the lode extends in this direction. The lode consists essentially of quartz, a good deal of iron and copper pyrites, with tin oxides and metallic bismuth as the minerals of commercial value. Both the tin and bismuth are found not only in the quartz vein-stone, but also to a considerable extent as an impregnation of the wall rock (slate). It often happens that, although the vein-stone proper is but 12 or 14 in. wide, it pays to take out and send to the battery "formation" for a width of from 3 to 6 ft. The average width of the payable stone is from 2 to 3 ft. The tin content varies considerably. The richer shoots carry from 15 to 20% of tin oxide, and there has been as much as 3 or 4 ft. of this class of stone showing in the stopes. Usually there is only a small seam of it, while the rest of the lode-matter may assay 4 to 8% of tin oxide.

During 1904 there was crushed 3,319 tons of stone, yielding 198 tons of tin-bismuth concentrate, assaying, on an average, 57% tin and 3½% bismuth. This gives an average of 6% marketable ore in the stone, not counting loss in dressing, which is considerable. The poorest ore sent to the battery carries from 3 to 4% tin-bismuth ore.

The presence of bismuth in the ore renders the process of treatment somewhat exceptional. The high percentage of pyrites would, under ordinary circumstances, render roasting advisable. This would, however, cause a great loss of bismuth, and seriously affect the value of the marketable product. At present the ore is crushed in a five-head battery, and concentrated on jigs and Lührig vaneers, the concentrate from the latter being re-treated on a Cornish hand-buddle. This results in a tin-bismuth concentrate assaying about 57% metallic tin and 3½% metallic bismuth, which is shipped to Europe for further treatment. With the present plant considerable quantities of tin are lost, mainly through the want of grinding appliances.

*Abstract of a description in the Annual Report of the Under Secretary for Mines, Queensland, 1904.

Filtration of Fine Precipitates.

BY C. S. PALMER.

Sometimes a chemist will have a precipitate which is so fine that the solution simply will not filter clear. This may be often the case, not only with such fine-grained materials as barium sulphate, metastannic acid, titanium oxide, etc., but also with other salts, acids, and bases, which may be semi-colloidal in their texture.

One writer has recently suggested that such difficult cases be coagulated by precipitation with a small quantity of ferric or aluminic hydroxides (by sodium carbonate or hydroxide). This will no doubt serve the purpose; but, when circumstances allow, the old-fashioned principle used in clearing coffee will always give a quick and clean filtrate.

Add in the cold a drop or two of white of egg; stir well and bring to a quick boil. The coagulation of the egg albumen will gather all the precipitate, which can be filtered, washed, ignited, and weighed as such, neglecting the trace of impurity in the ash of the albumen added.

The device is only an illustration of the value of old and simple methods when used in a common-sense way. Of course the expedient is to be used with judgment, but necessity will suggest its suitability.

According to *Cement Age*, ducts for underground conduits are being successfully built of concrete. The process used consists in ramming the concrete around a nest of pipes which have previously been coated with an insulating material of low melting point. Steam is passed through the pipes and they are then withdrawn, the temperature being sufficient to soften the coating. This sticks to the concrete and hardens, leaving a smooth surface that does not rub or damage the cable in any way. It is stated that a length of 225 ft. of pipe has been withdrawn with satisfactory results.

South American Notes.

BY FRANCIS C. NICHOLAS.

(1) *Mineral Development in Chile.*—In the department of Bordos mineral prospecting is receiving active attention, stimulated by important developments in the Elisa mine; this formerly noted producer may again become active. The Elisa produced $8,000,000, in copper and silver bullion, during a comparatively short period; the mine, it was thought, had been worked out, but recent explorations have exposed large bodies of ore. As a consequence of the new discoveries, the city of Copiapo is anticipating active mine working.

(2) *Petroleum in Argentina.*—In the territory of Neuquen, Argentina, there is some interest in regard to petroleum which has been discovered in that territory. The country is favored with indications of petroleum; situated along the base of the Andes, and well below the drainage zones of the Argentina plains, it presents a formation similar to Kansas.

(3) *Dredging in Argentina and Bolivia.*—The San Juan de Oro Mining Co. (Compania Minera San Juan de Oro) is establishing an enterprise to dredge for gold in Argentina. Along the base of the Andes there are low placer deposits which seem to be extensive; in lower Patagonia there are deposits somewhat similar to those at Cape Nome, in Alaska. It is natural to suppose that along old beach lines (where are now the plains of Argentina at the base of the Andes) gold deposits will be found; the theory is that the auriferous sands of Patagonia and Terra del Fuego are eroded exposures of an auriferous beach line concealed along the eastern base of the Andes. In Bolivia, near the Argentina line, at a place called Tupiza, the San Juan company is establishing a dredge; prospects are encouraging.

The auriferous deposits of eastern Bolivia are well known, though but little exploited; it is considered something of a feat to have successfully established a dredge in that country. With this beginning and with pay ground to work, the problem of tracing out the extensions southerly will receive attention.

(4) *English Mining in Bolivia.*—Engineers representing prominent interests are at the celebrated Arque mines, between Oruro and Cochabamba, in Bolivia; their examination may result in the development of the properties.

According to *Ice and Refrigeration,* tests on fuel oil, recently made by the Topeka (Kan.) Cold Storage, Ice & Fuel Co., show that about 13 lb. of water were evaporated per gal. of oil; but part of the steam was needed to atomize the oil. In efficiency, oil at 2c. per gal. on this basis is about equal to coal at $2.10 per ton.

Persian Oil Fields.

Consul Norton, of Smyrna, Turkey (*Daily Consular Report,* July 31, 1905), calls attention to the petroleum-bearing rocks in Mesopotamia, west of the Persian frontier. A company (having the franchise for the construction of the Bagdad railroad) has the concession for the exploitation of these oilfields. Engineers and oil experts have returned to Constantinople with flattering reports of the extent, nature and possibilities of the Mesopotamian oil region. The importance of such a source of fuel to the railroad (in a country entirely destitute of other fuel, as is Mesopotamia and nearly all the route traversed by the new railroad) is sufficiently apparent. Mr. Norton directs attention to the fact that developing a similar section in Persia may have an important bearing on the future of the Baku region, as well as on the foreign oil trade of the United States. He writes as follows:

There appears to be a broad petroliferous belt extending in a northwest-southeast direction from Kurdistan down through Mesopotamia, ancient Assyria and Chaldea, and the adjoining portions of Persia to the Persian Gulf. There are indications that this belt is prolonged to the east, passing through Baluchistan into India. In the Persian section, the surface indications are excellent. Bitumen is of frequent occurrence. Crude petroleum often oozes from the ground; and on certain streams, layers of oil are encountered several inches thick. The natives often dip, from the surface of these streams, the oil which they require for use as a combustible or an illuminant.

Various abortive attempts were made toward the close of the last century to develop the Persian oilfields. Extensive concessions were granted fourteen years ago to the Persian Mining Corporation, an English company organized to exploit the entire mineral wealth of the realm, with a nominal capital of $5,000,000. This organization came to grief. It attempted too many things at once and spread its operations over too extended a territory. Worst of all, it left out of its calculations the all-important item of cost of transportation. The mineral deposits of Persia are of unquestioned richness; but it was often found that the caravan charges for bringing ores to the seaboard represented more than double the current value of such ores delivered at London. In 1901, Mr. D'Arcy, an English capitalist, purchased the oil concession, and devoted his energies entirely to developing a single form of exploitation in a limited region, special attention being given to solving the questions of transportation. The lack of fuel would, of course, cease to be felt when oil was once secured. Surveys were made, oil was found, pipe-lines were projected, etc.

The route from Kasr-i-Shirin to Dizful, and thence to Mohammerah, crosses the mountains by passes ranging from 5,000 to 6,000 ft. in height, and then descends, by the wild and little-known valley of the Kerkah river, to Dizful. From there to Mohammerah the way leads over level ground. At Mohammerah connection can be made with ocean tank-steamers. The total length of this pipe-line would be 360 miles. The first section to Dizful passes through Luristan, a province notorious for the hostile character of its tribes. The first borings at Kasr-i-Shirin proved successful. At the close of 1903 two gushers were in active operation, oil having been reached at depths varying from 200 to 300 feet.

The fact that productive oil strata can be tapped having been settled, attention has been directed, during the past year, to the pipe-line and to the possibilities of reaching the oil strata nearer the sea. It has been decided to begin boring operations in the territory not far from Ahwaz, on the Karum river, whither light craft easily mount from the seaport of Mohammerah. Should the drilling in these lowlands during the present season be followed by successful results, the problem of the oil industry in that section of Persia is satisfactorily solved. Difficulties, unforeseen at the time of the survey, throw doubt upon the easy construction and maintenance of the projected pipe-line through Luristan. The natural route for the pipe-line from Kasr-i-Shirin is down the easy incline to Bagdad, distant in a straight line 110 miles to the southwest.

The difficulties, inherent in dealing with the administration of a second Oriental country, have deterred the owner of the concession from seeking an outlet through Turkish territory. Much delay and annoyance were, in fact, experienced in effecting the transit (through Turkey *via* Basrah, Bagdad and Khanikin) of the machinery requisite for the pioneer borings at Kasr-i-Shirin. It has been felt desirable to plan for a pipe system which would likewise serve the supposed oil-bearing regions between Kasr-i-Shirin and Ahwaz.

The main facts in evidence at this time are two, namely: First, oil, flowing abundantly, has been reached (by drilling to a depth of not over 300 ft.) at an elevation of 1,625 ft. above the sea, and at a distance of 360 miles from tide-water; second, English capital is actively engaged in prospecting for similar wells nearer to the seacoast, but has completed the preliminaries for the construction of a pipe-line to the more distant flowing-wells, if necessary.

According to the *Gas Engine,* an English firm has put on the market a portable suction gas-producer and gas-engine. An air cooler is used, consisting of tubes through which the gas passes from the generator to the coke scrubber. The total weight of a 12-h.p. outfit is about five tons.

The Truesdale Breaker and Washery.

A large breaker and washery at this new plant of the Delaware, Lackawanna & Western railroad in the lower part of the Lackawanna valley, in Pennsylvania, were briefly described in a former issue (Sept. 2, p. 408). This unique double breaker is notworthy on account of its size and its electrical operation, not to ignore various other features connected with the preparation of the coal. At present one side only will be equipped with machinery; the other side is to be completed within the next two years, as the mines are developed and are able to furnish enough coal to supply the whole breaker. Ordinarily grate, egg, stove and chestnut sizes will be prepared "dry" at this breaker; and steamboat when the market demands it. All coal smaller than these sizes will go to the washery for wet preparation, as well as the rebroken breaker "bony."

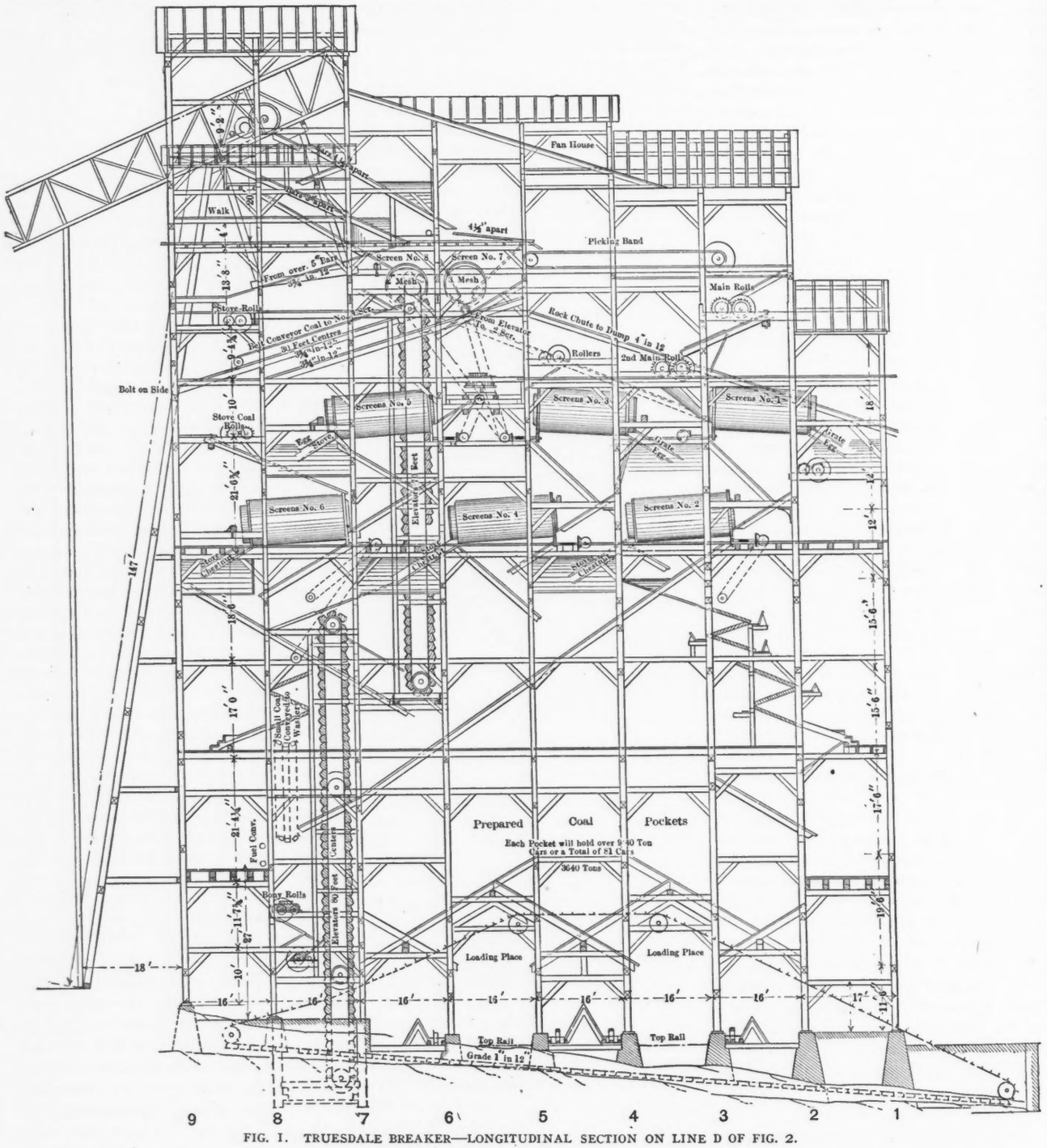


FIG. I. TRUESDALE BREAKER—LONGITUDINAL SECTION ON LINE D OF FIG. 2.

The breaker and washery were designed to handle 4,000 tons of coal per day, but this amount will probably be exceeded by 50%, during a busy season, and when the whole plant is fully developed.

The breaker and washery constitute an unusually large plant, 2,500,000 ft. of timber having been used in their construction. The breaker measures 129 by 142 ft. at the foundation, and is 171 ft. high. The immense weight carried by the main posts necessitates 16 by 16 in. timbers. Mortised framing of hemlock is used.

In the preparation, the coal is taken (from the pockets between the shafts, a distance of over 300 ft.) to the breaker, by a link-belt conveyor, which is fed by a reciprocating feeder. This inclined main conveyor is supported by structural steel trusses and towers. At the top of the breaker the coal passes to stationary

bars, then to oscillating bars and picking bands. Good opportunity is afforded (in the chipping room) to clean the coal of slate. Men standing on either side of the traveling bands throw out the lumps carrying slate and rock on a table; then they chip off the coal and send it to the main rolls.

In general the coal will take any one of three courses through the breaker. That dropping through the 3-in. bars contains the fine coal and flat pieces. This material goes to screens No. 8, 5 and 6. Coal going over the 3-in. bars passes to screens No. 7, 3 and 4. The remaining coal (that from the picking bands) goes through two sets of rolls to screens No. 1 and 2. If there is no demand for "steamboat," this coal is broken and sent to No. 4 screens. Provision is also made in other emergency rolls to rebreak the larger sizes to stove and under when desired.

The screens at the Truesdale breaker form one of its special features. Only two sizes of coal are made in each of the cylindrical double-jacketed screens; therefore an unusually large screening surface is provided. In addition to this, screens No. 1, 2, 3, 4, 5 and 6 are in pairs (as shown on the transverse section) to give large capacity and efficiency. Ordinarily egg, stove, chestnut and pea are made on one long screen; this practice throws great

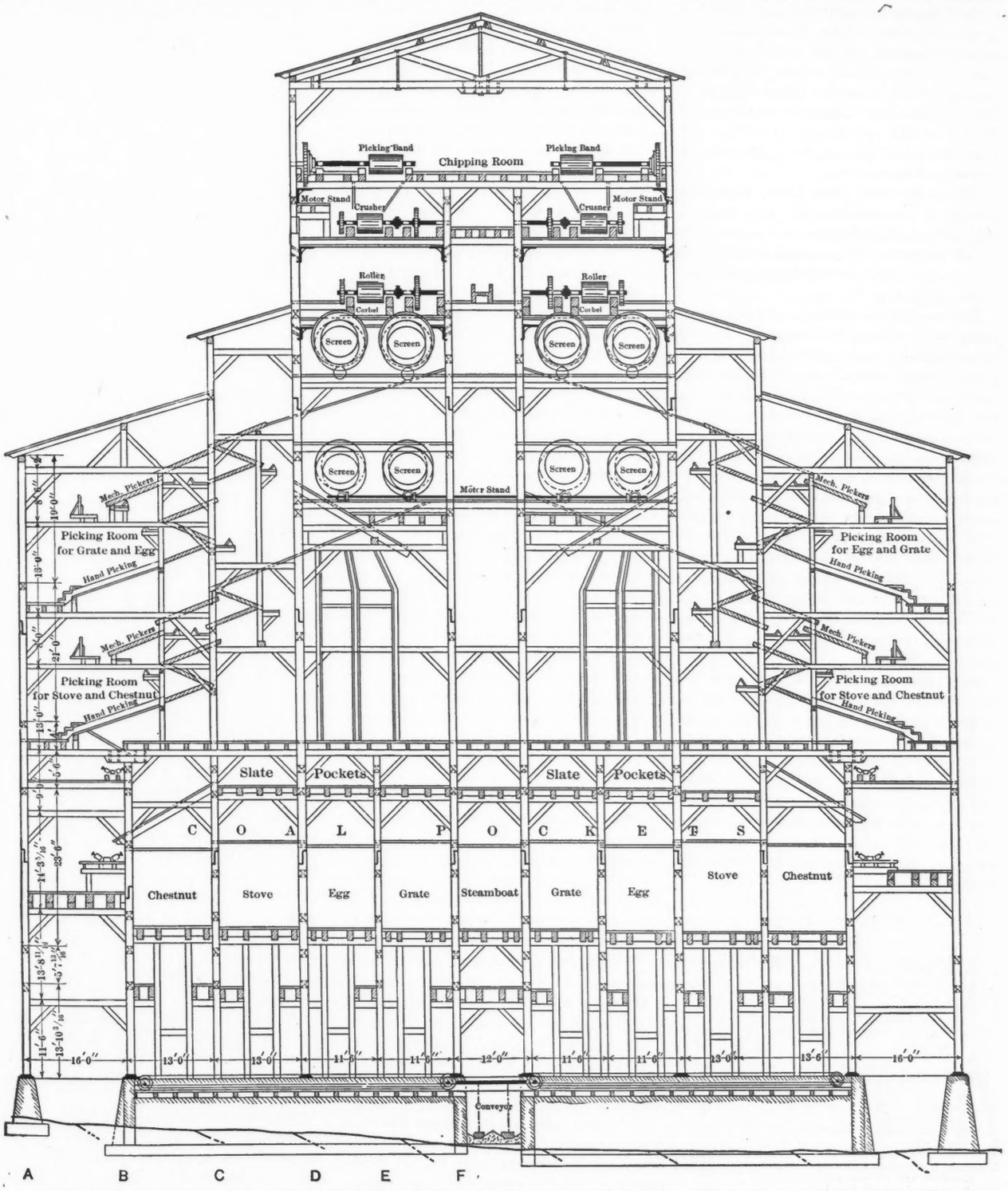


FIG. 2. TRUESDALE BREAKER—TRANSVERSE SECTION ON LINE 3 OF FIG. 1.

weight on bearings; it also gives considerably less surface for screening each size than the latest Lackawanna practice.

The washery (a smaller and less tall building) is an annex to the breaker on the west side; the washery handles all coal dropping through the mesh of No. 2, 4 and 6 screens. The chutes from these screens, leading to the small coal belt-conveyor, are shown in the longitudinal section of the breaker given herewith; they are the long diagonal chutes shown in the middle of the figure. The belt conveyor takes the small coal to the top of the washery.

The bony coal from the mechanical pickers is rebroken in the bony rolls at the bottom of the breaker and is also sent to the washery. When washed and freed from excess of slate, this bony makes fair steam coal.

The mechanical cleaning of coal (especially after leaving the screens) receives more attention every year; and so at this great breaker special provision has been made to eliminate (as far as possible) hand picking of broken material; however, chutes for hand picking are provided for emergency use. The picking floors are all outside of the screens and other machinery and are next to the windows, which furnish ample light. When natural light fails, incandescent electric lamps are available. From the screens the coal is mechanically picked by Emery machines (of both tandem and zigzag types); it is repicked by Nichter spirals and then goes by chutes (where hand picking can be done) to pockets.

The large capacity of the Truesdale necessitates the use of the machinery shown by the accompanying table, which gives the equipment of the breaker as it will be when both sides are completed. The horsepower given in this table is that required to run machinery with maximum load. A steam-engine with 28x60-in. cylinder, at 65 r. p. m., and 130 lb. steam pressure, is large enough to run the breaker.

MACHINERY FOR BREAKER.

No.	Machines.	No. Motors.	H. P. of Each.
1.	Main conveyor	1	135
2.	Sets of oscillating bars	2	4
4.	No. 1 screens	2	9
4.	No. 2 screens	2	9
4.	No. 3 screens and 1 each Nos. 7, 8, 9 and 10 screens and belt conveyor	2	24
4.	No. 5 screens, 1 elevator and 4 automatic feeders	2	26
4.	No. 4 screens	2	11
4.	No. 6 screens	2	11
2.	Elevators	2	9
2.	Picking bands	2	6
2.	Cross conveyors (scrapers)	2	4
2.	Conveyors	2	3
4.	Conveyors	1	6
2.	Pairs main rolls 40 x 46¼ in.	2	23½
2.	Pairs second rolls 40 x 46¼ in.	2	23
2.	Pairs pony rolls 27 x 36 in.	2	20
5.	Pairs stove coal rolls 27 x 36 in.	5	20
2.	Pairs pony rolls 24 x 18 in.	2	13
2.	Refuse belt conveyors	2	3½
2.	Bony belt conveyors	2	1½
1.	Short elevator	1	4

Total horsepower to run machinery. 646

The Emery picker was described in this JOURNAL (July 22, 1905, p. 98). In the Nichter spiral, special provision is made for adjustment (by means of rotation) to suit the varying character of the coal. The slate (with other waste) goes to slate pockets, from which it will be carried by belt conveyors to a dump at the lower side of the breaker.

Reference has been already made to the comparative practice at the Truesdale and Auchincloss collieries, in which connection it should be again noted that the latter (the Auchincloss) is the first plant in the anthracite field to try the experiment of using independent electric motor drives in a breaker; direct current is used, the motors being enclosed in cases to protect them from coal dust. Furthermore, air pressure is maintained in the cases to cool the motors and to insure a slight pressure from the inside of the box to the outside, thus keeping the dust out.

At the Truesdale, on the other hand, alternating-current induction motors are to be used. Moreover, it is expected that enclosing boxes will be unnecessary, for there are no commutator bars on induction motors to be affected by coal dirt. The sub-station at the Truesdale plant will contain three 250-kw. transformers for supplying alternating current (of the proper voltage) for the breaker motors; and one 150-kw. rotary converter for direct current for locomotives.

The prepared-coal pockets at this plant are decidedly unique, inasmuch as they occupy the space between bents No. 2 to 7, inclusive (as shown in the longitudinal section of the breaker), and at the two loading tracks, the chutes enter from both sides; thus large capacity is secured.

The conveyor (shown under these pockets) carries condemned coal and loading-lip screenings to the boot of the vertical elevators of the breaker; these elevators raise the coal to the screens again, where it is sized. Two elevators are used, for the height to which the coal must be raised would make too great a lift for one continuous elevator.

The breaker is built of hemlock and the washery of yellow pine, as the latter building is subjected to considerable moisture.

The breaker and washery are painted with Baldwin's fireproof, cold-water paint (red outside and white in the interior); the latter color greatly assists in the illumination of the interior of the buildings. They are to be lighted by electricity so that no time will be lost nor danger incurred in carrying torches around the buildings. The paint was sprayed on.

The machinery at this plant was furnished by the following manufacturers: The Link-Belt Engineering Co., of Philadelphia, built the main conveyor; American Bridge Co., the structural steel; Vulcan Iron Works, of Wilkes-Barre, Pa., the circular screens and hoisting engines; Exeter Machine Works, of Pittston, Pa., bands, rolls, shakers, bars, etc.; the Westinghouse company furnished the electric motors.

Blasting Coal in Bituminous Mines--II.

BY J. T. BEARD.*

(*Concluded from page* 530.)

Whenever possible, the miner should avoid placing a shot so that the force of the blast will be directed against the air current. This is especially true when firing a shot on the main airway for the purpose of blowing down roof or lifting bottom; or when taking a skip off the rib to straighten or to widen the airway. This may seem at first to be a small matter, but its importance will be better appreciated after a little reflection.

Suppose, for example, a shot is to be fired on the main airway at a distance of, say, 2,400 ft. from the mouth of the mine, and suppose also that the quantity of air passing in this airway is 100,000 cu. ft. per min. and at a velocity of 600 ft. per min. Since it takes $2,400 \div 600 = 4$ min., for the air to travel from the mouth of the mine to the point where the shot is fired, there is a total volume of "air outbye" of the shot equal to $4 \times 100,000 = 400,000$ cu. ft. And if 1 cu. ft. of air under ordinary conditions weighs 0.076 lb., then the entire weight of air outbye of the shot is $400,000 \times 0.076 \div 2,000 = 15 +$ tons. Since the velocity of the air is 600 ft. per min., or 10 ft. per sec., the inertia of the air is equivalent to an energy of $15 \times 10 = 150$ foot-tons per sec. Assuming the energy of a 3-lb. charge of powder to be developed in, say, 1 sec. of time (and that the energy of 1 lb. is 500 foot-tons), the total energy of the charge is equivalent to $3 \times 500 = 1,500$ foot-tons per sec. And if the blast from the explosion of this charge be directed against air current, as figured above, the effect is equivalent to increasing the heat energy exerted on the air $150 \div 1,500 = 1\text{-}10$, in case the shot blows its tamping.

On the contrary, if the force of the blast be directed in the opposite direction to that in which the air current is traveling, then the heat energy exerted on the air is decreased 1-10. Added to this at the moment of the explosion of the blast there is an increased mechanical effect or physical condition caused by the greater concentration of the dust thrown into suspension in the air, when the blast is directed *against* the current, than when the direction of the blast and that of the current are the same. These effects make it more dangerous to locate a shot (such as we have described) in an airway in such a position that the blast is opposed to the air current.

Black powder is generally best adapted to shooting coal, since its explosive force, which is developed gradually, overcomes the resistance of the strata and the inertia of the coal without breaking the latter into as small fragments as when a higher and more rapid explosive is used. The deflagration of the powder, however, is accompanied with much flame; this is often considerably increased by the mine

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gases or the dust suspended in the air, or both. To overcome this evil, flameless powders have been used; these are usually highly nitrated mixtures.

The grade of powder to be used will chiefly depend on the character and hardness of the coal and the thickness of the seam. In blasting soft coal, a larger-grained or slower powder should be used, while a quicker powder is better adapted to hard coal. The diameter of the drill hole may vary from 2 to 2½ in.; a 3-in. hole under ordinary conditions is too large, as it permits too great a pressure on the tamping or stemming, and the charge is more concentrated; while in a smaller hole there is a less total pressure on the tamping, and the explosive force is more evenly distributed through the coal.

The weight of the charge of black powder, in any given case, is important; it may be determined approximately by the following rule:

Multiply the fourth power of the distance in feet (from the center of the charge out in the direction of the line of least resistance) by 0.4 of the diameter of the hole in inches; divide the result by the thickness of the seam in inches; the quotient will be the weight of the charge in pounds.

Certain modifying conditions may increase or decrease the amount of powder that may be used with safety in any given case, but the rule given above will apply to average practice.

Too often the amount of powder used in charging a hole is gauged very roughly by the miner having regard only to the size and depth of the hole. At the present time few, if any, holes are charged with loose powder, but the charge is made up in paper cartridges. Generally the miner makes and fills his own cartridges, but often these are already prepared. These prepared cartridges are usually of a regular size and should contain a given weight of powder; two or more cartridges are placed in the hole and rammed carefully home. The best results can only be obtained when each cartridge, in turn, is carefully pressed home, so as to fill the entire area of the hole.

In many cases the miner places as many cartridges in the hole as possible, leaving perhaps only a few inches for tamping; this is a dangerous practice, as at least one-third of the length of the hole should be reserved for tamping, and in some cases, to insure against accident, it should fill about one-half of the hole. When the cartridges have been pressed home, a small clay plug is prepared and placed in the hole and rammed down on the charge; the tamping is then put in and rammed harder and harder as the mouth of the hole is reached.

In some hard coals, and in some shots in softer coals, it is often of advantage to place a small stick of dynamite in the bottom of the hole, no cap being used. The dynamite is exploded (by the explosion of the powder) quickly enough to rupture the coal at the point of the shot; it gives the powder opportunity to expand into the break. In no case should the dynamite be exploded by a cap when thus placed behind a charge of powder; the best judgment of the miner will be necessary to determine when this method can be employed with safety. There is no question that it produces good results under certain conditions; but it is not to be used in all cases.

When I was manager of the Bellair and the Laddsdale mines (for the Eldon Coal & Mining Co., in Iowa), I observed miners in the act of mixing gunpowder with blasting powder when charging holes. This is an exceedingly dangerous practice; two grades of powder should not be mixed in a single charge; the quicker powder will explode first and blow a large portion of the slower powder (while it is still burning) into the air.

Blasts are properly fired in mines either by fuse or by squibs. If fuse is used, it is important that a good quality of double-tape brand should be employed; the single-tape fuse (which is cheaper) is often the indirect cause of accident, owing to the fuse having been injured by the tamping bar in tamping, thus causing a mis-fire. An injured fuse will sometimes cause a shot to hang-fire (perhaps for several hours, or it may be for a few minutes only). The miner returning to relight the fuse, which he thinks has gone out, many times reaches the face just as the explosion takes place. Accidents have also occurred by the irregularity with which the fuse burns; this is discussed more fully elsewhere. As a means of firing blasts, squibs are safer than fuse. The squib does not hang fire as often as fuse; in case of a misfire, the shot can generally be prepared for relighting with greater ease and security than when fuse is used.

A misfire is always a source of danger to the miner until removed. Numerous methods of dealing with misfire shots have been suggested, all of which are more or less dangerous. When a squib shot fails to explode, one of two things is the cause: either the match at the end of the squib has gone out, or the needle hole has been blocked when withdrawing the needle, so that the squib did not reach the powder. If the squib has gone out, it must be relit; care being taken to ascertain that the part of the match remaining unburned is long enough to give the miner time to reach a place of safety. It is better to use a new squib than to take any chances in this regard. Some miners have a bad habit of breaking off the end of the match to hasten the action of the squib; this practice has resulted fatally in more than one instance. When the hole is blocked, a copper needle should be carefully inserted in the hole to clear away the obstruction if possible; this having been done, and the needle carefully withdrawn, a new squib should be used to fire the hole. Under no circumstances should an attempt be made to pick out a shot that has missed fire. The method of drilling a second hole alongside of the first, and blowing out the misfire by a fresh charge of powder is bad, owing to the double charge of powder, a considerable portion of which will probably be burned in the air. The double charge will also produce much fine coal, which will add to the danger.

A second shot fired in a hole that has blown its tamping always entails a risk; such a shot should never be fired, and for several reasons. The failure of the first shot to do its work should be sufficient evidence that this is a "tight shot." The habit of most miners in such a case is to put a heavier charge of powder in the hole, hoping to break the coal; this only adds to the danger. The first shot may have sprung the hole, and possibly may have creviced the coal at the back of the shot; this would render the firing of a second shot in the same hole extremely dangerous. The tamping of the second shot would be less secure than that of the first, owing to the smoothing of the bore of the hole by the blowing out of the first shot. It would also entail much risk to drill and fire a second hole near the first, without first filling the first hole full of clay, and tightly ramming it.

Many fatal accidents have resulted from the firing of such shots, owing to the charge blowing out through the first hole instead of breaking down the coal. A shot that finds access to, and blows out through, a crevice previously formed in the coal, or through a former drill hole, is called a "squealer," and produces the same effect as a windy shot.

Two or more "consecutive shots" fired at the same time in a narrow heading or chamber, often produce an effect similar to that of a windy shot (owing to the subsequent ignition by the flame of the last shot or shots, of the large volume of carbonic-oxide gas produced by the first shots). In this case, the effect of the ignition of the gas is cumulative, and increases until sufficient violence is developed to produce an explosion.

To illustrate this, I quote the experience of a miner at Troy, Ill., as given in his own words:

"I once fired three such shots in the face of a room, driven up 160 ft., lighting all three shots at the same time; these exploded in quick succession. After the last shot I heard a noise inside of the room, and went a few steps into the room to ascertain the cause. Hearing the noise getting louder, I turned quickly and went out, and none too soon; for I had barely reached the entry when a strong blast came from the room, hurling chips of wood and pieces of coal against the opposite rib of the entry and putting us in the

dark. The cause was probably the firing of the carbonic-oxide gas produced by the first shots. It proved a lesson to me, and I wish it might also to other practical miners."

I realize my inability to cope with a subject so important and having so many phases as this one. I have tried to emphasize the main points in regard to blasting as affecting the explosive conditions in mine workings. For lack of space, what has been said has been all too brief; doubtless many important points have been overlooked. It is hoped, however, that other writers and practical mining men will be stimulated to enter the discussion and give their experience and observations, and thereby assist as far as possible in exposing the evil practices of reckless miners; we shall thus secure greater safety in the operation of mining coal. This is not merely a theoretical question, though it is one on which theory throws much light. It will be readily agreed that, from a practical standpoint, the various phenomena of gas-, dust-, and powder-explosions are wholly inexplicable; in his relations to this subject the practical mining man must be guided by those who understand theory. At the same time what is required, in this case more than in any other, is a broad, practical knowledge combined with a knowledge of theory.

