The Engineering and Mining Journal

VOL. LXXXIV. NEW YORK, DECEMBER 21, 1907. NO. 25.

Testing Placer Ground with the Keystone Drill

Methods and Some of the Difficulties of Driving Pipe, Drilling and Pumping so as to Secure a Representative Sample

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The terms properly used in drill investigations for describing the constituents and the characteristics of placer gravel vary somewhat from the meaning of the words as usually defined. Gravel may be loose, medium, firm, very firm, or very hard. It is difficult to define these terms exactly, for they are all relative.

Speaking broadly, loose gravel can be worked easily with a pick; a prospecting shaft sunk in it would require timbers and close lagging. Drive-pipe may be driven a foot in such material in one or two minutes, although often, particularly when the drill hole is shallow, the pipe will go down ½ in. per stroke. (In driving at full speed about 60 to 65 thirty-six-inch strokes may be made per minute.)

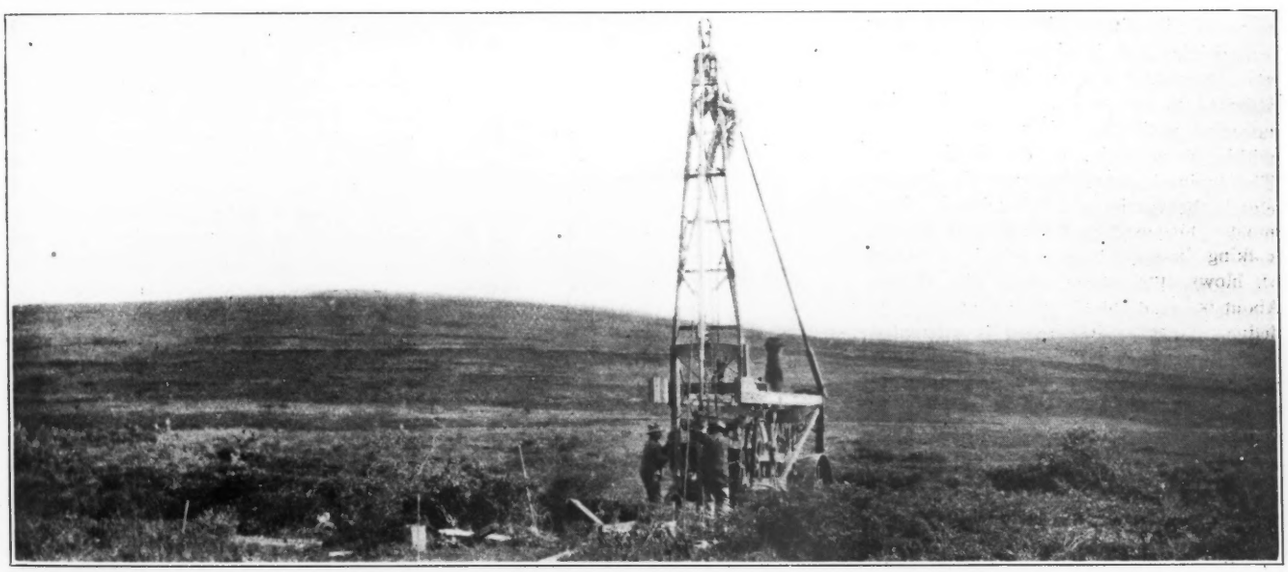
Medium gravel can be worked easily with a pick; a prospecting shaft sunk in it would require some timbering and lagging. Drive-pipe will be driven one foot in it in two or three minutes.

Firm gravel can be worked with a pick; a prospecting shaft sunk in it requires no timbering and lagging unless the ground is wet or the shaft is to be used for a considerable time; the rate of driving is one foot in three or four minutes.

Very firm gravel may be worked with a pick; a prospecting shaft sunk in it would require no timbering unless it were to be used indefinitely. Such gravel, though hard picking, could not be drilled and blasted in shaft-sinking advantageously, for it is not firm enough to stand drilling with hand drills. It may be blasted by using a "gopher" or "moiling" bar, which is like a pinch bar except that it has a longer point like a pick. A hole may conveniently be put down by this means 12 to 18 in. Drive-pipe may be driven one foot in four or five minutes in very firm gravel.

Very hard gravel can hardly be worked with a pick. A prospecting shaft sunk in it would require no timbering. In shaft-sinking it would require drilling and blasting. Drive-pipe may be driven in it, at times, one foot in 5 to 10 minutes, if no boulders are encountered. If big boulders are met through which the shoe cannot be driven, it is impossible to drive the foot required without first drilling and pumping out, leaving a usual after-pumping core, and then drilling below the drive-pipe until the boulder is crushed. (The hole must never be pumped below the drive-pipe.) After the boulder is crushed, driving is resorted to to finish the depth desired.

Bedrock in the terminology of the placer-ground driller means the bottom to which the investigation is carried. It may be a tuff or "false bedrock" with gravel under it, or a "true bedrock" such as slate or granite. The limit below which gold is not found in paying quantity or below which dredging cannot be conducted often determines the general depth of drill investigation.



USING CHAIN BLOCKS TO AID IN PULLING PIPE

Gravel may be sandy, fine, medium or coarse. Fine gravel is that in which pebbles about 2 in. in diameter or smaller predominate; it is usually sandy also. In medium gravel the predominating cobbles are about 6 in. in diameter, while in coarse gravel the predominating cobbles and boulders are more than 6 in. in diameter.

The distinctions here employed as to the hardness of gravel are those used in dredging practice. The very hard gravel of the dredge-man is barely moderately hard for the drift miner or hydraulic operator who may pulverize thoroughly by heavy blasts before the gold can be

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recovered. There are drift mines working in gravel which is treated with stamps after it has been loosened by means of machine drills and heavy blasts.

Driving Pipe

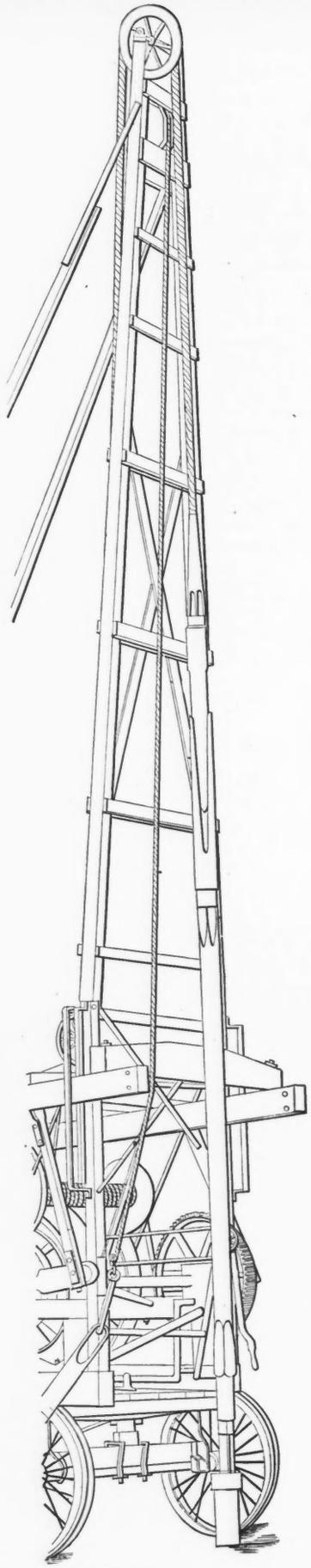
The term "casing" may be applied to anything used to curb or case a well or hole. Commercially it means a class of iron tubing which is too light for driving in alluvion. Its joints are not made to "shoulder up" snugly in the collars, and in using it there is therefore constant danger of stripping the threads. Casing 6 in. in diameter is made in three weights, 10, 12 and 14 lb. to the foot. Good drive-pipe of this size weighs 19 lb. to the foot and its joints are carefully turned to "shoulder up" in the collars.

In case there is a surface concentration of gold the drive-pipe is started immediately after the drill has been set up and prepared for operation, but usually a hole similar to a post-hole is dug in the soil if the surface material is barren. It is somewhat easier to start the casing if a preliminary hole is dug; but this is not good practice if there is any gold at or very near the surface.

After the hole has been prepared, a piece of pipe fitted with a driving shoe and driving cap is plumbed in the hole and tamped. The driving clamps are attached to the tool and the drill cable unreeled until the driving clamps hang within about 2 in. of the driving cap. The engine is speeded up and the friction clutch thrown in and the cable is alternately shortened and lengthened by the walking beam. The result is a series of blows like those of a pile driver. About 60 to 65 blows per minute may be delivered; if greater speed is attempted the result is not satisfactory. Care must be observed in starting the drive-pipe to keep it plumb, and blows should not be delivered too rapidly. It is usually necessary to use a lever with a fulcrum somewhere on the drill frame to keep the pipe vertical. One man standing on the derrick about 12 ft. above the ground steadies the tool. After the pipe has been driven 5 ft. in barren soil the driving clamps are removed.

The utmost care must be exercised in keeping the pipe perpendicular until it is deep enough in the ground to remain plumb. When the hole is shallow the pipe must be wedged if necessary after each time it is driven. If this is not done, the pipe may become so bent on reaching a depth of 30 to 40 ft. as to make it necessary to abandon the hole.

If a 5-ft. section is used, the drill hanging about 3 ft. into the pipe will begin to strike the core when the pipe has been driven about 2 ft. When it begins to strike the core, water is poured in. When the pipe has been driven 8 ft. there will have been drilled and crushed to a pulpy consistency, about 3 ft. of material and about 24 in. of solid core will be left in the bottom. In reality it will be about 26 in., for the driving shoe adds about 2 in. to the length of the pipe.



STRING OF DRILLING TOOLS

Removing the Core

The driving clamps are then removed, and the core is drilled to within about 3 in. of the cutting edge of the driving shoe. Then the drill is hoisted and washed as it rises so that any adhering material is washed back into the pipe; more water is added to thin the pulp if necessary. The tool is hung against the right corner of the walking beam on the brake. The brake lever should be wedged by means of a small improvised wooden wedge to prevent the lever's jarring off the ratchet teeth and thus dropping the tool. This is important, for if the tool should fall it might fatally injure someone among the crew.

The sand pump is then picked up from the bed of the drill, the ground, the sluice, or wherever it may have been placed, and inserted into the pipe and dropped with a rush as far as it will go. It is then picked up with a jerk and hoisted clear. It is not usually necessary to drop the sand pump a second time in soil drillings, but in gravel or sand repeated dropping is often necessary. The sand pump must be picked up with a run so that the plunger will act quickly and thus create a partial vacuum. When deep ground is tested, it is often necessary to lag the sand-pump line drum to compensate for elasticity and stretch.

The pump is hoisted clear of the pipe, the fireman grasps it by the lower end and backs away from the drill, the upper end of the pump being lowered into the dump box until it rests on a cross piece nailed between the sides at such a hight from the bottom that the inclination of the pump will not, in discharging, cause a rush of material. Generally the sand pump is discharged into a gold pan, which rests on top of the sides of the sluice. Care must be observed to prevent splashing.

After the water has been carefully poured off into the sluice, and the drillings begin to run out, the pan is held under the stream to catch the solid material. The sand pump is then further elevated and water poured in at the valve end to wash out any adhering material; the pump should be gyrated to insure thorough washing. The pump should be so held that the foot-valve hinge is on the side or bottom while discharging, thus allowing better washing behind the valve.

Adding Sections

When the pipe has been driven so far that additional length is required, the driving cap is removed and a section of pipe is screwed to the one already in the ground. Before coupling the sections together, the threads are carefully cleaned; in cold weather washing in hot

water with a stiff brush is necessary, while in hot weather, brushing with dry sand will remove grease and dirt.

Great care must be taken of all threads on drive-pipe, or much difficulty will result. In moving from place to place extra sleeves are put on the ends of the sections to prevent battering. When threads are damaged they must be straightened or cut out so that no further damage will result when the pipe is coupled together. A packing hook is used in cleaning and pulling out broken threads.

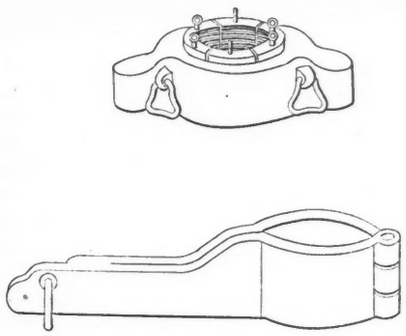
Sections of pipe, when coupled together, must butt end to end inside the sleeve, and each section should enter the sleeve an equal distance. Sometimes when the pipe is old and its threads are worn, sections are screwed end to end with but little effort. Then it is necessary to produce a strain on them with the pipe tongs, tapping the sleeve meanwhile in order to make a tight joint and insure against loosening during driving. It is always necessary to make joints perfectly tight; otherwise threads will be injured to such a degree that the pipe may be drawn apart and lost in pulling. Joints are generally made by using No. 15 Vulcan chain tongs with a length of 1½-in. gas pipe slipped over the wrench to make a handle about 10 ft. long, although good joints can often be made without the use of this extension.

A small amount of axle grease should be used on the male threads of the couplings, which in no way interferes with amalgamation. The male threads always are or should be those of the casing projecting from the ground; the sleeve should always be on the lower end of each section. Threads are so cut as to allow the pipe to enter one-half the length of the sleeve and a shoulder is left to prevent entering further. Sometimes taper threads are used; these make manipulation easier. It sometimes happens when the pipe or the sleeve is old, that the pipe will, unless prevented, enter too far. It is necessary to be extremely careful only in the first coupling of a sleeve on the casing, for generally, though not always, after use in one hole, the sleeve sets or locks, probably from the driving, after which it need not be watched so closely.

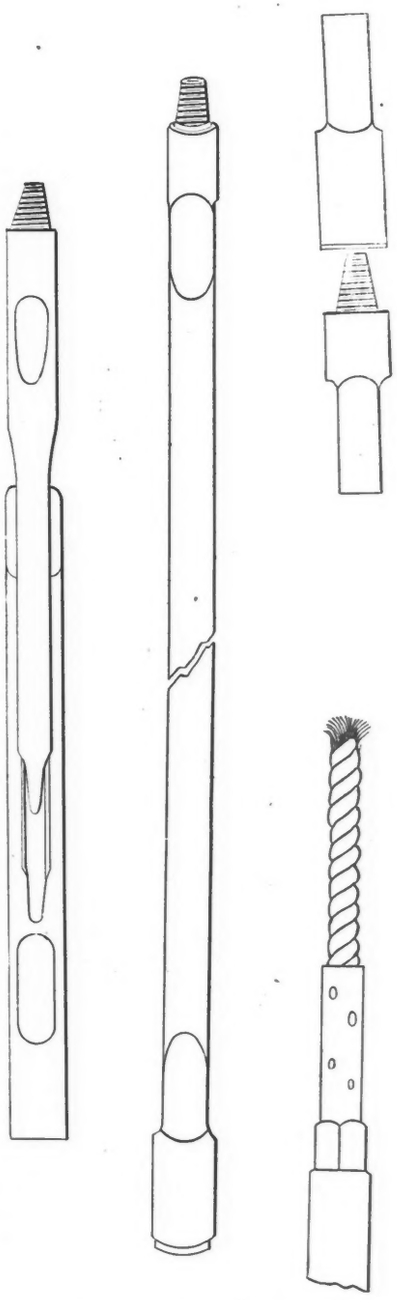
The pipe is marked every foot with chalk. To prevent valuable information from becoming public property, no figures indicating depth are added. The panner records the depths in his notes.

Drilling the Core

The bit is not ordinarily allowed to penetrate below 2 or 3 in. above the bottom of the pipe in free gravel of medium coarseness, although at times, but one inch of undrilled core is left, which is not the best practice, for there is constant danger of drilling below the casing, especially



PIPE CLAMP AND PULLING RING



JARS, DRILL STEM AND ROPE SOCKET

if a stratum of looser material should suddenly be encountered.

The inside diameter of the cutting rim of a new shoe is about 7 in.; as the cutting edge is dulled this dimension soon grows considerably smaller. Suppose the inside diameter of the drive-pipe to be about 6 in. while the diameter of the shoe is 6½ in. In driving 12 in. there should then be about 14 per cent. expansion in the depth of the core due to the inclusion of the material cut by the rim entering the pipe, all other considerations being excluded. There are a number of factors governing the depth of core which are indeterminate and, therefore, make accurate conclusions impossible. Instead of loosening material already loose, such as tailings, driving may compact it and give a shallow core. Driving a tube of small diameter into loose boulders of medium size without interstitial sand may result in a core the variation in the depth of which is puzzling. It may be too deep, which may occur when a number of boulders, say 4 or 5 in. in diameter enter the pipe and lie in such position and relation to one another as to create large spaces. It may also be caused by some of the boulders being pushed out of the path of the pipe. Driving in hard, compact, small or medium gravel may, in loosening considerably, give a large core; in hard, coarse gravel, where a large boulder is encountered, it may give little core. In dry sand cores are obtained in which practice and theory coincide.

Assume that a stratum of indurated, medium gravel is encountered. The indurated condition is indicated by slower driving and slightly slower drilling. In such gravel, drilling may be carried nearer the bottom of the drive-pipe than in loose material, within, say, about one inch of the cutting edge of the shoe; for ground of this kind will not run, and as a rule it is not likely to change suddenly to softer material.

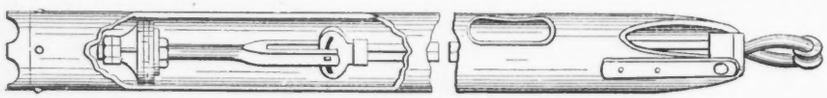
Hard gravel often occurs on a soft tuff or other bedrock. Breaking through accidentally and drilling below the pipe momentarily would in this case not vitiate results, for bedrock does not run unless it is much decomposed and has a heavy flow of water. If drilling near the bottom of the pipe should result in breaking through into a soft stratum either of gravel or bedrock and drilling for a moment below the shoe, the pipe should be driven the regular distance, say one foot, before the material loosened by drilling is pumped out. This is to insure against pumping material not properly a part of the core.