In closing, I wish to refer to a suggestion made some years ago (1893), when, with others, I was investigating the Cedar mines explosion at Albia, Iowa (produced by a blown-out shot, and causing the death of seven miners). In this explosion the flame traversed 250 yd. of entry, and exhausted itself at a side track or parting, where the entry was widened to twice its usual width. The suggestion was made to the mine superintendent by one of the party making the investigation, that in future he should slow down the fan about 20 min. before firing time, so as to reduce the quantity of air circulating in the workings. Then as now, I expressed myself as strongly averse to any such proceeding, regarding it as extremely dangerous to tamper with the ventilating current at the critical moment of firing.

The same matter was referred to again in connection with the examination into the explosion in the Jack Oak mine (Nov. 27, 1894); and I notice, more recently, that this same recommendation (in regard to the slowing down of the fan just previous to the time of shot firing) is made by a certain mining board. I do not know where this theory has gained ground, or how it could recommend itself to any intelligent man. It is not indorsed by the practice throughout the anthracite and bituminous regions of Pennsylvania, and I have been unable to find any record of such practice in any other coalfield, or in any mining country.

In the anthracite field of Pennsylvania there probably occur as many small local explosions of bodies of gas and of premature shots, as in any other district, with the result that these seldom develop into a large explosion; yet I do not hesitate to say that the creed of the anthracite district is today, and always has been, ample ventilation. It would be considered highly dangerous in the anthracite field to reduce, in any way, this current at the time of firing.

A reduction of the air in circulation means a fall of pressure throughout the mine, which, in a blowing system of ventilation at least, is at once accompanied by more or less of an outflow of gas, both from the coal in gaseous seams and also from the abandoned workings in every mine; this would occur just at the time when the mine air should be free from gas. Moreover, the firing of shots always produces large volumes of gas that should at once be carried out of the mine by an ample air current, and not allowed to diffuse into other portions of the workings. I hope that this practice (of slowing the fan just before shot firing) will be discontinued wherever it has been begun.

Aside from the careful handling of powder, and observing the various precautions in reference to the location, charging and firing of shots, nothing is more important in regard to reducing the danger incident to blasting in mines than the cleaning up of the working face and loading out the coal of previous shots before firing again. Every miner should keep his place clean and free from accumulations of coal and dust. The fine coal should not be thrown back into the gob, but should be loaded out, in practically dust-proof cars. Careful attention to the keeping of the working place clean and tidy, will go far toward making the mine safe and healthy.

Limestone Island is the center of the New Zealand cement industry. It is about 100 square miles in area and is wholly composed of hydraulic limestones. It was reported on originally by Sir James Hector for the New Zealand Government, as an island of hydraulic limestone of a quantity practically unlimited, and estimated to contain over 30,000,000 tons above water level. Beneath the limestone there is believed to be coal; and for this, borings are now going on. The works produce (*Cement Age,* Aug., 1905) about 300 to 400 bbl. a day to supply the local market.

An arrangement has been devised for regulating the supply of mixture to a gas-engine so as to enable the relative proportions of gas and air to be changed according to the varying calorific value of the combustible gas. A flame is caused to heat a metal rod, the expansion of the rod effecting the regulation of the valves. An alternative method is made to affect the electrical resistance of a wire, the change of resistance accomplishing the same purpose through the medium of a solenoid.

The Hampton Water-Hoist.

SPECIAL CORRESPONDENCE.

The largest automatic water-hoisting plant in America, if not in the world, was placed in operation recently by the Lackawanna company in Keyser valley, near Sranton, Pa. The plant has been in course of construction for two years. As may be surmised, the cost of the machinery and its instalment has been great, for the hoisting station will drain all the mines of the company in the Keyser valley. The testing operations (previous to the automatc mechanism being put in motion) were satisfactory, and henceforth the machine will be self-operating. The construction of the plant has been one of the great forward strides made by the Lackawanna company in recent years. While the cost of the plant has been large, it is expected that it will be recouped within a comparatively short time by the abandonment of all the smaller pumping stations at the mines, which this supersedes.

A large volume of water was pumped out of the workings in the Keyser valley mines by the means of one or more pumping stations placed at each mine. The expense of maintaining these stations has been a big item in the standing charges of the company, a number of men being employed night and day, while only two men will be necessary for the running and control of this new plant.

About two years ago, the company began sinking a shaft near the Central mine, to reach a low point in the workings in the valley. The drainage of the mine workings in the Keyser valley was so arranged that the water will flow from the other collieries into the new shaft, from which it will be hoisted and emptied into the Keyser valley creek. Several months ago, when the American Society of Civil Engineers was in Scranton, holding its annual convention, the members inspected the new plant and expressed their admiration of the originality, the completeness, and the immense scale upon which the project has been undertaken.

While it is a return to the old method of hoisting water by buckets, there is, of course, nothing primitive in the manner in which this piece of hydraulic engineering is carried out.

The plant is operated electrically; the two large buckets are hoisted by an 800-h.p. motor, the current being furnished from the Hampton power plant. The buckets are loaded and emptied automatically, while they are also set in motion (after they are loaded and emptied) by automatic machinery. Each bucket holds 4,100 gal. of water, or about 17 tons.

Notwithstanding the great weight that is hoisted, and the large size of the machine, all connected with the plant works with the ease and regularity of a watch. When the power is turned on, the hoisting apparatus is set in motion instantaneously. When one bucket strikes the water at the

foot of the shaft, the other empties the water that it has raised, both actions being simultaneous.

When the surface of the water at the foot of the shaft is struck by the descending bucket, the water enters the bucket through two valves (in the bottom); when the water reaches a certain level, the valves close automatically. At the same time the lower bucket is filling, the other bucket, having reached the surface, slowly ascends in the head frame at the top of the shaft. A lever on the outside of the bucket (connected with the valves at the bottom) comes in contact with a timber on the head frame and thus the valves are opened. The water then rushes out, in two big streams on either side of the shaft, and flows into concrete, connecting reservoirs, from which it flows off through a flume.

The length of time the buckets are at rest is regulated by mechanism in the hoisting room. Sufficient time is given for the upper bucket to empty and the lower one to fill, after which certain clutches are thrown into engagement and the hoisting drum is set in motion. The empty bucket then descends and the loaded one is hoisted and emptied.

It has taken only one minute to fill a bucket, and hoist it to the top of the shaft in one compartment, while the bucket in the other compartment is emptied and lowered to the sump at the foot, respectively.

The 17 tons of water (the capacity of the bucket) are loaded and discharged without any manual labor whatever. At the rate of 4,100 gal. of water per min., the quantity hoisted from the mine in 24 hours would be 5,904,000 gal. One man is employed to oil and attend the motor, while another watches the buckets, only to act in case of accident.

The installation of this water-hoist was carried out under the supervision of H. M. Warren, the electrical engineer of the Lackawanna company.

The work of adjusting the machinery (as may well be supposed) has been most exacting. It was necessary that allowance should be made for the stretching of the wire rope attached to the buckets; there were numerous other details which demanded attention to insure automatic working of the complicated machinery. The sinking of the shaft and other operations underground were under the direction of Col. R. A. Phillips, the general superintendent of the Lackawanna coal department.

Cleaning Blast-Furnace Gases.

Purification of blast-furnace gas was considered in papers (before the Mining Congress at the Liège Exposition) by Emile Bian, general manager of the Dommeldange Iron Works, Luxemburg, and P. Delville, chief engineer at the Angleur Steel Works, respectively. After describing the various methods hitherto employed for this purpose, Mr. Bian said that they did not intercept the very fine dust, and can only be used to advantage for comparatively small volumes of gas. Great progress has been made, however, by employing fans with water injection at the inlet, which effectively intercepts the fine dust. A second fan eliminates the humidity and cools down the gas, thus rendering it more easily combustible. There is advantage in purifying all the gas of a blast-furnace, not merely that which is to be used in gas-engines, but also that used in the stoves for heating the blast and that which is burned under the boilers. It has been demonstrated that a saving of 46,000 fr. ($9,200) per furnace per annum is possible, owing to increased efficiency and the decreased expense of cleaning. [Centrifugal gas-cleaning apparatus now being introduced in the United States has shown important economies in these two directions also.]

Mr. Bian considers that when a gas is freed from humidity, it is also practically free from dust; he purifies the gas in two stages. He finds that for effecting this purpose congelation is too expensive, and therefore falls back on a considerable cooling down of the gas, for which he devised an appliance (shown in the Luxemburg section of the Exhibition). In a closed tank half filled with water revolves a horizontal shaft carrying a series of disks made of wire gauze. The water drawn up by the disks is first evaporated by the hot gases passing through the upper half of the tank. Subsequently, when the gases become too cool, the contrary effect is produced. The water on the disks condenses the vapor contained in the gas, so that the latter issues cool and freed from most of its impurities. For completing the purification the gas is then passed through a fan, which renders it perfectly suitable for heating the blast and firing boilers.

The largest stone-arch bridge in the world is the one carrying the main line of the Pennsylvania system over the Susquehanna river, five miles west of Harrisburg, Pa. The width of the bridge is 52 ft., for four tracks. Its total length is 3,830 ft.; number of arches, 48; length of each arch, 70 ft.; 20 ft. rise. In the construction of this bridge 220,000 tons of stone were required, and the time consumed in building was eighteen months. The largest single-span stone bridge in this country is the Cabin John bridge, near Washington, D. C. It was built under the direction of Jefferson Davis when he was Secretary of War.

The first gold from the Yukon basin was obtained from the bars in the Lewis and Stewart regions; the region has been prospected since 1878.

Titanium in Iron and Steel.

In a paper on "The Influence of Titanium on Pig Iron and Steel," Pierre Delville, chief engineer at the Angleur Steel Works, near Liège, gave some interesting results obtained by titano-thermite (before the Mining Congress at the Liège Exposition). Samples taken both before and after the addition of titano-thermite, and which were run into plates and planed, showed fewer blow-holes after the addition than before; the aspect, instead of being dull gray at the edges, became of a lustrous white. From an establishment producing steel castings, the author had received the following particulars as to the use of titano-thermite:

"When we have a large piece to cast which requires two runs from the converter, we introduce into the ladle containing the first quantity of metal a box of titano-thermite (0.5% of the weight of the bath), this being done a few minutes before adding the second quantity. The metal becomes appreciably hotter and mixes perfectly. As a general rule, the castings thus obtained are very sound; and this method has given results superior to those by any other process yet tried."

In consequence of these results, Mr. Delville tried the addition of titano-thermite to basic steel, and arrived at the following conclusions: Titanium chiefly acts on steels by reducing the oxides dissolved in the metal and eliminating the nitrogen, especially in presence of carbon, so that it appears advisable to add, with the titanium, substances giving carbon by decomposition in the bath, especially when the metal contains but little of that element.

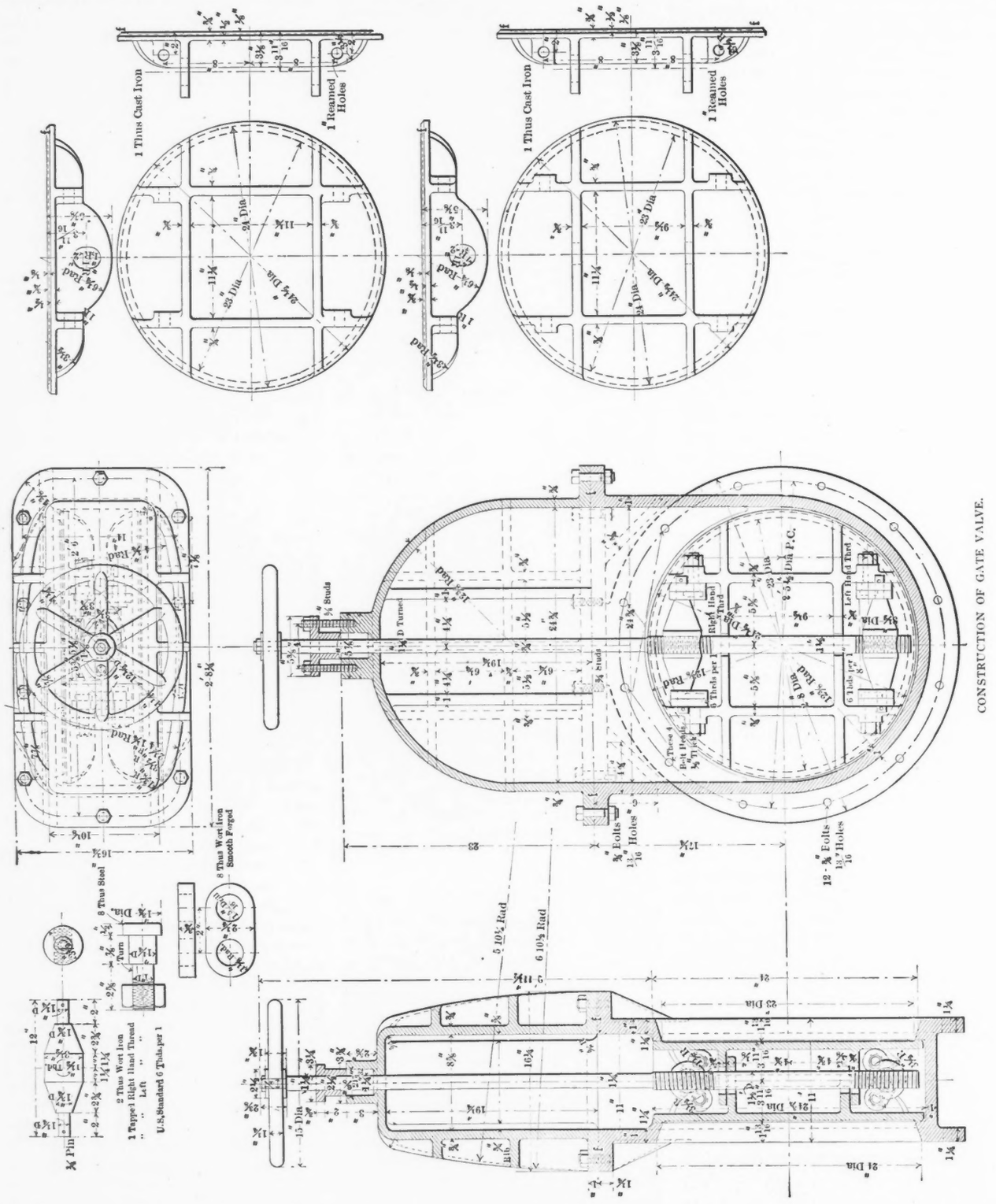
Oxygen Gas in Copper Smelting.

From *Metallurgie* we learn of some experiments recently conducted at the Institute for Mining and Electrometallurgy at Aix-la-Chapelle, under the direction of Prof. Borchers, who employed a mixture of oxygen gas with the air blown into the bessemer converters during the smelting of copper. It is pointed out that Prof. Linde's process of liquefying air provides a ready means of producing large volumes of oxygen gas, or of air rich in oxygen, at small cost, and the use of such gas must be of great theoretical value in all oxidation processes and in the various metallurgical operations of refining metals, roasting ores, smelting and the like. An illustration is given of the small test converter employed for these experiments, and the results of numerous tests, together with analyses, are set forth in tables. It is evident that, as compared with the use of air alone, a much higher temperature can be attained in a shorter space of time when oxygen is employed with the blast to the extent of from 28 to 29%. The time required for blowing in the air is also much shortened, in some of the experiments from 33 to 50 per cent.

Large Gate Valve for Low Pressures.*

BY JOHN J. SMITH.

The pressure carried in the blast-furnace plant, for which the gate valve described was built, is ordinarily only 3 or 4 lb. per square inch, and the volume per furnace from 10,000 to 15,000 cu. ft. of free air per minute. This is handled through 2-ft. pipes, and in the problem of distributing the blast from either of the two cylinders of a cross-compound blowing engine to either of two furnaces, four valves are necessary, two on each cylinder. Formerly butterfly valves were used for this purpose, but these are undesirable, and have been superseded by the type illustrated. In this valve the spindle is threaded for a small portion of its length, only 6 or 8 in. This is sufficient to force the valve from its seat, so as to allow the pressure to partially equalize on both sides of it, and the valve can then be withdrawn the rest of the way by hand; similarly in closing, it is pushed up by hand until the thread engages and is then forced to its seat by the latter.



CONSTRUCTION OF GATE VALVE.

When the occasion arose for the four valves just mentioned, a prominent manufacturer was written to for prices and in-

*Abstract of a paper in *American Machinist*, Aug. 24, 1905.

formation. He replied, offering to make four valves of the type outlined, for something over $600. This price was thought to be very high, and I decided to have them designed and made locally, which was accordingly done for just $400. It may be said that I had never designed a valve of this type and size before, and was in some doubt as to how it should be made absolutely tight all around the face of the disk. If any sort of wedge were applied at one point there would be no sufficient guarantee that the valve would be forced into close contact with the seat at all points, and if more than one wedge or its equivalent were used, it was more than doubtful whether all of them would bear equally at the same time. It should be stated also as one of the conditions of the design, that it was desired to keep the valve the smallest possible in the dimension of length, or face to face measure, as well as in the financial dimension. It was also desired to make it of a type which could be handled by the tools of an ordinary repair or jobbing shop. Accordingly, instead of making a cylindrical body, with the faces for the gate in a recess in the center and the flanges on necks long enough to separate them from the body proper, it was decided to put the joint or seat face on the inside of the flange itself. In order to get the bolt circle the same as the standard on the other pipes, the faces were made slightly beveled inward, so as to give room for the seat face and still allow for this condition. This, of course, obstructs the area to a very slight extent, but the effect could not be determined by any instrument of which the writer has knowledge.

In order to secure proper contact between the valve and seat, it was finally decided to make the valve with two separate disks, and to force these apart at points as nearly uniformly distributed around their periphery as possible. In order to do this uniformly some form of equalizing device was necessary, and the scheme of long nuts operating toggle joints, shown in the drawing, was finally adopted as the solution. The nuts are long double cones, the outer ends of which constitute the center pins of the four toggle joints, the screw passing through the nut at right angles to the axis of the double cone. The outer ends of the toggles are pinned to ribs on the valve disks. The screw which goes through one nut is right hand, while that going through the other is left hand, the pitches being the same.

It must be remembered that the valves are intended to be opened and closed entirely by hand, the handle being turned only to force the disks against their seats. A little consideration will show that the toggles are equalized almost perfectly against one another. The nuts are not fitted very tightly to the thread, so as to allow them to have a little play at the ends, and in this way each nut becomes more or less of an equalizer, while as against each other they are perfectly equalized, for the reason that they pull only against one another, and if one nut forces its pair of toggles out and brings the valve disks to a bearing on that side, that nut will then come to rest until the other nut has traveled far enough to bring an equal tension on its pair of toggles, and so force the other side of the valve disks to an equal bearing on their seats. This at least was the expectation, and it has been amply fulfilled in practice. Before the valves were mounted in the pipe they were operated and inspected for tightness, with the result that it is impossible to conceive of any better joint of that character than they made. The equalized action seemed to be perfect in all directions, while the pressure which could be obtained from the toggles is so great that it is not improbable that the valve disks could be burst by it.

Over all the lower half of the seat face the valve body proper makes an absolute reinforcement of the stiffest description; but over the upper half this is not the case, and to overcome this difficulty heavy ribs were run from the bonnet-flange of the valve down, just as close to the face of the pipe flange as they could be allowed to come. Of course, at the upper part the great stiffness of the bonnet-flange parallel to its face had the desired effect without any further addition, although it was made full width on this account.

The bonnet presents quite a large, flat surface, which is always subjected to the full pressure on the main, and it was necessary to stiffen this, which was done by external ribs. There are also provided two shallow internal ribs slightly wider apart than the valve faces, which serve to guide the valve when being pulled in or out, the axis of the valve being horizontal and their central plane being inclined transversely. It will be observed that the four top holes in the pipe flange came at such a point as to bring its bolt heads inside the valve body, which necessitated taking off the bonnet in order to insert these when putting the valve into its place in the pipe. This was foreseen and was endured because I have a deep-rooted objection to studs in cast iron. Nevertheless, in the present instance studs would have been justifiable not only because they would have saved this work of dismantling the valve in order to erect it, but also because the pressure being all around the bolt heads, they were not made tight by an ordinary internal gasket, such as the writer always uses in ordinary work of this kind, and grummets were required under them.

In practice, as before stated, these valves have given entire satsfaction, but one or two points may be noted for the benefit of those who may desire to use the design. The right- and left-hand threads on the stem should be so located that the ordinary right-hand rotation for closing the valve will be the proper one for tightening a valve of this type. No attention was paid to this matter on the present valves, and of course the threads happened to come so as to require left-hand rotation of the wheels to tighten the valves, and a right-hand one to release them, which is a great nuisance.

Another point is that when a pressure of even four or five pounds per square inch comes on the area of a two-foot pipe, the aggregate is large, and the friction of starting the valve from its seat considerable. For the present purpose this is not objectionable, but if the valves were to be used frequently a slight change in design should be made so that a screw would force the valve from its seat and draw it to its seat *after* and *before* the locking and unlocking operations, respectively. This would not involve the necessity of another hand-wheel or much additional mechanism.

The practical reason for describing this type of valve is, apart from its novelty, that the four equalized toggles furnish a means for forcing the valve disks to their seats, which is very simple and which leaves nothing to be desired in point of effectiveness. Of course the feature of putting the seat face on the inside of the flange is merely incidental, and is not a necessity of the design, which, in fact, would be much more easily made without this condition.

For higher pressures the same construction could be used, but in that case the modification of the design for moving the valve disks by a screw should be extended so that their entire travel would be accomplished in this way—not a very difficult matter.

The Monazite Supply.

At a recent meeting of the South Metropolitan Gas Co., of London (according to U. S. Consular report, No. 2358, Sept. 12, 1905), it was stated that the monazite sand used in Europe is obtained from Brazil, where the supply is in the hands of two concessionnaires. They supply the monazite to a group of continental firms, which are known as the Thorium Convention. Thoria was sold two or three years ago at $8.36 per kg. Later the price was $10.48, and now it is $13.36 per kg. There is an absolute monopoly in it.

The directors of the South Metropolitan Gas Co. sent an agent to Brazil to endeavor to obtain a concession to export monazite sand, but without result. Last year another opportunity was accorded them of obtaining an independent supply. It was known that monazite sand was found in the Carolinas, in the United States, and an offer was made of property there, which was accepted. The company has erected machinery for working the deposit, and by taking this step will have no difficulty in obtaining its supply of thoria in the future.

Experiments With the Taverner Process.*

BY K. L. GRAHAM.†

The requirements of our local practice with the Taverner process seem to be more exacting than elsewhere. Materials satisfactory in other localities have been tried here with little success. Some 50 tests with bone-ash are foremost in the category. Tamping in layers was the cause of many failures; cracking and exfoliation invariably took place when annealing, partly due to poor ash. Since then we can buy bone-ash both better and cheaper, and a test can be made for $30, excluding labor. But we wanted something better than bone-ash.

Whatever mixture we selected would require to possess the chief characteristics of a first-rate firebrick: (1) Refractoriness, (2) capacity of resisting the corrosive action of litharge, (3) capability of withstanding great and frequent changes of temperature. Of course firebricks possessing these qualities are difficult to produce; were it not so, less would be heard of gold locked up in the bottoms of our pan furnaces. Were we to deal with large lots of lead bullion at a time, say, 50,000 oz., instead of as at present small cupellations at intervals, characteristic No. 2 would be our chief consideration, as the hearth would not be expected to last more than one operation. Cracking on cooling would be immaterial, whereas our method of working now demands that No. 3 should be present in a marked degree.

The material we have adopted here satisfies all these conditions. On deciding to abandon the use of bone-ash, after considerable experimenting, we found a mixture of two-thirds English cement to one-third crushed firebrick, as recommended by Hofman, answered fairly well. After using two or three tests, it became apparent that one of the essential qualities was lacking, that of withstanding satisfactorily the action of the litharge; 240 lb. of cement, with 120 lb. of crushed brick, made a test costing for material $10.60, from which, if properly handled, 20,000 to 25,000 oz. of lead bullion could be worked off. This was about our limit, although better results have been obtained from similar tests at the New Heriot G. M. Co. It was necessary to add some other ingredient which possessed the quality lacking Assay "mabor," which is largely magnesia, does what is required. I now use a mixture of 160 lb. English portland cement, 95 lb. mabor, 85 lb. crushed local firebrick passed through 12 by 12 mesh, and about 40 lb. water.

These tests, which possess the qualities required, cost about $15.60 for material. They will deal with 60,000 to 70,000 oz. of lead bullion, and can be made and the cavity cut in about four hours, no great care being necessary. On being broken up they are easily dealt with in the pan furnace.

The quantities given above, when mixed and screened, will fill a test ring 7 in. deep to the top, the center being heaped up 2 in. When filling the ring, the mixture should be worked in hard with small hand shovels, otherwise much will be wasted, as after tamping has been commenced no more can be added. The four litharge gates should be cut and bored within about 24 hours of the test being made.

It is the practice here to allow the two center channels 1¾ in. vertical depth at the breast end, the two outside ones 1½ in. only. This saves any cutting before cleaning off. While working, bone-ash stops are used on the gates that are in disuse; these can be cleaned off with a bar during operations, should it be necessary to change to another gate. Of course, it is a *sine qua non* that the furnace should be fitted with some mechanism whereby the test can be raised or lowered at will, while running off the litharge.

*Abstract of a paper read at a meeting of the Chemical, Metallurgical and Mining Society of South Africa, May, 1905.

†Cyanide manager, Geldenhuis Deep, Ltd., Cleveland, Transvaal.

Breaker Screens.

A number of articles, descriptive of breaker practice, have apeared in recent issues; and the general subject of breaker screens is one that is attracting no little attention. There has been a gradual change in the breaker practice of the anthracite field of Pennsylvania, with respect to the type of screen employed. The recent tendency has been to substitute shaking screens for the cylindrical form. Many new breakers throughout the field have been equipped with shaking screens, particularly in the preparation of the smaller or steam sizes.

In the rotary type, the coal falls repeatedly from the side to the bottom during its travel down the length of the screen, with more or less breakage as a consequence. Only about one-quarter of the circular screen periphery is operative at any instant. Also, the coal being thus sized, is heaped up on the screen, and is not spread uniformly over the surface as is the case with the shaker. As a rule, the rotary machine readily clears itself of pieces of coal which may have become wedged in the mesh. If the coal does not drop out it can be automatically removed by a roller, bearing on the top of the screen. The space required for the rotary is several times that needed for a shaker of equal capacity.

The method of screening material by shaking is ancient; considered in itself, it would seem to be the natural means for separating the various sizes of coal. Moreover, the gradual sliding motion down the flat screen would seem to cause a minimum of breakage. Nevertheless, the larger pieces of coal readily lodge in the mesh and must be removed by hand; this disadvantage, in some cases, is serious enough to decide against the shaker in the separation of the large sizes.

When dirty coal requires a large quantity of water to clean it, the shaker is an ideal device, and is the only screen successfully used in preparing the small sizes (pea and the buckwheats). In breakers preparing coal "dry," it is still the practice, in many cases, to adhere to the rotating screen. In addition to the objections already noted there is a vibration transmitted to the building by shaking screens, which may be serious. However, when shakers are operated in pairs (and thus adjusted to balance) the vibration is reduced to a minimum; but unless provision is made for this feature, the breaker or washery will soon be badly racked.

Each type of machine has its advantages and disadvantages; and hence the choice of screens is a matter on which the mechanical engineers of the anthracite field are not in entire accord.

Action of Gases on Blast-Furnace Lining.

In the August issue of *Stahl und Eisen* T. Ludwig gives an account of the destructive action of certain gases on the refractory lining of a blast-furnace, observed by Frank Firmstone. In the lower part of the furnace the fireclay lumps had worn in the usual way; but in the upper part the lining had been melted to a species of yellow glass, which had run down the walls of the furnace. It is pointed out that no satisfactory explanation was given for this phenomenon, which was assumed to be due to the action of sublimed alkaline salts. The author considers it advisable to study the analyses further and to calculate them as of a uniform composition, as respects the amount of alumina in each. Having done this, it becomes evident that the proportion of silica and the alkalies has become greatly increased; while the amount of iron, lime, and magnesia remains approximately the same. The melting point of the unaltered firelump would be about that of Seger's No. 30 cone, and this heat would not be attained in that part of the furnace. The question is how the silica and the alkalies reached the upper part of the lining; various suggestions are made. The alkalies sublime, it is well known, at relatively low temperatures. It appears possible that silica may combine with cyanogen, which is largely present in the blast-furnace. This silicium cyanide might be sublimed at the high temperature existing at the base of the furnace and become decomposed on cooling, setting free silicic acid to enter into combination with the furnace lining.

Power pumps are sometimes used at better economy than the ordinary steam pump. The engine employed to drive the former uses the steam expansively and the saving in this direction is enough to overcome the loss in transmission by belt or gearing.

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Departments.

THE PRICE OF PETROLEUM has continued to increase, the purpose being obviously to expand the production. Conditions in Russia are still unsettled, and it will probably be a long while before operations there resume their normal state.

WE HAVE SEVERAL TIMES called attention to the rejuvenation of some of the old mining camps of Nevada. Even Eureka and White Pine are receiving attention, the latter on account of the "base-metal range," which could not be successfully exploited 35 years ago, and has since remained forgotten.

THE GOLD OUTPUT of Rhodesia in August was the largest ever reported in a single month; but it was not large enough to relieve that country from the shadow of its failure to realize the early expectations. A total of about $640,000 a month is not enough to give the region a high rank as a gold producer; or to repay the labor spent and the capital sunk in prospecting and opening its mines.

A NOTEWORTHY FEATURE in the new development which is going on in the Lake Superior copper country is that much of it is on old ground. That is to say, it is on properties which were partly opened many years ago, and then abandoned because they did not pay. Here, as in other mining regions, more economical methods, better machinery and closer saving of copper may make the new exploitation profitable. In fact, it has already done so in some cases.

ACCORDING TO THE mining laws of Western Australia, wire ropes employed for hoisting are not allowed to become covered with thick grease. Every strand in the rope must be visible to the eye. The provision as to cleanliness of the rope is thoroughly rational. It facilitates adequate inspection, and that is the best safeguard as to prevention of accidents in hoisting. Regular inspection of the cages and wire ropes is required in Western Australia.

THE IRON MARKET is getting into much the same feverish condition as the copper market was a few weeks ago. Temporary difficulties in arranging deliveries and the unfailing desire of consumers to buy on a rising market have brought matters to the point where the talk of scarcity and an "iron famine" begins to be heard. There is no danger. If purchasers would only remember the large increase in manufacturing capacity of the past few years, they would stop bidding up prices on themselves. But such is the way of booming markets.

THE PRICE FOR SPELTER continues to have an upward tendency, the London market having risen this week to £27, equivalent to 5.85c. per pound, while the New York market has risen to the neighborhood of 6 cents. Conditions are, therefore, on the verge of the parity at which exports to Europe can be profitably made; but the domestic demand for spelter is so strong that our brands are likely to be kept at home. The situation is decidedly agreeable to the producers of ore, but the smelters still have to struggle with a small margin between ore and metal.

Gold Dredging in California.

The recent merger of gold-dredging interests in the vicinity of Oroville, California, has attracted a good deal of attention to this branch of gold mining. In this connection it is worth while to note that there prevails generally a very much mistaken idea as to the gross output per annum of an ordinary dredge. This is not only the case outside of California, where most of the dredgers of the United States are at work, but in that State itself, where the newspapers report all sorts of absurd statements, which are accepted as truth.

The dredges are usually credited with two or three times the amount of gold they actually mine each year. In fact, many statements are made to the effect that certain dredges are making a yield each month of a sum which they really only attain in a whole year. These exaggerations are not due to information given by the dredge men themselves, who are generally conservative and averse to any publicity of financial statements connected with their business.

Dredging work is conducted in the same manner as any other mining enterprise. It has its certain expenses daily, and the average values of the ground are seldom very high. Care has to be exercised to prevent loss of time by breakdowns, and also to insure that as high a percentage of gold as possible may be saved. The work cannot be carried on in a haphazard fashion. It takes good management to make a dredging enterprise pay, just as it

does any other kind of mining. While the profits are steady, they are not at all out of proportion to the cost of operation and the investment involved in lands and machinery. Naturally, some ground is more profitable than the average; but then there are places where only the greatest care and economy will result in any profit. The enterprises require large preliminary investments, and the business is not one that the ordinary run of miners may undertake.

The machines are generally credited with an output of from $75,000 to $150,000 each per annum. The number in operation in California at present is about 45 in total. They will not really show an average yield as high as $60,000 each per annum. Some, of course, produce more than the average; but others produce less. The general supposition is that these machines are producing from three to five million dollars a year in the aggregate. As a matter of fact they are really producing very little over two millions at present.

A large part of the increase in the gold production of California in 1904 was derived from the dredges, but it is likely that their contribution has been overestimated, even in this respect. The quartz mines of the State certainly made great progress in 1904, many new mines having been developed, and many old ones having been reopened. Their contribution to the increase in the gold output of the State was very important.

Enrichment in Veins.

It is now generally recognized that veins do not increase permanently in richness with depth, but on the contrary become poorer. The old theory, held tenaciously by the prospector, was that the chief essential to the discovery of rich ore was to go deeper; but that has been abandoned even by the prospector. The evidence of impoverishment presented by so many important mines, which have been opened to great depth, is so conclusive that it is impossible to retain any optimistic view in that respect. It is a fair subject of discussion as to whether there is any mine which has been so rich below 1,000 feet of depth, as above it. The copper mines of Lake Superior are a possible exception.

In the above remarks, the subject has been regarded broadly, inasmuch as it is well known that in mines of certain ores and in mines of certain districts there is apt to be experienced a temporary increase of value with depth, followed sooner or later by a petering out. Some mines have been quite poor at the immediate surface, but have had rich bodies of ore lower down. This has been especially the case of some copper mines. Other veins have been distinctly richest directly at the surface, have failed steadily as they led downward, and have become very poor at a comparatively moderate depth. This has been especially the case of some gold mines. We know well, from the researches of the economic geologists, that these conditions are due largely to changes that have occurred in the ore deposits subsequent to their original formation, and the factors and processes which have contributed to them are fairly well understood.

The practical miner, unversed in the science of economic geology, having lost his former hope of an increase in richness with depth, seeks new, correct and simple rules for his guidance in prospecting. Having received inquiries on this subject, which we considered incapable of a satisfactory brief answer, we submitted the following questions to several experienced mining geologists:

1. At what depth in fissure veins are generally found the richest orebodies? Recognizing that veins as a rule do not increase in richness with depth, is there any point at which enrichment may be especially looked for?

2. As fissures go down, do they generally increase in width, or do they rather tend to pinch? And to what depth are they likely to extend?

There is more or less difference of opinion as to the subjects involved in the above questions, especially the first. They lead, however, to the possibility of some broad generalizations, which are the logical conclusion of special study and put new knowledge at the service of the mining industry at large. The subject is therefore one which may be usefully discussed by mining men, and especially by the mining geologists, who have within very recent years developed a new and extremely valuable profession in the application of their study of the laws of ore deposits to practical mining.