Excessive Use of the Drill

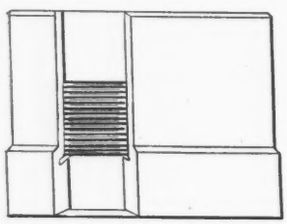
In case coarse, hard gravel, composed of tough boulders, is encountered, it is nearly always necessary to drill below the pipe about 6 in. or less; then the pipe is driven one foot, if possible, after which

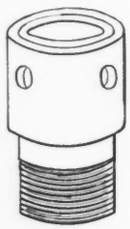
the drillings should be pumped. If it is not possible to drive below the point reached by the drill it is of course necessary to resort to more drilling; but whenever possible the pipe should be kept ahead even in hard gravel, although in material of this kind there is less likelihood of material entering the core from the sides of the hole.

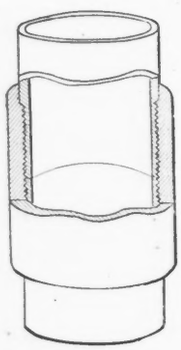
In hard gravel it takes less time to drive after drilling below the end of the pipe, and the drill man is likely to do too much of this sort of work. All drilling below the end of the pipe introduces unknown factors and termine the loss due to this cause have shown that 20 minutes' drilling in hard ground caused a loss of about 25 per cent. In the experiment which gave this result 100 mg. of dredging gold was subjected to drilling in a hole in barren, hard gravel for 20 minutes. In another similar experiment the same amount of gold was subjected to 10 minutes' drilling; in this case about 95 per cent. was recovered. These experiments show a large loss under rather abnormal conditions. In the first place 100 mg. per lineal foot of casing would indicate a gold content of about $6 per cu.yd. corresponding to

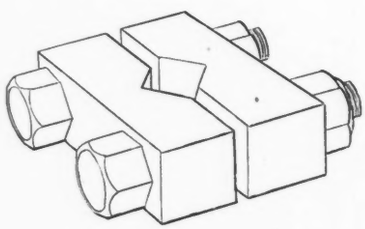


VACUUM SAND OR SLUDGE PUMP









SHOE, DRIVING HEAD, SLEEVE AND DRIVING CLAMP

the less of it done the better. Even where hard boulders are encountered it is often possible to drive a foot below the shoe. In such cases it is not always possible to crush all the core to a proper condition for pumping in one drilling. It may require ten minutes or more to crush all the boulders, and an attempt to drill a full foot in one operation introduces a possibility of loss by abrasion. Under circumstances of this kind it is better to drill the core, in two equal sections, pumping out separately and leaving the customary after-pumping core.

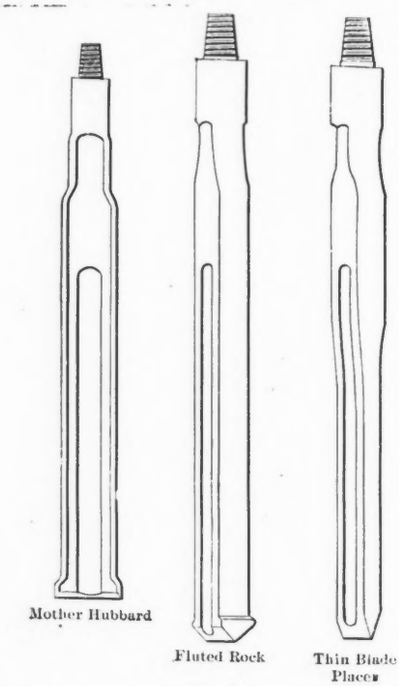
Excessive drilling may cause flouring of the gold, some of which may float away in suspension. Experiments to de- exceptionally rich ground; besides, the gold thrown in on the top of the core is exposed to constant attrition by the drill, and this is a most important consideration. However, the results indicate positively that excessive drilling is bad practice.

In drilling hard gravel below the shoe, particular care must be taken to note the volume of material that is actually pumped to compare it with the theoretical amount. In drilling very hard gravel less solid material and more slime is pumped per foot than in loose gravel. Boulders of such size and hardness are sometimes met as make it necessary to abandon the hole.

When the Drive-pipe Reaches Bedrock.

Suppose that bedrock has been reached and that it is a tuff or soft rock of similar character. The pipe is driven far enough to prevent material from running in from the outside, for bedrock is usually decomposed or soft at its contact with gravel.

The rate of driving shows whether or not bedrock has been reached; the pipe drives hard after it has passed beyond the gravel. It is necessary, of course, to continue the drill hole until no more gold recoverable by dredge buckets is got. Gold may penetrate bedrock and its crevices so far as to be unrecoverable by dredge buckets; drilling to such depths is unnecessary. It is sometimes necessary to strike for hours with the pipe-pulling jar before pipe driven into bedrock or into deep coarse gravel and bedrock can be started. An error may be introduced by a hard boulder of about the diameter of the pipe which may be met on soft bedrock. The drill may drive such a boulder several feet before it gets a firm enough setting to permit crushing. Gold carried down under this rock may appear to come from bedrock, while as a matter of fact it was above the lowest depth of the gravel.



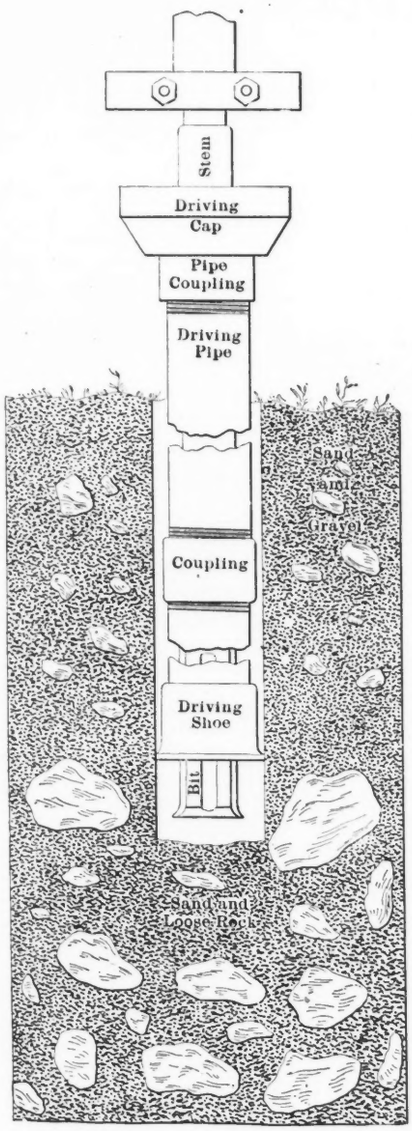
DRILL BITS

Variations and Difficulties

Drilling without drive-pipe may be carried on in investigating drift gravel which will stand without casing. As a general rule all ground investigated for dredging must be cased, for ground that will stand without casing and give correct results is generally too hard for dredging. It is

sometimes necessary to penetrate a hard lava cap to reach a gravel channel which may be loose and thus need casing. This means that a drill bit of sufficient diameter to permit inserting the drive-pipe when loose material is reached must be used. When loose material is reached below the hard cap, drive-pipe is inserted in the usual way.

After long use the driving cap becomes burred, and unless dressed it may chafe the drilling cable. The driving blocks



ARRANGEMENT OF PARTS FOR DRIVING PIPE

and clamps when worn may slip on the square stem and break the bolts which hold the blocks together. Particular care should be used in setting up these bolts, for if the nuts work loose they will be broken. Bolts 1½ in. or 2 in. in diameter are used; the smaller, if carefully manipulated, are about as good as those of larger dimension and they are more generally used. The bolts should be of the best material obtainable. They can be cleaned easily at the pet cocks on the boiler.

When the shoe strikes a big, hard boulder on a sloping side the pipe will sometimes kink at a joint or in a section. This may be so serious as to necessitate abandoning the hole. Sometimes, if the hole is shallow and in free material, turning the pipe 90 deg. may rectify a slight bend and permit the completion of the hole. Pipe which has been badly bent in this way is best discarded; heating to straighten the bent section renders the material soft and likely to yield again easily.

Running ground gives too large a core. When the pipe has entered sand or fine gravel containing much water an excess of material is brought up by the pump. The pipe may be filled as high as 8 ft. or more by material flowing in from the outside. It is best to drive through running ground until solid material is reached, which is indicated by harder driving, and then to proceed in the regular way. It is most unusual to find much gold in running ground. If considerable gold should be found allowance must be made for the irregularity of the core. The panner usually keeps the gold obtained in running ground separate, leaving the adjustment to be made by the man in charge of the investigation.

Sometimes, particularly if the corners of the drill bit are not in good condition, a hard pebble becomes wedged between the drill and the pipe. It is then necessary to slack the cable slightly until the upper part of the jars drop from 4 to 6 in., or as far as they will go, then with the jerk of the cable the blow of the jars will ordinarily remove the obstruction if repeated a few times.