Elsewhere in this issue we publish a communication from Mr. J. E. Spurr, distinguished for his work in this field, which is both interesting and valuable as a practical contribution on the subject. We hope that other engineers and geologists will join in the discussion.

Lump-Sum Versus Pound-Price Contracts for Steelwork.

In letting contracts for steel work, which nowadays the metallurgical engineer has to do with increasing frequency, the temptations of added profits to the manufacturer are too often lost sight of. A lump-sum contract, which, on the part of many engineers, is still preferred, offers an inducement to the person in charge of the general design (in this case the metallurgical, or constructing, engineer) to slight the work by the omission of details for the sake of supposed saving of time. There may, indeed, be occasionally a saving in time, and time may be in some cases an element of value offsetting other considerations to a large extent; but as a matter of fact, this practice is apt to operate in such way as to lengthen the period of construction. Anyway, insufficient details nearly always result in misunderstandings, and account in large part for the "extras" which the engineer of experience aims to avoid as he would the plague.

Another result of this procedure is the uncertainty upon the part of the contractor as to just what is absolutely requisite to the completion of the work. This results in guesswork instead of careful estimates, and in dependence upon the humor of the engineer as to just how much will be required or how little will be accepted. There is always in a lump-sum contract (and this is not confined to steel work) the temptation on the part of the contractor to "skin." The only salvation of the engineer in charge is the most rigid inspection, not only of the tests and materials, but also of the details designed by the contractor.

Especially in erection work, some contracting firms require close watching. There are firms which make a practice of punching the holes for bolts 1/8 in. larger than the same firms do for rivets of the same size. This enables the shop work to be much less accurately fabricated (it allows a total variation from the exact dimension of 3-16 in. instead of 1-16 in.), and so more cheaply produced, and also effects a very great economy in erection, for the reason that the pieces are not necessarily brought together as they should be. The resulting structure is apt to be

loose and shaky, with no certainty that the joints will hold. It is generally regarded by engineers that looseness of the bolts in holes that were excessively large for them was one of the contributing causes of the collapse of a building in this city less than a year ago.

The opportunities for additional profit to the contractor do not exist only in work let on the lump-sum basis. A pound-price contract also offers opportunities, unless the details are specified absolutely by the engineer in charge. Material may be piled on to a point where the purchaser may be called upon to pay for as much as fifty per cent more than is really required. Even where the column-sections, beams and truss-members are specified, some contractors will use brackets and lugs, stiffeners, and plates and small details in general, far in excess of what is necessary, not in number, but in weight.

The owner who endeavors to economize in engineering expense, and the engineer who shirks draughting expense, are liable, therefore, to be imposed upon either way; whether the contract be let by lump sum, or by pound price. The safe and proper course, which safeguards against deception and misunderstanding, is quite clear; it is the preparation of plans and specifications by the engineer, showing precisely what is wanted and what the contractor must be required to supply. Such plans must be prepared by some party to the transaction in any case, and the owner must pay for them in one form or another. The contractor may be able to prepare them a little more cheaply than the owner's engineer, but any economy in that respect is far offset by the advantage of the independent advice and oversight which the engineer is retained to give.

It is by no means necessary that the engineer should prepare working drawings. The spacing of rivets and such minor details may properly be left to the engineers and draughtsmen at the shop. But the sections of all members, bracing and the connections, including the minor connections, should be carefully specified. The engineer who is letting the contract should know, in brief, what material is to be put into the building he is ordering, and that it is to be disposed in the right way. With such knowledge, and on such specifications, the lump-sum and pound-price contracts are apt to come to approximately the same thing. If they do not, it is almost certain that insufficient attention has been shown to the details.

The Cost of Anthracite Coal.

Some figures bearing on the question of costs and profits in the anthracite coal trade can be obtained from the report of the Philadelphia & Reading Coal and Iron Company for the fiscal year ending June 30, 1905, which has just been published. So far as profit is concerned, this company has always labored under the disadvantage that its coal lands were bought late, at very high prices; making its relative capitalization much higher than that of companies like the Lackawanna and the Delaware & Hudson.

The following statement shows the results from anthracite coal only. To secure this we have deducted the sales of bituminous coal—$548,398—and the purchases of such coal —$526,266—from the earnings and expenses, respectively. We have also added the depletion fund and taxes to the expenses, where they properly belong:

	Tons.	Amount.	Per Ton.
Coal sales	10,312,224	$34,943,001	$3.39
Coal added to stock	283,973	608,021	2 18
Rents, etc.	10,596,197	369,334	0.03
Total receipts	10,596,197	$35,920,356	$3.39
Mining coal	9,438,666	$18,378,357	$1.95
Coal purchased	1,184,349	2,711,837	2.29
Depletion fund	9,438,666	478,325	0.05
Miscellaneous	9,438,666	983,609	0.10
Transportation and handling	10,312,224	9,805,217	0.96
Total expenses	10,596,197	$32,357,345	$3.05
Net earnings	10,596,197	$3,563,011	$0.34

The cost of mining coal includes royalties, repairs and some minor items. Transportation averages are necessarily calculated on the total coal sold. The arrangement of some of the items has been slightly changed from that given in the company's report; but shows, we think, the actual results more clearly.

It will be seen that the expenses last year were 90.1% of the gross earnings; the cost of mining being 60.1%, of transportation and handling, 27.3%, and miscellaneous, or general expenses, 2.7%. In addition to this the sum of $1,730,975 was expended for colliery improvements. If this is added to the expenses, it brings the total up to $34,088,320, or 94.9% of the gross expenses; reducing the net earnings to $0.18 per ton of coal. As the colliery improvements are an expense necessary to the maintenance of the company's production, it is quite fair to include them in the expenses. Eighteen cents per ton seems a return quite inadequate, considering the money invested. In the company's balance sheet, the property is valued at $84,267,240; the fixed capital, including the advances made by the Reading Company, is $88,455,760. This is an average of $9.37 per ton of yearly product, taking the figures for 1905. This capitalization is the highest of any company in the anthracite field; and the net earnings per ton were less than 2% on this average.

In this case, however, the question is complicated by the common ownership of the railroad and the coal company. This makes the rate charged on its own coal largely a matter of bookkeeping; that is to say, the increase of the rate on this coal would simply subtract a corresponding sum from the apparent earnings of the coal company, and add to those of the railroad. The net earnings of the railroad on all coal carried were, as nearly as can be ascertained from the figures given in the report, 38 cents per ton. This would bring the return per ton of coal up to, approximately, 56 cents, or 6% on the capitalization named, which is not an unsatisfactory result. It may be objected that no allowance is made in this for interest on the capital invested in the railroad; but it is probable that this will be covered by the difference between the rates on the Coal & Iron Company's coal and those on coal carried in competition with other roads. What this difference is, cannot be ascertained from the figures given in the report, but it is known to be considerable.

It must be remembered also that anthracite is a short-haul coal; it is not burdened with the long hauls to market which increase the cost of a large part of the bituminous coal mined in the Central West. Fully 90% of the anthracite marketed is used within a distance of 300 miles of the mines. In the case of the Reading, probably 95% of its coal is sold on its own lines, or shipped by cheap water transportation from its tidewater terminals. Much of this water transportation, also, is owned by the company itself, its colliers and barges reaching almost every coast port from Baltimore to Bangor. The books of the Reading Company —which owns both the Philadelphia & Reading Railroad and the Coal & Iron Company—show, so far as the figures made public indicate, a fair return on its coal, taking mining and transportation together; though we do not believe that there is the excessive profit in the anthracite business which some writers try to make us see.

Metallics.

Under no conditions should dynamite be placed on hot steam pipes, or steam boilers, nor on or in a hot stove, nor on any hot metal. It should not be exposed to radiated heat from a fire or hot stove. It should be kept away from the blacksmith's forge or shop.

Zinc unites with bismuth when both are melted, but upon cooling two distinct layers are formed, the upper containing 2.4% bismuth and 97.6% zinc, and the lower 85.7 to 91.4% bismuth and 14.3 to 8.6% zinc. In this respect bismuth behaves with zinc very much as lead does.

With gold zinc forms a series of alloys which are pale yellow when the gold is in excess, and become greenish as the proportion of zinc increases. For jewelry, part of the copper is often replaced by brass, the zinc in the latter giving the gold a more desirable color, but the presence of much zinc makes the alloy hard and difficult to work.

The shaft furnaces for lead smelting at Monteponi, Sardinia, are of the American type, but the water jackets have been repaced by walls of cast steel 0.75 in. thick, which are cooled by external water sprays. It is claimed that the water consumption is considerably reduced by this system, while all danger of leakage from the jackets is eliminated. The steam developed is said to have a beneficial effect upon the workmen.

According to J. W. Richards, the net thermal efficiency in melting metals varies greatly, from, say, 2 to 3% in a crucible steel-melting wind furnace to about 10 or 15% in reverberatory furnaces, 20 to 30% in regenerative open-hearth furnaces, 30 to 50% in shaft furnaces, where material to be heated and fuel burned are in direct contact with each other, 50 to 75% in steam boilers and hot-blast stoves, and 60 to 85% in large electrical furnaces.

With antimony zinc unites readily in all proportions, forming alloys which are brittle and fusible, and exhibit a close-grained, dark-gray fracture when much antimony is present. An alloy consisting of equal parts antimony and zinc is of a bright, sky-blue color, and has the peculiar property of writing upon glass. Even a small proportion of antimony renders zinc bluish, and the presence of more than 0.5% may be detected in this manner. Zinc-antimony alloys have found a limited application in thermopiles.

Hammer handles can be fitted to the hammer itself more satisfactorily than in any other way, by the following means: Thrust the end of the handle into the fire under the boiler; let it burn or char on the outside and then remove it and rub briskly back and forth on any rough surface. Continue this process until the end has the right size and shape to enter the hole in the head. A little practice will make an expert of the man who does this work, and the handles that he sets will not often come out, even if the wedge at the head is not inserted.

The superintendent of a mine should designate a competent person, who at a stated hour each day should make an inspection of all mining appliances, boilers, engines, magazines, shafts and shaft-houses. He should carefully examine all underground workings, roof, pillars, timbers and explosives. He should descend the shaft slowly and examine the bell-rope, track, timbers, ladders, etc., and report any defects to the superintendent, in writing, at once. Such a rule should be strictly enforced where men are handled by skip, car, cage or bucket.

Too much attention cannot be given to the use of signals in mines, and the care of their appliances. To give proper and distinct signals, the appliances must be kept in first-class condition. The bell line should be of sufficient strength and clear of any possible obstruction. A code of signals should be posted at different parts of the workings, especially at the shaft-head, together with a notice of penalty for wrong signals. Punishment for wrong signals should be severe. It is advisable to provide a speaking tube from the foot of the shaft to the engine-room.

The iron founder who casts the desilverizing kettles for lead refineries should be held down to certain specified weights. Work of this character is apt to over-run, and an allowance of 10% over-weight is often made. This certainly is ample, yet founders have been known to produce (and expect pay for) material that over-ran as much as 20%. A better specification would call for not more variation than 5% either way. It is usually inconvenient to determine what the actual thickness of the bottom may be, and, if the maker is at all inclined to take advantage, the temptation to thicken up this portion is yielded to.

Old, but only half-worn platinum crucibles which show pin-hole openings can often be repaired by the chemist himself by the following simple expedient. Get some of the fine gold buttons or scales (which are obtained from assaying) and which are pure metal. Clean the surface of the platinum about the hole and place one of the fragments of gold over it. By holding this for a moment over a blow-pipe or burner the gold will alloy down with the platinum, completely plugging the aperture and making the crucible practically as good as new. Obviously, skill in this emergency repairing of platinum ware can be obtained only by practice, but a few trials will convince one of the value of this suggestion.

In re-timbering old and caved shafts with logs, the most practical method (as well as the safest and most economical one) appears to be the following: The first set is made of the heaviest timber, and that having the largest diameter. This is made with a "lock-crib" joint, and set in position before beginning the excavation. As the excavation proceeds, the earth is thrown back of the logs and additional sets are placed successively on top as the cribbing sinks. This enables the two sets of men, laborers and timber men, to work at the same time, and will facilitate construction materially. The diameter of the logs should be kept large at the bottom, but the smaller sizes can be utilized as the work approaches completion, on account of the decrease in the pressure of the earth surrounding the shaft.

At Monteponi, Sardinia, when the smelting of low-grade lead ore was begun in 1894, the slag contained an average of 20.93% of zinc oxide. With respect to its zinc content, this slag was about on a par with that which is run in the Lower Harz, Germany, and has been run by certain of the smelters at Broken Hill. A content of 20% zinc oxide appears to be approximately the maximum that can be economically carried in a slag under any conditions. During the first year's operation at Monteponi nearly 20,000 tons of slag were produced. It is now intended to treat this slag for the manufacture of zinc white, a certain proportion of ferruginous zinc ore of higher grade to be mixed with the slag for that purpose. The plant will comprise a bag filtering system similar to what is employed in the United States. The slag above referred to contains upward of 2% of lead. The slag now made by the lead furnaces at Monteponi assays about 15% zinc oxide and only 1 to 1.5% lead.

At the Benedict mine of the Golden West Mining Company, in the Black Hills, S. Dak., the ore is mined from an open cut, five men producing 100 tons daily. The cars of an aerial tramway run close to the face of the cut, where rough, portable plank chutes are set up, so that some of the ore is broken directly into the cars. Use is also made of a belt conveyor, which can be quickly adjusted at any desired place. The loading is entirely attended to by one man. The buckets of the tramway dump into a gyratory crusher at the mill. The mill crushes 100 tons per 24 hours, two men being required per day and one at night. The cost of mining and milling is as follows: Five miners at $3 per day, $15; one loader at $3 per day, $3; two millmen at $4 per day, $8; superintendent at $5 per day, $5; steel, oil, repairs, etc., $4; total, $35, or 35c. per ton of ore mined and milled. This extraordinarily low cost is made possible by exceptional conditions, there being free water power, and ore so soft that no drilling and blasting are necessary.

Colliery Notes.

Increased areas and consequently increased resistance to the passage of air in coal mines, led to the building of fans of larger diameter. At the St. Hilda colliery (South Shields, England), a fan 50 ft. in diameter was installed.

At coke plants in Germany, the retort oven is very largely used. After purification, the gas from the oven is used to drive gas-engines. It is stated that the power generated in this way is at least double that obtained by burning the gas under boilers and generating electricity by steam so raised.

In Cumberland, England, tee rails (either old or new) have been proposed as substitutes for props and timber sets in mines. Rectangular and curved (or arched) sets may be formed by various combinations of rails, which make strong supports; the arch set, in particular, should offer great resistance to top and side pressure. Heaving of the bottom may be prevented, to a certain extent, by longitudinal rails or timbers placed under the sills.

Recent tests made by the Babbington Coal Co., Derbyshire, England, with a Bemis stoker and compressed air self-cleaning furnace show that the hand-fired furnace used, in comparison with that equipped with the stoker, was much less effective and would not burn the lowest grades. The stoker was successful in burning all grades and with black shale chippings evaporated 7.07 lb. of water from and at 212° F. per lb. of fuel. Five very low grades of coal were used, including black shale chippings and "smudge."

At the Horden colliery (near Sunderland, on the east coast of England) a plant is being opened up to develop about 18,000 acres of coal. There are three shafts on the property, of 864, 1,044 and 1,254 ft. in depth, respectively. Considerable engineering difficulty was experienced in sinking the shafts. In the deepest opening, 30,430 gal. of water was pumped per minute; the largest feeder being 4,000 gal. per min. The flow was 6,630 gal. per min. and 5,100 gal. per min. in the 864- and 1,044-ft. shafts, respectively. The shafts have been lined with metal tubbing, varying from 1 to 1¾ in. in thickness.

In anthracite breakers, where coal is prepared "dry," special provision should be made to remove the fine dust which ordinarily fills every part of the interior during working hours. The chief sources of this dust are the screens, rolls and mechanical pickers. The screens and rolls may be enclosed, and thus the dust will be kept to more or less extent from flying about the building. These cases enclosing machinery can advantageously be connected with an exhaust fan, so that the coal dust may be conducted outside of the breakers. Some day this dust will be caught and utilized in briquette form.

In resuscitation from electric shock, the treatment is similar to that used to save persons made unconscious from want of air. Artificial respiration methods should be used at once, until all doubt as to the benefit of such a course has been removed; or until a physician arrives to take charge of the case. The electric shock tends to stop the actions of the heart and lungs; if these actions can be started again (unless otherwise injured), the victim generally recovers. However, when a person has been subject to the action of a current for a long enough time, so that the vital organs of the body are injured, death is certain.

A shaking grate (invented by Chief Engineer E. A. Wildt, of the Scranton Railway Co., in Scranton, Pa.) burns coal dust which has hitherto been thrown aside as refuse by the anthracite washeries. Two important features of this grate are: First, the air space is only 8% of the total grate surface (leaving 92% solid); second, each individual bar may be easily replaced. Each of the bars (making up the grate) is separate, and every alternate bar has shoulders which fit into grooves in other bars on either side. Thus the whole set of bars is solidly supported, yet they are mounted so that they can be shaken.

In German coal mines, electricity is extensively used for running pumps. The tendency, in plunger pumps, is to increase the speed so that they can be run by slow, direct-connected motors, without the use of gearing. The pump of the future may possibly be of the centrifugal type. Its advantages are as follows: Small comparative cost; small space occupied; little attention, lubrication and repair; and especially, adaptability to electric driving. Turbine pumps and motors both show the best results when run at high speeds. Centrifugals are largely used in Germany for high and low lifts, and are successful for shaft-sinking.

The coals of Japan are of a highly bituminous nature and are not particularly suitable for naval operations. Therefore, the Japanese Admiralty purchased a mine, imported machinery from England, and is now manufacturing coal briquettes for naval use. The total installation expense of this plant, including 10 miles of railroad, is said to have been 1,060,000 yen (a yen is about 50c.). Under normal circumstances the factory will turn out 150,000 tons of briquettes per month; but, if operated night and day, 250,000 tons. The navy has hitherto imported coal costing at least 20 yen per ton; whereas the briquettes will cost only 9 yen. It is claimed that the briquettes give better results for steaming purposes (and in avoiding fouling) than even Cardiff coal in ordinary practice.

Correspondence and Discussion.

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

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

Letters should be addressed to the Editor.

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

Enrichment in Fissure Veins.

Sir—The questions you propound are similar to questions which I have treated in a recent publication (*Geology Applied to Mining*). I shall therefore make this communication an adaptation of the opinions expressed in that publication.

Ores due primarily to descending waters can be counted on to become poorer in depth, also where an earlier ore deposit has been worked over and concentrated by descending surface waters, the values will often be less below the shallow enriched zone.

Concerning the great class of ore deposits due to ascending waters, it is evident that, being limited bodies, they will have a top and a bottom somewhere; also that at some point, probably intermediate between the top and the bottom, they will be largest and probably richest. The ore deposits would ordinarily not be revealed to the eye of man were it not for the removal of the overlying rocks. Therefore the wholly fortuitous circumstance of the level of the plane of erosion at the time of the discovery of an orebody determines whether it will become stronger or weaker in depth. Erosion may reveal only the top of a deposit, and it will grow richer below; or it may reveal the bottom, and it will grow rapidly poorer; or it may cut some intermediate level, and the vein may hold its own for a long distance down, with about the same strength and richness. These conditions are apt to be fairly uniform over a considerable district, so far as the ore deposits formed at a single period are concerned. So in one district the ore characteristically grows weaker in depth; in another stronger.

Under favorable circumstances, it is probable that a vein may extend to a great depth, perhaps, in extreme cases, two or three miles below the original surface. Where such a vein is being worked, it may be profitable as far down as the present methods of exploitation can be pushed.

Even in the case of veins deposited by ascending waters, there may be a change in the character of mineral in depth, for ores may be deposited according to their relative solubility, by ascending waters, in much the same way (though probably not so regularly and definitely) as by descending waters. In many cases, however, the character of the ore may remain about the same through a considerable vertical range—say, several thousand feet.

Owing to the pressure exerted by gravity, it is doubtless more difficult for a fissure to stay open in depth than near the surface. The tendency is to press the sides together and close the opening. At a certain depth, it is probably the case that the pressure, and the plasticity resulting from this, together with the increase of heat, make it impossible for fissures, fractures, or other openings to exist. Such depth has been variously estimated as from 16,000 to 33,000 feet. This limit is far below the depth that can be attained in mining. But some veins are very old, and even the comparatively recent ones (such as the Tertiary veins) are old enough to have had in many cases several thousand feet of rocks, which overlaid them at the time of their formation, removed by erosion. Hence, it is very possible that we may find some veins diminishing, and even disappearing in depth, from this cause.

There are all kinds of fractures and fissures, little and big, transitory and permanent. It is a saying of some miners that a vein will go down as far in depth as it extends horizontally on the surface. This saying seems to have some sound principle behind it.

Where a fissure or fracture system, along which mineralization has taken place, passes in depth from one kind of rock into another, it may change its character so as to influence strongly the nature of the vein. A strong fissure in limestone may die out entirely on meeting a bed of shales. This is an influence exerted by the mechanical properties of different rocks.

Where a vein or other ore deposit depends largely for its existence upon the chemical properties of the rocks through which it passes, changes may also be expected. A replacement deposit in limestone may be expected to be poor, or to stop entirely when followed down into quartzite or granite, although the physical conditions (the fracture zones and water channels) may be as good in the latter rocks as in the limestones.

Within a vein, the richest ores are often irregularly distributed in the form of shoots, pockets, or bonanzas. Such orebodies are often irregular in shape, and may or may not come to the surface. Where such a body outcrops, mining work will eventually "bottom" it, in which case the miner will say his ore has played out in depth. In another lode, or perhaps in the same lode, however, sinking on a low-grade or barren portion of the vein may discover an orebody. In this case the miner may believe that the rule of increase of richness in depth is demonstrated, but the two cases illustrate a single condition.

In the case mentioned in the first paragraph, where an orebody has been worked over by descending surface waters, a certain zone or zones, always more or less closely related to the surface, may show either concentration or improvement, as compared with its original values. The richest ores may be concentrated near the surface in the oxidized zone, or below the oxidized zone in the form of secondary sulphides (secondary sulphide enrichment). The results in a given case depend upon local factors—the rainfall, the topography, the chemical and physical nature of the ores and of the wall-rocks. A great amount of rainfall is more favorable to this result than aridity, and slight slopes to steep ones. Most favorable is the combination of slight slopes and abundant rainfall; the combinations of abundant rainfall and steep slopes, and of slight rainfall and slight slopes, are perhaps equally favorable, one to another; but in the first case the oxidized zone will be slight, and the secondary sulphide zone important, and in the second the reverse will be true. The amount and place of concentration also depends upon the solubility of the ore. Quartz veins, containing free gold, for example, should not be expected to show so much rearrangement as copper ores, which are more easily soluble. In the first instance the gold is apt to be concentrated at the surface, in or near the outcrop, the values here being greater than are ever found below; while in the latter case the outcrop and the shallow zone of the vein may be quite barren (iron capping), while below in the secondary sulphide zone, a rich belt of concentrated copper ore will be found.

The depth at which such enriched ores occur varies with the conditions above mentioned. Separate instances which I have collected lend a considerable probability to the suggestion that in well-watered regions, especially in the case of copper ores, as well to a less extent, as those of lead and zinc, the zone of enrichment may be found anywhere from the surface to a depth of 300 feet or more; while in arid regions it may extend twice or three times as deep, though the secondary concentration is apt to be incomplete.

J. E. SPURR.

Washington, D. C., Aug. 28, 1905.

A New Safety Device for Mine Hoisting.

Sir—Considerable interest is evidenced in the anthracite field in regard to the safety catches on the mine cages. Since the unfortunate disaster at the Conyngham shaft, and the series of tests which followed, to determine whether the cages throughout the field were in proper condition, a number of new devices have been invented. The operators have encouraged their employees in the mechanical departments to provide some device that will be at once safe, simple, and serviceable.

Among the safety catches for cages which have been brought to the notice of the public recently is an invention by John G. Scott, of Girardville, Pa. Mr. Scott is a practical miner, and his device displays considerable originality. His invention has been on exhibition at Wilkes-Barre for some time, and has attracted considerable attention. At a lecture given before mine foremen and others, the operation of the model appeared to be simple; but a model is one thing and a practical application is another.

In speaking of his invention, Mr. Scott said: "Many disastrous wrecks have occurred of late years, especially since the adoption of the first motion engine, frequently with loss of life and great destruction of property. While the human element has entire control of hoisting apparatus, accidents will occur. The object of this invention is to prevent a disaster in case of an overwind. Should the cage be hoisted beyond the required distance, the rope is automatically detached from the cage, which is then supported independent of the ordinary catches now in use, thus making the appliance doubly sure."

A mine foreman, to whom I spoke after the lecture, said that it was a very ingenious invention, but that its adaptability to practice could only be determined after an actual test had been made upon a cage. Again, it has been stated that the object of the invention was to act in event of an overwind and to prevent the cage from being drawn up to the sheave-wheel. However, the invention would be much more effective if it could prevent an overwind. The most careful engineer will sometimes make a mistake. What is needed in mining is an automatic device that will act instantly, at the right time, and correct any deficiency on the part of an engineer. Mr. Scott's invention is useful as far as it goes, but it does not go far enough. Overwinds, accompanied by fatal results, are comparatively rare. Naturally, if the cage should reach the sheave-wheel in an overwind, the chances are ten to one that it may be shattered. If Mr. Scott's invention, in practical use, is as successful as his model, it would prevent such a disaster.

An invention is needed, a single device, which will act automatically and infallibly when the rope breaks and the catches fail to act. Mr. Scott's invention has satisfied one of these requirements, and only one.

W. S. T.

Scranton, Pa., Sept. 23, 1905.

A Peculiar Mine-Gas Test.

Sir—The following account is of a recent mine-gas test, which seems to me to show very exceptional results, and may interest others engaged in similar mines.

In testing for inflammable gas in a manjak (bitumen, or "glance pitch," as it is called in the United States) mine in Barbados, an almost imperceptible blue cap was discovered above the oil (light petroleum) flame of the safety lamp (bonnetted Mueseler type) in a small roof cavity at 140 ft. depth at a temperature of

28° C. underground, while the surface temperature was 24° C.

A sample of the gas was taken in the usual way in glass-stoppered bottles and sent for analysis. The gas is reported to have given the following analysis: Carbon dioxide, not determined, but less than 0.1%; unsaturated hydrocarbon, nil; carbon monoxide, nil; oxygen, 14%; methane (CH_4, firedamp), 11.1%; hydrogen, 1.6%; nitrogen (by difference), 73.3%; total, 100.

The analyst reported that the gas was non-explosive, but by adding some oxygen to a small quantity of it, and firing by an electric spark, his apparatus was blown to bits. As these results seem to be contrary to all mining experience, I shall be glad to have suggestions from your readers as to the cause of the failure of the "flame-cap test" of the safety lamp in the presence of so large a percentage of firedamp, and the cause of the non-explosive properties of such a mixture. And, as the analyst has not been sufficiently explicit as to state what percentage of oxygen he found necessary to add to the mixture to effect an explosion, I should also be glad to know what is that percentage, and whether the explosion was entirely due to the increased temperature of the spark caused by the oxygen, or whether an addition of pure air might also have caused the same result.

The safety-lamp used was one of extra sensitive construction, known as a "Fireboss lamp" and made by John Davis, of Derby, England; and with it I have frequently detected small quantities of gas which were undetectable with the ordinary Mueseler safety-lamp. R. H. EMTAGE.

Villa Nova, St. John, Barbados, Sept. 6, 1905.

Gold Dredging in the Argentine.

Sir—You may be interested to know that during the last 10 months the Argentine Republic has experienced a great boom in mining, especially in gold dredging. Up to date, 10 companies have been formed for that purpose, of which two have already begun operations. The remainder are still engaged in erecting the dredges, the machinery for which has come partly from New Zealand, and partly from the United States. V. F. R.

Buenos Ayres, Aug. 4, 1905.

Consul Anderson, of Amoy, writes that the prospect is that American interests working through the Philippines will inaugurate an extensive business in commercial fertilizers along the lower Chinese coast. The field for fertilizers in China is very large. Practically all the farming land has been under the same sort of cultivation for 2,000 years or more; but the increase of chemical knowledge is forcing a change from old methods, and the advantages of modern fertilizers are coming to be appreciated.

New Books and Publications.

Leistungen Metallurgischer Oefen. By W. Borchers. *Metallurgie,* II, 17, Sept. 8, 1905; pp. 393-428.

Die Zinnoberlagerstätte von Vallalta-Sagron. By Prof. A. Rzehak. Zeit. f. prak. Geol., 1905, XIII, ix, pp. 325-330.

Das Manganeisenerzlager von Macskamező in Ungarn. By F. Kossmat and C. v. John. Zeit. f. prak. Geol., Sept. 1905, XIII, ix, pp. 306-325.

The Rocks of Cape Colville Peninsula, Auckland, New Zealand. Vol. I. By Professor Sollas, with an Introduction and Descriptive Notes by Alexander McKay, Government Geologist, N. Z. Pages 290, 7 by 9¼ in., illustrated, cloth. Wellington, N. Z., 1905. John A. Mackay, Government Printer.

Progress of Stream Measurements for 1904. Part II.—*Hudson, Passaic, Raritan and Delaware River Drainages.* Under the direction of F. H. Newell. By R. E. Horton, N. C. Grover and John C. Hoyt. Water Supply and Irrigation Paper No. 125, United States Geological Survey. Pages 114, 6 by 9 in., paper. Government Printing Office, Washington, D. C., 1905.

Progress of Stream Measurements for 1904. Part VII—*Hudson Bay, Minnesota, Wapsipinicon, Iowa, Des Moines and Missouri River Drainages.* Water Supply and Irrigation Paper No. 130. United States Geological Survey. Pages 204, 6 by 9 in.; paper. Government Printing Office, Washington, D. C., 1905.

Oil and Gas Sands of Kentucky. By J. B. Hoeing, Assistant Geologist, Kentucky Geological Survey. Pages, 233; 7 by 10½ in., cloth and paper. Office of the Survey, Lexington, Ky. Cloth, $1.18; paper, 70c.

Contents.—Preliminary discussion. General geology of oil and gas. Principal divisions of the geological scale in Kentucky and the oil sands corresponding to each. The oil sands corresponding to the different formations. Well records. Additional well records. Production of oil and gas. Transportation of oil and gas. Maps (3). Appendix: Elevations above sea-level. Plates (10).

This report is a preliminary part of Bulletin No. 1, to cover special work in advance of the completion of the entire bulletin; this is done to meet insistent calls for authentic information on Kentucky petroleum and gas. Comparatively little concerning the oil possibilities of that part of the State west of the Louisville and Nashville division of the Louisville & Nashville railroad is given in this report; this is because but little prospecting has been done in that section. Contrary to what has long been supposed, the studies of the Survey have brought out the fact that there are productive oil horizons in the Kentucky "Trenton." Also, that the "Calciferous" gives promise of being productive in gas.

Mechanics of Materials. By Mansfield Merriman. Pages, xi + 507. Illustrated. 6 by 9 in., cloth, $5. New York, 1905; John Wiley & Sons; London, Chapman & Hall, Ltd.

That the tenth edition of this classic (for we believe it entitled to rank as such) can be considered an improvement upon former editions is high praise. The work has been practically rewritten in more modern form, and has been enriched by several new chapters, as well as by the change in the notation. The latter makes the book easier for the student and relieves him of the trouble occasioned by the use of different characters for similar quantities. This was a defect of the old editions, but one that was not recognized as such until the advent of the present issue of the publication.

In the chapter devoted to the materials of engineering, we should have liked to see more descriptive matter, especially of the alloys and of sand-lime brick. The tables are good, but many of them superfluous when one considers that every student in an engineering course is apt to be provided with a pocket-book of one or the other of the steel companies who roll the sections described. This, however, if it be a fault, is one that is shared by most publications that relate to the subject, and it does add somewhat to convenience in using the book.

The illustrations are good, and the system of numbering them a novelty to us. The use of the article number for the figure as well is one that would seem to be time-saving; whether the use of the sub-letter is confusing or not, however, remains to be seen.

The quotation from Lamé, given in the appendix, constitutes in itself an explanation and a review of the work before us. We cannot do better than translate it: "Our object is, not to give a complete treatise, but to show by simple and varied examples, the utility and the importance of the mathematical theory of elasticity."

Questions and Answers.

Talc and Soapstone.

What is the demand for talc and soapstone, its value, uses, etc.?—J. J. B.

Answer—There is a strong and growing demand for stone of such quality as to make a smooth, clean, white powder, when finely ground, in which form it is used as a filler in the manufacture of white paper. For this use, it is better than clay and chalk, which have been largely employed for the purpose. The entire production of New York State in

1903—60,230 short tons—was sold for this use at $7 per ton, ground.

Massive soapstone, sawn into slabs, is used for a variety of purposes. Crude is worth about $8 per ton, and sawn into slabs about $15 per ton. To stand this treatment, the stone must be free from veins or impurities, and must be capable of being mined in large masses, free from fractures.

Asbestos.

What is the production and demand for asbestos in the United States? M. E. C.

Answer—There are two kinds of asbestos: the gray sort, of which nearly the whole output of the United States consists, is only suitable for lagging, and for boards and moldings; the green kind, found always and only in serpentine rock, of which all the imports into the country consists, has a stronger fiber and is better adapted for wearing. Both kinds are about equally resistant to heat.

The domestic production in 1904 was 1,480 short tons, worth at the mines $17.50 per ton; imports, mainly from Canada, were worth $700,572 for unmanufactured and $51,290 for manufactured material, unit value unknown.

Graphite.

What is the market for graphite, what are its principal uses, and what is its value?—S. O.

Answer—The market for crystalline graphite of good quality is excellent. The United States does not produce all that is required, and a good deal has to be imported from Ceylon and elsewhere. The value of graphite depends not only on its purity, but also on its physical characteristics, wherefore it is impossible to value it closely without making an examination of the samples in each case.

There are two principal kinds of graphite mined in the United States, viz., crystalline and amorphous, the crystalline being the more valuable.

Of the crystalline variety, 55% of the production is used for crucibles and other refractories; 15% for stove polishes; 10% for foundry facings; 5% for paint; 15% for pencils, electrotyping, etc. It is also used as a lubricant.

Of this variety, 5,681,177 lb. was mined in the United States in 1904 and was valued at an average of 4.2c. per pound.

Amorphous graphite is used exclusively for paint; 19,115 short tons were mined in 1904, and sold at $5.38 per ton. The principal sources are Michigan, Rhode Island, New Mexico, and Georgia.

Artificial graphite is made at Niagara Falls; 3,248,000 lb. sold at 6.7c. per lb. in 1904.

The imports of graphite from Ceylon amounted to 14,195 short tons, worth $905,581, in 1904. Ceylon graphite is better than the domestic for crucible manufacture.

Abstracts of Official Reports.

Camp Bird, Limited.

This company owns or controls 75 lode claims, 2 placers and 2 mill sites at Ouray, Colo. The present report covers the year ending April 30, 1905. John Hays Hammond is the general manager.

Development has been driven vigorously, although it was retarded by an exodus of miners to the new goldfields of Nevada. It included 5,293 ft. of drifts, 416 ft. of crosscuts, 1,169 ft. of raises and 1,287 ft. of diamond-drill holes, and has resulted in the opening of reserves comprising 116,535 tons broken in the stopes and 114,962 tons blocked out, having a total value estimated at $4,850,000. Although these reserves are well in advance of the demand of output, a considerable territory must yet be explored before the mine can be said to be fully developed.

During the year, 71,448 tons of ore were broken, of which 41,312 tons were delivered to the mills and 30,136 tons were left in the stopes. From the reserve broken in the stopes, 36,844 tons were withdrawn, making a total of 78,156 tons delivered to the mills, equivalent to 74,674 tons of dry ore, the recovery from which averaged $31.38 per ton, an increase of $4.14 per ton as compared with the previous year. This increase is due principally to an improvement in the value of the ore developed, a fair portion of which has been stoped.

The 60-stamp mill was running for 357 days, a remarkable record, in view of a break in the electric power line, and a temporary shortage of mill water. The mill crushed 78,156 tons (wet) of ore, 4,131 tons more than in the year before, yielding:

Gold	$2,265,093
Silver	62,506
Lead	15,583
Copper	371
Total	$2,343,553

Of the total gold content of the ore, 93.4% was recovered. Of the total recovery, 79.07% was obtained by amalgamation, 14.96% by concentration and 5.97% by cyanidation. In the cyanide mill, 69,849 tons (dry) of tailing was treated. The cyanide mill ran for 356 days, the value of its gross product being $139,691; the stamp-mill recovery was valued at $2,203,862. The stamp-mill equipment was increased by the addition of ten 1,000-lb. stamps, set on two 14,000-lb. anvil blocks; one Huntington mill; four Frue vanners and a 50-h.p. induction motor; the cyanide mill was also enlarged and its number of vats was increased.

Other construction included a 50-h.p. hoist, inclined skip and all the hoisting equipment for shaft No. 2; four electrically driven pumps, two of which have a capacity of 100 gal. per minute at 600 ft. lift and two rated at 200 gal. per minute with a 1,000-ft. lift; a 5,300-ft. electric transmission line to work at 10,000 volts, including reducers and transformers; an enlargement by 60% of the storage battery; main hoist at shaft No. 1; an 800-gal. bailer, besides numerous underground stations, blacksmiths' and carpenters' outfits, reservoirs and purifiers of domestic water and other structural additions. The total cost of such construction was $79,508.

Working expenses may be averaged as follows, on the basis of 74,674 tons (dry) treated:

	Per Ton.
Mining	$4.73
Tramway	.24
Stamp mill	1.07
Cyanide mill	.65
Shipping and selling	1.20
General	1.67
Depreciation of plant	.60
Acquiring claims and water rights	.16
Total	$10.32

A new arrangement as to royalty has been made with Mr. Walsh; $353,382 was paid to him during the year. An option has been taken on the property of the Imogene Basin Gold Mines Company adjoining the Camp Bird, and development in this ground is to be driven rapidly. If orebodies should be found, the acquisition of that company's territory would be advantageous. The Camp Bird already owns 80,000 shares of the Imogene Company's stock.

The revenue and profit and loss accounts may be condensed as follows, in sterling for totals and in dollars per ton:

	Total.	Per Ton.
Sales of bullion	£395,291	$25.41
Sales of concentrate	70,375	4.52
Sales of slag and matte	700	.04
Increase in stocks	13,626	.88
Miscellaneous	6,573	.42
Total receipts	£486,565	$31.27
Operating and depreciation	£160,526	$10.32
Royalty	73,695	4.74
London office expenses	3,846	.25
Bonuses and income tax	27,175	1.75
Total charges	£265,242	$17.06
Net income	£221,323	$14.21
Balance brought forward	116,118	
Available for dividends	£337,441	

From this balance, three dividends aggregating £92,250 were paid during the year, two more dividends totaling £133,250 were declared on April 30, and the remainder, £111,941 was carried forward.

The company's authorized capital is £1,100,000, of which £820,000 has been issued. In the three years since its incorporation, its gross earnings have totaled $6,242,563, and it profits over operating expenses $4,167,093. In the same time, dividends aggregating £553,500, or 67.5% of its outstanding capital, have been distributed.

Manchester's new dock, 2,700 by 250 ft., has been opened on the canal, 50 miles inland from the mouth of the Mersey. The new dock and its structures are of ferro-concrete construction. A 2,000,000-bushel elevator is being built at its easterly end; it has facilities for handling and storing material.

The American Electrochemical Society.

The sessions of this society, held in the physical laboratory of Lehigh University, at South Bethlehem, Pennsylvania, on September 18, 19 and 20, were characterized by the increasing interest shown in the meetings and by the high standard of the papers presented. Many of the latter were of importance from the point of view of the commercial interests, and show the practical plane upon which many of the latest investigations in electrochemistry are being placed.

The papers read at the first session, on Monday afternoon, followed the introduction, by Dr. J. W. Richards (chairman of the local committee), of President Drinker, of Lehigh University, who, in a short address of welcome, extended the freedom of the university to the members and their guests. Wilder D. Bancroft, president of the society, opened the meeting and presented a paper on "The Chemistry of Electrochemistry"; this was read by title and made the basis of an extended series of experimental demonstrations which brought out many interesting and novel points. The paper was discussed by C. J. Reed (communicated) and by Betts, Carrier, Hering and Richards.

The following paper, on "The Phenomena of Metal Depositing," by Anson G. Betts, was read by the author and discussed by Burgess, Franklin, Bancroft and Richards. Of this paper, together with the discussion, we hope to publish an abstract in a later issue of this JOURNAL.

After the session a reception to the visiting members and guests was tendered by Dr. and Mrs. Joseph W. Richards. The members of the faculty of Lehigh University, assisted by the ladies' reception committee, received. A smoker was given in the house of the Lincoln Republican Club at a later hour, where a "Dutch lunch" was served.

Tuesday morning's session was devoted to papers on "The Use of Aluminum as a Reducing Agent," by O. P. Watts, read by C. F. Burgess; "The New Gin Process for the Electrical Manufacture of Steel," by Gustav Gin, abstracted by Jos. W. Richards, and discussed by Richards, Sadtler, Russel, Smith and Waldo; "Electrolytic versus Sulphuric Parting of Bullion," by F. D. Easterbrooks; and "The Electric Smelting of Zinc," by O. W. Brown and W. F. Osterle, discussed by Richards. The paper on the Gin process, with the resulting discussion, will be published in a future issue of this JOURNAL.

The morning session was followed by lunch, tendered by the trustees of Lehigh University, in the gymnasium. The electrical laboratory was visited immediately after, and the afternoon was spent in visits to the plant of the New Jersey Zinc Company and the Bethlehem Steel Company by the courtesy of Major de Saulles and O. E. Acker, respectively. Tuesday evening a subscription dinner was given at the Eagle Hotel. Dr. Joseph W. Richards was toastmaster, and the toasts given and responded to were: "The Society," President Bancroft; "Lehigh," Prof. Franklin; "Bethlehem," A. G. Rau; "The Steel Works," O. E. Acker; "The New York Contingent," Messrs. Coho and Isakovics. Other members spoke on various topics, and, after adjournment, an owl party continued the proceedings in an informal smoker.

At the concluding session on Wednesday, papers were presented on "A Method of Measuring the Specific Resistance of Electrolytes," by R. Thelfall; "Ammeters for Electrolytic Work," by L. Addicks; and "Thermodynamics of the Electric Incandescent Lamp," by E. F. Roeber. The author of the latter showed the new tantalum and the osmium lamps in operation. Other papers presented at the three sessions were: "Centrifugal Experiments with Colloidal Solutions," by W. S. Franklin and L. A. Fuerdenberger; "Electrolytic Process for Refining Silver," by Anson G. Betts; "Insulating Paints," by Maximilian Toch; "Utilization of Active Oxygen," by R. von Foregger; "Arsenic in Pickling Solutions," by C. F. Burgess; "Electrometallurgy of Antimony," by A. G. Betts; "The Electrochemical Exhibits at the Louisiana Purchase Exposition," by C. F. Burgess; "Reversible and Irreversible Electrolytic Polarization," by Franklin and Fuerdenberger; "Chemical Separation of the Excited Activity of Thorium," by H. Schlundt and R. B. Moore; "Radioactivity of Natural Waters," by the same authors; "The Electrolytic Preparation of Iodoform from Acetone," by G. A. Roush; and "The Electrical Resistivity of Iron and of Steels at High Temperatures," by Gustav Gin.

The afternoon was spent in visits to the Dexter Portland Cement Company's works, at Nazareth, Pa., and to Mauch Chunk, two separate parties being formed for the purpose. Some of the members, however, remained in Bethlehem for the opening exercises of Lehigh University. The next meeting of the society, the annual meeting, is to be held in Ithaca, N. Y., in the spring.

An electrically-driven oil boat, 245 ft. long, 32 ft. broad and rated at 1,100 tons, has been built for the Russian oil trade. She uses three Diesel oil-engines for the production of power, which is transmitted electrically to motors operating the propellers. The engines are placed amidships, and the oil tanks forward and aft. The entire control equipment for the motors is situated in the pilot house, thus doing away with all signalling apparatus to the engine-room.

A fire-cement can be made of 100 parts fire-clay (wet), three parts black oxide manganese, three parts white sand, and a half-part asbestos pulp.

Iron and Steel in Russia.

Through the courtesy of Adolphe Wolski, of the Statistical Department of the Ministry of Finance of the Russian Government, the American Iron & Steel Association has been enabled to compile the official statistics of the production of iron ore, coal, pig iron, steel ingots and castings and steel rails in Russia and Finland for the last 15 years. The figures throughout are in metric tons.

The production of iron ore for this period was as follows:

1890	1,795,663	1898	4,536,217
891	1,958,452	1899	5,890,900
1892	2,044,106	1900	6,112 090
1893	2,310,305	1901	4,723,983
1894	2,524,610	1902	3,987,303
1895	2,986,715	1903	4,218,600
1896	3,321,786	1904	5,272,300
1897	4,102,536		

The maximum production of iron ore in the Russian Empire was reached in 1900, when 6,112,000 metric tons were mined. The next highest years were 1899, when the production amounted to 5,890,900 tons, and 1904, when it amounted to 5,272,300 tons.

The production of pig iron for the 15 years is reported as follows:

1890	927,214	1898	2,243,081
1891	1,005,570	1899	2,727,382
1892	1,072,651	1900	2,296,191
1893	1,147,391	1901	2,869,306
1894	1,348,615	1902	2,597,435
1895	1,453,529	1903	2,486,610
1896	1,607,490	1904	2,978,325
1897	1,881,670		

Although the production of pig iron in the Russian Empire in 1904 was the largest in its history, the industry has made but little progress statistically since 1899, in which year the production was only 250,943 tons less than in 1904. Russia is a large importer of pig iron, her production in some years being only slightly in excess of her annual production of steel ingots and castings.

The output of steel ingots made by all processes was as folows:

1890	278,422	1898	1,621,801
1891	440,212	1899	1,903,000
1892	516,315	1900	2,217,752
1893	633,120	1901	2,230,000
1894	726,017	1902	2,183,400
1895	880,451	1903	2,410,938
1896	1,023,118	1904	2,811,948
1897	1,225,526		

The make of steel rails for the 15 years has been as follows:

1890	166,156	1898	468,787
1891	166,503	1899	464,377
1892	193,338	1900	496,475
1893	230,954	1901	481,918
1894	250,190	1902	382,152
1895	302,428	1903	332,367
1896	398,848	1904	401,541
1897	444,062		

The maximum production of steel rails was in 1900. The rail mills in Russia are largely dependent on Government orders.

The proportion of steel to pig iron is larger than in most other countries. Over two-thirds of the steel now made annually in Russia is produced by the open-hearth process. The production of steel castings by the bessemer and open-hearth processes amounts to from 35,000 tons to 40,000 tons annually. About 2,000 tons of steel ingots and castings are also annually produced by the crucible process. In addition, from 5,000 tons to 6,000 tons

of steel are annually made by various minor processes. The growth of the Russian steel industry from 1899 to 1904 has been steady.

The Merrill Filter-Press Process.

Charles W. Merrill, of Lead, S. D., in U. S. patent No. 798,200, filed Jan. 2, 1904, and issued to him Aug. 29, 1905, indicates (we may infer) the new process of slime treatment, which is to be introduced at the Homestake mill. This process was referred to in this JOURNAL of Aug. 26. It is stated that by its means slime can be treated at a profit, though it assays only 50 cents to $1 per ton.

According to the specification, the invention relates to improvements in processes for removing the semi-solid material from the containers of filter presses; and the primary object is to facilitate and cheapen the removal from its containers of the material which will not pass through the filtering medium.

A secondary object is to permit of the independent introduction of cleansing, precipitating or other material into the containers.

In the operation of filter presses or similar pressure filters it is customary to separate the units of which each press is composed and remove the solid, semi-solid or unfilterable material from the distance frame or container, usually separately by hand. This method is naturally expensive in view of each unit of material so removed, as the wear and tear on the filtering medium covering the filter-plates is heavy, and the time so occupied during which the press cannot be used for filtering greatly reduces its capacity per unit of time. Hence the scope of the ordinary filter press is limited in the separation of solids from liquids to cases where the value of such materials is such as to permit of the expenses outlined above. Furthermore, the necessity of removing the filtered material from each distance frame separately results in the use of deep distance frames in order to increase their separate capacity. Moreover, the resultant thick cake of solid or semi-solid material increases the pressure necessary to accomplish the filtering, and thus adds another factor to the cost of operating said filter presses.

The Merrill process consists in so constructing the containers of a filter press as to permit removing the solid or semi-solid material from the containers without separating the units of the pressure filter. To accomplish this an inlet for each distance frame or container is provided, through which a liquid, vapor or gas is introduced under pressure and the solid, semi-solid or unfilterable content is sluiced or forced out through an exit from the frame. This exit may be an independent outlet, or it may be the opening through which the material to be filtered is originally introduced.

The "Central" Copper Region, Alaska.

According to a report by Walter C. Mendenhall, of the United States Geological Survey, the Copper river valley came into prominence in 1898. Thousands then attempted to enter the valley over Valdez glacier, or by way of the Copper river. The more persistent of these pioneers proved their faith in the country until the discovery of the Nicolai, Bonanza and Elliott Creek copper properties, and of the Chistochina, Nizina and Sunshine goldfields justified their belief in the section.

The region includes portions of three great mountain ranges — the Chugatch range, the Wrangell group and the Alaskan range—all rising from Copper valley, a great central lake-dotted plain. Mount Wrangell, the central cone, is an active volcano. Other peaks about Mount Wrangell are volcanic, but are not now active; Mount Sanford, the highest of them, rises 16,200 ft. above the sea.

The eastern end of the great Alaskan range, which falls within the territory covered by this report, is not impressively high, as altitudes are less than 10,000 ft.; but it is interesting because of the great fault which marks its southern base. The relief of the range is believed to be due to movement along this fault line, uplift to the north of it and subsidence to the south of it. The development of the fault and its apparent connection with the genesis of the Alaskan range have led Mr. Mendenhall to an hypothesis for the origin of the great central valley of the Copper river. This is that a zone of profound displacement marks the southern, as well as the northern, limit of the valley, which is regarded as a great sunken area between two uplifted belts, marked by the Chugatch and the Alaskan ranges. It is conceived, further, that this subsidence may have accompanied the outpouring of the Wrangell lavas, as their escape from beneath the surface and accumulation upon it may have had a relation to the subsidence of the Copper valley.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

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

Week ending Sept. 12, 1905.

799,048. BABBITTING DEVICE. Frank G. Head, Hydepark, Mass., assignor to Frank Ridon Company, Boston, Mass, a corporation.

799,059. MINER'S WASHING-PAN. Josef Johansen, Paramaribo, Dutch Guiana.

799,061. ELECTROLYTIC APPARATUS AND ELECTRODES THEREFOR. Carl Keiner, Hallein, Austria-Hungary.

799,063. ROASTING-FURNACE. Frank Klepetko, New York, N. Y.

799,079. DEVICE FOR CONVEYING AND HOISTING VARIOUS MATERIALS. Nels H. Nelson, Pennock, Minn.

799,101. ORE-FEEDING MECHANISM OF PNEUMATIC STAMP-MILLS. John J. R. Smythe, Johannesburg, Transvaal.

799,105. REVOLVING ELECTRIC FURNACE. Ernesto Stansano, Rome, Italy.

799,149. PRESS FOR THE MANUFACTURE OF FUEL BALLS, BRIQUETTES, ETC. Hubert J. Debauche, Gilly, Belgium.

799,161. GOLD-SAVING MACHINE. Jonas B. Holmes, Los Angeles, Cal., assignor to Holmes-Bowman Dry Placer Mining Co., a corporation of Arizona.

799,170. STEAM-SHOVEL. George W. King, Marion, Ohio, assignor to the Marion Steam Shovel Company, Marion, Ohio, a corporation of Ohio.

799,189. PRODUCING WROUGHT-IRON SPONGE. Dexter Reynolds, Albany, N. Y.

799,200. ABRASIVE COMPOUND. Henry L. Siager, Springfield, Ohio, assignor to The Springfield Tire & Rubber Company, Springfield, Ohio, a corporation of Ohio.

799,235. CLINOMETRICAL GAGE. Andrew M. Johnson, Detroit City, Minn.

799,244. CRUSHING-MILL. Louis B. Lehmann, Dresden-Loebtau, Germany.

799,256. SUCTION-DREDGE. Levin S. Parker, New York, N. Y.

799,269. ROLLING-MILL ROLL. Ambrose Ridd, Newport, Ky., assignor of one-half to Albert Simms, Newport, Ky.

799,317. PROCESS OF PRODUCING GAS. Byron E. Eldred, New York, N. Y., assignor to Eldred Process Company, New York, N. Y., a corporation of New York.

799,376. FEEDER FOR STAMP AND OTHER MILLS. Charles C. Hamill, Barstow, Cal.

799,382. MINING-CAR. Richard R. Hopkins, Oskaloosa, Iowa, assignor of one-half to B. C. Buxton, Buxton, Iowa.

799,441. PROCESS FOR PURIFYING TANTALUM METAL. Werner V. Bolton, Charlottenburg, Germany, assignor to Siemens & Haiske Aktiengesellschaft, Berlin, Germany.

799,470. RETORT. George Ketchum, Cutler, Ga.

799,477. ELEVATOR. Christopher W. Levalley, Milwaukee, Wis.

799,501. WIRE-DRAWING MACHINE. Hugh L. Thompson, Waterbury, Conn.

799,542. PROCESS OF CEMENTING IRON OR STEEL. Charles C. Davis, Germantown, Pa.

799,548. PROCESS OF EXTRACTING GOLD FROM ITS ORES. Friedrich W. Dupré, Leopoldshall, Germany.

799,589. APPARATUS FOR PURIFYING GASES. Hugh Boyd, Thornton, England.

BRITISH PATENTS PUBLISHED
Week ending Aug. 31, 1905.

GREAT BRITAIN.

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

18,922 of 1904. CYANIDE VAT. F. C. Brown, Komata, New Zealand. An improved cyanide vat, in which sands can be agitated by means of compressed air alone without the use of mechanical stirrers.

20,842 of 1904. GRATE-BAR ALLOY. W. G. Crosthwaite, Leeds. An alloy of iron and aluminum for use in making firebars in furnaces, made by adding to 10 tons of pig iron, 2 cwts. of aluminum and 10 cwts. of scrap steel; will not burn away so quick as ordinary cast iron.

21,568 of 1904. ELECTROLYTIC DEPOSITION. T. O. Cowper-Coles, London. A method of electrically depositing a continuous spiral strip of metal on a revolving cathode, suitable for subsequent manufacture into wire.

5,653 of 1905. COAL WASHER. F. H. Emery, Scranton, Pa. An improved coal washer, the improvements being intended chiefly for the better distribution of the material.

6,388 of 1905. BRIQUETTE FURNACE. F. J. Bergendal, Herraeng, Sweden. An improved furnace for burning briquettes made of fine iron ores.

6,693 of 1905. PROCESS OF MAKING CARBIDES. F. Boiling, Frankfort-on-Main, Germany. Producing shaped blocks of carbide of silicon or carbide of boron by first making a block of carbon of the shape required, then covering this block with finely-pulverized carbide of silicon or boron and submitting it to the action of an electric furnace.

7,997 of 1905. SAFETY DEVICE FOR MINE CAGES. J. & W. Shutt, Penkridge. An improved safety device for mine cages.

14,214 of 1905. ELECTRIC FURNACE. F. A. Kjellin, Stockholm, Sweden. An improved method of arranging the electric fittings of electric furnaces, so that they do not get damaged by the heat of the furnace.

Personal.

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

Mr. W. A. Prichard passed through New York this week, on his way to California.

Mr. J. T. Monell has been reporting on some mines in Clear Creek county, Colorado.

Mr. C. A. Wright, of Hancock, president of the Keweenaw Copper Co., is in New York.

Prof. H. A. Wheeler is in Wisconsin, examining some zinc properties for Eastern parties.

Mr. Samuel Newhouse was in Denver last week. He is now residing permanently at Salt Lake City.

Prof. A. E. Seaman, of the Michigan College of Mines, has returned from an extended visit to Alaska.

Prof. Geo. A. Koenig, of the Michigan College of Mines, has returned from a visit to mining properties in Finland.

Mr. Edwin E. Chase has returned to Denver from a professional trip to California, and is at present in Cripple Creek.

Mr. Arthur Thacher, president of the Central Lead Co., has returned to the St. Louis office after a trip to New York and Boston.

Mr. G. M. Hyams, of Boston, has been in the Michigan copper district inspecting the Bigelow mines, with which he is associated.

Prof. H. Foster Bain, of the United States Geological Survey, has been appointed State geologist for the new Illinois Geological Survey.

Mr. C. W. Purington returned to Denver from the San Juan country last week, and left shortly afterward on a three months' trip to Alaska.

After an absence of three months on professional business in Arizona and Mexico, Mr. C. W. Pritchett returned to Denver a few days ago.

Dr. J. K. Leith, of the University of Wisconsin, who has extensive mining interests in the Cobalt region and elsewhere in New Ontario, is in Toronto.

Mr. H. F. Fay, of Boston, president of the Allouez, Centennial and other Lake Superior copper-mining companies, is in that district inspecting his interests.

Mr. J. H. Curle, of London, passed through New York this week, on his way to Nevada. He has just returned from an extended trip in South America.

Mr. W. Murdock Wiley, president of the Mineral Development Co., will leave New York Oct. 5 on a visit of inspection to the company's properties at Guanajuato, Mexico.

Dr. W. B. Dawson, brother of the late Dr. Geo. M. Dawson, who was director of the Geological Survey of Canada, is engaged in making a tidal survey of the Pacific coast of Canada.

Mr. William H. Schramm, of Durango, Mexico, will be for the next three months at San Ramon Canelas, Tarazula, experimenting with the cyanide process, for Mr. V. Brandis, of Durango.

Mr. Gordon R. Campbell, of Calumet, Mich., secretary of the Calumet & Arizona Mining Co. and associated companies, at Bisbee, Arizona, was in Pittsburg on business last week.

Mr. Harry H. Armstead, Jr., manager of the Silver Fissure property, at Polaris, Beaverhead county, Montana, has gone to Denver to superintend the shipment of machinery for a smelter for the mine.

Mr. Archie B. Lamb, of Shenandoah, Pa., has been appointed district mine inspector, to succeed William Stein, whose term has expired. The appointment holds only until the election next November.

Mr. John B. Lack, paymaster of the North End Coal Co., in Scranton, Pa., was stricken with paralysis last week while at work. He has been for 32 years connected with different coal companies.

Mr. W. H. Aldridge, chief of the Canadian Pacific Railway mining and metallurgical department, has returned from a trip to England, and is spending a few days in eastern Canada before proceeding West.

Mr. Grant Raub has been appointed outside foreman of the Alaska colliery at Pottsville in the place of J. W. Morrison, who has been appointed outside superintendent of the Minersville district of the Reading company.

Mr. J. H. Plummer, president of the Dominion Iron & Steel Co., of Sydney, N. S., who recently recovered from a serious illness, has obtained six months' leave of absence from the directors and will go abroad to recuperate.

Dr. Robert Bell, acting director of the Canadian Geological Survey Department, passed through Vancouver recently on his way north. He took steamer to Skagway and it is understood that his destination is Dawson, Yukon Territory.

Mr. Walter G. Perkins, late superintendent of the Northport smelter, in British Columbia, is now superintendent of the Nevada Consolidated smelter at Ely, Nevada, with headquarters at 604 Montgomery street, San Francisco, California.

Mr. John J. Case, formerly superintendent of the Great Falls smelter, now identified with the McCune-Haggin interests in Cerro de Pasco, Peru, is visiting Montana for the purpose of securing smeltermen for the Cerro de Pasco plant.

Mr. J. L. Parker, mine superintendent for the Alaska Smelting & Refining Co., and Mr. Paul Johnson, smelter superintendent, both of Hadley, Alaska, lately met the president of the company, Mr. D. B. Brown, of New York, in Seattle, Washington.

Mr. R. W. Brock, who has been engaged for several months in making a structural geological survey of Rossland camp, will shortly return to Ottawa, preliminary to resuming his duties at Kingston, Ontario, as professor of mining in the School of Mines there.

Mr. James Jopling, chief engineer of the Cleveland-Cliffs Iron Co., Ishpeming, Mich., has left for New York, from which port he will start for a five months' trip of inspection to the various mining districts of Europe to obtain information regarding methods of underground operations.

Mr. J. Cuthbert Welch, who resigned the superintendency of the Montreal & Boston Consolidated Co.'s smelter, at Boundary Falls, B. C., has been appointed general superinendent of the Alaska Copper Co., which lately commenced operating a smelter at Coppermount, Prince of Wales Island, Alaska.

At a special meeting of the board of directors of the Calumet & Arizona Mining Co., held in Calumet, Mich., Captain Thomas Hoatson was elected second vice-president. Samuel A. Parnall, formerly superintendent, was appointed general manager of the Bonanza Circle group of properties at Bisbee, Arizona.

Mr. John B. Hobson, manager for the Consolidated Cariboo Hydraulic Mining Co., left British Columbia early in September to proceed to Toronto, to meet the directors of his company, and to go thence to New York, where several well-known men are considering the purchase of the company's hydraulic mines at Bullion, in the Cariboo country.

Prof. Robert H. Richards, professor of mining engineering and metallurgy at the Massachusetts Institute of Technology at Boston, and government expert on the black-sand concentration experiments in progress at the Lewis and Clark Exposition, Portland, Oregon, is in British Columbia. It is stated that his visit is at the request of the Dominion government for the purpose of making an examination of black sands occurring in places on the British Columbian coast.

Governor Warner has appointed the following delegates from Michigan to the American Mining Congress, to be held at El Paso, November 14: James MacNaughton, Calumet; James Chynoweth, Calumet; Fred. Smith, Kearsarge; Norman W. Haire, Houghton; Frank McM. Stanton, Atlantic; F. W. Denton, Painesdale; John L. Harris, Hancock; M. M. Duncan, Ishpeming; W. H. Johnson, Ishpeming; O. C. Davidson, Iron Mountain; William Kelley, Vulcan; W. J. Richards, Crystal Falls; J. H. McLean, Ironwood; H. F. Ellard, Ironwood; George B. Morley, Saginaw; E. B. Foos, Bay City.

Obituary.

William H. Foster, of Edgewood, Pa., died suddenly at Atlantic City, N. J., recently. He has been identified with Pittsburg coal interests for 25 years, being connected with the W. L. Scott Co., at its Scott Haven mines for years; more recently he has been superintendent of the Turtle Creek mines of the New York & Cleveland Gas Coal Company.

W. O. Williams died at Dallas, Pa., on Sept. 14, aged sixty-five years. He had charge of coal operations under the Delaware, Lackawanna & Western railroad for thirty years, and for the past seven years was superintendent of the East Boston collieries for W. G. Payne & Co. Mr. Williams came to America from Wales when he was seventeen years old.

Robert M. Haseltine died at his home in Columbus, Ohio, Sept. 12. He was for a number of years connected with coal mining operations in Ohio, and was best known through his long service of twelve years as State inspector of mines—an office which he held under four administrations. Since his retirement, a little over a year ago, he had practiced as a consulting engineer, with office at Columbus. He was thoroughly familiar with Ohio coal mines and mining.

Jacob North, who died at Pittsfield, Mass., Sept 15, was born in Leicester, England, in 1812, and came to this country in 1843. He opened a copper mine at Flemington, N. J. In 1862 he was engaged by Robert Pomeroy, of Pittsfield, Mass., to open iron mines in Richmond and Stockbridge, Mass. Later he was manager of the Colby Iron Works at Lanesboro. His name was prominently associated with the development of the New England iron-mining industry, of which much was expected, but which failed in competition with the more extensive fields of the Lake Superior region.

Trade Catalogues.

The Nernst Lamp Co., Pittsburg, Pa., issues the August number of the *Nernst Central Station Bulletin.*

"The Western Electrical Directory" for 1905 has just been issued. It is published by the Blanchfield Publishing Co., Rialto Building, San Francisco, California.

The Union Elevator & Machine Co., Chicago, Ill., is sending out leaflets describing the articles of its manufacture, including hand and power elevators, sewer pumps, etc.

The Sprague Electric Co., New York, sends us its bulletin on "Type N Motors." These are especially designed for crane service, and are of the enclosed dust-proof type.

The Wagner Electric Manufacturing Co., St. Louis, Mo., hands us its catalogue of "Transformers; Their Operation and Construction.' It is of standard size and well illustrated.

Three flyers, entitled "Horizontal Refrigerating Machines," "Ammonia Fittings" and "Dry Air for Blast-Furnaces," are being sent out by the De La Vergne Refrigerating Machine Co., New York city.

Circular No. 1108, of the Westinghouse Electric & Manufacturing Co., is received. It describes Westinghouse regulating and reversing controllers, and is of the same odd size used for other bulletins by this company.

The Sullivan Machinery Co., Chicago, Ill., has just issued its bulletin No. 48-E, describing its automatic cross-over dumps. The half-tones and dimension drawings are good. The size is standard, and the make-up uniformly good.

The Robins Conveying Belt Co., New York, sends us its bulletin No. 12, entitled "Hoisting and Conveying Machinery for Power Stations." It is of standard size, well illustrated and the descriptive matter clear and well writen.

The Crane Co., Chicago, Ill., sends us seven advance circulars and two copies of the *Valve World.* They are published in such size that they are too inconvenient to be preserved. The difficulty of handling them detracts a great deal from their otherwise excellent make-up.

Industrial.

The Beaver Metallurgical Co. has just completed the installation of a large plant at Beaver Falls, Pa., for the manufacture of chemical and metallurgical products, especially those of the rare metals. For the present the company will devote itself only to the production of metallic tungsten, ferro-tungsten and other tungsten alloys and compounds.

El Paso Consolidated Gold Mining Co., Cripple Creek, Colo., is installing a Jeanesville Iron Works triple-expansion station pump 1,000 ft. below the surface; capacity, 2,000 gal. per minute. The pump is fitted with Corliss valve motion; the steam cylinders are lagged with Russia iron, and provided with steam separators and power lubricators.

The Allis-Chalmers Co. has shipped to San Francisco a consignment stock of Gates rock and ore breakers of various styles and sizes, together with standard repair parts which may be required for Gates breakers which that company has already installed in various plants in California and neighboring States. This is done in order that customers may be able to secure prompt delivery of repair parts for their machines. The company's San Francisco offices are located in the Rialto Building.

The contract for the plant of the Raymond Consolidated Mines Co., 4 miles from Ohio City, Colo., has been let to the Colorado Iron Works Co., of Denver, Colo. The equipment consists of twenty 1,050-lb. stamps, chrome steel being used exclusively in all the mill parts; the amalgamating plates are 12 ft. long, in two sections; the pulp, after leaving the plates, is concentrated on tables and the slimes handled by Roberts slimers; the concentrates will be dried before shipment. The mill will have a capacity of about 100 tons per day. Power is supplied by a 150-h.p. high-speed Skinner engine. The Colorado Iron Works Co. will erect the complete plant, the mill building being erected in accordance with the best modern practice of heavy construction.

Ex-Governor William A. Stone, Niven McConnell, formerly of the Carnegie Steel Co., and George A. Lee, of the Philadelphia Transit Finance Co., as representatives of Pennsylvania interests, have secured the controlling interest in the Passaic Steel Co., of Paterson, N. J. They will proceed at once to remodel the works and to reorganize its finances. It has been decided to issue $1,000,000 in bonds, half of which is to pay off present indebtedness and the balance to pay for improvements and additions to the plant. Mr. McConnell, president of the company, was formerly superintendent of the Donora plant of the Carnegie Steel Co. and general superintendent of the Sharon Steel Co. Several large contracts for mill and furnace machinery have been or soon will be awarded.

The J. Geo. Leyner Engineering Works Co., of Denver, reports air-compressor sales as follows: Asiatic Tunnel & Mining Co. (Colo.) two 10-drill compressors; Waldorf Mining & Milling Co. (Colo.), two eight-drill compressors (electric driven); American Smelting & Refining Co. (Utah), cross-compound; Southwestern Brokerage & Investment Co. (Colo.), complete plant with tandem compound, 10-drill compressor; F. C. Miller (Mont.), belt-driven compressor; Denver Gas & Electric Co. (Colo.), tandem compound; Prescott Engineering Works (Ariz.), duplex; Denver & Rio Grande Railway Co. (Colo., 1; Utah, 1), two steam-actuated, two-stage, of 1,000 cu. ft. capacity each; Mountain Copper Co. (Cal.), belt-driven, four-drill; United States Reclamation Service, tandem compound; Imperial Japanese Government, electric-driven; Kansas City Southern Railway (La.), steam, straight-line; Blue Flag Mining Co. (Colo.), eight-drill, steam-actuated; Denver Iron & Wire Works Co. (Colo.), electric-driven; Consolidada de Construcciones Metalicos (Mex.), electric-driven; Newark Mining & Milling Co. (Nev.), two-drill, steam; Centennial Coal Co. (Colo.), two-stage, steam. The same company reports its new factory completed and machinery now being installed by degrees without interference with its production.

Construction News.

Boise, Idaho.—The Equitable Mining Co. is planning reduction works for its Red Jacket mine.

Jarilla, New Mexico.—The St. Louis Copper Co. is arranging to equip its mine with electric hoist and drills.

Leesburg, Idaho.—R. E. Rex, of the Gold Dust mines, is letting contracts for the new plant to be installed near this place.