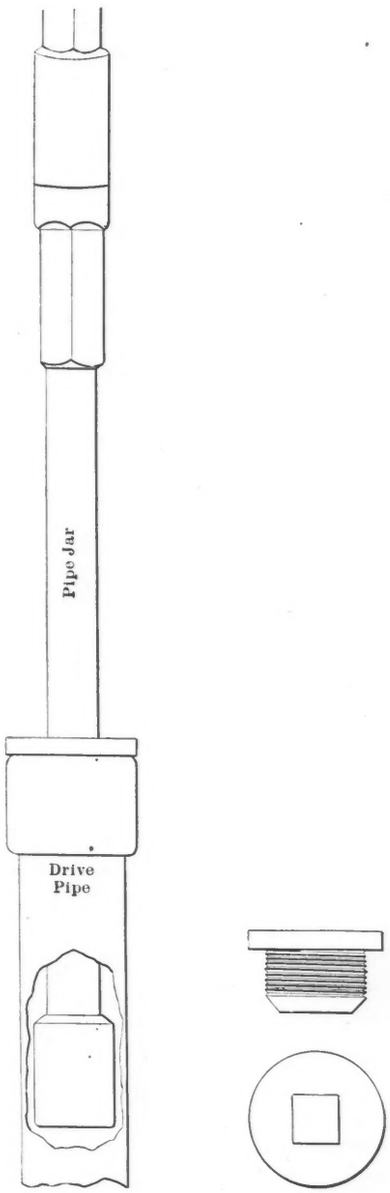
If a drill unprovided with jars sticks so that no part of the tool projects above the pipe the condition becomes extremely troublesome. It may require many pulls combined with the action of the walking beam. If this is continued too long without intervals, there is danger of burning and breaking the drill cable, the repeated bending over the three sheaves causing sufficient internal friction to damage it. If the drill cannot be moved it is necessary to cut the cable and pull the casing a little; this generally loosens the drill. The cable must be cut high enough to allow a splice to be made above the pipe.

With much slack in the cable it is impossible to get the maximum stroke. If the jars are attached and are not in good condition, they may get out of proper relation and become locked; this is rectified by hoisting the tool and hammering the jars loose.

Sand-Pump Practice

It is not easy to pump heavy, fine sand unless mixed with a large proportion of water. This is because it settles and packs almost immediately after drilling. Coarse sand does not pack readily because it has considerable interstitial water while fine sand has a small proportion of voids. When fine sand is encountered it is necessary to pump several times before the drillings are completely removed.

When bedrock is reached particular pains are needed to remove all the drillings from the hole. This may involve re-



PULLING HAMMER AND KNOCKING HEAD

peated pumpings. It is a common practice to pan each pumping and to continue the hole as long as any gold is found. The bedrocks usually encountered in testing dredging ground, are so soft that the pump will detach some of the material and pumping can often be carried on for some time, bringing up a little material each time. This fact must be kept in mind or the results may puzzle one. Usually the peculiar color of the drillings

of bedrock is a certain means of identification.

In spite of all care it is sometimes difficult, particularly in unfamiliar areas, to ascertain when bedrock is reached. This is the case especially when the gravel near or on the bottom of the deposit is composed of large boulders of the same character as the bedrock. Then it is necessary to keep on with the hole until all doubt has been removed. Many bedrocks of the granite family decompose into a clayey material, the products of feldspar giving it this quality. Such material may appear to the casual observer to be a clay, but panning will reveal the decomposition products and make a correct deduction easy. Where clays similar to the bedrock are present as overburden and intercalated in the gravel, especial care is required, but panning will clear up all doubts. Knowledge of petrology is of great value in dredging-ground investigations. Alluvial areas in districts with country rocks of the granite family are likely to have considerable clay as overburden, as bedrock or as a sticky constituent in the gravel.

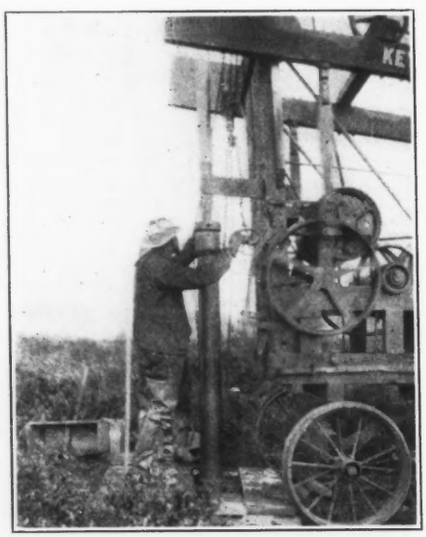
One great difficulty with the percussion drilling method is the fact that it changes the physical character of the material under investigation. This results from the combined effects of driving, drilling and pumping. Some boulders are changed during drilling and pumping from a semi-decomposed condition into a clayey material which may be thought to be a true clay. Slightly indurated material may not, in driving or drilling, reveal its true condition, but panning will show agglomerated fragments. Such material may not be fatal to dredge operation but a knowledge of its presence is of great importance, for if present in quantity it may seriously reduce the excavating capacity of a dredge.

Pulling Drive-pipe

When the drive-pipe is to be drawn the tool is first disconnected. For this purpose it is lowered with the end on a plank and a 2-in. block is placed under the drill below the joint. Two solid special tool wrenches are used to loosen the screw connection. It is best to increase the power by means of a lever and chain between the handles. Many drill men set and break this joint by hammering on the end of the wrench handles. This is bad practice because it damages the wrenches, it is slower, and it makes it difficult if not impossible to tell how tightly the coupling is screwed up.

The pipe-jar or pulling hammer is then screwed on the socket and set up with the wrenches. The pulling hammer is then hoisted and the sack, wrapped around the hammer to protect the thread, is removed. The threads must be clean and in good condition. The pulling hammer is then lowered into the pipe and the cap of the pulling hammer is screwed on. Enough slack is left to give an easy blow or none at all at first, and the friction clutch applied slowly. The slack is adjusted and the engine speeded up until a maximum of about 62 blows per minute is obtained. If greater speed is attempted the cable will not be pulled out fast enough by the descending tool and the slack of the rapidly revolving drum will make the cable fly off the sheave nearest the drum. The pulling hammer is rather light and it is good practice to attach the jars to it to add weight. In fact it is good procedure to keep the jars on both in drilling and driving, particularly in deep ground.

As the pipe comes up the cable is carefully reeled in, the speed being regulated to secure the best blow. When a sleeve has risen to about 6 in. above ground the pulling hammer is disconnected, and the exposed section is unscrewed by putting



PULLING DRIVE-PIPE

on large wrenches, taking a strain on them, and hammering lightly on the sleeve if necessary. The section removed is placed on the sled and a sleeve is screwed on to protect the threads.

This procedure is repeated until all the pipe has been pulled. Sometimes after a part of the pipe has been pulled the portion still in the ground gets so loose in the hole, that it slips back after each stroke. A drive-pipe clamp or "bull-ring" is furnished with the Keystone drill to prevent slipping back. Chain tongs are commonly used to accomplish the same purpose, a method which is more convenient. The sleeve on the pulling hammer must be watched closely, for if it becomes loose it may result in stripping the threads.

Difficulties of Pulling Drive-pipe

The resistance to be overcome in pulling drive-pipe is largely due to skin friction. This is greatest in clay, sand and soft bedrock when penetrated several feet. It is also considerable in hard gravel and in hard bedrock even when the pipe is driven no deeper than through the decomposed surface. Skin friction is of course greater in deep than shallow holes.

It is a common belief that it is extremely difficult to pull pipe that has been driven several feet into a sedimentary, untilted or moderately tilted rock, for the following reason. As the pipe is driven into the rock, the laminæ break a short distance from the shoe and the edges near the pipe are tilted downward. When the pipe is pulled these inclined laminæ are supposed to act like grips, grasping the pipe when the direction is reversed. This theory rests upon supposition only and may well be questioned.

A pipe driven through coarse, hard gravel often shows unusual resistance to pulling at intervals. This peculiar behavior seems to indicate that the projections of the sleeves catch on sharp edges of rock broken by the drive shoe. It is often necessary to strike many blows with the pulling hammer to start pipe apparently held in this way.

When the pipe sticks, the only thing to do is to keep on pulling. It may be necessary to continue this for several hours before it starts; but after it once begins to move the pulling is comparatively easy. It sometimes takes several hours to pull the first 5 ft. even after the pipe has been started. It may take several days to pull all the sections from a hole in rocky, indurated ground more than 50 ft. deep. Sometimes if the pipe has been bent in a sleeve and the threads have become damaged the sections may be pulled apart. In that case the portion left in the hole is usually lost unless it can be dug out cheaply. If the sleeve of the pulling hammer works loose it may pull off, stripping the threads. Pulling drive-pipe involves the hardest service required of the drill; most breakage of machinery and apparatus occurs during this part of the work.

If the sleeve of the pulling hammer is jerked off and the threads of the pipe are not too badly damaged, it is often possible to dress the screw threads with a half-round file and then to put a new sleeve on the pulling hammer. As the new sleeve is screwed on it will usually tend somewhat to repair damaged threads. After the pipe has been pulled until only a few sections remain in the hole, it is often possible to hoist it by means of the drill cable friction. It is then customary to hoist and uncouple the pipe, a section at a time, and not to take it out of the hole and uncouple it on the ground. The drill cable is most frequently broken during pulling. It should always be repaired with a long splice. Pipe-sections should be numbered and always used in the same order.

Rapid Development of Fairview, Nevada

By Robert B. Todd*

Fairview, the new mining camp in Churchill county, Nevada, is about a year and a half old; one of its mines is a steady dividend producer, and a score of others have practically reached that stage of development. The greatest producer of the district yields ores of higher assay value per ton than those of the Mohawk in Goldfield.

West Gate, a part of Fairview, was a watering station on the old Overland route to California, but after the days of the pony express the place lay deserted for years. A visit by F. O. Norton, a prospector of Reno, early in the fall of 1905 marks the beginning of the present boom. The stampede to Fairview began in February, 1906. Today the camp has more than 20 hoists in operation, and within a few months it will have water, electric light and power, an ice plant, and rail transportation.

Fallon, 42 miles northwest, the terminal of a spur from the Southern Pacific, is Fairview's present railway station. Last March the Southern Pacific completed a survey from Fallon to Fairview and Wonder, and announced that the branch would be ready for service by October, the cost to be about $900,000. Delays occurred, and the Nevada Hills mine had an accumulation of ore for which it could find no means of transportation. The management determined to build an independent broad-gage railroad to Fallon, the work to be finished by next April. Meanwhile the Fairview Electric Railway and Power Company is arranging to build a trolley line from the town to the mines.

Government officials have granted contracts which will give Fairview a water power equal to 4000 h.p. from the middle of March to the middle of September and 2000 h.p. during the remaining months of the year. The supply is to be derived from a dam across Carson river near Fallon, where 10,000 h.p. is available. A local company has shipped in a pumping plant to hoist a supply of water from another source and will also install apparatus for the manufacture of ice.

Some of the Mines

Two claims were located by Perly Langsdan early in the history of Fairview and named Nevada Hills. W. H. Clark, James R. Davis and others bought the prospects, paying $7500 for them in March, 1906; in June they cleared $8000 on their first shipment to Salt Lake, the first carload, taken practically from the surface, averaging $254 per ton. There is a pay shoot of ore demonstrated for a distance of 1600 ft., a large quantity of ore sacked for the market and sufficient cash on hand to guarantee the building of the mine's own railroad to Fallon. At the rate of 10 tons per day the wagon haul to Fallon would cost the mine $345,000 in a year, and that sum will build the railroad.

On Sept. 30, the date of its expiration, the parent company purchased the equipment, including two hoists, of the Nevada Hills Leasing Company's lease, which has been shipping at the rate of $300,000 per month. Henceforth these workings will be operated on company account. Their greatest vertical depth is 200 ft.

Next in importance is the Fairview Eagle that adjoins Nevada Hills on the north and east, and was purchased by Senator Nixon and George Wingfield in the early days of the camp. After a year of development the property has exposed shipping ore in four places and at a depth of 200 ft. has tapped 15 ft. of sulphide ore averaging $50 per ton, with 2 ft. running $700, without sorting, and smaller seams giving still higher assays. The sulphide formation is deeper than the lowest levels of the adjoining Nevada Hills and is regarded as the most important revelation of the camp's history. The product of the Eagle carries silver, gold and copper. The output is sacked and regular shipments will be made as soon as machinery can be installed to handle the flow of 8000 gal. of water per day, tapped when the sulphide ledge was uncovered. Fairview Eagle bought the first hoist delivered to Fairview district.

Fairview's second hoist, in commission since April, was bought by the Fairview Aztec, adjoining the Eagle on the east. Beside the Aztec, on the south are the Pyramid and Lookout groups, on the latter of which diamond drilling has exposed ore-bearing ledges that trend toward the Aztec. At the point of the recent strike on Fairview Eagle that vein is headed directly for the Aztec, 300 ft. distant. The Aztec's double-compartment shaft, which at 210 ft. has entered a sulphide formation, has tapped a strong flow of water, just as did the Eagle in the same relative position. Lateral development at this station is temporarily stopped by the stream.

One of the Fairview Eagle ledges is traced into the territory of the Eagle's Nest group, adjoining on the north the eastern portion of the Eagle. This vein, where exposed on the Eagle's Nest, displays a width of 25 ft. and carries two pay streaks respectively 8 and 12 in. wide, the lead having been traced upon the Eagle Nest ground for a distance of 1200 ft. Two shafts are going down on the vein, 200 ft. apart.

A large ledge traverses the holdings of the Dromedary Hump and at frequent intervals shows shipping values in the croppings. Three hoists are in operation and cross-cutting and drifting will develop the deposit. Much ore has been sacked for the market. At a depth of 100 ft. in the shaft of the Dromedary Hump Leasing Company's lease there was crosscut a 25-ft. vein in which a pay streak was found. This property adjoins on the north that of the Eagle's Nest.

Immediately west of the Dromedary Hump lies the Golden Boulder. A winze is being sunk from the tunnel level and the property is equipped with the only underground hoist in the district. Ore has been sacked and the crosscut on the 200-ft. level is expected to tap the source in quantity.

Six miles south of the belt, in which lie the Eagle and Nevada Hills, is located the property of the Nevada Fairview Company, controlled by Salt Lake operators. Initial shipments from that mine averaged $100 per ton.

*President, Nevada-Goldfield Prospecting Company, Goldfield, Nevada.

Gypsum in the United States

According to the U. S. Geological Survey, the gypsum mined in the United States in 1906 amounted to 1,540,585 short tons, valued at $1,147,129. This production represents an increase in quantity of more than 47 per cent., and in value of nearly 40 per cent., as compared with that of 1905, and exceeds that of any previous year.

Gypsum is produced in 17 States and Territories besides Alaska, and in connection with the mining, mills for grinding and burning it are operated at nearly all the places of production. As to relative rank among the States producing gypsum, Michigan still holds first place, New York regains second place, and Iowa is a close third. The other States show few changes since 1905, their present rank being as follows: Texas, Ohio, Oklahoma, Kansas, California, Wyoming, Virginia, Nevada, Oregon, Utah, New Mexico, Colorado, South Dakota, Alaska, and Montana.

Gypsum occurs in sedimentary rocks of practically all ages, either in the crystalline form or as rock gypsum, and it is widely distributed over the world. It is found commonly in the vicinity of beds of rock salt. In the United States workable deposits are confined to beds of rock gypsum, which occur at comparatively few geological horizons. New deposits of gypsite—the earthy, granular form of the mineral—are reported to have been recently discovered in Riverside county, Cal., and many newly developed deposits are reported from other parts of the country.

A report in the *Min. Jour.* (Sept. 7, 1907) says that the asbestos deposits at Trodos on the island of Cyprus are to be exploited by the Cyprian Mining Company. A trial shipment of 30 tons of asbestos fetched good prices and it is hoped in 1908 to attain an output of 1000 tons of cleaned asbestos per annum.

Extraordinary Repairing of a Copper Reverberatory Furnace

By E. H. Hamilton*

In March, 1906, it became my duty to start reverberatory furnaces of 100x20 ft. area, using California crude oil as fuel. The roof and inside side and end walls were constructed of silica brick.

As the heat gradually increased, it became apparent that defective workmanship rendered the walls useless, although the roof was in good condition. After a run of a short period it was evident that the side walls would have to be rebuilt. By regulating the tie rods and buckstays the roof was held in shape. The hot walls were removed by drilling small holes into the redhot foundations by small air drills, while sprays of cold water were blown by compressed air into the holes. Small charges of dynamite were discharged in the holes, and in this way the men were enabled to do their work from the outside of the furnace through the small spaces between the buckstays, etc. At one stage of our operations a considerable portion of the furnace walls were built while the furnace was running.

The accompanying engraving shows a reverberatory. roof 100x20 ft. intact and in good shape, while all the side walls had been removed. The walls were then put securely in place, and the furnace was nearly as good as new, while the bottom was still hot.

*Superintendent, Consolidated Arizona Smelting Company, Humboldt, Arizona.

New Manganese Deposits in the Caucasus

By Robert Grimshaw*

Deposits of manganese were recently found on the Trans-Siberian Railway, in the neighborhood of Samtredi. The Caucasians who are interested in the old manganese mines near Tschiatury do not wish any rivals, and so far have prevented the engineers who were sent to examine and report upon the new deposits from doing their work.

The value of the deposits will depend on whether or not the ore, as has already been found on other occasions, is found in a thin vein under the surface. Transportation to the railway would be rather expensive, unless narrow-gage railways, rope railways, etc., were built for the purpose, but there can be no thought of any such improvements until quiet is restored in the neighborhood. Up to the present, the inhabitants of the district have resisted all attempts at installing any devices which seemed to them to compete with their own.