Uniontown, Pennsylvania.—The Bessemer Coal & Coke Co. will erect at its Margin works at Jacob's Creek 50 new coke ovens.

Patagonia, Arizona.—A mill of 50-ton daily capacity is to be erected at the Gringo mine. R. E. Doan, Los Angeles, Cal., is owner.

Pearl, Idaho.—The Blue Jacket Mining Co. will soon equip its property with an electric plant. G. W. E. Dorsey, of Boise. Idaho, is manager.

Tolland, Colorado.—It is expected that the Golden Sun Mining & Milling Co. will instal an air compressor and drills. E. T. Butler is manager.

Pottsville, Pennsylvania.—The Pine Hill breaker, recently destroyed by fire, is to be replaced by the erection of a larger and more modern plant.

Republic, Washington.—H. R. Case, of the California mine in this district, is in the East, making preparations for installing new machinery in that mine.

Vivian, Arizona.—The Vivian Mining Co. proposes to put in a hoisting plant, air compressor and drills. Col. Thomas Ewing, Los Angeles, Cal., is manager.

Empire, Colorado.—Denver parties have bought the Red Elephant mine, and are arranging to put up a milling plant and hoist. G. B. Sinclair, Empire, Colo., is manager.

Redstone, Pennsylvania.—The Colonial Coke Co., a subsidiary corporation of the Pittsburg Coal Co., has asked bids for the immediate erection of 100 coke-ovens at this place.

Guadalajara, Jalisco, Mexico.—A new company, known as the San Francisco Mining Co., has been incorporated to operate in the Autlan district, this State. L. E. Fuller, of Chicago, is president.

Bucyrus, Ohio.—The Bucyrus Steel Casting Co. is to begin work upon its new plant. New machinery will be installed and other improvements made. W. A. Blicke is secretary and treasurer.

Oak Harbor, Ohio.—It is reported that gypsum has been discovered in paying quantities in Ottawa county, and that a plant will be built to handle the material, producing plaster and hard wall plaster.

Cleveland, Ohio.—The National Refining Co. of this place is investigating the Chanute, Kansas, oilfield, with a view to erecting its new refinery in that immediate district. Julius Lamprecht is president.

Sault Ste. Marie, Michigan.—The Pittsburg Coal Co. will build a new dock at this place for the purpose of coaling the Lake boats of the Steel Corporation, which it is expected that this company will have under contract.

Idaho Springs, Colorado. — George Stroehle & Sons will build a machine shop, 100 by 75 ft., and will instal a 10-ton electric crane for handling machinery, intending to turn out boilers, ore buckets and cars, etc.

Chicago, Illinois.—The United States Steel Corporation announces under date of Aug. 30 that it will build seven additional open-hearth furnaces and an additional blast-furnace for the plant of the Illinois Steel Co. at South Chicago.

Needles, Arizona.—The Arizona-Mexican Mining & Smelting Co. will make changes in the Fletcher Smelting Co.'s plant, which has been transferred to it, and will also instal new machinery. L. D. Godshall is managing director.

Belle Isle, Newfoundland.—R. E. Harris, president of the Nova Scotia Steel Co., recently purchased in Newfoundland the submarine ore deposits on the shore of Belle Isle. Development work will be carried out upon the newly acquired deposits.

Washington, District of Columbia.—The Benedictine Mining & Milling Co., Consolidated, with headquarters at this place, is acquiring mining properties in the States of Durango, Sinaloa, and Chihuahua, Mexico, which it intends to develop in the immediate future.

Richfield, Piute county, Utah.—The Gold Development Co., M. F. Murray, manager, has made the statement that this corporation will be in the market in the spring for mill equipment. Ore similar in character to that of the Annie Laurie mine at Kimberly was recently encountered.

Ishpeming, Michigan.—The Lake mine, of the Cleveland Cliffs Iron Co., at this place is to be electrically equipped. Contracts for 5 locomotives and a 105-kw. generator have already been let, but further electrical contracts are ready for estimate at present, and will probably be let in the immediate future.

Philadelphia, Pennsylvania.—The Piedmont Mining & Metallurgical Corporation will soon be in the market for boilers, steam hoists, sinking pumps, drilling, cyaniding and concentrating machinery. It will possibly build a smelter. E. W. Siegmann, 1136 Columbia avenue, Philadelphia, is interested.

Rollinsville, Colorado.—The Penobscot Mining & Milling Co. is figuring on the erection of a concentrating plant. P. J. Hamble is manager.

Hawn, Stevenson & Co. are considering the erection of a 10-stamp mill, with amalgamators and a concentrator at the Smuggler mine, in Moon gulch.

West Gore, Hants County, Nova Scotia.—John McArthur, of Glasgow, Scotland, has been awarded a contract for the construction of the new plant of the Dominion Antimony Co., at this place. Work will not be started until the return of Mr. McArthur from Scotland, and further contracts are to be let at that time.

Marquette, Michigan.—A new dock is to be built at this place for the Duluth, South Shore & Atlantic railroad, and a similar structure is to be erected at North Escanaba by the Chicago, Milwaukee & St. Paul Railway Co. Both docks are required on account of the constantly increasing ore traffic, for which the present equipment is insufficient.

South Chicago, Illinois. — Pickands, Brown & Co., of Chicago, and Pickands, Mather & Co., of Cleveland, are reported to intend organizing a corporation for the purpose of building a new furnace plant at this place. William L. Brown is expected to become president of the company. The plant will be of the most modern type and is to have a capacity of 300 to 350 tons per day.

Hudson, New York.—The Hudson Iron Co., of this place, has leased the mining property of the Poughkeepsie Iron Ore Co., at Forest of Dean, near Fort Montgomery. This is the project regarding which so much has been said in the local papers, and it is for this property that a tramway was recently projected. It is expected that the new owners will extend the present development work into the new property.

Ensley, Alabama.—It is reported that the Tennessee Coal, Iron & Railroad Co. will soon begin construction of its proposed new furnace referred to in a former issue of this JOURNAL. A capacity of 400 tons daily is contemplated, and furnace No. 5 is now being dismantled to provide room for the new construction work. The general offices of the company are at Birmingham, Ala., and the New York office at 100 Broadway.

Tonopah, Nevada.—The New Western Ore Purchasing Co.'s sampler at Miller's Well, on the Tonopah railroad, 13 miles from this place, is to be connected with the town of Liberty by a narrow-gauge railroad. The road may be extended past the Nevada-Alpine mine at Lone Mountain to Silver Peak. Liberty is 20 miles north of this place; three shipping mines being located there. It is also probable that the Robert E. Lee in the same district will be re-opened.

Special Correspondence.

San Francisco. Sept. 20.

James O'Brien, of Smartsville, Yuba county, and J. E. Ebert have agreed to sell to Frank Weston, of San Francisco, about 1,000 acres of dredging land in Linda township, Yuba county, adjoining the property of the Marysville Gold Dredging Co., the agreed price being $375 per acre. In this connection it may be stated that James O'Brien was formerly a prosperous hydraulic miner of Smartsville, but had to quit that work when that class of mining was prohibited by law in that vicinity. Along the Yuba river below Smartsville the mining debris covered large tracts of land which were rendered useless thereby. The occupants finally moved away altogether. O'Brien bought large tracts of this land subsequently, for about 50c. an acre, thinking that in time vegetation would come and the ground could be used for pasture. Since then the gold dredge has come into vogue and it has been found that the lands are valuable enough to be worked by these machines, which were not thought of at that time. O'Brien is now selling tracts of land along the river for from $300 to $400 per acre. This last 1,000 acres alone brings in a sum of $375,000.

In the same vicinity O'Brien, Ebert, J. A. McKenna and F. Weston have signed an agreement to sell another 240 acres for $375 per acre. Another 1,000 acres near by, owned by the J. G. Cohn estate, has been bonded by Sacramento men for about $200,000. All the land is to be prospected at once. The land across the Yuba river from Marysville has not been used for years, except for the wood it produces. Eight miles east of Marysville, on the south side of the river, the Marysville Gold Dredging Co. has selected a site for a new town, which will be drained and sewered, have water and electricity, etc., and here the men employed on the company's dredges will live, with their families. The repair shops will be erected in the new town.

The new Risdon dredge erected by a Boston company on Yreka creek, Siskiyou county, has been started up with electric power. This is the second dredge erected at this point, the first one, of the scoop type, having proven a failure.

A custom cyanide plant is being installed on Humbug creek, Siskiyou county, which will prove of great advantage to numerous small quartz operators in that vicinity. There are a great many quartz mines worked in a small way by their owners who send their ores to custom mills, but a custom cyanide plant is rather a novelty.

L. W. Kevane has sued H. W. Miller, Dan Kevane, J. A. Sheehan, J. H. Arnold and A. Teichert, directors of the San Andreas Gold Channel Mining Co., of Calaveras county, for damages in the sum of $1,000 alleged to have been caused by the neglect and failure of the defendants to have the reports and accounts current and balance sheet made and posted as required by law. He avers that he is a stockholder in this company, and that because of the lack of necessary information he has been damaged to the extent named. The same plaintiff has also sued the same defendants to restrain them from declaring the same mining company insolvent, and the court has granted a temporary restraining order to prevent the directors passing a resolution declaring the corporation bankrupt, until a showing is made in court to justify such action. Kevane, the petitioner, who is a stockholder, declares the company is solvent. It is asserted by one of the attorneys of the plaintiff that the mining property is worth $75,000, while it owes but $8,000. It is alleged in the complaint against the parties named that Miller is trying to freeze out the other stockholders and get possession of the mine. Miller is the president of the company. Kevane, Sheehan and James Flanagan own the majority of the stock in the mine. Flanagan recently resigned from the directory.

It is reported that the Tonopah Mining Co., of Tonopah, Nev., has bonded the Pittsburg and Liberty mines in Masonic district (Bridgeport P. O.) Mono county, California. The Pittsburg group is a promising one. The bond is for two years and the company is to do at least $2,000 worth of work monthly. The Liberty is being worked by lessees at present, but no more leases will now be granted unless by the Tonopah company. Masonic district is not like some of the Mono districts, for it is at all seasons accessible and the snowfall is light.

It is predicted now that the boom of Tonopah, Goldfield and Bullfrog districts will soon be shifted down toward the Panamint section, Inyo county, California. There is a strong movement in favor of the latter section. The Panamint is not a new mining country, by any means, since it is one of the oldest though least known in the State. Reports received from there lately indicate that the story of the newer Nevada camps is being duplicated. If these reports contain any truth, the opening up of the newest boom of all is assured in a short time. The Panamint range is located near the California-Nevada State line in Inyo county, this State. Several parties of capitalists and mining engineers are at present investigating the possibilities of the district.

The miners around Randsburg, Kern county, have commenced shipping tungsten ore from the new discoveries in that section. Two carloads of the ore were shipped last week, one going to Philadelphia and the other to Germany, *via* San Francisco. The ore shipped was selected and of a high grade. There is no local market for it.

Glass sand is in demand in California these days, and the citizens of Marysville are about to utilize the sands of the Yuba river for this purpose. An analysis made for the Marysville Chamber of Commerce shows it to contain: Silica, 97.13; iron oxide, 0.61; alumina, 1.55; lime, magnesia, gold and silver, 0.37. Efforts are being made to interest glass manufacturers in this sand, for it is claimed to be of excellent quality. It is also good for the manufacture of cement or lime-brick. The sand is available in unlimited quantities. The Yuba at this point is filled with débris from the old hydraulic-mining operations, but nobody supposed until this time that these tailings would ever be utilized.

Most of the sand used for glass manufacture in California comes from the sand ranches owned by the Pacific Improvement Co., on the shores of Monterey bay. Some few shiploads are imported annually from Holland.

Fire has destroyed, in Shasta county, the central cable station and the central spur, together with several ore-cars of the Reid mine, which is now under bond to Hunt & Sallee. Ore-bins, ready to be filled with ore for shipment to the smelter at Kennett, were burned. The heavy cable spanning the Sacramento river fell into the stream, cutting off all means of transportation. The mines affected are the Walker, Eastern Star, Central and the Reid and Handy. Some had already commenced to ship fluxing ore to Kennett, preparatory to the blowing in of the Mammoth smelter. All would soon have been shipping. The Mammoth smelter had placed its first orders with the mines of the district. It will now have to look for a time to the mines which can ship from Middle Creek, Keswick and Copley, in the same county.

Goldfield, Nev. Sept. 13.

Goldfield is now in direct communication by railroad with the Southern Pacific system at Reno. Both freight and passenger trains are running daily between Reno and Goldfield by way of Tonopah. There is a good deal of traffic, and the directors of the Tonopah Railroad Co., owners of the road, are so well pleased with the prospects, that, it is reported, they have decided to extend the line to Bullfrog at an early date.

Negotiations have been in progress for some time between New York capitalists and the owners of several mines at Goldfield with a view to the formation of a large mining combine. It is reported that matters are so far advanced that control of the Florence, Jumbo, Combination, Atalanta, and Red Top mines has been secured. The names of the promoters have not been divulged; but it is believed that Chas. M. Schwab, and Pittsburg associates, who have long held interests in some of the mines, are the chief movers.

The mines have large bodies of low-grade ore developed; and if they were combined and placed under one management, working expenses could be materially reduced. At the present time the lessees in the Florence are taking out ore as fast as possible. Their leases expire on Nov. 1, and they are on a body of good ore.

Much activity prevails in the Bullfrog district. Development operations are progressing in all directions. The leading mines are looking well and reports of new strikes are of daily occurrence. A feature of interest is the recent discovery of a thin streak of mineral matter showing tellurium in the Bullfrog Extension mine. Tellurides have been found in ore from other mines at Bullfrog and Goldfield; and some mine-owners believe the tellurides to be good indicators regarding the permanence of the orebodies in both fields.

Bisbee. Sept. 20.

At the Shattuck-Arizona mine the shaft now rests at 830 ft., and the conclusion of the management is that more depth must be attained before the best results are possible. A drift was started at the 800 a week ago, and is now in about 35 ft. It is expected to cut the same ore that was struck in the shaft at 525 ft. and in the 700 level, 70 ft. from the shaft, at about 150 ft. in. The shaft will be sunk another lift as soon as this ore is found.

The Houghton Development Co. has finally abandoned its property on Gold Hill, and definitely thrown up the sponge. This was the prospect in which Dr. Hubbard, of Houghton, Mich., was heavily interested. Copper Queen mines are now producing about 1,800 tons of ore daily. In October this tonnage will be increased.

Water in the Junction workings is steadily increasing, and the mine is now throwing 2,900 gal. a minute. This is the result of increased lateral workings, and is draining the camp, even cutting off much of the water that had been going up the Briggs shaft. As soon as Briggs shaft reaches 128 ft. it will be at the same level and the water flow will be more equalized. Junction is getting a lot of 20% carbonate ore in the north drift on the 900-ft. level, and is finding ore all around the shaft. One of its drifts is now entering Calumet & Pittsburg ground, and is in ore. The Junction Development Co. has ceased to exist, and is succeeded by the Junction Mining Co., with a capital of $2,500,000 and about $1,000,000 cash on hand.

The new Cochise Development Co. has ordered a hoist capable of sinking to 1,000 ft. and has something like $380,000 on hand to begin work with. Its lands lie east of the Holbrook claims of the Copper Queen, and mining from Holbrook shaft has been carried near the line. The Cochise is that old concern, the Copper King, under new and presumably better management, and there are those here who think it can make a mine.

The Arizona Smelting Co., which is completing its 600-ton smelter in Yavapai county, is soliciting ores, and is buying the old silver-copper dumps of the Kelvin region. The smelter will be an important factor in the district, and will aid small miners in disposing of their product.

Assays from the Arizpe "lost mine," south of here, have been made in the offices of local chemists, and show high values in gold, silver, copper and lead. The mine is almost entirely owned by Bisbee parties.

Warren Development Co., largely owned by the Cole group, Minnesota capitalists, is adding claims to its already large holdings and now has the largest area of possibly mineralized ground in the district, aside from the Copper Queen. It has had trouble in securing title to some of the ground it bargained for, and is not announcing any plans till all these matters are settled. Hoval A. Smith, manager of the company, has just returned from Duluth, Minn., where he went to confer with the large owners of the company.

American Development, lying close to Junction and Denn, is about to explore its ground by diamond drill, to determine the probability of mineralized ground. If this work is successful it will sink a shaft.

Butte. Sept. 19.

The Silver Fissure Co., operating in Beaverhead county, has let a contract to a Denver firm to supply it with a 100-ton smelter, which is to be placed on the Polaris silver mine. The company has been developing the property about a year and has opened up a body of high-grade ore on the 600 level. The vein extends to the surface, but is not so rich above the 600. The development consists of a 2,000-ft. tunnel and a shaft 700 ft. deep, which connects with the tunnel. The property is being managed by H. H. Armistead, Jr., who has gone to Denver to look after the shipping of the machinery for the plant. It is the intention to have the plant at the mine before the snow becomes too deep for wagon-road work. The stock of the company is held by four persons, John MacGinniss, mayor of Butte, and Mr. Armistead being two of them.

The North Butte Co. has bought the Hancock, a fractional claim near its other mines, and is negotiating for the purchase of others required in its operations. The company is still engaged in the work of re-timbering its main shaft and will not complete the job for at least six weeks. In the meantime the ore is being raised through the shaft of the High Ore, an Amalgamated mine.

The Mountain View, owned by Boston & Montana, is yielding 20,000 tons of ore per month, and it is all being raised through the shaft on the property.

Owing to a shortage of electric power, the result of low water in the Missouri river, whence the mines of Butte are supplied, Amalgamated has been compelled to return to the use of steam at its mines temporarily. The company has been operating its air-compressors and pumps with power furnished by the Missouri River Power Co., taking 1,700 h.p. The change has been in progress several days, the first mine being put on steam Sunday. United Copper is also short on electric power, but has not been using much. The shortage is not interfering with the operation of the mines of either company.

Fair progress is being made in the work of equipping the Lexington mine with machinery, preparatory to unwatering the workings of the mine. While this job is going on, Heinze, who holds the property on an assigned option, is extracting ore from a stringer which lies beside the main vein between the surface and water. This ore carries copper, zinc, lead and a little gold. The vein is yielding about 40 tons of ore per day, and while it is of fair quality, it is not above the average of other ores of the Butte district. The Lexington has been opened to a depth of about 1,500 ft., and contains miles of crosscuts, stopes and levels, all of which, up to the 550-ft. station, are full of water. No copper ore has been found in the bottom.

Salt Lake City. Sept. 21.

At the annual meeting of stockholders of the New York Bonanza Mining Co. the old board of directors was re-elected. The financial statement shows receipts from ore sales, $27,401; assessments, $9,015; other sources, $500. The year closed with a deficit of $2,699, which will be practically wiped out by the proceeds of ore now in transit. A large amount of development work has been done during the year. M. J. McGill, of Park City, is president of the company. Park City is also the location of the mine.

The directors of the Lost Packer Mining Co., operating in the Loon Creek, Ida., district, have closed a deal for the purchase of 78,000 out of 100,000 shares of stock of the Omega Mining Co., thus giving them control of about 400 acres of adjoining territory.

A syndicate of well-known Salt Lake mining men has formed a company to operate the Chiquita group of mining claims in the Good Springs, Nevada, district. The president of the company is R. W. Nicol, of Salt Lake. About 600 ft. of development work has been performed on the property. A tunnel is to be run and it is expected shipments will be inaugurated soon. The adit will tap the orebodies at a depth of 300 ft. below the present lowest workings.

The ore and bullion settlements reported by Salt Lake banks during the past week amounted to the sum of $405,700.

On account of the suit pending in the courts, in which Col. E. A. Wall, of Salt Lake, is the plaintiff and the Utah Copper Co. and its other officers are defendants, the campaign of construction which was to have been inaugurated has been brought to a standstill. Until the courts dispose of the matter the company will be content with its present facilities for ore reduction.

The American Smelting & Refining Co.'s copper plant, at Garfield, is beginning to take form. The raising of the first steel for the permanent buildings was commenced during the present week. About 500 men are on the payrolls at the site of the new plant at the present time.

Denver. Sept. 22.

The State Land Board has had a survey made of the tract of land in Grand county, on which deposits of gilsonite were discovered last year. Last winter the American Asphaltum Co. and H. C. Webb had a contest over the same. The survey has shown that the land is Government property, and that the State has no title to it.

Judge Northcutt, of Trinidad, handed down an important decision a few days ago, which, if it stands, will affect a number of suits pending at different points. The Victor Fuel Co. claimed a large amount of damages from the United Mine Workers of America, John Mitchell, its president, and a number of officers of the organiation, in consequence of the long strike in the coal districts. The court holds that the organization is a voluntary one and that, while its officers may be sued, the corporation cannot.

After deliberating a whole night, the jury in the case of Decker vs. Hanchett returned a verdict, awarding the plaintiff $89 compensating damages and $100 punitive damages. Eleven more cases are pending against members of the Citizens' Alliance at Idaho Springs, who took part in the deportation of the union miners two years ago.

The opening of the Moffat road to Hot Sulphur Springs, in Middle Park, took place a few days ago and the event was celebrated by a large excursion under the auspices of the Chamber of Commerce of this city. A large force has been set to work, and it is hoped to complete the line to Yampah, in Routt county, by January.

A few years ago a syndicate secured the only feasible grade from the main line of the Union Pacific railroad into the Grand Encampment district, and about 30 miles of grading was done. They organized under the name of the Laramie, Hahn's Peak & Pacific Railroad Co. It is now stated that the Union Pacific will construct the line from Laramie, through the Centennial valley, across the range into the Saratoga valley.

Near the mouth of Platte cañon, only a little over 20 miles from this city, a large deposit of lignite coal has been discovered and the Platte Cañon Fuel & Power Co. has been organized to develop the same, which is located on State land. The present plan is to build a monorail road to connect the mine with the Colorado & Southern railroad and to have an output of about 900 tons daily.

Invitations have been issued by the trustees of the State School of Mines for the laying of the cornerstone of Guggenheim Hall on Monday, Oct. 2, under the auspices of the Grand Lodge of Masons. Among the speakers will be the Governor, Congressman Bonynge, and Simon Guggenheim.

Our engineers and machinery houses are kept busy lately with the beginning of a number of cyanide plants for the Black Hills.

The official investigation by direction of the Mexican government, with the object of determining to what extent the American Smelting & Refining Co. is interested in the smelting industry in that Republic, shows that that organization by no means controls the same, as its own and allied smelters in Mexico have a capacity of about 4,000 tons daily, while that of the independent smelters is 14,500 tons, more than three times as large. There are about 50 independent smelters located in Mexico, 36 of which have a capacity of only 25 to 250 tons per day.

Leadville. Sept. 20.

There is considerable activity on the eastern end of Fryer hill, but the same cannot be said of the western end, as little or no work is being done at this point. From the properties controlled by the Fryer Hill Mines Co. quite a quantity of ore is being shipped, both sulphides and silicious ores; from the Chrysolite, Dunkin No. 3, Little Chief, Matchless and others a good tonnage of iron is being sent out by the different lessees.

The upper part of Breece hill still continues to be the great attraction for capital, and during the week Silver Nugget, a full claim, has been secured by parties from the West and work will start at once. The claim adjoins the Garbutt, and is near the Jonny, and a shaft will be sunk 700 ft.; the surface work is being done now, and whenever the machinery is installed sinking will start. Several years ago the Garbutt produced considerable high-grade ore, and it is expected that the same shoot will be caught in the Nugget.

The Croppy Boy group of claims, California mining district, has been sold to Pueblo parties, who will start work at once. A tunnel will be driven from the gulch, striking the claims at considerable depth. Ore found on the surface ran high in gold.

Extensive work is being carried on in South Evans gulch, and the results are highly encouraging. From the Brattleboro 800 tons per month are being sent out. All of this ore was found in the quartzite and is still being worked, but the dolomite lime has been prospected with good results, as a fair body of ore has been opened, and promises to widen out with further development work. At No. 1 shaft of the Ollie Reed, from the 300- and 400-ft. levels a fair quantity of good ore is being shipped daily, while at No. 2 shaft at the 350-ft. level prospect work with the diamond drill is being carried on. At the 200-ft. level of the Nevada a small streak of rich ore has been encountered and is being followed with the hopes that it will lead to the main body of ore. From the Favorite 30 tons daily are being sent to the smelter. At the Little Ellen work is being carried on at the 300- and the 1,000-ft. levels, and from both places 200 tons per month. In addition to the gold and silver values, the ore carries 18% lead. The Pearl brothers, leasing on the Porter claim, have opened up a body of ore at the 200-ft. level that runs $20 per ton.

Carbonate hill at present is also a busy section. The Castle View is shipping 100 tons daily of iron and sulphides, and from the Maid of Erin, which is worked through the Adams shaft, 100 tons daily of zinc sulphides are being sent to the mill. At the Catalpa, No. 1 and 2, Ladder shaft, Waterloo, Log Cabin, Crescent and Yankee Doodle, all belonging to the Morning and Evening Star group, 300 tons daily of an excellent grade of iron is being shipped.

In another 40 ft., the shaft of the Home Extension, down-town section, will be deep enough, and drifting to the Cloud City shaft will be started; a drift is now being run from the Cloud City to catch the drift from the Home Extension, and a very good contact has been opened which is heavily stained with mineral.

The A. V. shaft, on East First street, was put into commission during the week and the cleaning out of old drifts is the work now in progress. When this is finished work on the old orebodies will be started, and it is expected that some of the rich chlorides, found in the Bon Air, will be caught in the A. V. workings to the south. The property is under lease to T. S. Schlesinger.

William Ingles, who opened up the large body of ore in the Sunday, has secured a lease on the Bald mountain claim and is sinking; a good-looking contact has been opened and it is only a question of depth until the ore shoot is encountered.

Duluth. Sept. 21.

The Antoine Ore Co., which is now a property of the Republic Iron & Steel Co. is making a fine product this year. Its mines at Iron Mountain will ship not less than 140,000 tons, which is some 60,000 better than last year. The company is making its product at a very low cost. It proposes to instal considerable new ma-

chinery during the winter, a larger hoist and new crusher, as well as other items. It will carry on some stripping and will open more ground for milling. Its ore is silicious and is even in quality and texture.

The old Cuff exploration at Crystal Falls, once belonging to the American Steel & Wire Co., is to be explored again, this time by a company of Norway, Mich., and Toronto men, who have organized with $1,000,000 capital.

A good deal of exploration is under way in Sagola township, in the Menominee range, 42-30, and there are some promising finds there.

The Spruce mine at Eveleth, Minn., has been flooded out for a week or more and every possible step is being taken to free it from water. Several additional pumps have been lowered and two skips are now bailing water from the lower levels. The mine is situated in the bottom of a big basin, and the excessive rains of the summer have formed a lake, which has seeped through into the workings faster than the pumping plant could care for it. There has not been a year since the Mesabi range was opened in which the trouble from water has been as serious as this season. About once a month the open-pit mines, no matter how carefully protected and thoroughly ditched they have been, have been drowned, and the underground properties are pumping up to 5,500 gal. per min. for single mines, while nearly all are having a great deal more water than usual.

A stripping record has been made at the Fayal mine by the Drake & Stratton Co. in moving during August, sending out 124,000 cu. yds. in the month. It was a very wet season, which makes the business more difficult. This firm is stripping at many mines on the Mesabi, including Fayal, Stevenson, Leonard and others. They have some 12 shovels stripping.

The number of ore vessels that have been lying here for some time waiting cargoes is gradually growing less and the blockade is over. The roads are now moving the product easily, and the stock-piles are about cleaned out at most points on all ranges. Shipments for September will be nearly as heavy as in August.

The new Mayas Iron Co. has opened about 500,000 tons of good ore near the Duluth & Iron Range crossing of the Mesabi, in section 15-59-14, and will strip it this fall and mine next season. This is the most easterly find of ore in any considerable quantity that has yet been made. The Shenango Furnace Co. has taken a lot of land in the northeast corner of the same town, where ore has been found in years past, and is now at work exploring there. This is five miles east of the railroad crossing.

At the old Hale and Kanawha mines, in the northeast corner of town 58-16, G. A. St. Clair has opened about 50,000 tons on each property and is stripping preparatory to mining. These are pockets of ore that were overlooked when they were mined and have little bearing on the general situation, either as to those mines or the permanence of the range in general.

Platteville, Wis. Sept. 22.

The St. Rose mine, in the Toadville camp, four miles southwest of Platteville, owned by Platteville and Mineral Point parties, has been a steady producer for the last two years, averaging 8 tons of zinc concentrate per shift of 10 hours. At the present time the ore is selling at $40 per ton; the average expense, including all items, is $71.30 per day. The St. Rose is one of the many smaller producers that are giving their owners satisfactory returns.

The Fox River Mining Co., which has large holdings near the State line in northern Illinois, has recently acquired some large interests in Wisconsin near the Hazel Green camp. At a recent meeting the stockholders concluded to reorganize and incorporate under the laws of Wisconsin, under a new name. The property is considered rich in zinc and lead, and as soon as the reorganization is consummated the managers will be in a position to push development work.

The Empire Mining Co. declared another $10 dividend the early part of the week, making the second one so far this month, and the twentieth dividend within a little over a year.

The new 100-ton concentrating plant, which is being erected for the King B. Mining Co. on its property sub-leased from the Hazel Green Mining Co., is about completed. The property has been well prospected; there are four shafts, averaging 50 ft. in depth, every shaft showing lead and zinc ore in paying quantities. The ore was first struck at 23 ft. and continues the full depth of the shaft. The company is sinking a pump shaft. The Hazel Green camp has been one of the richest producers in the district, and has been proven by the considerable amount of diamond core drilling that has been done in the immediate vicinity; also by the usual method of churn drilling. The King B. Mining Co. is under the management of Mr. Fred Bremmerman, representing Indianapolis capitalists.

In addition to the many improvements placed at the Phenix mine, in the Toadville camp, near Platteville, the company is now contemplating the building of a new tramway from the mouth of the tunnel to the mill, a distance of some 1,400 ft. The body of zinc ore at this place is of a disseminated nature, and as the drift into the hill progresses, the quantity of the ore improves. It is of a high grade, and at present enough is being produced to pay the expense of development work. The operating expense at this plant is much below the average, owing to the fact that there is no pumping machinery to maintain, the water being drained through the working adit.

During the past few months considerable attention has been commanded by the prospect work at the British Hollow camp, about 13 miles from Platteville, particularly on the Preston land, upon which there was at one time a large concentrating plant. This was moved on account of the ore running down in quantity, the owners thinking the mine had played out. Recent development has shown that the ore continues in larger quantities than before, and local parties are at present figuring on the installation of a complete concentrating plant with electrical power, to cost in the neighborhood of $15,000.

Messrs. Wilkens and Yeatman, of New York, who are associated with the New Jersey Zinc Co., made an extensive tour of the Platteville zinc and lead district recently in the interest of that company.

The Longhenry Bros. and several Milwaukee associates have secured a lease known as the Fox, consisting of 256 acres, located in the Strawbridge camp, east and a little north of the Hazel Green camp. They have four distinct ranges running through their property, from which quantities of lead have been taken in the past. They intend to prospect the property thoroughly, and now have one drill hole down 110 ft., cuttings showing up rich mineral.

Calumet. Sept. 23.

The Atlantic Mining Co. has put a force of men at work sinking a permanent shaft on the Baltic lode, on its section 16 property. It is expected that the formation will be encountered at a depth of 40 ft. This work, preparations for which have been under way for some time, is of the utmost importance to the Atlantic Co. By its recent real estate exchange with the Baltic Mining Co., the Atlantic has secured the outcrop of the lode, and it is now practicable to open shafts on this bed right from surface. That the Atlantic will develop a valuable mine, seems assured by the openings on adjoining properties. Excellent copper-bearing rock has been uncovered on both sides of section 16, and it is a natural conclusion that the intervening land is also well mineralized.

Indications are that the work of opening section 16 will be conducted rapidly and at comparatively little expense. The Atlantic Co. is favored by a number of conditions which will lessen the expense of its new work. A temporary surface plant has been secured from the Phœnix Consolidated Mining Co, which will suffice during the early development period. Ties for the extension of the Atlantic railroad are being prepared, and the track will be laid to the new point of attack in a short time. For some months the cost of development will be confined largely to labor bills. The Atlantic possesses an

immense advantage in its complete mill, mine and railroad equipment, and it can make the new openings a producing factor from the very start, if such a course is deemed advisable.

The Atlantic will develop its 640-acre property by two shafts, located 1,200 ft. apart, the plan of operations resembling in some respects the method employed by the Centennial in developing its mile-square track on the Kearsarge bed. The overburden on section 16 is very light, and the initial work will be simple.

In its opening of section 16, the Atlantic is greatly encouraged by the character of the openings on both sides of its property. On the south the Baltic Mining Co. has extended a drift on the sixth level to the line of section 16, and the Atlantic company is continuing the drift. The lode is fairly well charged with copper, as are also the seventh, eighth and ninth level drifts north from No. 5 shaft of the Baltic, all of which are close to the Atlantic's line. The latter company will continue work in the sixth level drift until it has reached the strike line of its new shaft. Openings on the north side of section 16 are very favorable. The Superior Copper Co. is conducting work at that point, and its drift southward on the second level toward the Atlantic's property is above the average of the Baltic lode in copper content. The rock is of an excellent stamp grade, and there is much mass and barrel copper in the lode.

An addition of 50 men has been made to the force of the Mass Consolidated Mining Co., of Ontonagon county. The management is taking advantage of the present copper market to push opening work and increase the production. At the present time, rock shipments average 500 tons daily. The output will be further increased as soon as the railroad spur to C shaft is completed. The bridges are built and grading completed, men now being engaged in laying track. A and B shafts are yielding good returns. Sinking in the latter is close to the sixteenth level.

Preparations are under way for the installation of a new hoisting engine at No. 2 shaft of the South Kearsarge branch of the Osceola Consolidated Co. mine, as the present hoist has reached the limit of its capacity. The hoist formerly in use at No. 2 shaft of the North Kearsarge branch will be installed. It is two years since No. 2 shaft, North Kearsarge branch, went out of commission, when Nos. 1 and 3 shafts were reconstructed to handle the entire rock production. The hoist which is to be installed at No. 2, South Kearsarge branch, will probably meet the demands of that shaft as long as it remains in commission.

Scranton. Sept. 23.

An important convention of the miners' union will be held in Shamokin on Dec. 14, when districts No. 1, 7 and 9 will meet and formulate their demands to the operators to be conceded when the present agreement expires. The importance of this convention lies in the fact that the ambiguous demands that the president of the union has been making on the platform will be definitely and officially promulgated.

Coal inspectors of the Pennsylvania & Reading Coal & Iron Co. have been granted an increase in wages. At the larger collieries they will be granted $10 a month more, and at the smaller collieries $5 a month.

The engineers, mine foremen and other officers of the mines at almost every colliery in the anthracite regions were granted a week's holiday on full pay during the summer months. Among these also a general increase in wages all around has been granted by the majority of the operators.