If the new deposits should prove rich, and if the transportation problem can be readily and satisfactorily solved, their position would be more favorable than that of the Tschiatury veins; for the latter have, besides the land transport from the mines, to be carried on a branch railway before shipments can reach the main Caucasian line.

Recently another manganese deposit was discovered in the eastern Caucasus, in the district of Yelisavetpol, near the village of Michailovska; but as yet there are no data concerning the amount and the quality of the ore, although according to all reports the deposit seems to be important.

*Dresden-A, Germany.

Mining in Southern China

The present prospects in the mining industry in the regions of south China are the subject of an article in the *Montan-Zeitung* (Oct. 15, 1907). In the different parts of the province of Kwangsi rich lead mines have been discovered. In the district of Kanton at Kun-yun-shen and Tun-gkun, as well as in the district of Yuengkong, gold deposits have been found. A concession to operate coal mines in Lu-Kuong, Pun-yu district, was recently secured from the viceroy of Kanton. The syndicate which previously had the concession to operate this property was forced to suspend owing to insufficient capital. A Chinese company has been formed to take over the antimony mines in Kuk-Kong. Coal discoveries are also recorded in the Ping-Hai and Fa-Yüen districts; also rich tin mines in Luig-Ngan.

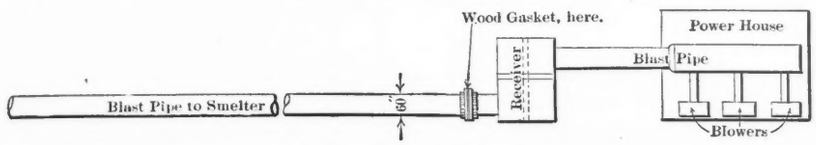
At Kwai-Shen, about 300 miles from Wuchow, a Chinese company has been exploiting the silver mines of Sam-cha for several years past. As there was no engineer to direct operations no satisfactory results were obtained. The viceroy of the district has appointed a Chinese mining expert whose special duty is to examine new mineral claims and report on them before any concession is granted.

REVERBERATORY FURNACE WITH SIDE WALLS REMOVED

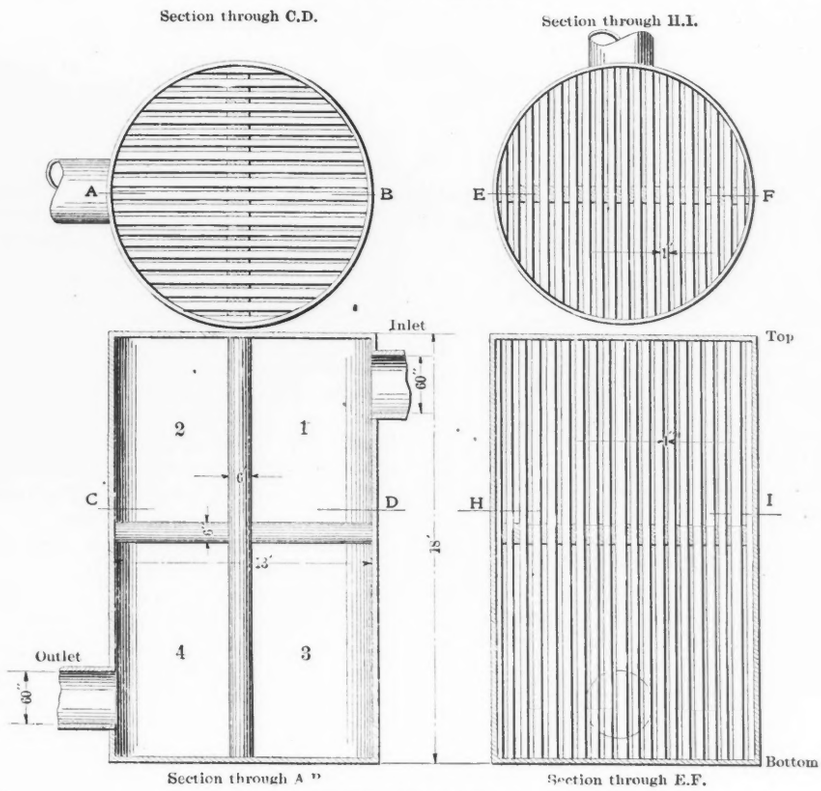
Preventing Blast Pipes from Vibrating

By Thomas Evans*

At the Boston & Montana smelting plant, situated at Great Falls, Montana, a unique and ingenious device has been perfected by Peter Thill, master mechanic of the company, whereby the destructive vibration of a large blast pipe and the ear-splitting noise that accompanied it have been entirely eliminated. The remedy will undoubtedly be interesting to others experiencing the same trouble.



BLAST-PIPE AND RECEIVER



RECEIVER FOR BLAST-PIPE

The blast pipe in question is 66 in. in diameter and 1500 ft. long, connecting the blowers in the power-house with the blast furnaces in the smelter, carrying a pressure of 48 oz. to the square inch. The vibration of this pipe, which was at times sufficiently violent to tear it from its fastenings, and the offensive noise accompanying it, were caused by the volume of compressed air forced through the pipe, which gets into synchronism with the pulsations of the blowers, or air compressors.

*Great Falls, Montana.

The desired end was accomplished as follows: A receiver 13 ft. in diameter and 18 ft. high was made and placed about 50 ft. from the power-house and alongside the blast pipe. The pipe was taken apart, one end connected to the upper part of the receiver and the other end connected to the lower part and opposite side of the receiver. Then one section of the blast pipe connected the blowers with the receiver and the other section connected the receiver with the blast furnaces.

As will be seen by referring to the sketch, the receiver is divided into four equal compartments by partitions made from strips of wood 6x1 in., set 1 in. apart. One of these partitions runs vertically from the top to the bottom of the receiver and extends completely across the diameter. The other is set horizontally and extends directly across the receiver, midway between the top and the bottom. The strips forming the horizontal partition are fastened between those forming the vertical partition; thus between all of the strips that divide the several compartments are spaces of 1 in., or the thickness of the strips. The combined area of these spaces or rectangular openings from one compartment to the other equals, or exceeds, the area of the blast pipe, so that the air from blowers will be in no manner throttled.

The strips act as baffles for the volume or column of compressed air to strike against, chopping it up as it were, and striking the second partition it is again chopped up, destroying its synchronism with the pulsations of the blowers.

The portion of the outlet pipe of the receiver is insulated from the main pipe by a wooden gasket 1 in. thick, held between the flanges that connect the pipes. This gasket cushions any vibration that might arise in the receiver. The receiver is grounded to the earth by being set on a concrete foundation. It may be added that the pipe leading from the receiver to the smelter has several crooks and bends, some 90 deg., and some over.

As stated above, that portion of the blast pipe leading from the receiver to the blast furnaces has stopped its violent vibration and quietness has taken the place of the shrill cracking noise that has for many years been a deafening nuisance.

Diamonds in Shantung, China

When the Germans secured the mining rights throughout Shantung Province a few years ago, says a recent consular report, experts were sent over the whole country to try and locate something worth working. Among the mining propositions taken up after this examination was the diamond field near Ichoufu. It has been known for a long time that diamonds existed in southern Shantung, and a quantity of stones are continually being offered by natives in that locality. The Ichoufu diamond is, as a rule, not clear enough to be of much value for gems, but for industrial purposes these stones answer very well. The district in which they are found evidently covers a large area, but in no case did the Germans manage to discover the stones in paying quantities. A good deal of surface work was carried on, but everything was finally abandoned some 18 months ago. At that time the German foreman thought he had found the right place to work, but it was many miles north of the original diggings and seemingly not covered by the company's concession, and as no arrangements could be made with the native officials the matter was dropped.

At present the output of the district is regularly bought by Tsingtau dealers, but as the natives do not carry on regular mining operations, finding the stones they have, apparently by chance on the surface, it seems doubtful if foreigners will again try to locate the field, as they have nothing to guide them in their efforts. The Chinese, on the other hand, will not tell where they receive their supply, always answering any inquiry by stating that the farmers wear straw shoes when plowing; these shoes they afterward burn and occasionally find raw diamonds, which have stuck in the straw, in the ashes.

Mining in the Province of Quebec

By H. Mortimer Lamb*

The annual report of the Department of Mines of the Province of Quebec for the year 1906 has just been issued.

New Explorations

Rather more than half of the report is devoted to an account of explorations conducted by J. Obalski, superintendent of mines, to the north of the county of Pontiac, in the region to the east of lake Temiscamingue, which is a continuation of the Huronian formation in which the rich argentiferous deposits of Cobalt occur. Mr. Obalski's investigations lead to the conclusion that this belt of Huronian rocks traverses a wide area from Cobalt to Chibogomo, and that the same rocks are found throughout it. It may, however, be observed that the mass of the Laurentian formation extends farther north than had been supposed, and that only islets of Huronian formation are met with in the surveyed townships east of lake Temiscamingue. In this section already a considerable amount of prospecting has been attempted, and on one promising showing of chalcopyrite two shafts have been sunk with favorable results. Other prospects showing galena, gold-bearing pyrite, magnetic iron and also cobalt bloom have also been found in the area. In the unsurveyed section, chalcopyrite has been discovered near Fish lake on the Ontario boundary; gold-bearing quartz at lake Opasatica and at lake Abittibi; and molybdenite in the township of Guerin east of lake Opasatica and also on lake Keewagama and the river of the same name. Chalcopyrite has been found on the Bell river and on the Harricanaw river, north of the route of the Transcontinental railway; while on the latter river at one point a green serpentine rock outcrops in which have been found small threads of asbestos. The report states that all these indications, taken in conjunction with the nature of the rock, justify exploration in the region and lead to important discoveries.

In the Chibogomo district new discoveries of asbestos are reported to have been made on the west of McKenzie bay, while a large body of magnetite has been found to occur northwest of the bay of Islands. Chalcopyrite, carrying good gold and silver values, has been discovered on the peninsula separating lake Dore from lake Chibogomo, and pyrrhotite, assaying well in gold and copper, west of lake Dore. The discovery on the Chibogomo river, about 10 miles below lake Assinibastats, of pink arsenate of cobalt, is, however, regarded as the most important find of the season as confirming the opinion of the probable extension of the Cobalt field northward. The country rock in this vicinity resembles very closely the schistous diabase met with in the Cobalt district.

Mineral Production

Production in 1906 is valued at $5,500,000, which figures, however, do not include the items of mineral waters and natural gas. These returns compare very favorably with those of 1905, which were given as $3,755,000, the increase being largely attributed to the rapid growth and expansion of the asbestos industry, which contributed no less than $2,143,653 to the total. The mineral industry as a whole, however, shows substantial progress and development. A summary statement of yield affords the following information:

	Tons.	Value.
Bog iron ore	18,331	$61,175
Chromic iron	9,961	91,834
Copper ore	32,527	176,681
Asbestos	61,675	2,143,653
Mica, lb.	530,086	168,887
Calcined ocher	1,962	19,620
Graphite	125	8,300

In addition, phosphate, cement, lime, slate and other non-metallic substances are produced in the Province, while during the year 7851 tons of charcoal pig iron, worth $177,643, and 374 tons of copper matte were produced. The number of men employed in the mines in 1906 was 5680.

Iron and Chrome Ores

Pig iron is produced at the blast furnace of Radnor and Drummondville, which have been in continuous operation on bog ore from various parts of the Province. Iron also occurs as magnetic sands on the north shore of the St. Lawrence, and experiments with a view to devising a satisfactory method of concentration and fusion to admit of their utilization are being continued.

The chrome iron industry is confined to the Colraine area, where several mines are worked. Operations last year were extended and one company installed concentrating works, including a 20-stamp mill and five Wilfley tables. The mines are supplied with electric power generated at the river St. Francis. The greater bulk of the product is marketed in the United States. The first-class ore averages about 50 per cent. of sesquioxide of chromium; the second-class about 45 per cent., and the concentrate from 49 to 54 per cent.

Copper

According to an opinion expressed by one of the best known consulting mining engineers in Eastern Canada, a gentleman who has a reputation for ultra-conservatism, indications in the eastern townships justify the belief that sooner or later this area will be one of the most important copper-producing sections of Canada. The only mines at present operating on any considerable scale are the Eustis and Nichols at Capelton, which for some years past have been on a satisfactory dividend-paying basis. Of last year's production, 24,642 tons were shipped to the United States, the remainder being treated locally and used for the manufacture of sulphuric acid. Another copper mine is also being opened and equipped with machinery in the township of Fabre.

Other Metals

Some attention is being again devoted to lead, zinc and silver mining and a number of formerly worked properties have been re-opened and prospected with a view to installing new plant and resuming operations. A little gold mining was also carried on in different localities, but not to a sufficient extent to warrant more than a casual reference.

Asbestos

Unquestionably the mining and production of asbestos is the most important mining industry of the Province, and notwithstanding the developments that have taken place the production at the present time in no way keeps pace with the increasing demand. The advance in prices in the last year or so is quite remarkable, and a product that not long since sold for under $40 a ton, now realizes between $175 and $200. A recent improvement whereby costs will be considerably cut down is the completion of a line from Shawinigan Falls, over which electric power will be transmitted for mining and milling purposes. A notable feature of last year's operations was the commencement of underground working by the Bell Company, which is opening up large reserves by driving a tunnel from the bottom of the quarry at a depth of 200 ft. under the line of the Quebec Central Railway in the direction of the mill, while drifts are run transversely from various points. Heretofore all mining has been done by quarrying methods entirely. During the year several new companies were organized to operate in the field and much new ground has been opened, large installations of machinery made, and a new industry inaugurated by the establishment of factories for manufacturing asbestos boards, one of which has a capacity of 10,000 ft. board measure per day. According to the returns made by the respective companies, the total production of asbestos last year in tons of 2000 lb. was as follows:

	Tons.	Value.
First-class crude	1,477	$324,380
Second-class crude	2,450	321,355
Fiber	18,542	815,962
Paper stock	39,906	681,956
Total	61,675	$2,143,653
Asbestic	21,119	18,875
Total	82,794	$2,162,528

The number of men employed in the in-

*Secretary, Canadian Mining Institute, Montreal, Canada.

dustry in 1906 was 2000, representing a pay-roll of $750,000 in all.

Mica

Another important industry in the Province is the production of mica, which employs some 1200 persons. Mica is found, generally in a formation of grayish and red gneiss and pyroxene, in various localities in the Ottawa valley. Production is chiefly confined to phlogopite or amber mica, and it is worthy of note that Canada is the only country producing this variety in paying quantities. It has been found difficult to ascertain exact figures of production, since part of the product is sold rough-culled, another part trimmed and still another split. The average price of the rough-culled is about $150, which yields 75 per cent. of merchantable mica, 50 per cent. thereof being under and 25 per cent. over 2x3 in. In the counties of Berthier and of Pieds des Monts the Canadian General Electric Company is working deposits of muscovite. In this connection mention is made of the accompanying minerals, samarskite and fergusonite, which are found in fairly important quantities in the rock, in small masses varying from a few grains to a pound or even more. It is suggested that if these minerals possess the value attributed to them, it may be possible to recover a sufficient quantity for treatment. A sample of samarskite submitted to Prof. Barnes, of McGill University, proved to possess marked ratio-active characteristics, and was found to contain 0.04 to 0.05 gram of radium to the ton, being about 25 per cent. of that contained in the pitchblende of Joachimsthal, which contained 0.17 gram.

Mining Law

Recently some important amendments have been made in the Quebec mining law, and in February last an order-in-council was passed classifying all minerals, except building materials, as "superior minerals." The price of mining lots was changed as follows: Superior metals, $10 per lot when more than 20 miles from a railway and $20 when less than that distance; inferior metals, $2 and $4 respectively. The fee for mining licenses was raised to $10. In March of this year an amendment was passed by the Provincial Legislature fixing the maximum area of land to be granted under a prospecting license to the same person, within a radius of 100 miles, at 25 square miles; and not more than 400 acres of mining lands can be sold outright to any one individual in any one year, within a radius of 100 square miles. Miners or owners of inferior metals under mining patents have the first right to the purchase of superior metals.

The Quebec Mining Law is, however, regarded by many mining men as wrong in principle and inimical to the interests and development of the industry in this Province, which undoubtedly possesses great natural mineral resources. It is satisfactory to learn, therefore, that the Government has decided to appoint a commission to secure evidence and make such recommendations as they may decide to be necessary, with a view to amending the law in important particulars. The great objection to the present system is that it admits and even encourages the locking up of large areas by speculators to the detriment of legitimate exploration.

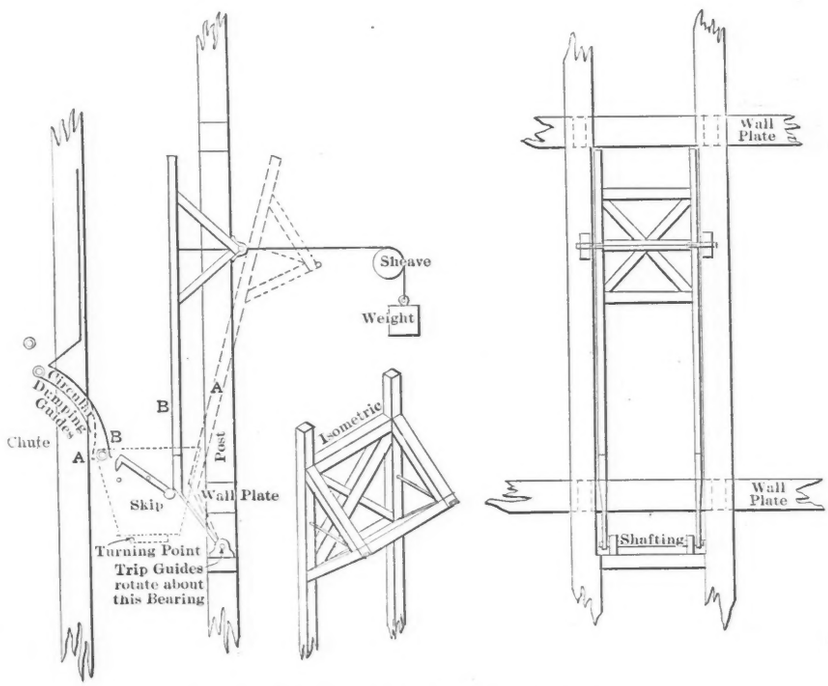
Adjustable Skip Tripping Device

By Herbert R. Hanley*

The accompanying illustration shows the details of a device recently installed in the mines of the Bully Hill Copper Mining and Smelting Company, which enables a skip to dump at different places in the same compartment of the shaft. When the ordinary trip and circular guides are in position for the self-dumping skip, the latter can go no higher than its dumping position. This device was designed to permit the skip to dump, and also to pass by without dumping at that point, and to proceed to some other convenient dumping place, such as the surface. This is almost indispensable when ore and waste are to be hoisted through the same compartment, the ore to the working tunnel level, and the waste to the surface.