The little mining town of Nanticoke is sorely stricken. There are at the present moment over 200 residents down with typhoid fever, and a number of deaths have already occurred. The fever shows no signs of decreasing. The water supply of the village has undoubtedly been polluted, and it is alleged by some that the origin of the pollution is to be traced to the culm that is drained into the creek that supplies the dam from which Nanticoke takes its water supply. Whether this is so or not will be definitely ascertained by the State Bureau of Health, which is making an investigation.

A strike took place at the National colliery, South Scranton, on Thursday. The strike seems to have grown out of the readjustment of affairs at this colliery since it changed hands some time ago. The National was formerly operated by the Connell Coal Co., and was purchased recently by the Lackawanna Co. Since the change of ownership there has been more or less dissatisfaction at the mine among the men employed there. The Lackawanna officials say that the trouble there has arisen from the change of conditions that has necessarily arisen under change of management. The operations of the mine must be brought into conformity with the general policy of the company. Colonel Phillips, the general superintendent of the Lackawanna Co., has suggested to the men that they hold a conference with the officials to adjust existing difficulties, and this the men have agreed to do. It may be said in passing that there is not a coal company in the anthracite regions that has had less trouble with its employees than the Lackawanna since the settlement of the last general strike.

Captain Groome, who is to organize the State constabulary to supersede the old organization known locally as the Coal & Iron Police, has gone to Ireland to study the organization of the Royal Irish Constabulary, which he hopes to follow in training his own men. The Pennsylvania State constabulary will be all mounted, and the appropriation made by the last legislature is only for 250 men. The Coal & Iron Police were merely the employees of the various coal companies, sworn in as deputy sheriffs to protect property and lives.

Empty cars are becoming so scarce around Hazleton that many of the collieries are operated under difficulty. If more cars are not forthcoming some of the mines may have to shut down.

Trouble is again brewing at the Cranberry mine, near Hazleton, and there is grave probability of a strike. A month ago, as recorded in this place, the drivers and patchers went out on strike, but returned on the promise of receiving higher pay. When the boys received their pay envelopes a few days ago, the increase given them was not considered sufficient. They have appointed a committee to wait on Mr. Pardee to see that the provisions of the agreement are carried out.

Toronto. Sept. 23.

Sanitary conditions in the mining camp of Cobalt have latterly been very unsatisfactory, owing to the rush of prospectors and miners and the need of improvements Dr. Bell, inspector of the Provincial Board of Health, has spent several days in the town endeavoring to have matters put on a better footing. Orders were given respecting the disposal of garbage and rubbish, and Provincial Constable Caldick was appointed sanitary inspector to see to their enforcement. Drinking water is only obtainable from one well, and measures will be taken to procure a better supply.

The oil-producing territory of the Leamington petroleum field has been extended by the striking of a big gusher by Palmer & Dalley, contractors, on the property of the St. Clair River Oil Co, on lot 11 on the sixth concession of Mersea township. The well was completed to a depth of 1,077 ft., and is flowing at the rate of over 500 bbl. per day. Several new wells are near completion and showing good indications of oil, while others are being started.

Cobalt mining transactions are giving rise to much litigation. Alfred Larose, of Haileybury, who is said to be the original discoverer of the silver-cobalt deposit, has issued a writ against Duncan McMartin and John McMartin, of Cornwall, and N. H. Timmins and David A. Dunlop, of Mattawa, asking for the setting aside of an assignment purporting to transfer to defendants an undivided one-fourth part of mining location J. S. 14. James Donaldson, of Dalmeny, Russell county, Ont., has brought action against the Timiskaming & Hudson Bay Mining Co. on behalf of himself and other shareholders, and asking to have declared illegal and void an agreement made between the directors and James Whyte,

Duncan Cameron and J. J. McKeen, of New Liskeard, by which these three were to receive one-fifth of the net profits of the mine. He claims that the agreement was secured by false pretenses and entered into by the directors without authority and without the knowledge or sanction of the shareholders.

Victoria, B. C. Sept. 11.

Rossland.—The statements made last week by Rossland and Nelson newspapers to the effect that the shipment of ore from the Le Roi mine to the Northport smelter, Washington, will cease on Sept. 15, and that thereafter all Le Roi ore will be shipped to the Canadian Smelting Works, Trail, has not to date been officially confirmed. Press despatches have been sent out from Rossland and Nelson, stating that W. H. Aldridge, who is chief of the Canadian Pacific Railway Co.'s mining and metallurgical department, had made a contract with the directors of the Le Roi Mining Co., in London, providing for the shipment to the Trail smelter of the product of the Le Roi mine, and that after the ore in stock at the Le Roi company's smelter at Northport shall have been smelted these works will be closed, but this, too, lacks official confirmation. It is known, though, that for some time Trail smelter officials have been endeavoring to secure the smelting at Trail of Le Roi ore, and the consequent shutting down of the Northport smelter, toward which end much misrepresentation has been made, and many misstatements have been published, by certain newspapers, ostensibly with the object of stopping the smelting in the United States of Rossland ores.

Erie.—The Hastings (British Columbia) Exploration Syndicate, Ltd., an English company, which lately paid a 5% dividend, this having been the first division of profits among its shareholders for about eight years, has offered its men two and a half days' leave of absence on full pay, or an equivalent addition to the earnings of such of them as shall prefer to remain at work. The mine superintendent has been granted 15 days' leave in which to visit the Lewis and Clark Exposition at Portland, and has received a check toward payment of his expenses. This voluntary action on the part of the company has gratified its employees, who appreciate this official recognition of their faithful work. The company's Arlington mine is situated near Erie, in the Ymir district.

Ymir.—Latest information published concerning the Ymir mine is that the higher-grade ore encountered last month at the 500 level is believed to contain better average values than was at first regarded as probable. Good ore is also being taken from the east drifts on the 600- and 700-ft. levels. The ore is of a character suitable for milling, so is being reduced at the company's stamp mill and cyanide mill, and not being shipped as crude ore to the smelter.

Boundary.—At the Emma mine, in Summit camp, what is described as the main orebody has been encountered in a crosscut from the new shaft, which was recently sunk to a depth of 150 ft. The ore is of higher average grade than that shipped from the open-cut workings of this mine, from which about 80,000 tons have been sent to Boundary and Nelson smelters during the last four years. The Emma is owned by the B. C. Copper Co., of New York, and the Hall Mining & Smelting Co., of London, in the proportion of three-fourths by the former and one-fourth by the latter.

Dawson, Yukon. Sept. 1.

Hon. Frank Oliver, Minister of the Interior for Canada, who has been visiting Yukon Territory, the administration of which is carried on by his department of the Government, was much impressed by the evident richness of the country tributary to Dawson. He was taken to several of the gold-producing creeks, including Bonanza, Eldorado, Hunker, Dominion and Bear creeks, along which he talked with many of the working miners and was shown the operations of both the individual miner and the companies working on a larger scale. The minister found that much interest is being taken by residents in Dawson and surrounding country in the surveys the Dominion government is having made for a proposed extensive water system. It is believed that, with plenty of water available, much gold could be obtained from the White Channel, which is a strip of ground along the course of Bonanza creek at a height of about 150 ft. above the present level of the creek, and is believed to be the bed of the old stream through the valley. It is composed mainly of whitish decomposed quartz, which appears to contain gold in paying quantities, and under conditions favorable to extraction without difficulty.

On the return trip from Dawson to British Columbia, Mr. Oliver stopped off to inspect J. H. Conrad's mining properties at Windy Arm. These have been attracting much attention, owing to the reported richness of the ore and its occurrence in considerable quantity. Development is being carried on in this locality on a comparatively large scale, and it is understood that Mr. Conrad has about completed arrangements for shipping ore before the close of October. One aerial ropeway, to convey the ore between the mines and the White Pass & Yukon railway at Caribou, is nearly finished, and three other lines are planned for similar purposes.

It is reported that a nugget of gold valued at $614 has been found by J. S. Peters on a claim on Livingstone creek, Big Salmon district, which he is operating for Eastern men. Other large nuggets have been found in the locality, but this is the biggest yet discovered there. Work will be continued throughout the winter in the Big Salmon country. This part of the Yukon has been producing gold for several years, but this year's yield promises to be the largest for any season since work commenced on its creeks.

It is believed that the White Channel has been found at a new point. Similar gravel to that occurring on French hill has been found on the hillside, left limit, adjoining 22 Eldorado. The hillside on which this discovery has been made lies between Little Eldorado, which comes in at 21, and Twenty-nine gulch. The pay was encountered at a depth of 8 ft., and has been found to be deeper than on neighboring hillsides. Miners believe that the White Channel has been located here, and that good pay will be found going to considerable depth in places.

An engineer sent to Dawson by the Dominion Railway Commission to ascertain the facts of the position relative to injunctions obtained against the Klondike Mines Railway Co. which necessitated a suspension of construction work on Bonanza creek, states that the trouble will probably be settled by constructing its railway line along the high benches up the creek valley instead of in the bed of the creek, as at first intended. The miners of Bonanza creek have been desirous of having the railway, but they objected to having it traverse their claims on the creek bottom, considering that if located there it would add to the difficulties of working the claims and would interfere with the disposal of the tailings from the sluices. The railway company chose the creek-bottom route as being less costly, but on the other hand, as the miners would probably file suits for damages, and claim large sums as compensation for interference with their mining operations, it is probable the company will, in the end, find the cost less for construction on the high ground than on the low. The railway commission has power to decline approval of the location of the right-of-way, if the members conclude to do so, hence the visit to the Yukon of one of its engineers to endeavor to arrange a satisfactory settlement.

An order-in-council has been passed by the Canadian government dealing with royalties on mining in the Yukon. It provides that no royalty will be collected on gold produced from quartz from claims upon which $25,000 has been spent on machinery, etc., within five years after the date of the order. A plant with a minimum capacity of 5 tons per day must be installed for milling or otherwise treating the ore, the value of which is to be included in the estimate of outlay. The royalty is abolished with respect to copper claims, provided $50,000 is expended upon

them within 10 years and a smelter erected of not less than 10 tons capacity per day.

Mexico. Sept. 19.

The various districts in the State of Chihuahua continue to make an excellent showing, the production for August being as follows: Santa Eulalia 28,000 tons, with a value of $1,200,000 Mexican; Parral & Santa Barbara, 23,000 tons, value $900,000; Chihuahua, 5,000 tons (of which about 1,000 tons were zinc ores from Calera); Naica, almost a one-mine camp as yet, 5,000 tons; Almoloya, 5,000 tons; Ocampa, bullion to the value of $90,000; Batopilas, bullion valued at $100,000; Lluvia de Oro, with only 20 stamps, bullion worth $120,000; Palmarejo, bullion worth $80,000; Dolores $60,000; and other smaller districts, bringing the value of the total output of the State for the month of August up to $3,000,000 Mexican. Of the new work in the State, Pedro Alvarado, of Parral, has given the contract to Meisel & Koch, also of Parral, for a 1,000-h.p. central electric power plant, for the Palmilla mine, which will consist of water-tube boilers, tandem compound Corliss engines, and 700-kw. alternating generators running on 2,200 volts.

At Terrazas station, on the Mexican Central railroad, about 25 miles north of Chihuahua, the old Rio Tinto copper mines, owned by Juan D. Creel, manager of the Minero Bank, of Chihuahua, and Enrique C. Creel, the governor of the State, are to be opened up by J. D. Creel, J. D. McKenzie and D. Goodale, with the latter in charge of the work. As soon as possible after work has been started the old 150-ton matte smelter will be blown in. This will no doubt lead to the resumption of operations at the Columbia mine and other adjoining properties.

At Naica a rich strike has been made of a high-grade lead ore in the Lepanto mine, which is worked under lease by No. 2 smelter at Monterey.

At Uruachic, Chihuahua, considerable new work is expected in the near future, as a large piece of ground has just been acquired there and is to be opened up under the management of J. W. Pryor, by the Benedictine Mining & Milling Co., of Washington, D. C., which has a capital of $20,000,000 gold and extensive holdings in the States of Durango and Sinaloa. T. D. Ripperdon, of Los Angeles, Cal., is vice-president.

In the State of Guanajuato, and near the city of the same name, the mines and mill of El Cubo, acquired in 1901 from the United Mexican Mines Association, Ltd., of London, by H. P. Hollis and associates, of Chicago, have just been turned over under lease and bond from the latter to T. H. Leggett, of London, but what the consideration is has not been made public. The Perigrina Mining & Milling Co., of Guanajuato, is having plans made for 100-stamp mill and cyanide plant, as the old 20-stamp mill is too small for the estimated production of the mines. It is further intended to treat, besides the production of the mines, two enormous old dumps on the property. The new plant is designed by A. B. Carpenter, of Mexico City, and it is understood that the greater part of the order will go to the Fulton Iron Works. The Guanajuato Reduction & Mines Co. contracted with the Guanajuato Power & Electric Co. for the power for unwatering its mines.

In a recent letter reference was made to W. B. Budrow going with the American Mining & Smelting Co., in Taxco, Guerrero, which was an error, as the name of the company is the Mexico Smelting & Refining Company.

London. Sept. 9.

You have referred in your columns a number of times during the present year to the proposed amalgamation of the Le Roi, Centre Star and War Eagle and the Trail and Northport smelters, and you have discussed the advantages to be obtained by such a consolidation. The sole obstacle in the way of the scheme has been the opposition of A. G. McMillan, the managing director of the Le Roi. The other directors of the Le Roi Co. have had to go to extreme measures, in order to remove his opposition. By virtue of one of the articles of association of the Le Roi Co. they have unanimously voted him out of his directorship. Mr. McMillan intends to carry the war into the enemy's camp at a general meeting of the shareholders, and attempt to secure control, but it is doubtful if he has a strong enough following to enable him to win. In the meantime, Messrs. Bradley and Mackenzie are to take charge of the Le Roi properties until the consolidation can be arranged.

One of the less successful mines at Kalgoorlie, Western Australia, is Hannan's Star. The veins at this property have always been narrower and of lower grade than those at its more celebrated neighbors. It is a notable example of the inability of even honest and capable management to insure the discovery of rich ore. Hannan's Star is managed by Messrs. Cordner James and Trewartha James, and the mine superintendent is also a Cornishman, W. R. Bowden. With ore at only 11dwt., it has been hard work to make ends meet on an expensive field like Kalgoorlie, and during the 10 years' life of the mine no dividend has been paid and new capital has repeatedly been required. The company has again arrived at the end of its resources, and it has been found necessary to reconstruct, with the object of raising £40,000 new capital. With this money it is intended to develop the low-grade ore so as to increase the output considerably, and to supply the necessary new plant for treating the increased output of ore.

Your readers are already aware that Mr. John Hays Hammond has acquired control of several of the gold dredging companies working in the Oroville district of California. During the past few weeks the Venture Corporation has been arranging for the underwriting of the shares of the new consolidated company, to be called Oroville Dredging, Ltd. As I wrote, a few weeks ago, the Venture Corporation is doing pretty well nowadays. There is no doubt about the success of the flotation of the present company, and we should have heard more about it in the London market but for the fact that we are now in the dull season of the year. The capital of the company is £700,000, of which £50,000 is working capital, to be used chiefly in purchasing new dredges. The company will then have 12 dredges at work, and it is estimated that there is sufficient gravel to occupy them for 15 years. These placers have been described so fully in your columns that it is not necessary to enter into details now.

The financial and daily press are at present displaying conspicuous advertisements of the shares of the Canas Mines, Ltd., and the methods pursued by the advertisers are somewhat out of the ordinary. Great prominence is given in the advertisements to Señor Alvarado and his phenomenally rich mine, the Palmilla. It requires great self-restraint on the part of the reader to refrain from jumping to the conclusion that the Canas Mines, Ltd., is the owner of this famous mine. The shares on offer are those of an English company formed as long ago as 1896, to acquire an old mine 16 miles from Zimapan, Mexico. The promoter of the company was the Mines Contract Co., Ltd., which was formed in 1888, and the same company is now advertising the shares for sale. I find also that they are not what are called in America, "treasury shares" that are being now offered, but shares originally issued to the vendors as purchase price. The money thus subscribed will not, therefore, go to the development of the mine. When the company was floated the shares issued were only to the seven signatories and the vendors, and it does not appear that any working capital was ever put up, or the mines actively worked. Before purchasing the shares, intending buyers should obtain some information as to the work being done at the mine and the resources of the company. As the company was floated nearly 10 years ago, and nothing being heard of it since, intending buyers should also satisfy themselves that the property still belongs to the company. The property in question is an old mine that was worked 200 years ago, and has yielded large profits in days gone by. Perhaps some of your Mexican readers may know something of it.

New Lake Ore-carrier.—The latest large lake steamer—appropriately named *John Stanton*—has just been launched at the Lorain yard of the American Shipbuilding Co. The vessel is built for the Pioneer Steamship Co., of Cleveland, Ohio. The *Stanton* is 524 ft. over all, 504 ft. keel, 54 ft. beam and 30 ft. deep. She has 30 hatches spaced 12-ft. centers. She is of arch construction, and the sides of her cargo hopper are straight. Her engines are 23½, 38 and 63 in. cylinder diameters by 42 in. stroke, supplied with steam from two Scotch boilers, 14 ft. 6 in. diameter by 11 ft. 6 in. long, equipped with Ellis & Eaves draft and allowed a pressure of 180 lb. She is designed to carry 9,000 gross tons of ore, but under favorable conditions will probably carry 9,500 tons.

CALIFORNIA.

CALAVERAS COUNTY.

Hexter.—E. J. West has bonded the Hexter mine, near Mokelumne hill, and will shortly commence active operations. He has also bonded a gravel mine on the Field ranch, near Paloma, and will soon have 15 men at work drifting.

EL DORADO COUNTY.

Alpine.—It is understood that a deal is on for this quartz mine, near Georgetown. Some good ore was recently struck in this mine.

Pacific House.—Oregon people, headed by J. B. Bingham, have become interested in this mine at Pacific, 10 miles east of Placerville, and will prospect it with a drill to determine depth of the gravel channel and then run a tunnel to it.

Texas Hill Mining Co.—This is a new company, organized to work the Nungesser mine. The directors are Geo. Nungesser, of Placerville; W. A. Pratt, H. Watham and F. Holland, of Los Angeles.

FRESNO COUNTY.

Jenny Mining Co.—At this mine, five miles north of Millwood, a shaft has been sunk and a tunnel run. The ore found is better than that mined last year. Work has been temporarily suspended and will not be started again until January.

HUMBOLDT COUNTY.

Humboldt War Eagle Mining & Milling Co.—This company is being formed to work ground in the Three Rivers district. A tunnel is to be driven at once.

Herbert H.—At this mine, China Flat, James Henderson, superintendent, seven men are engaged in digging a new ditch, ¾ mile long, to bring the water from China creek direct to the mine on Trinity river. About 1,000 ft. of 11-in. pipe will also be used. The mine has heretofore been worked on a small scale only.

MADERA COUNTY.

Jack Boy Mining Co.—This company has been incorporated by N. W. Thomas, J. E. Ewing, G. M. Wilcox, E. J. Wittenberg and W. H. Miller, to work the Jack Boy mine at Bailey Flat.

MARIPOSA COUNTY.

Sweetwater.—This mine, near Mariposa, has closed down and thrown 60 men out of work. A new 10-stamp mill and other machinery was recently installed.

NEVADA COUNTY.

Kenosha.—At this mine (formerly the Seven-Thirty), near Grass Valley, a rich body of ore has been encountered. Work was only recently started on the mine, which has been idle some years. Geo. W. Root is superintendent.

Chicago.—This mine, near Nevada City, is now in full operation, with Wm. P. Mather as superintendent. The mill is running night and day. The company has 700 ft. of stoping ground already developed. The new development work south of the shaft is showing a higher grade of ore than heretofore found.

Junction.—From this mine, near North San Juan, Hawkins Bros. are shipping ore to the Selby Smelting Works.

Celia.—This quartz mine, near Omega, has been bonded from the Red Cross Co. by J. L. Bryson, and is to be opened up.

PLACER COUNTY.

Bellevue.—A station is being cut on the 300-ft. level. A five-drill Leyner air-compressor has been installed and also a new hoist. Three shifts of men are at work. The ore is averaging $30 per ton.

Evening Star.—The shaft is down 110 ft. and drifts are being run on the 60- and 110-ft. levels. Work will soon be conducted on a large scale.

PLUMAS COUNTY.

Standart & McGill Group.—Droege Bros. are adding 10 stamps to their 15-stamp mill near Greenville. They intend to crush the low-grade ore found on the mines.

SHASTA COUNTY.

Boulders.—This mine is on the boundary line of Shasta and Trinity counties, and the men sleep in Trinity county and work in Shasta. Superintendent Fred. Hurst is building boarding and bunk houses and a dry-house in preparation for winter work. The tunnel being run is drifting after the main ore-shoot.

SIERRA COUNTY.

South Fork.—An important strike has been made in this mine at Forest City, F. W. Kuhfeld, superintendent. The channel has been caught in the long tunnel. Extensive surface improvements are contemplated. This strike has an important bearing on the Maple Grove mine adjoining, which is in line with the channel encountered.

Last Resort.—At this mine, near Downieville, men are at work driving tunnels to re-open the property. Two parallel ledges are being developed under Superintendent A. L. Wilson.

Jason Frye.—This mine is the northern extension of the Last Resort, and is being developed by a tunnel with good prospects.

Mabel Mertyz.—In this mine, near Forest, the channel was recently tapped in the long tunnel and is now being drifted in on the rim. Pay gravel is expected when the dish of the channel is reached. This point in development has been attained after eight years' work. There are 4,000 ft. of tunnels, upraises and drifts. H. B. McCormick is superintendent, and the company working the mine is the Forest City Mining Company.

SISKIYOU COUNTY.

Gold Dike Mining & Milling Co.—This company, composed of San Jose men, has bought the Gold Dike mine at Summerville, and will at once put on a force of men. A new mill, rock crusher and cyanide plant will be installed. L. S. Barnes, of Redding, is general manager and superintendent.

Sale.—A. B. Downes, of Los Angeles, has bought from Theo. Reames, of Callahan, certain placer ground, which is to be equipped with pipe and giant ready for hydraulicking this winter.

Brokaw Ditch and Mill.—A. C. Brokaw has bought a water right and mill site from Mrs. Grant, and men are now digging a ditch and preparing the site for a new mill.

TRINITY COUNTY.

Nonpareil.—This mine, on Cañon creek, has been bonded by G. Graham and G. W. Braden from Louis Schall, and a milling plant will be installed if development work proves satisfactory.

YUBA COUNTY.

Marysville Dredging Co.—This company, R. E. Cranston, superintendent, is progressing with work on its two new boats. A site for a town has been selected on the lands of the company, 1½ miles from the new town of Hammon, and repair shops, boarding houses, office, etc., will be erected.

COLORADO.

GILPIN COUNTY.

Kirk.—It is reported that L. G. Nesmith, of Bald mountain, Col., who is operating this property on Quartz hill under an option, has received returns of $2,500 per ton for a shipment of more than 10 tons of uranium or pitch-blende ores, which he took to the Krupp works at Essen, Germany, last summer. He would not sell to the middleman, being only offered $800 per ton in Denver, and concluded that he could more than make expenses of a trip across the ocean, with the ores. Mr. Nesmith intends to erect a plant for the treatment of the lower-

grade uranium ores, and will, it is expected, take up the option from the Denver owners.

Great Divide.—C. E. Hurlbut, of Downsville, N. Y., has purchased a half interest in this group in Mommoth gulch, and increased operations will follow. A. M. Willard, Gilpin, Col., is manager.

Copper King.—Denver parties have taken an option on this property in Lump gulch, and are preparing to instal machinery. Good copper ore has been taken out, property being owned by Central City parties. Duress & Dowd, of Gilpin, Col., are the lessees.

Mountain Monarch Mining Co.—The annual meeting was held at Rollinsville, and the old board of directors was re-elected, with J. C. Barrows, Rollinsville, Col., as manager. The Monarch mill has been started up in Gambell gulch, and the company will increase its capacity with five more stamps and other machinery at an early date.

Penobscot Mining & Milling Co.—Valley Falls, Kan., people are interested in plans for a new 10 rapid-drop stamp amalgamating and concentrating mill, to be erected in Gambell gulch, and the company will also instal a 100-h.p. boiler and a four or five air-drill compressor plant. The company intends to have the mill running inside of 60 days. P. J. Hamble, Rollinsville, Col., is manager.

Black Hills & Denver Gold Mining & Milling Co.—The annual meeting of this company was held in Denver this week with Ohio parties interested. R. P. Clark, Ashtabula, Ohio, was elected president, and M. H. French, general manager, with offices at Tolland, Col. The company is building a new shaft-house and installing machinery for increased operations at its property.

Old Town Consolidated Mining Co.—A dividend of 0.5c. per share, amounting to $15,000, will be paid on Sept. 15, this being the usual 60-day dividend. A good strike has been made in the 800-ft. level, after driving a crosscut for 60 ft., opening up nearly 4 ft. of mineral which runs well in gold. G. K. Kimball, Jr., Idaho, Springs, Col., is manager.

Pleasant Valley Mining & Milling Co.—Three hoists and three boilers and other machinery for this company have been delivered to the Banta-Hill property, and a contract for three new shaft buildings has been let to Quigley & Co., of Central City. The properties of the company are to be operated under a leasing system. R. L. Martin, Central City, is manager.

August Shipments.—The shipments of smelting and crude ores from the Black Hawk depot to the Denver smelters and to outside points of treatment for the past month were 281 cars, or 5,900 tons, showing a gain of over 20% over preceding month and corresponding month of previous year.

Fairfield Mining Co.—A contract has been let for the erection of a shaft building 24 by 60 ft. and the installation of a steam-hoisting plant. Baltimore, Md., parties are interested, with W. M. Nickerson, Opera House block, Denver, as manager.

TELLER COUNTY—CRIPPLE CREEK.

Drainage Tunnel.—The immediate commencement of the new drainage tunnel is again being talked of. In all probability a number of other surveys to determine the most feasible place to construct the bore will be begun at once. Considerable has already been done on this line. Until recently it has been understood that the tunnel would be constructed in Cripple Creek gulch, but now there is some talk of driving from Wilson Creek gulch. It is understood that D. W. Brunton, the well-known mining engineer, will probably be retained as consulting engineer for the tunnel. The principal idea of the location of the tunnel is to find a site which will be the most beneficial to all the mines concerned. The new tunnel will undoubtedly be constructed by all of the mines in the district, and will be under the supervision of the Mine Owners' Association.

Ironclad Hill.—This hill is at present attracting a great deal of attention. On the Caley block of the Jerry Johnson a good strike has been made in the bottom of the shaft. From present indications this bids fair to be one of the best strikes in this vicinity for some time. Some ore of fair grade is being taken out of the Forest Queen and considerable new work is being planned. The strike on the Pride of Cripple Creek is still holding out well. A strike of considerable importance was recently made on the Long John, in this vicinity, and it is reported to be holding out well. A new ore-house is being built on the W. P. H. and also one on the Caley lease of the Jerry Johnson. The Gilpin Leasing Co. is shipping the usual amount of ore from the main workings of the Jerry Johnson. R. P. Russell and the D. A. C. Leasing Co. are also doing some work in the vicinity. Sinking is still in in progress on the Norfolk lode by the Omaha Leasing Co. A number of other small leases are also working and some are shipping ore.

ILLINOIS.

Prior to the enactment of the shot-firers' bill only one mine inspection a day was required in this State. Attorney-General Stead now rules that, where necessary, more than one inspection must be made in a day. After the firing of shots there may be a heavy accumulation of smoke and gas in a mine which may become a menace; therefore, the fire-boss or other official should inspect the mine before the miners go to work.

Governor Deneen has completed the appointment of district mine inspectors, under the new law, which increased the number of districts from seven to ten. The inspectors are now as follows: First district, Hector McAllister, Streator; second, Thomas Hudson, Galva; third, James Taylor, Peoria; fourth, Thomas Weeks, Bloomington; fifth, Thomas Hannah, Riverton; sixth, Frank J. Campbell, Maryville; seventh, William Williams, Marissa; eighth, Walton Rutledge, Alton; ninth, John Dunlop, Centralia; tenth, Thomas Little, Herrin. Messrs. McAllister, Hudson, Taylor, Weeks, Rutledge and Dunlop are re-appointed; Messrs. Hannah, Campbell and Williams are the appointments to the new districts; and Mr. Little succeeds William Atkinson, who was killed in the accident at the Ziegler mine.

It is stated that 1,800 miners were to return to work in the machine mines of the Chicago & Alton sub-district recently as a result of a settlement reached between representatives of the operators and men, on the controversy which has existed since July 1 over the employment of shot-firers. The settlement is a victory for the operators, their contention that the employment of shot-firers was not necessary being sustained.

The miners in the Chicago & Alton sub-district have voted to repudiate the agreement to return to work, made by the officers of the union. The question is, therefore, still unsettled, and the mines remain closed.

KENTUCKY.

HENDERSON COUNTY.

Green River Coal Co.—This property, including the Spottsville mine, has recently been bought by Wm. Clendaniel and R. L. Biddle, of Donora, Pa., with others. It is announced that the new owners will greatly enlarge the mine and will ship coal both by river and rail. The Green River Co. was controlled by the Messrs. Arnold and O. W. McGinnis.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

Quincy.—No. 8, or the Mesnard shaft, will be equipped with a thoroughly modern plant. Contracts for larger hoisting machinery were let some time ago, and preparations are now under way for its reception. Carpenters are at work framing timbers for the new buildings.

KEWEENAW COUNTY—COPPER.

Allouez.—Sinking in No. 1 shaft is 100 ft. below the fourth level, and by October 15 it is expected that work at the fifth level will be under way. The fifth level will be cut 130 to 160 ft. below the fourth, so as to correspond with the third level of No. 2 shaft, whereas the other levels are only 100 ft. apart. Excellent rock continues to be opened in No. 1

shaft, and the extension of the levels also shows the same quality of ground.

ONTONAGON COUNTY—COPPER.

Adventure Consolidated.—In the ninth and tenth levels of No. 3 shaft, on the Knowlton lode, there is a good showing of copper. The company has $70,000 in its treasury, and the present monthly output of 150 tons of mineral pays the cost of work. During the past year the output has been doubled. No work is being done on the Evergreen lode at present.

Mass Consolidated.—McCurdy Bros., of Houghton, have been awarded a contract for the erection of a shaft and rock house at C shaft. Work will be started at once, and the structure is to be completed by December 31. The rock bins will have 1,000 tons capacity. Diamond-drill explorations on the Minnesota group of lodes has been discontinued, and an exploratory shaft started. It will be sunk 200 ft., and from the bottom crosscuts will intersect the various lodes. The development of the Mass mine has now reached a stage that warrants larger rock shipments to the stamp mill, and it is likely that the property will increase its production in a very short time, the necessary improvements to the mill having been completed.

Victoria.—In the case of Ancil J. Rich versus the Victoria Copper Mining Co., the jury in the United States court at Marquette returned a verdict of no cause for action. The suit was begun in May, 1904. The value of the two quarter sections of land involved in the case, as estimated by various witnesses, differs. Dr. L. L. Hubbard, of Houghton, testified that he values the northwest quarter at $250 an acre, while another witness placed $500 per acre as the true cash value.

OKLAHOMA.

KINGFISHER COUNTY.

Southwestern Salt & Mining Co.—This company has been organized to operate salt deposits in the Territory. Charles E. Peoples, of Pomeroy, Ohio, and F. L. Winkler, of Kingfisher, Okla., are the leading stockholders.

OREGON.

BAKER COUNTY.

Thompson Placers.—The Thompson-Hale Co., of Wabash, Ind., has opened work on the old placer mines on Thompson, Gold and Paddy creeks, east of Baker City. The company owns about 320 acres of ground and the old Perkins ditches. Roads have been built and the ground put in condition for operating.

Muir.—La Grande and Baker City capitalists have formed a company which has purchased the William K. Muir property at the head of Grand Ronde river, 75 miles northwest of Baker City, in Union county. The property is considered rich and the ore consists of silver, gold and galena. Shipments of ore have already been made to the smelter with returns of $95 to the ton. It is said by the promoters that a mill will be placed upon the property in the near future, but no definite plans have yet been announced.

E. & E.—The management of the E. & E. mine, at Bourne, 30 miles west of Baker City, has decided to continue deep sinking. Superintendent John Thomas has just returned from Portland, where the principal stockholders live, and says he has been fully authorized to proceed with the development of the property. The main workings are now down 600 ft. and the plans call for a depth of 1,000 ft. more. This is an old property and has in the past produced more than $1,000,000 and is shipping steadily today.

PENNSYLVANIA.

ANTHRACITE COAL.

Lehigh & Wilkes-Barre Coal Co.—This company's report for the year ending June 30 shows earnings and expenses as below:

	1904.	1905	Changes.
Earnings.....	$16,725,996	$16,316,829	D. $409,167
Expenses.....	14,522,653	14,153,198	D. 369,455
Net.....	$2,203,343	$2,163,631	D. $39,712

Interest and sinking fund charges last year were $1,538,311, leaving a surplus of $625,320 for the year. The expenses for 1905 were 86.7% of the gross earnings, against 86.8% in 1904, showing only a very slight reduction.

Philadelphia & Reading Coal & Iron Co.—This company's report for the fiscal year ending June 30 shows that the coal mined from the company's lands was, in long tons:

	1904.	1905.	Changes
By company.....	8,707,508	9,438,666	I. 731,15
By tenants.....	1,703,342	1,619,077	D. 84,26
Total.....	10,410,850	11,057.743	I. 646,893

The coal mined and sold is reported as below, also in long tons:

	1904.	1905.	Changes·
Coal mined.....	8,707,508	9.438,666	I. 731,158
Coal bought.....	1.388,535	1,184,349	D. 204,186
Total.....	10.096,043	10.623 015	I. 526,972
Coal sold.....	9,788,140	10,312,223	I. 554.083
Stock, Dec. 31.....	866,192	1,150,165	I. 283,972

The financial statement is as follows:

Coal sales, anthracite.....	$34,943,001
Coal sales, bituminous.....	548,398
Coal added to stock.....	369,334
Miscellaneous.....	608,021
Total earnings.....	$36,468,754
Mining and purchase of coal.....	$21,237 814
Transportation.....	9,805,217
Miscellaneous.....	1,362,254
Total expenses.....	$32,405,285
Net earnings.....	$4,063,469

Payments from net earnings were: Improvements at collieries, $1,730,975; depletion of coal lands fund, $478,326; fixed charges, $104,035; interest, 2%, on Reading Co. loans, $1,582,255; total, $3,895,591, leaving a surplus of $167,878 for the year.

The report says: "The cost of coal mined and purchased during the year was 2.7c. per ton less than for the previous year, and the price realized on all sizes was 9.7c. per ton less, making a total decrease in the net amount realized of 7c. per ton, compared with the previous year. From the earnings of the company for the fiscal year, there was appropriated to the depletion of lands fund the sum of $478,326, being 5c. per ton on coal mined from the company's lands during the year, making the total amount in this fund $944,976. The new yard, near Bridgeport, for the temporary storage of unmarketable coal, was completed during the past fiscal year and immediately put into operation. The increase of receipts of the Coal & Iron Co. from the sale of anthracite over the previous fiscal year was $993,613. The receipts, however, from the sale of bituminous coal and from other sources were $145,367 less, making the increase of total gross receipts only $848,246 in 1904-5, as compared with 1903-4. The increase of expenses amounted to $1,326,981. The principal items in which increases occurred were as follows: Cost of mining and repairs increased $694,612, which is accounted for by the increase of 731,157 tons in the number of tons of coal mined. Cost of transportation by rail and water increased $482,712, which is accounted for by the fact that the coal sold during the past year increased 554,083 tons over the previous year. The amount of the expenditures in improvements at collieries made in 1904-5 in excess of the amount paid on the same account in 1903-4 was $457,939 in all."

BITUMINOUS COAL.

The H. C. Frick Coke Co. is about completing a 28-mile pipe-line from a reservoir, near Dunbar, to supply water to the different plants of the company in the southern part of Fayette county. The work was started last April, and a large force of men has been employed on the line. It will supply the Leith, Atlas, Oliphant, Wynn and York Run ovens, and a branch line goes to the three Continental mines. A 24-in. pipe starts from the reservoir, and the size decreases to 8-in., 6-in., 4-in. and 3-in. pipe, according to the volume of water to be carried. When the work is finished, the Frick ovens in that section should have an unfailing supply of water.

Monongahela River Consolidated Coal & Coke Co.—It is announced that the Black Diamond mines of this company are again in operation, after several months' shut-down; about 300 miners are employed there. The company has several other mines along the Monongahela which (it is believed) will soon resume operations.

Carnegie Coal Co.—This company has formally opened the new mine at Oakdale. The mine is modern in every way, and its electrical equipment is said to include several new devices. The Oakdale mine has a capacity of 1,500 tons daily, and when in operation with the other two mines of the company, at Primrose and

Carnegie, the total output will be 4,000 ton per day. A feature of the electrical equipment is the new automatic device by which the loaded cars are hauled to the tipple, unloaded and brought back empty to the mine, without being touched by hand.

Pittsburg & Westmoreland Coal Co.—This company was incorporated recently with a capitalization of $3,000,000, by the merging of the five concerns noted in a preliminary announcement (this JOURNAL, August 26, 1905). Those named in the articles of consolidation are: D. W. Kuhn, president; H. K. Knopf, vice-president; S. A. Davis, secretary; W. A. Lyon, treasurer; and J. H. Roelfs, all of Pittsburg. The merged properties are all fully developed, and they have all been managed by the same interests in the past, so that the new combine is not expected to effect any changes in trade conditions. The same interests that own these properties control the Blaine Coal Co., H. A. Kuhn having managed all of them. He is expected to manage the new combine.

UTAH.

JUAB COUNTY.

Uncle Sam Consolidated.—During August this company marketed nine cars of crude ore and four cars of concentrate.

Scranton.—A large body of zinc ore has been opened in this property in North Tintic. The ledge is 30 ft. wide and the ore assays from 30 to 45% zinc. This is believed to be the largest zinc orebody in the Tintic district. A drift for 130 ft. and a winze sunk 40 ft. reveals quite uniform character of ore.

Star Consolidated.—Sinking of the main shaft is progressing at the rate of three feet per day. It is now down 740 ft. and will be continued to 1,000 feet.

Tetro.—The sinking of a new shaft at this property is under way.

PHILIPPINE ISLANDS.

LUZON.

Bua Mining Co., Ltd.—Work has been begun on the property of this company at Baguio, in Benguet province. Development is to be pushed, with the largest force available. Leonard Lehlbach is mining engineer in charge.

Foreign Mining News.

AFRICA.

RHODESIA.

Gold production in Auugst was 35,765 oz. bullion, the largest monthly output on record. For the eight months ending August 31 the total was 267,903 oz. bullion, an increase of 106,397 oz. over the corresponding period in 1904. The bullion reported this year was equal to 238,434 oz. fine gold.

Other production reported for the eight months was 403 tons lead and 58,448 tons coal.

TRANSVAAL.

The Chamber of Commerce returns show an output in August of 410,859 oz. fine gold; which is 9,738 oz. more than in July, and 96,931 oz. more than in August, 1904. For the eight months ending August 31 the total was 2,436,981 oz. in 1904, and 3,191,134 oz. in 1905; an increase of 754,153 oz., or 30.9%, this year.

The number of Kaffirs employed decreased during the month. On August 31 there were 88,829 reported at work, a decrease of 2,344 during the month. The number of Chinamen increased 1,424; there were 44,565 at work at the close of the month.

EUROPE.

SPAIN.

Mineral Exports.—Exports of minerals from Spain for the seven months ending July 31 are reported by the *Revista Minera* as follows, in metric tons:

	1904.	1905.	Changes.
Iron ore	4,294,761	4,626,820	I. 332,059
Copper ore	639,767	571,698	D. 68,069
Zinc ore	76,559	79,307	I. 2,748
Lead ore	3,408	3,712	I. 304
Pyrites	307,776	406,119	I. 98,343
Salt	243,603	255,352	I. 11,759

Exports of metals were 28,341 tons pig iron, a decrease of 6,653 tons; 23,680 tons of copper, an increase of 6,128 tons; 986 tons of spelter, an increase of 33 tons; 95,047 tons of lead, a decrease of 8,080 tons, as compared with last year.

Coal Trade Review.

NEW YORK, Sept. 27.

ANTHRACITE.

Improvement in the hard-coal trade is now felt by nearly all dealers, and the fall activity has commenced. It is likely to increase, however, as the reports of a tendency toward a general strike in April become more ominous. The mine workers will meet in November to formulate their demands for an eight-hour day and recognition of the Union, which demands the operators assert, not officially but with emphasis, they will not consider, being willing at most to continue the present arrangement. The Illinois Coal Operators' Association has come forward with the proposal to close the mines on the first of April, not only to steal a march on the workers, but also to raise the price of coal, which they feel has not been renumerative. To what extent the anthracite operators will fall in with this plan is a question; those whom we have interviewed think that there is small likelihood of any such action in their quarter. It is a known fact, however, that the anthracite mines are working under pressure and are laying by stores of hard coal, often keeping it on the culm piles. Shipments are made from the daily output, with the intention of holding these reserves intact.

The domestic sizes are in good supply and are moving off regularly. Pea coal is exceedingly active and is being laid in by many consumers. Buckwheat, even washery coal, is readily disposed of.

Prices remain as follows: $4.75 for broken and $5 for domestic sizes. Steam sizes: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice and $1.30@$1.35 for barley.

BITUMINOUS.

The Atlantic seaboard soft-coal trade is unusually strong, all consumers calling for more coal, so that it is a serious question to get coal forward in sufficient quantities. Car supply is variable, so that no one can depend upon receiving a stated proportion of his needs. The embargo issued by the Baltimore & Ohio against the New York, New Haven & Hartford still continues and forces shipments to New England to go by water. The advance of 10c. per ton announced to take effect on some coals at the Virginia Capes on Oct. 1, is causing a rush to this point. The ship-owners are taking advantage of this haste by raising their freights 10c. per ton. This has the effect of sending many vessels to Virginia, which it is believed will scatter elsewhere as soon as the pressure is relieved.

The far East is calling for vigorous shipments, particularly those ports where the ice forms early in the winter. This section probably has a larger supply on hand than is usual at this time of the year. Trade along the Sound is active, and is calling for more coal than can be given to it. Trade in New York harbor is taking all the coal that comes and has only small stocks on hand to supply further business; loaded cars generally run at once to the wharves, where they are discharged. Prices range about $2.60@$2.65 f. o. b. New York harbor shipping points for the ordinary grades, while the poorer grades range down to $2.30@$2.35. Some producers say that they get only half the cars they need, while others complain of a small shortage. All-rail trade does not get as much coal as it calls for, being slighted in favor of tidewater shipments. Transportation from mines to tide is excellent; a day's manifest of coal often runs through in train-load lots to point of discharge.

Vessels in the coastwise trade are in fair supply, while rates are firm and inclined to advance. Philadelphia quotes as follows on the larger vessels; to Boston, Salem and Portland, 75@80c.; to the Sound, 70c.; to Lynn, Newburyport, Gardner and Bangor, $1; to Portsmouth, 80@85c.; to Saco, $1.10; to Bath, 85 cents.

COAL TRAFFIC NOTES.

The coal and coke originating on all lines of the Pennsylvania railroad east of Pittsburg and Erie were as follows for the year to September 16, in short tons:

	1904.	1905.	Changes.
Anthracite.....	3,123,436	3,252,812	I. 129,376
Bituminous.....	18,949,555	20,334,421	I. 1,384,866
Coke.....	5,955,880	7,720,554	I. 1,764,674
Total.....	28,028,871	31,307,787	I. 3,278,916

The largest increase this year has been in coke.

The coal traffic of the Philadelphia & Reading railroad for the fiscal year ending June 30 last was as follows:

	904.	905.	Changes.
Anthracite	11,324,624	12,029,459	I. 704,835
Bituminous	8,059,243	9,184,421	I. 1,125,178
Totals.....	19,483,867	21,213,880	I. 1,730,013
Av. haul, miles....	112.5	113 9	I. 1.4
Av. rate per ton, miles, 0.73c.		0.71c.	D. 0.02c.

The large proportion of bituminous coal —43.3% of the total tonnage—will be somewhat surprising to those who are accustomed to consider the Reading as an anthracite road entirely. The total increase in coal tonnage was 8.9%. The earnings from coal traffic were $15,921,800 in 1904, and $17,163,351 in 1905; an increase of $1,241,551, or 7.8%, last year.

Birmingham. Sept. 25.

The coal situation in Alabama shows no change. The mines in operation are doing nicely and there is a demand for every ton being mined. Just as soon as the quarantine regulations throughout the South are over and the yellow fever epidemic is past, it is believed that demand is going to pick up and the shipments to Louisiana and lower Mississippi river points will increase. The coming of the Illinois Central railroad to this district within the next twelve months will mean much. It is believed that this road will participate largely in the handling of coal, and will give assistance in the development of the coalfields. Good prices obtain for coal.

Coke is still in short supply in this State. A number of ovens are to be started up in the next few weeks, when it is believed the situation will be relieved.

Cleveland. Sept. 26.

There are signs of distress in the coke situation. Prices have run up sharply during the past week and promise to go higher. The shortage of material is aggravated by a slack supply of cars. The advance during the week was to $3 for the best grades of 72-hour foundry coke and to $2.50 for furnace coke. Some of the off grades are selling for less.

The Lake coal situation is about on an even keel. The movement is rather slow. The rates remain as they have been, at 30c. to the head of the Lakes and 40c. to Lake Michigan. The price has not been changed, holding at $1.90 f. o. b. boats at Lake Erie ports for Lake three-quarter coal.

The steam-coal situation is still dragging. There is a good demand, but constant fear of over-production. About the only check on the market is the shortage of cars, limiting the supply in the open market. The price holds at about 95c. at mines for both Ohio and Pennsylvania. The best demand is for slack, which is selling at 50@60c. at mine in the Ohio district and about the same in the Pennsylvania field.

Pittsburg. Sept. 26.

Coal.—Prices continue firm on a basis of $1.10 a ton at the mine for run-of-mine. The outlook is better than it has been for some time, but producers are handicapped by a scarcity of railroad cars. The shortage of cars is preventing the full operation of the mines. A number of idle mines that were put in operation last week were forced to close owing to the lack of transportation facilities. The Pittsburg Coal Co. has announced that it will not participate in the convention to be held in Chicago on Nov. 22 for the purpose of forming a federation of bituminous coal operators, and the action was followed by several leading independent interests. It is not likely that the Pittsburg district will be represented in the convention. Unless the United Mine Workers succeed in making the mining rate uniform upon the termination of the present agreement, it is believed the operators who are parties to the interstate agreement will insist on a reduction to put them on a more equal footing with the non-union operators.

Connellsville Coke.—Prices have advanced and strictly Connellsville coke is quoted at $2.20@$2.30 for furnace and $2.50@$2.60 for foundry. Indications point to higher prices for next year. The shortage of cars caused a falling off in shipments. Production for the week amounted to 260,219 tons and the shipments aggregated 11,191 cars distributed as follows: To Pittsburg and river points, 4,179 cars; to points west of Pittsburg, 5,755 cars; to points east of Everson, 1,257 cars. This was a decrease of 465 cars compared with the shipments of the previous week.

San Francisco. Sept. 21.

The market continues quiet. Sales of fuel oil are good, and check any tendency to increase in coal prices.

Mr. J. W. Harrison's circular of Sept. 21 says: "Since our last there have been two cargoes of Australian coal received; total, 5,280 tons. On the coal loading list from Newcastle, there are 20 vessels, with a carrying capacity of about 54,000 tons; of these only three are so far reported as having sailed. At this date last year, there were 34 vessels on the chartered list with a carrying capacity of over 85,000 tons; this decrease of 31,000 tons from last year, shows very pronounced shrinkage in Colonial coal shipments. The difference does not appear to have caused any disturbance in the market prices locally, as the liberal deliveries from British Columbia and Washington have fully supplied all of our requirements. The collieries belonging to the Western Fuel Co. have not yet settled their labor troubles; steps are being taken and meeting are being held which should lead to an early compromise. Reports are being circulated that James Dunsmuir has been making purchases of new coalfields under the Dominion Government, that are reported to be promising properties. Our present spring weather is not inducing a generous consumption of domestic fuel, and for steam purposes fuel oil asserts its authority at prices which coal cannot possibly compete with."

For Coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, $8; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; White Ash, $5.25. For Rocky Mountain coals, in car lots, quotations are: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, $8.50. Eastern coals are nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland. For foreign coal quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

Sept. 27.

Imports of fuel into Spain for the seven months ending July 30 were, in metric tons:

	1904.	1905.	Changes.
Coal.....	1,295,608	1,243,956	D. 51,652
Coke.....	106,723	85,459	D. 21,264
Total.....	1,402,331	1,329,415	D. 72 916

These imports were chiefly from Great Britain.

Exports of fuel from Germany for the seven months ending July 31 were as follows, in metric tons:

	1904.	1905.	Changes.
Coal.....	9,945,413	9,739,459	D. 205,954
Coke.....	1,572,002	1,501,497	D. 70,505
Total.....	11,517,415	11,240,956	D. 276,459

In addition, there was about 12,000 tons of brown coal, or lignite, exported this year.

Imports of fuel into Germany for the seven months ending July 31 were, in metric tons:

	1904.	1905.	Changes.
Coal.....	3,748,397	5,755,352	I. 2,006,955
Brown coal.....	4,323,421	4,449,927	I. 126,506
Coke.....	296,250	417,496	I. 121,246
Total.....	8,368,068	10,622,775	I. 2,254,707

The more important imports of coal were from Great Britain. The brown coal was all from Austria.

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

	1904.	1905.	Changes.
Coal.....	68,807,303	67,358.403	D. 1,448,900
Brown coal.....	27,028,148	28,717,990	I. 1,689,842
Total mined.	95,835,451	96,076,393	I. 240,942
Coke made.....	7,035,239	7,976,175	I. 940,936
Briquettes made	6,354,122	7,097,135	I. 743,013

The coal production this year was diminished by the strikes in the early part of the year.

The production of coal in Russia for

15 years past is officially reported as follows, in metric tons:

1890	6,085,080	1898	12,333,500
1891	6 223 450	1899	14,311,200
1892	6,946,200	1900	16,135,600
1893	7,610,600	1901	16,507,240
1894	8,762,600	1902	16,431,440
1895	9,098,800	1903	17,818,000
1896	9,384,900	1904	19,318,370
1897	11,201,524		

The increase shown has been fairly steady. The gains in recent years have been chiefly from Poland and the Donetz basins.

Iron Trade Review.

NEW YORK, Sept. 27.

The iron market continues extremely active. In fact it has nearly reached the stage of two years ago, when pressure from buyers for deliveries resulted in premiums of all sorts on material. As usual in a rising market, buyers are showing a tendency to rush matters unduly, and the largely increased capacity of mills may be taxed before we are through. It looks as if consumers did not take this increase in productive capacity into account; if they did, they might be less excited than some of them are now.

The Steel Corporation and the Cambria Steel Co. have been buyers of outside pig iron, and the former will probably take further large quantities during the last quarter of the year. Their buying has put bessemer pig about on a basis of $15 at furnace. Steel billets are scarce and buyers are paying heavy premiums. The great rush is for structural steel, as might be expected from the extensive construction work in progress all over the country.

In short, a strong market and activity at mills and furnaces are assured for at least the first half of next year.

Birmingham. Sept. 25.

Southern iron manufacturers will find a ready demand for all their iron during the balance of this year. There is a good inquiry for iron to be delivered the first three months in next year, and sales already to some amount. Prices are firm and indications are that there will be but little change, if any, between now and the first of the coming year. The outward movement of iron is steady and the month's report will aggregate well. The orders in hand require considerable iron. With the exception of coke there appears to be an easy supply of raw material.

The demand is pretty well divided on the grades. Large interests are said to have been buying freely of late of the lower grades of iron. Stocks of iron on hand are being reduced right along. Consumers and brokers who bought liberally in this district and have been allowing their product to remain on the yards at the furnaces are beginning to ask for shipment.

The Tennessee Coal, Iron & Railroad Co. and the Sloss-Sheffield Steel & Iron Co. both report a steady production of iron. The Alabama Consolidated Coal & Iron Co. and the Republic Iron & Steel Co. each have three furnaces in blast.

The following quotations are given: No. 1 foundry, $12.50; No. 2 foundry, $12; No. 3 foundry, $11.50; No. 4 foundry, $11; gray forge, $10.50; No. 1 soft, $12.50; No. 2 soft, $12.

The steel plants at Ensley and Gadsden continue to operate steadily and the production is quite satisfactory. The shipments are equal to the production. It is understood that the Tennessee Co. has recently received inquiries as to steel rail, but there has been no new business placed. This company has practically placed its product all through next year and longer, perhaps.

Cleveland. Sept. 26.

Iron Ore.—The movement of ore down the Lakes is still heavy. It is estimated shipments during September will exceed 4,000,000 tons.

Pig Iron.—Buying of pig iron has become feverish. Business has been steady for the past six months, with prices good. Buyers have begun to plunge and from stable conditions a situation has developed which threatens a runaway market. Bessemer is selling now generally at $15 in the Valleys, and some material has been sold for $15.50 in the Valleys for delivery through the remainder of this year and the first half of next. While some foundry has been sold at $14.50@$14.75 during the past week, the bottom now is about $15, with some furnaces holding for and obtaining $15.50 in the Valley for long time delivery.

Finished Material.—The market is extremely strong for plates and standard rails. There is an acute shortage of structural steel and billets, in both of which premiums are being paid. The distress in structural is acute. The slack business in pipes is disappearing and special concessions in prices are withdrawn. Price cutting in sheets is also disappearing. The whole market has an appearance of feverish energy.

New York. Sept. 27.

Pig Iron.—Business has been active, and there has been almost a rush among buyers to fill their requirements. Late buyers find little comfort. There is talk of placing orders abroad for the first quarter of next year.

Prices have risen sharply. For Northern iron, in large lots, quotations are: No. 1 X, $16.75@$17.25; No. 2 X, $16.50@$16.75; No. 2 plain, $16@$16.50; forge, $15@$15.50. There has been a good deal of inquiry for basic pig; Northern sells at $15.50@$16; Virginia and Alabama the same. Virginia foundry has brought $17.25 for No. 1 and $16.85 for No. 2. For Southern iron, on dock, quotations are: No. 1 foundry, $16@$16.50; No. 2, $15.50@$16; No. 3, $15@$15.50; No. 4, $14.75@$15; No. 1 soft, $16.25@$16.50; No. 2 soft, $15.75@$16; gray forge, $14@$14.50. No. 1 soft is still scarce.

Warrant business is quiet. For October delivery, latest quotations are: $15.30 bid, $15.60 asked, for regular warrants; $15.40 bid, $15.85 asked, for foundry warrants.

Cast Iron Pipe.—Orders are a little slower, but the makers are all full of work. Current quotations for carload lots are on a basis of $27 per net ton, 6-in. pipe, at tidewater.

Bars.—Orders are less pressing, but premiums are still asked for early delivery. The base price is 1.645c. tidewater, but sales have run up to 1.795c. Steel bars are about the same price. Store trade is active, and 2.25c. is about the current price.

Plates.—Steel plates are still scarce for early delivery; premiums of 10c. per 100 lb. are being secured for deliveries within the next three months. Tank plates are 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.645c. up, according to width.

Structural Material.—New business is abundant, while all the mills, both consolidated and independent, are busy on old and new contracts. Individual orders are not large, but the aggregate is considerable and premiums are secured on prompt deliveries. Prices are higher. Beams under 15-in. are 1.845c. for large lots; over 15-in., 1.895c.; angles and channels, 1.845c., tidewater delivery. Large orders are not closed here, as a rule, but directly with mills.

Steel Rails.—New orders are reported, but none placed in this market. No change in standard sections. Light rails are in demand and higher, prices ranging from $22.50 for 35-lb., up to $27.50 for 12-lb. rails.

Old Material.—Demand is active, particularly for low-phosphorus scrap, while the whole market has a firm tone. Prices are higher. No. 1 railroad wrought brings around $19@$20; No. 1 yard wrought, $17@$18; machinery cast, $13.50@$14. There is demand for heavy steel melting scrap, and sales are made at $15@$16. These prices are on cars, Jersey City, or other terminal delivery.

Philadelphia. Sept. 27.

Pig Iron.—The prospect today is that some of our furnace companies will be obliged to withdraw from the market temporarily. Several of the interior isolated furnaces are asking more money for pig iron as they are well sold up, and they see an opportunity for getting a little more money. The tone of the market is very strong and prices are nominally advanced 50c. per ton. Bessemer iron has sold liberally, one lot of 20,000 tons going to the Cambria Steel Co. and 10,000 tons more are wanted. Basic iron is quietly mov-

ing, but no definite details can be had at present. Forge iron is selling in large lots; very little of it for early delivery. No. 2 foundry is quite active and is bringing the top price level. No. 1 X foundry is being chased after and it is quoted 50c. higher. No. 1 foundry is quoted at $17.50 @$18; No. 2X, $16.50@$17; No. 2 plain, $16.50; standard gray forge, $15@$15.50; basic, $16@$16.50; Southern No. 2 by rail, $16@$16.50.

Steel Billets.—Steel billets are very strong at $27.50 for basic; for forging billets sales have been made at $32.50, with $33.50 as an asking price.

Muck-bars.—Muck-bars are quoted at $28 and have sold to some extent.

Bars.—The card rate is being disregarded for early deliveries and business is being done at 1.73½c.

Merchant Steel.—Some business is being done this week at outside figures.

Pipes and Tubes.—There is an urgent demand for tubes and prices for early delivery have been slightly marked up.

Plates.—The extraordinary demand has hardened prices for early delivery. Quotations for tank in large lots are 1.73½; boiler steel, 1.83½; locomotive fire-box, 2.23½ cents.

Structural Material.—A large business has been done this week in structural material, in which the American Bridge Co. has figured. A great deal of winter construction work is being planned for office buildings and large warehouse work in connection with railroads. A further advance is inevitable.

Steel Rails.—During the past week, mostly for 1906 delivery, upward of 300,000 tons have been contracted for.

Old Material.—Old iron rails are quoted at $33; railroad scrap, $21; machinery scrap, $15.50; No. 1 steel scrap, $16.25, and wrought turnings, $14 per ton.

Pittsburg. Sept. 26.

Conditions in the iron and steel markets continue bright, but no particularly large transactions have developed during the week. It is reported today that the United States Steel Corporation is in the market for a heavy tonnage of bessemer pig iron, and may close for its requirements of outside iron for the rest of the year within a few days. Official information, as usual, is withheld, but it is believed contracts will be made this week for fully 100,000 tons for delivery in the fourth quarter at the minimum rate of $15, Valley furnaces. According to reports, the bulk of the order will go to the Bessemer Pig Iron Association and W. P. Snyder & Co., and part of it will be divided among several small independent interests. Details of the purchase of bessemer and basic iron by the Cambria Steel Co. have not been given officially, but it is understood the company bought 50,000 tons, and deliveries are to begin on October 1 and run into January. The price is $15, Valley furnace, or $16.30 delivered at Johnstown. While there are many inquiries for iron for delivery next year, furnaces are not quoting a price at present, but do not seem inclined to advance the price until later in the year. There is a good profit in bessemer iron at $15, and unless coke prices increase, it is believed that rate will prevail for the rest of the year. The demand for foundry iron has improved, and the asking prices have advanced to $15, Valley, but on a good order 25c. less could be done for No. 2 grade. The heavy rains in the Northwest have interfered with the mining and shipping of ore during the past week, but shipments to date are far ahead of previous years. It is now estimated that fully 32,000,000 tons will be brought down this season, or about 5,000,000 tons more than the record of 27,500,000 tons made in the season of 1902.

The scarcity of steel is more pronounced. An independent steel producer is in the market for 5,000 tons of billets, but so far has been unable to get the material, even at a stiff premium over the pool price. Other inquiries for billets amount to fully 30,000 tons, but so far the orders have not been placed. An advance of $2 a ton for open-hearth and $1 a ton for bessemer steel skelp has just been ordered. The minimum price on open-hearth skelp is now 1.65c. on sheared, and 1.60c. on grooved. Iron skelp prices are nominally the same as on open-hearth skelp. Most of the mills are sold up for the year. While there was no meeting of the plate pool last week, an agreement was entered into by all interests to advance the price of narrow plates $2 a ton. This was done by discontinuing the differential of $2 on plates 14-in. and under. The price is now 1.60c. for ¼-in. and heavier, 6¼ to 100-in. wide, inclusive. It is impossible to get early deliveries on plates, but large orders for next year are being placed, and the plate business for 1906 promises to exceed all former years. The business in structural material is very heavy, the large mills having specifications that will keep them busy for fully six months. Prices remain the same, based on 1.70c. for beams and channels, 15-in. and under, but on small lots large premiums are asked.

Great interest is being taken in the probable action of the convention of the International Association of Bridge & Structural Iron Workers in session in Philadelphia. The strike against the American Bridge Co., authorized by the executive board on Aug. 10, was indorsed and the question of extending it to the material of the company is to be considered. It is estimated that fully 60% of the material going into bridges and buildings is furnished by the American Bridge Co., and if the workers refuse to handle this material the result would be serious to building operations. Merchant steel bars are very active and mills are behind in deliveries. The ruling price of 1.50c. may be advanced before the end of the year. Sales of iron bars are now being made at 1.75c., Pittsburg, the price named by the leading producer about two weeks ago. This is an advance of $3 a ton since Aug. 1. Steel-rail orders aggregating about 100,000 tons have been placed within a week and a number of railroads have not yet completed their estimates of requirements for next year. It is impossible to buy new rails for early delivery and relaying rails are being bought in some sections at a sharp advance over former prices. The only weak line is merchant pipe and prices are lower than at any time since 1899. Sales are said to have been made at five points below the established discounts.

Pig Iron.—Outside of the iron bought by the Steel Corporation and the Cambria Steel Co., sales of bessemer iron during the week amounted to about 5,000 tons at $15@$15.25, Valley furnaces. Basic iron is held at $15, but this rate could be shaded by about 10c. a ton. Some sales of foundry No. 2 are reported to have been made for delivery next year and the market is stronger. The asking price is $15.85, Pittsburg, but $15.60 can be done. Sales of gray forge have been light and the price remains at $14.65@$14.75, Pittsburg.

Steel.—Billets cannot be quoted, as no sales have been made, but the price is nominally $25@$26 for both bessemer and open-hearth billets. Plates are firm at 1.60c. and merchant steel bars at 1.50c.

Sheets.—Despite the high prices for sheet-bars the price of sheets is unchanged. Black sheets are quoted at 2.30c., and galvanized at 3.30c., for No. 28 gauge.

Ferro-Manganese.—The price has advanced since the withdrawal of the Carnegie Steel Co. from the market, and last week sales were made at $52@$53. This week 80% is quoted at $54@$55 a ton in large lots.

Cartagena, Spain. Sept. 9.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that owing to the scarcity of tonnage and high rates of freight, no shipments of iron ore have taken place during the past week; nevertheless a healthy, firm tone pervades the local market, and several new contracts are reported as having been made for delivery over next year at from 1s. to 1s. 6d. per ton increased price, and even at these rates some shippers are declining to sell, anticipating still better prices later on.

Quotations are slightly higher. Ordinary 50% ore is 6s. 6d.@6s. 9d.; special low phosphorus, 6s. 10d.@7s. 8d.; specular ore, 58% iron, 10s. 3d.; S. P. Campanil, 9s. All prices are f. o. b. shipping port. Manganiferous ores, same terms, range from 10s. 6d. for 35% iron and 12% manganese, up to 17s. for 20% iron and 20% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton. Shipments were 100 tons copper pyrites to St. Louis du Rhone.

Dusseldorf, Germany. Sept. 15.

Exports of iron and steel from Germany in July were the largest reported for any month in the year, except May, the total being 276,325 metric tons. For the seven months ending July 31 the total exports were 1,639,491 tons in 1904, and 1,762,263 tons in 1905; an increase of 122,772 tons, or 7%. Imports, on the other hand, fell off this year. The total reported for the seven months was 212,887 tons in 1904, and 177,490 tons in 1905; a decrease of 35,397 tons, or 16.6% this year.

The output of the blast-furnaces, as reported by the German Iron & Steel Union for July, was 942,905 tons, being 24,731 tons more than in June, but 8,526 tons less than in May. For the seven months ending July 31 the total production of pig iron was, in metric tons:

	1904.	1905.	Changes.
Foundry iron	1,042,467	1,041,404	D. 1,063
Forge iron	479,030	468,771	D. 10,259
Steel pig	352,769	384,808	I. 32,039
Bessemer pig	255,789	229,063	D. 26,726
Thomas pig	3,716,685	3,917,447	I. 200,762
Total	5,846,740	6,041,493	I. 194,753

Steel pig, under the German classification, includes spiegeleisen, ferromanganese, ferrosilicon and all similar alloys. The increase this year was wholly in Thomas, or basic iron, which is the staple German product.

Heavy Chemicals and Minerals.

NEW YORK, Sept. 27.

The market for heavy chemicals holds even and firm, with no special features except for American sulphur, which is still firm at the recently advanced prices as noted. The Louisiana product is quoted at $22.50 in New York, Boston and Portland, with a quiet but steady improvement in the demand. Sicilian sulphur is still quoted at $22.25 for Atlantic ports.

Pyrite continues unchanged at 10@11c. per unit of sulphur for lump ore, with 25c. additional for breaking to furnace size; 9.5@10c. for fines f. o. b. Atlantic ports. Domestic pyrite sells at 11c. per unit for furnace size, and 10c. for fines f. o. b. shipping point. The market is even and demand steady. There are no large stocks to disturb it.

Sulphate of copper holds at about the same figures, and a fair business is reported.

Phosphate companies report the same quotations, with firm markets, and freights. Shipments of Florida phosphate rock through the port of Savannah in August are reported by J. M. Lang & Co. at 9,688 tons, of which 8,165 tons went to Germany and 1,523 tons to Holland.

Nitrate of soda is only slightly changed. Quotations are $2.20@$2.12½ per 100 lb. for the balance of the year.

Acids.		
Boric, crystals	per lb.	.10
powdered	"	.10½
Carbonic, liquid gas	"	.12½
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Nitric acid, 36°, 100 lb		$4.75
38°, 100 lb		5.25
40°, 100 lb		5.50
42°, 100 lb		5.75
Oxalic acid, com'l, 100 lb		$5.00@ 5.25
Sulphuric acid, 50°, bulk, ton		13.50@14.50
60°, 100 lb. in carboys		1.05
60°, bulk, ton		18.00@20.00
66°, 100 lb. in carboys		1.20
66°, bulk, ton		21.00@23.00
Blue Stone (Copper Sulphate), car-load lots, per 100 lb		$5.30
Nitrate of Soda, 100 lb		2.20@ 2.12½
Sulphate of Ammonia, per 100 lb		3.10@ 3.15

Phosphates.	F. o. b.	C. I. F. Gt. Britain or Europe.
*Fla., hard rock	$7.25@7.50	$10.67@11.85
land pebble	3.75@4.00	7.70@ 8.40
†Tenn., 78@80%	4.35@4.40	10.27@10.67
78%	3.75@4.00	.....
75%	3.40@3.50	.....
68@72%	3.00@3.25	.....
‡So. Car. land rock	3.75@4.00	.....
river rock	3.50@3.75	6.33@ 6.61
Algerian, 63@70%	.....	7.04@ 7.71
58@63%	.....	6.15@ 6.60
Tunis (Gafsa)	.....	6.00@ 6.60
Christmas Isle	.....	13.28@14.11
Ocean Isle	.....	13.60@14.45
Somme, Fr.	.....	11.39

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

Metal Market.

New York, Sept. 27.

Gold and Silver Exports and Imports.

At all United States Ports in August and Year.

Metal.	August.		Year.	
G'ld	1904.	1905.	1904.	1905.
Exp	$10,762,818	$274,153	$30,295,460	$41,265,017
Imp	7,764,491	3,146,223	64,453,635	24,699,625
Exc	E. $2,998,327	I. $2,872,070	E.$15,841,825	E$16,565,392
Silv.				
Exp	4,848,932	4,549,485	25,751,145	33,915,751
Imp	2,517,578	2,316,162	17,674,195	20,437,438
Exc	E. $2,331,354	E. $2,233,323	E.$18,076,950	$13,478,313

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

Gold and Silver Exports and Imports, N.Y.

For the week ending September 23, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	.....	$41,368	$ 869,299	$54,041
1905	32,285,443	1,450,700	25 169,367	3,187,523
1904	72,938,564	3,882,636	28,686,578	692,459
1903	31,416,903	6,324,730	21,668,787	2,938,638

There were no exports of gold for the week; the exports of silver all went to Great Britain. The imports, both of gold and silver, were from Mexico and the West Indies.

More gold has been taken in London for shipment to New York, and it is said that a considerable amount will come directly from Australia. The Bank of Germany has raised its discount rate to 4%, to stop any shipments of gold, and it is expected that the Bank of England will also raise its rate. The gold taken over a week ago is just beginning to arrive.

The statement of the New York banks —including all the banks represented in the Clearing House—for the week ending Sept. 23 gives the following totals, comparison being made with the corresponding week of 1904.

	1904.	1905.
Loans and discounts	$1,138,504,800	$1,075,440,600
Deposits	1,214,083,100	1,083,195,800
Circulation	40,719,200	53,712,300
Specie	251,967,500	200,454,400
Legal tenders	77,804,300	75,579,600
Total reserve	$329,771,800	$276,034,000
Legal requirements	303,520,775	270,798,950
Balance surplus	$26,251,025	$5,235,050

Changes for the week this year were decreases of $9,331,300 in loans, $1,720,800 in specie, $968,800 in legal tenders and $13,154,400 in deposits; increases of $599,750 in surplus reserve and $15,800 in circulation.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York Associated	$200,454,100	.....
England	176,156,970	.....
France	595,083,395	$220,930,635
Germany	174,550,000	58,180,000
Spain	74,685,000	112,780,000
Netherlands	32,987,500	30,659,000
Belgium	16,030,000	8,015,000
Italy	123,710,000	16,299,000
Russia	569,745,000	27,000,000
Austria	231,830,000	62,205,000

The returns of the Associated Banks of New York are of date Sept. 23, and the others Sept. 22. The foreign bank statements are from the *Commercial and Financial Chronicle,* of New York.

Shipments of silver from London to the East for the year up to Sept. 14 are reported by Messrs. Pixley & Abell, as follows:

	1904.	1905.	Changes.
India	£7,462,088	£4,305,121	D. £3,156,967
China	372,722	758,288	I. 385,566
Straits	58,103	2,800	D. 55,303
Totals	£7,892,913	£5,066,209	D. £2,826,704

Receipts for the week were £130,000 from New York. Exports were £32,500 to India.

Indian exchange has been only fairly firm. The Council bills offered in London were all taken at an average of 16.03d. per rupee, but the demand for bills was not especially active. It is understood that more silver will be bought soon for Indian coinage.

The movement of gold in France for the seven months ending July 31 is reported as follows:

	1904.	1905.
Imports	Fr. 529,110,000	Fr. 481,940,000
Exports	53,718,000	64,291,000
Excess, imp	Fr. 475,392,000	Fr. 417,649,000

The net imports of gold were 57,743,000 francs less than last year.

The movement of silver for the seven months was as follows:

	1904.	1905.
Exports	Fr. 74,631,000	Fr. 60,470,000
Imports	62,889,000	53,624,000
Excess exp.	Fr. 11,742,000	Fr. 6,846,000

Exports of copper and nickel coins were 238,000 francs in 1904, and 225,000 francs in 1905. Imports of these coins were 81,000 francs in 1904, and 95,000 francs this year.

The price of silver has been steady. Inquiry from India and Russia has absorbed supplies, but the market is slightly easier at the close.

SILVER AND STERLING EXCHANGE.

Sept.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Sept.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
21	4.85¼	61⅜	28 5/16	25	4.85¼	62	28⅜
22	4.85¼	61½	28⅜	26	4.85¼	61⅝	28⅛
23	4.85¼	61⅜	28⅜	27	4.85¼	61⅝	28⅛

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.47	$0.49
Peruvian soles and Chilean pesos	.43	.45
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

Other Metals.

Daily Prices of Metals in New York.

September.	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.
21	15¾ @16	15¾ @16	69⅞	32	4.85	5.90 @5.95	5.75 @5.80
22	15¾ @16	15¾ @16	69½	31¾	4.85	5.90 @5.95	5.75 @5.80
23	15¾ @16	15¾ @16	.....	31¾	4.85	5.90 @5.95	5.75 @5.80
25	15⅞ @16¼	15⅞ @16⅛	70	32	4.85	5.90 @6.00	5.75 @5.85
26	15⅞ @16¼	15⅞ @16⅛	71	32	4.85	5.90 @6.00	5.75 @5.85
27	16 @16⅜	16 @16¼	70⅞	32¼	4.85	5.90 @6.00	5.75 @5.85

London quotations are per long ton (2,240 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.

Copper.—During the past week the market has remained quiet. A little business has been done, but manufacturers, generally, both in this country and abroad, are not buying. On the other hand, there is no pressure to sell, producers being busy executing orders which they have on their books. The market, therefore, continues nominal. Transactions that have taken place appear to have been made at somewhat higher prices than last week, and at the close we quote Lake, 16@16⅜c.; electrolytic in ingots, cakes and wirebars at 16@16¼c.; cathodes at 15⅞@16⅛c.; casting copper at 15⅝@15⅞c.

In the London market for speculative copper there was a sharp rise this week in spot, which advanced from the opening on Thursday of £69 17s. 6d., to £71 on Tuesday, closing at £70 17s. 6d. for spot, £70 for three months. The stocks in warehouse there have been much reduced, which accounts for the present squeeze in warrants for early delivery.

Refined and manufactured sorts we quote: English tough, £74@£74 10s.; best selected, £75 10s.@£75 15s.; strong sheets, £84; India sheets, £79; yellow metal, 6⅞d.

Exports of copper from New York for the week were light, the quantity reported being only 1,873 tons. Our special correspondent reports the exports from Baltimore for the week at 1,038 long tons of fine copper.

Tin.—The market has been quiet but firm, and a fair business was done at 32@32¼c.

The London market has been quiet, but at the close is somewhat firmer. It opened on Thursday at £146 for spot, £145 for three months, and was about 5s. lower on Monday, but on Tuesday and Wednesday was up to £147. It closes at £147 for spot, £145 12s. 6d. for three months.

Lead.—The market is active at last prices, 4.85 New York, 4.77½ St. Louis.

The London market has advanced, Spanish lead being quoted at £14 2s. 6d., English lead at £14 5s.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is quiet, selling at 4.75@4.77½c., according to brand and delivery.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of Sept. 9, that silver has been 14.75 reales per ounce. Exchange is 33.15 pesetas to £1. Pig lead is 78.75 reales per quintal, which, on current exchange, is equal to £13 5s. 10d. per long ton, f. o. b Cartagena.

Spelter.—The market is firm. On the one hand, there is a good demand for the metal, and, on the other, the ore supply is scant. Higher prices have been paid, and we quote 5.75@5.85c. St. Louis, 5.90 @6c. New York.

The London market continues to advance, good ordinaries now being quoted £27, specials £27 5s.

Zinc Sheets.—Sheet zinc is quoted at $7.50 per 100 lb. (less discount of 8%), f. o. b. cars Lasalle and Peru, in 600-lb. casks, for gauges No. 9 to 22, both inclusive, widths from 32 to 60 in., both inclusive, and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since January 1, 1905, have been as follows: December 30, 1904, $7.25; January 7, 1905, $7.50; May 12, $7.25; June 1, $7; July 29, $7.25; August 10, $7.50. The demand is reported active.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Sept. 9, that prices are still 80 fr. per ton for blende, 35% zinc, and 60 fr. for calamine, 30% zinc. The market is strong and the mines are all busy. Exports for the week were 1,130 tons of blende to Swansea.

Antimony.—The market is unchanged, prices being 12¾@13¾, depending upon brands and deliveries.

Nickel.—Quotations for large lots, New York or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Platinum.—Quotations are firm at $20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated wire, 90c.; and cones, $1 per gram.

Quicksilver.—The market is quiet. The New York quotation is $40 per flask of 75 lb. for large orders, and $40.50@$41 for small lots. San Francisco prices hold steady at $39 for domestic orders, and $37.50@$38 for export business. The London market is unchanged, £7 2s. 6d. being quoted both by first hands and jobbers.

Manganese Alloys.—Prices for manganese alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 500 kg., delivered in Bremen, and are as follows, per 100 kilograms:

	Marks
Manganese Copper, No. 1, 30% Mn	265
No. 2, 28% Mn	175
No. 3, 20 to 25%	165
Manganese Tin, No. 1, 55% Mn., no iron	365
No. 2, 55% Mn., some iron	225
Manganese Nickel, No. 1, free of iron	450
No. 2, traces of iron	270

Manganese metal is quoted at 3.60 marks per kg.—38.8c. per lb.—delivered in Bremen.

Minor Metals.—For minor metals and their alloys, wholesale prices are f. o. b. works:

Aluminum.	Per lb.
No. 1, 90% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled Sheets	4c. up.
Aluminum-Bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Cadmium, f. o. b. Hamburg	77c
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	95c.
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (74%)	12½c.
Ferro-Tungsten (37%)	29c.
Magnesium, pure (N. Y.)	$1.60
Manganese (98@99% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N. Y.)	$1.75
Tantalic acid (N. Y.)	50c.
Thallium, f. o. b. Breslau, Germany	65@70c.
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best), pound lots	90c.

Variations in prices depend chiefly upon the size and condition of orders.

Missouri Ore Market.

JOPLIN, Sept. 23.

The highest price paid for zinc ore was $54 per ton, and the assay basis is reported at $47@$50 per ton of 60% zinc. Owing to the strong competition among purchasing agents, prices were not confined exclusively to an assay basis, and some ore was reported sold at a price on a flat bid higher than the equivalent of $50 for 60% zinc. This is further evident in the report that the basis price is no higher than last week, and the fact that the high price is $4 per ton above the price reported for 60% zinc. Silicate ores sold from $19@$30 per ton and the average of all grades was $45.12 per ton.

The Badger mines outputted this week, the first since the week of July 5, when the mines were filled with an overflow from Spring river. It has required just ten weeks to put miners back in the ground and not for a week or two more will they be outputting at the former rate. It is found that the water in the lower ground is unusually heavy, and this week's production is from the upper ground.

For the fifth week lead sold at $63.50 per ton for the choicest bins, and $63 per ton for 80% grades, an average for all grades of $62.74, all the ore being purchased by local smelters.

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

	Zinc, lb.	Lead, lb.	Value.
Carterville-Webb City	1,933,830	471,580	$59,330
Joplin	3,053,250	275,180	83,470
Galena-Empire	1,081 890	114,900	27,970
Duenweg	632,110	110,920	18,030
Neck City	615,790	.....	15,700
Aurora	867,080	.....	14,480
Alba	542,470	.....	13,830
Oronogo	330,670	450	8,150
Granby	520,000	20,000	6,880
Baxter Springs	165,550	74,840	5,670
Carthage	213,480	.....	5,440
Prosperity	134,700	67,660	5,230
Badger	152,510	8,270	3,850
Beef Branch	73,210	16,710	1,370
Zincite	40,980	1,610	1,030
Sherwood	33,980	5,500	990
Sarcoxie	41,270	.....	980
Spurgeon	46,140	6,370	850
Central City	36,020	.....	810
Totals	10,514,930	1,173,890	$274,060
38 weeks	366,821,260	44,851,590	$9,530,045
Zinc value, the week, $237,235; 38 weeks, $8,206,645			
Lead value, the week, 36,825; 38 weeks, 1,323,400			

The average prices for zinc ore for the week were $45.12; for the year, $44.74 per ton. For lead ore the average was $62.74 per ton for the week, and $59.02 for the year.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
Jan.	33.33	52.00	Jan.	55.55	61 50
Feb.	33.63	52.77	Feb.	56.37	57.62
March	35.40	47.40	March	57.20	57.20
April.	35.75	42.88	April.	58.00	58.00
May	34.87	43.31	May	57.77	58.27
June.	32.93	40.75	June.	56.60	57.80
July.	33.37	43.00	July.	53.00	58.00
August	37.55	48.83	August	53.00	58.00

Wisconsin Ore Market.

PLATTEVILLE, Sept. 22.

The market for zinc ore for the past week has been characterized by a little lower prices. Buyers have been quite active, and have taken all the ore in sight. It is reported locally that the reserve ore at Mineral Point is getting down near a minimum. The zinc ore from the St. Rose mine sold for $40; the highest price reported was $45. Lead remains stationary at $29@$30 per 1,000 lb., with a good demand.

Mining Stocks.

New York. Sept. 27.

Speculation is still rather of a professional kind, and the public is not coming into the market on a large scale. Just now there is a little weakness, but this may not last, and is probably due to the current high rates for money. The better stocks have suffered little from the change, and today's market shows an upward turn.

In the outside market there was a good deal of trading, but no marked changes in quotations. Mitchell Mining sold at $7¾; Union Copper at $1⅜; United Copper at $34½@$33½ for the common, and $77 for the preferred. The Greene stocks were not much in evidence. Green Copper sold at $25¼, and Greene Gold at $4 per share.

On the Consolidated Exchange there were the usual moderate dealings in Comstock shares. Alice, of Montana, put in an appearance at 53c. Brunswick, of California, was again dealt in at 42c. The Cripple Creek stocks showed little change, but a fair demand. There is some interest in the new Nevada stocks, and Tonopah Belmont showed sales at $1.40; Ohio Tonopah at 30c.; Original Bullfrog at 24c. A little more interest is apparent in mining stocks generally.

Boston. Sept. 26.

The copper-share market continues to broaden, much to the satisfaction of brokers and customers alike. Present indications are that there will be no abatement in the price of the metal for some time to come, and the mining companies will continue to reap the benefit of the present high prices. No better bull argument than this could be brought forward for a continued improvement in the share market. At present, "Kearsarge" is the magic word, and any mine that comes within its scope is easily made to move upward. Of course, properties in other districts besides the Lake show an improvement marketwise, but the most activity is seen in stocks in that region.

Allouez has been the main feature this week, touching $39.75 today, against last week's close at $33. Underground developments continue to improve. While the rock has been running 44 lb. to the ton lately, as high as 65 lb. has been secured. Trading in this stock has been extremely heavy the past week on this knowledge. Seneca, which is a curb stock, jumped up $20 from Saturday to Monday, touching $60 per share. As there are but 20,000 shares of this stock, this would be equivalent to $12 per share on a 100,000-share basis, which is the ordinary capitalization of most of the Lake mines.

Atlantic rose to $27 per share last week, but this brought considerable realizing, and the price fell back to $26.75, but rallied to $27 today. Franklin has also done well, rising $3 to $16.50. Tecumseh stiffened $1.12½ to $10.12½. The Kearsarge lode has been intercepted at a depth of 185 ft., which is the cause of the activity in this stock.

Mohawk continues in fair request, although it is less speculative than some of the above-mentioned. However, it is up $2.50 for the week to $58.50. The increase in the Anaconda dividend gives hope that the next Amalgamated dividend will be increased. The latter has been heavy lately, although it closes with a net gain of $1.25 at $83.12½. United States has given a good account of itself, having risen $2.25 to $37.50, and North Butte has again been conspicuous. The latter is up $3.62½ to $48.62½. Although an attempt was made to depress United Copper, thus far the stock has gone off but $2.87½ to $36.87½, with a subsequent recovery to $34.

Copper Range is up $2.75 to $72.. A $2.50 dividend was declared by Baltic this week, which practically all goes to Copper Range. Adventure is up $2 to $7.25, Centennial $2.37½ to $26.50, while Isle Royale, which fell $2.75 to $21, is back to $22.25. Mass is up $1 to $9.50, and Michigan $1 to $14.25. Parrot has advanced $1 to $27, and Rhode Island $1.75 to $6. Shannon has moved $1 to $8, Utah $1.50 to $46.50, and Winona $1.50 to $11.75. Ahmeek touched $64 today.

Colorado Springs. Sept. 22.

The Cripple Creek stocks have been in somewhat better demand during the past week, and prices have advanced in a number of instances, but no sensational changes have been noticed. Elkton made the most marked gain, increasing from 44 to 56½c. This mine has increased its force of miners and there is a rumor that a good strike has been made. El Paso again reached the low mark of 76c. during the week, but closed today at 81c. Findley has made a slight gain, selling today for 79c. Portland remains at the same old price of $2.25. Isabella is selling at 28½c. Gold Sovereign has shaded off a fraction, selling today for 11⅛c. Gold Coin sold during the week for 15, and United Gold Mines at the same figure. Golden Cycle is quoted at 60@70c.; Independence at 12½@15c. Acacia made an advance from 12⅜ to 14¾c., but dropped off to 12¼c. today. Preliminary work on the great

drainage tunnel has been started, and it is estimated it will take two years to complete.

San Francisco Sept. 21.

The Comstock shares were quiet, but steady most of the week; but toward the close there was a little break in the North End and Middle stocks. The Gold Hill stocks were firm, especially Caledonia. Ophir sold at $5.25; Consolidated California & Virginia, $1.25; Hale & Norcross, $1.15; Caledonia, 48c.; Sierra Nevada, 35c. per share.

The Tonopah stocks were fairly active and prices firm. There was some good buying, especially in the low-priced stocks. Montana Tonopah was quoted at $3; Tonopah Midway, $1.60@$1.65; Tonopah Belmont, $1.45@$1.50; West End, $1.05; McNamara, 40c. per share.

Oil shares were quiet, with little change. Claremont sold at 75c.; Independence, 27c. The largest business was in these two stocks.

Dividends.

Company.	Payable.	Rate.	Amount.
Amer. Smelting & Ref.	Oct. 16	$1.75	$875,000
Amer Smelting & Ref., pfd.	Oct. 2	1.75	875,000
Anaconda Copper	Oct. 19	1.25	1,500 000
Baltic Copper	Sept. 23	2.50	250,000
Central Coal & Coke	Oct. 15	1.50	76,875
Central Coal & Coke, pfd	Oct. 15	1.25	23,437
Copper Range	Sept. 30	1.00	383,781
Gen. Chemical pfd	Oct. 2	1.50	150,000
New Idria Qnicksilver	Oct. 2	0.20	20,000
Philadelphia Co.	Nov. 1	0.75	434,295
Republic Iron & Steel, pfd.	Oct. 2	1.75	364,910
Sloss-Sheffield St. & Iron	Oct.	2.50	187,750
Sloss-Sheffield, pfd.	Oct.	1.75	117,250
Tenn. Coal, Iron & R. R.	Nov. 1	1.00	225,536
Tenn. Coal, I. & R. R, pfd.	Nov. 1	2.00	4,960
Tonopah Extension	Oct. 1	0.10	100 000
U. S. Reduction	Oct. 1	.01½	90,000
Va.-Carolina Chem., pfd.	Oct. 16	2.00	360,000
Westmoreland Coal	Oct.	2.50	150,000
Wolverine	Oct. 7	6 00	360,000

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

Assessments.

Company.	Delinq.	Sale.	Amt
Anaconda Tonopah	Sept. 23	Oct. 14	0.02
Bullion	Sept. 14	Oct. 5	0.05
Bunker Hill	Sept. 27	.....	0.05
Caledonia	Sept. 6	Sept. 28	0.10
Con. Cal. & Va	Sept. 14	Oct. 5	0.25
Con. Imperial	Oct. 2	Oct. 26	0 01
Exchequer	Sept. 6	Oct. 10	0 05
Gonld & Curry	Sept. 18	Oct. 6	0.10
Potosi	Sept. 5	Oct. 16	0.10
Sheba Gold and Silver	Sept. 15	Oct. 16	0 02
Socrates Con	Sept. 30	.....	0.02
Yellow Jacket	Oct. 17	Nov. 22	0 10

St. Louis. Sept. 23.

	High.	Low.
Adams	$ .40	$ .25
American Nettie	.09	.07
Center Creek	2.25	1.50
Central Coal & Coke	65.00	64.50
" " " pfd	78.50	77.50
Columbia	1.00	.25
Con. Coal	30.00	29.00
Doe Run	140.00	137.00
Granite Bimetallic	.20	.15
St. Joe	16.00	15.00

LONDON. (*By Cable.**) Sept. 26.

	£	s.	d.
Camp Bird	1	19	6
Consolidated Gold Fields	6	11	3
De Beers	18	0	0
Dolores	$8.00 @ 8.50		
East Rand	7	10	0
El Oro	1	15	0
Esperanza	5	9	0@5 11 0
Modderfontein	9	3	9
Rand Mines	9	0	0
Rio Tinto	65	5	0
Simmer and Jack	1	13	0
Stratton's Independence	0	8	3
Tomboy	1	9	6

*Furnished by Wm. P. Bonbright & Co., New York.

STOCK QUOTATIONS.

NEW YORK. Week Sept. 26.

Name of Company.	High	Low	Clg.	Sales
*Amalgamated	83⅜	81⅛	81⅛	127,590
Anaconda	123	116	117¾	43,100
British Col. Copper	8½	8	8	6,400
Federal	112	110	.....	400
Federal, Pf.	92⅞	92	92	1,500
Greene Copper	25⅞	25	25⅛	11,500
Greene Gold	4¼	3¾	3⅞	7,200
Mitchell	8⅜	6½	7⅛	11,050
Tennessee Copper	34½	32	34½	1,400
Union Copper	1⅝	1¼	1¼	6,250
United Copper,	35½	32	32	9,100
United Copper, Pref.	77¼	76	77	640
White Knob	1⅛	1½	1/16	1,600

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	128¼	126⅜	126½	47,595
Am. Smelting & Ref., Pf.	122	121	121¼	2,400
Colorado Fuel & Iron	45½	43⅝	43⅜	31,400
National Lead	47¾	46	46	16,625
Pittsburg Coal	15½	13½	15	1,000
Pittsburg Coal, Pf.	59½	54	59½	2,450
Republic I. & S.	24⅝	23	23	29,460
Republic I. & S., Pf	95⅛	90½	90⅛	11,500
Tenn. Coal & Iron	88⅞	86⅜	86⅞	18,500
U. S. Red. & Ref.	30	29	29	500
U. S. Red. & Ref., Pf.	69¾	67	67	1,400
U. S. Steel	38¼	36⅝	37¾	289,308
U. S. Steel, Pf.	105¼	104⅜	104¼	83,500
Bethlehem Steel	29⅜	29	29½	1,000
Standard Oil	638	628	633	177

BOSTON.

Allouez	39¾	33	39½	26,140
Amalgamated	83⅜	81½	81½	15,019
Atlantic	27¼	23¾	26½	28,712
Bingham	31	30⅛	30½	2,575
Boston Consolidated	8⅜	7¼	8	4,265
Calumet & Hecla	665	660	660½	83
§Centennial	27	25½	25½	5,580
Mercur	.57	.54	.56	2,150
Copper Range	72¼	69	71⅛	18,319
Daly-West	14½	13½	14⅛	530
Franklin	16½	13¾	14½	14,094
Granby	7⅞	7¾	7⅝	4,796
Green Con. Copper	25⅝	25	25⅛	5,936
Isle Royale	23¾	21	21	4,665
‡Mass	9⅛	8	8¾	1,783
Michigan	14½	13½	14	1,900
Mohawk	58½	56¼	57¼	3,608
*North Butte	48¾	44¼	47⅞	14,700
Old Dominion	27⅛	26¾	26¾	1,630
*Osceola	102	100	101⅜	1,888
*Parrot	27	25½	25½	1,735
Phoenix	1	1	1	675
Quincy	106	101	105	264
Rhode Island	6	4½	5	13,039
Shannon	8	7	7¾	11,210
Tamarack	125	119½	123	157
Tecumseh	10½	9	9⅝	15,022
United Copper, com	36	25	31	5,585
United States	38⅛	35¼	36⅞	30,862
Utah	46½	44¾	46⅛	6,731
Wolverine	119	118	118	185

PHILADELPHIA.

Cambria Steel	28½	27¼	27½	5,962
Philadelphia Co	48¼	47	47⅝	10,667
Tonopah	13⅞	13½	13½	1,931

PITTSBURG.

Crucible Steel	13¼	12¾	13⅛	5,927
Crucible Steel, Pref.	69⅜	65⅞	68½	4,714
Tonopah Ext	6.20	6.00	6.00	4,810

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	50	56	50	50½
El Paso	82	84	80¼	84
Isabella	27¾	28¼	27¾	28
Portland	220	230	220	220
Vindicator	77	77	77	77

SAN FRANCISCO.

Best & Belcher	1.10	1.20	1.05	1.05
Bullion	.38	.38	.36	.36
Caledonia	.48	.48	.40	.43
Confidence	.75	.75	.75	.75
Con. Cal. & Va	1.25	1.30	1.25	1.25
Gould & Curry	.21	.21	.18	.19
Hale & Norcross	1.15	1.15	1.10	1.10
Mexican	1.05	1.10	1.00	1.00
Occidental Con	.87	.87	.87	.87
Ophir	5.12½	5.37½	5.12½	5.12½
Savage	.56	.60	.56	.56

*Ex-dividend. †1st Installment Paid.
‡Assessment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	58.046	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.430	57.832	25.578	26.664
June	55.673	58.428	25.644	26.910
July	58.095	58.915	26.760	27.163
August	57.806	60.259	26.591	27.822
September	57.120	.....	26.349	.....
October	57.923	.....	26.760	.....
November	58.453	.....	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1904.	1905.	1904.	1905.	1904.	1905.
Jan.	12.410	15.008	12.553	15.128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.963
March	12.299	15.125	12.551	15.250	57.321	68.174
April	12.923	14.920	13.120	15.045	58.247	67.017
May	12.758	14.627	13.000	14.820	57.321	64.875
June	12.269	14.673	12.399	14.813	56.398	65.881
July	12.380	14.888	12.505	15.005	57.256	66.887
Aug.	12.343	15.664	12.468	15.725	56.952	69.830
Sept.	12.495	.....	12.620	.....	57.645	.....
Oct.	12.993	.....	13.118	.....	60.012	.....
Nov.	14.284	.....	14.456	.....	65.085	.....
Dec.	14.661	.....	14.849	.....	66.384	.....
Year	12.823	.....	12.990	.....	58.587	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	28.845	29.325	July	26.573	31 760
Feb.	28.087	29.262	August	27.012	32.866
Mar.	28.317	29.523	Sept.	27.780	.....
April	28.132	30.525	Oct.	28.596	.....
May	27.718	30.049	Nov.	29.185	.....
June	26.325	30.329	Dec.	29.286	.....
			Av., year.	27.986	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July	4.192	4.524
Feb.	4.375	4.450	Aug.	4.111	4.665
Mar.	4.475	4.470	Sept.	4.200	.....
April	4.475	4.500	Oct.	4.200	.....
May	4.423	4.500	Nov.	4.200	.....
June	4.496	4.500	Dec.	4.600	.....
			Av., year.	4.309	.....

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905.	1905.
January	4.863	6.190	4.673	6.032	25.063
February	4.916	6.139	4.717	5.989	24.594
March	5.057	6.067	4.841	5.917	23.825
April	5.219	5.817	5.038	5.667	23.813
May	5.031	5.434	4.853	5.284	23.594
June	4.760	5.190	4.596	5.040	23.875
July	4.873	5.396	4.723	5.247	23.938
August	4.866	5.706	4.716	5.556	24.675
September	5.046	.....	4.896	.....	.....
October	5.181	.....	5.033	.....	.....
November	5.513	.....	5.363	.....	.....
December	5.872	.....	5.720	.....	.....
Year	5.100	.....	4.931	.....	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.

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

(See also Market Reviews.)

ABRASIVES—		
Bort as to size	carat,	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, powd	lb.	.08
Grains	"	.10
Corundum, N. C	"	.07@.10
Chester, Mass	"	.04½@.05
Craigmont, Ont	"	.05½@.06¼
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Garnet, per quality	ton	25.00@35.00
Pumice Stone, Am. Powd.	lb.	.01 3-5@.02
Italian, powdered	"	.01¼@.01½
Lump, per quality	"	.04
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ALCOHOL—Grain	gal.	2.38
Refined wood, 95@97%	"	.70@.75
Purified	"	1.25@1.30
ALUM—Lump	100 lb.	1.75
Ground	"	1.85
Chrome Alum	lb.	0.05
ALUMINUM—Sulphate, com'l.	"	75@1.25
AMMONIUM—		
Bromide	lb.	.22
Carbonate	"	.08
Muriate grain	"	.05⅝@.05¾
Lump	"	.09½
Sulphocyanide com.	"	.25
" " chem. pure	"	.35
ARSENIC—White	"	.02¾@.03
Red	"	.06⅜@.06⅝
ASPHALTUM—		
Barbadoes	"	.02½@.03
Cuban	"	.01½@.03½
Egyptian, crude	"	.06@.07
Gilsonite, Utah ordinary	"	.03@.03½
Trinidad	"	35.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton.	25.00@27.00
92@98%	"	28.00@29.00
Powdered 80@90%	lb.	.01½@.02
Chloride com'l	100 lb.	1.35@1.50
Chem. pure cryst	lb.	.05
Nitrite, powdered	"	.05
Sulphate (Blanc Fixe)	"	.02
BARYTES—		
Am. Crude No 1	sh. ton.	9.75
Crude No. 2	"	8.00
Crude No. 3	"	7.00
Floated	"	16.75@18.00
Foreign floated	"	20.00
Snow-white	"	17.25@18.75
BAUXITE—Ga. or Ala. Mines: First grade	lg. ton.	5.25@5.50
Second grade	"	4.50@4.75
Arkansas, first grade	lg. "	5.00@5.50
Second grade	"	4.50@4.75
Washed ore	"	6.00@7.00
BONE ASH	100 lb.	.02½@.02½
BORAX	"	.07½@.07½
CALCIUM—Acetate, gray	"	2.30
Acetate, brown	"	1.55
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. works	"	9.00@10.00
CEMENT—		
Portland, Am. 500 lb.	bbl.	1.55@1.60
Foreign	"	1.25@1.75
"Rosendale," 300 lb.	"	.85
(in sacks)	"	.65
Slag cement	"	.75@1.25
CHLORINE—Liquid		.30
Water		.10
CHROME ORE— (50%) ex-ship N. Y.	lg. ton.	18.50@19.00
Bricks, f.o.b. Pittsburg, M.	"	175.00
CLAY, CHINA—Am. common ex-dock, N. Y	"	7.75@8.00
Am. best ex-dock, N. Y	"	9.00@9.25
English, common	"	11.00@11.25
Best	"	16.75
COPPERAS—Bulk	100 lb.	$0.47½
In bbls	"	.52½
CRYOLITE	lb.	.06½
EXPLOSIVES—		
Blasting powder, A	.25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.11@.11½
FELDSPAR—Ground	sh. ton.	9.75@10.00
FIRE BRICK.		
American	per M.	20.00@30.00
Imported	"	30.00@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
FULLER'S EARTH—Lump	100 lb.	.80
Powdered	"	.85
GRAPHITE—		
Ceylon, common pulv	"	.02¾@.03½
Best, pulverized	"	.04@.08
German, com. pulv	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian, pulverized	"	.01½
GYPSUM—Ground	sh. ton.	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton.	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—		
Ground Am. best	"	20.00
French	"	37.50
German	"	40.00
LEAD—Acetate, white	lb.	.09@.09⅝
Brown	"	.07@.07½
Nitrate, com'l	"	.06½
" granular	"	.08¼
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	6.50@7.00
Calcined	sh. ton.	16.50@17.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	lb.	.01¾
Sulphate	100 lb.	.50@1.25
MANGANESE—		
Crude powdered: 70@75% binoxide	lb.	.01¼@.01½
75@85% binoxide	"	.01½@.02¾
85@90% binoxide	"	.02¾@.03½
90@95% binoxide	"	.03½@.05½
Ore	unit.	.18@.20
MARBLE—Flour	sh. ton.	6.00@7.00
MINERAL WOOL—		
Slag, ordinary	"	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
MONAZITE SAND— Guar. 97%, with 5% Thorium oxide	lb.	.10
NICKEL—		
Oxide, crude, 100 lb. (at .55 for fine metal contained		.35@.40
Sulphate, single	100 lb,	.22@.25
" double	"	.13@.15
OZOKERITE	lb.	11½
PAINTS AND COLORS—		
Litharge, Am. powdered	"	.05½@.06½
English glassmakers'	"	.08½@.08⅞
Lithophone	"	.03½@.06½
Metallic, brown	sh. ton.	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½
French, washed	"	.01½@.01⅞
Paris green, pure, bulk	"	.12
Red lead, American	"	.06½@.06½
Foreign	"	.07@.08½
Turpentine, spirits	gal.	.64
White lead, Am., dry	lb.	.05½@.05½
American, in oil	"	.06½@.06½
Foreign, in oil	"	.09@.09½
Zinc white, Am. extra dry	"	.04½@.04½
Foreign, red seal, dry	"	.06@.08½
Green seal, dry	"	.06½@.09½
POTASSIUM—		
Bicarbonate crystal	lb.	$0 08½
Powdered or granulated	"	.14
Bichromate, Am	"	.08½@.08¾
Scotch	"	.08⅝@.08¾
Bromide	"	.15
Carbonate (80@85%)	"	3.50@4.00
Caustic, ordinary	"	.04½
Elect. (90%)	"	.06½
Chlorate, powdered	"	.08½@.08½
Crystals	"	.08½@.08½
Cyanide (98@99%)	"	.18@.19
Kainit (bulk)	g. ton.	8.50
Manure salt 20%	"	14.75@15.75
Double Manure Salt, 48@53%	100 lb.	1.16½@1.19½
Muriate	"	1.90@1.95
Permanganate	lb.	.09½@.09⅝
Prussiate, yellow	"	.13½@.13½
Red	"	.35
Sulphate	100 lb.	2.18½@2.21½
SALT—N. Y. com. fine 280 lb. bbl.		.72@1.18
N. Y. agricultural	sh. ton.	4.40
SALTPETER—Crude	100 lb.	4.00@4.25
Refined	"	4.25@4.75
SILICA—		
Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
Infusorial earth, crude		25.00
Calcined and floated		32.00
SILVER—Nitrate, crystals	oz.	.36¼
SODIUM—		
Acetate	lb.	0.04¼
Bicarb., ord., bulk, f.o.b. works	100 lb.	1.30
Extra domes, f.o.b. works	"	3.50
Bichromate	lb.	.06⅜
Bromide	"	.20
Carbonated ash, high test, in bags, f.o.b., works	100 lb.	.75@.77½
Foreign, f.o.b. N. Y	"	.85@.87½
Caustic, 60@78%, f.o.b., works	"	1.75@1.85
Foreign, f.o.b. N. Y	"	1.90@1.95
Chlorate, com'l	"	.08½@.08½
Cyanide, ("100% KCN")	"	.18@.19
Hyposulphite, Am	"	1.50@1.60
German	"	1.75@2.00
Phosphate	lb.	.02½@.02½
Prussiate	"	.09¼@.09½
Sal soda, f.o.b. works	100 lb.	.60
Foreign, f.o.b. N. Y	"	.85
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lb.	.65
SULPHUR—Best seconds, per ton.		21.00
Roll	lb.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.20
TALC—North Carolina	sh. ton.	15.50@23.50
N. Y. Fibrous best	"	10.25
French, best	"	20.00
Italian, best	"	30.00
TAR—Oil bbl. (50 gal.)	bbl.	5.40
TIN—Bi-chloride, 45%	lb.	.09⅛
Crystals	"	.23⅛
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic ch. pure	"	.07@.09⅞
Chloride solution, com'l	"	.02½
Chloride, granular	"	.04½@.04⅞
Dust	"	.05½@.05⅞
Sulphate	"	.02@.02½

The Rare Earths.

BORON—Nitrate	lb.	$1.50
CERIUM—Nitrate	"	12.00
DIDYMIUM—Nitrate	"	45.00
ERBIUM—Nitrate	"	67.50
GLUCINUM—Nitrate	"	13.50
LANTHANUM—Nitrate	"	56.00
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07@.07½
THORIUM—Nit. 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	10.00

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.