The trip guides consist of two maple sticks about 4x4 in. by 12 ft. sufficiently braced to be rigid. In the drawing *B* is the tripping position of these guides, holding the hooks of the skip in proper position to allow the skip bucket to turn in the circular dumping guides, dumping its contents into a chute beside the shaft. This position *B* is used when the ore is to be delivered at the chute in the working tunnel level.

When all the ore has been hoisted for the day, and it is desired to hoist the waste which has accumulated in the waste pockets of the shaft, a man unlocks the trip guides by removing the sliding bolts, and pulls the guides back between the posts to the position *A*, in which they are clear of any part of the skip mechanism. He also unlocks the circular dump guides by removing the sliding bolts, and lets them drop down against the iron bolts in position *A*, also clear of any part of the skip mechanism. The skip loaded with waste may now be hoisted past the ore-dumping point to the surface.



ADJUSTABLE TRIPPING DEVICE FOR DUMPING SKIPS

In regard to the production of antimony in Japan the American consul-general at Yokohoma states that this industry centers around Osaka and Kobe, but is declining. The largest production in recent years was in 1896, about 1300 tons, valued at $115,000. The amount diminished annually until 1905, when it was less than 300 tons, valued at $45,000. Antimony is produced in China, and in recent years ores have been imported chiefly from that country, refined in Japan, and re-exported. In 1906 the imports were valued at $57,680 and the exports at $102,680.

*Assistant superintendent, Bully Hill Copper Mining and Smelting Company, Winthrop, Shasta county, Cal.

Electric Hoisting at Grangesberg, Sweden

Balanced Skips, Hoisted by Spiral Drums, Electrically Driven and Controlled by One Lever, Raise 1200 Tons in Eight Hours

BY J. B. VAN BRUSSELL*

The Grangesberg iron mine is owned by the largest iron-mining company in Sweden, and is situated about 200 miles northwest of Stockholm. The ore outcrops on the hillside and dips at a steep angle. Many thousand tons have been obtained from the surface workings, which have now reached a depth of more than 300 ft., and look like a large quarry. Shafts have now been sunk at the foot of the hill to a depth of about 600 ft. and these will be sunk gradually as the vein is worked out and new crosscuts are required to meet the deposit at lower levels. Eventually a final depth of about 1800 ft. is expected to be reached.

The winding installation of this plant is of interest; from Fig. 2, it will be seen that the winding drums are of the tapering spiral type, frequently used both here and abroad to compensate for the weight of the ropes and to facilitate acceleration. Large castings, between the two drums, form a friction clutch, which provides an adjustment between the two if necessary at any time due to stretching of ropes, etc. The exact adjustment is necessary, as the entire operations of loading and discharging the ore from the buckets or skips is automatic; this is shown in Figs. 3 and 4. Referring, for the moment, to Fig. 4, which is a diagram of the shaft bottom, it will be seen that the tubs are tilted by a hydraulic lifting jack, and discharge their contents into a chute or hopper. The door or shutter at the lower end of this hopper is opened and closed by hydraulic power also, and the cage buckets are filled, one man only being required to operate and to signal to the engineer at the surface. On arriving at the headframe, the bucket is automatically tipped by curved guides, shown in Fig. 3, and the contents dumped upon a screen.

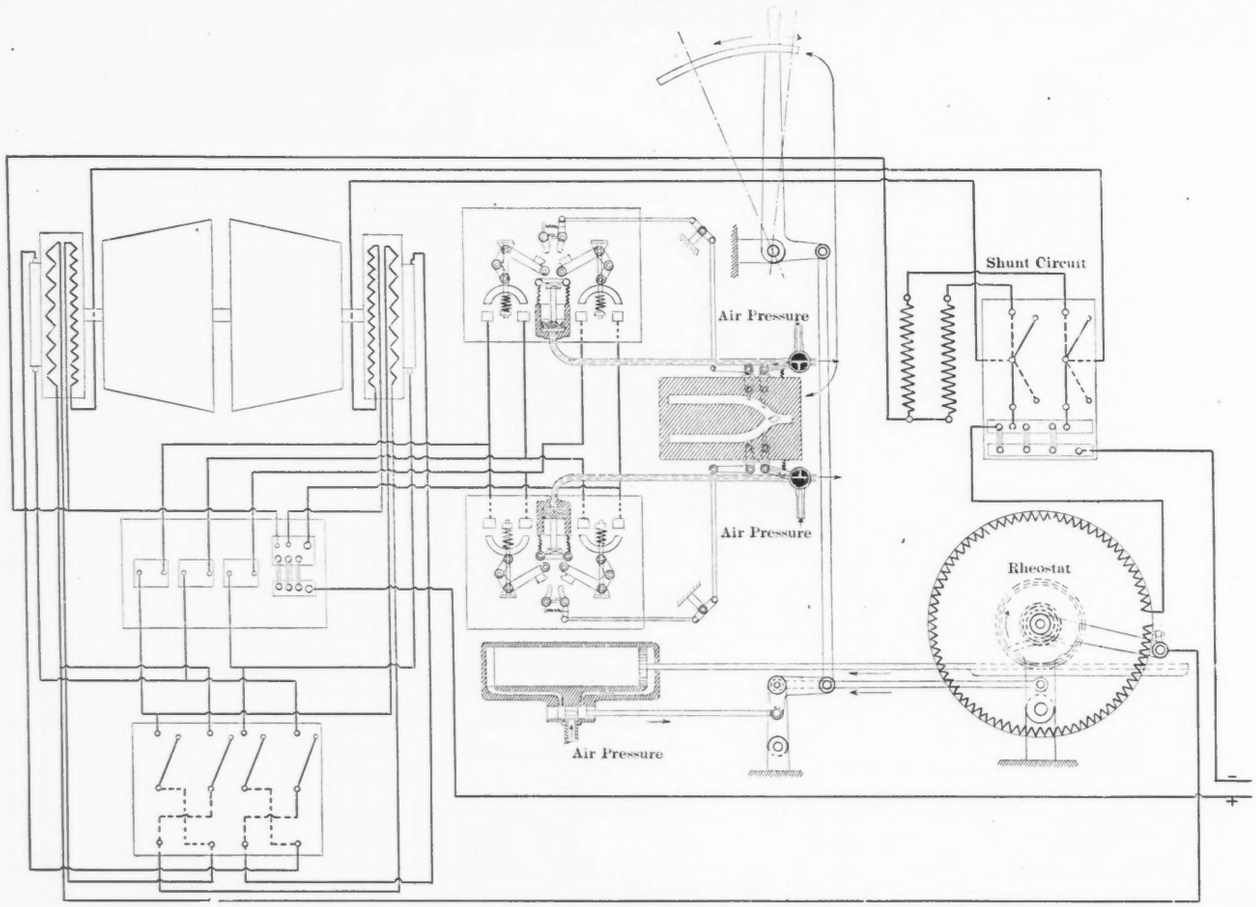


FIG. 1. ELECTRICAL CONNECTIONS FOR CONTROL OF ARMATURE RESISTANCE

Crushing and Sorting

The smaller pieces fall through the screen and are delivered to traveling belts, where the material is hand-sorted. The oversize from the screen falls into a Gates crusher, driven by a 200-h.p. induction motor. This crusher weighs more than 80 tons, and has a capacity of 200 tons per hour. After passing through the crusher the material is delivered to the traveling sorting belts. All the small material (about the size of nut-coal) passes along other conveyer belts to a magnetic separator, which is capable of treating about 600 tons per 8-hour shift. The separator is about 2 ft. 6 in. in diameter by 3 ft. wide. The sorted ore of all grades finally passes by conveyers into five hoppers situated immediately above several railway tracks, and the cars are loaded direct from these. Each of the hoppers has a capacity of 150 tons. The traveling and sorting belts are driven by induction motors, and so is also practically all other machinery at the pit-head. The work in the mine, breaking down and blasting, goes on continuously, three shifts of men being employed, each shift working 8

*Brussels, Belgium.

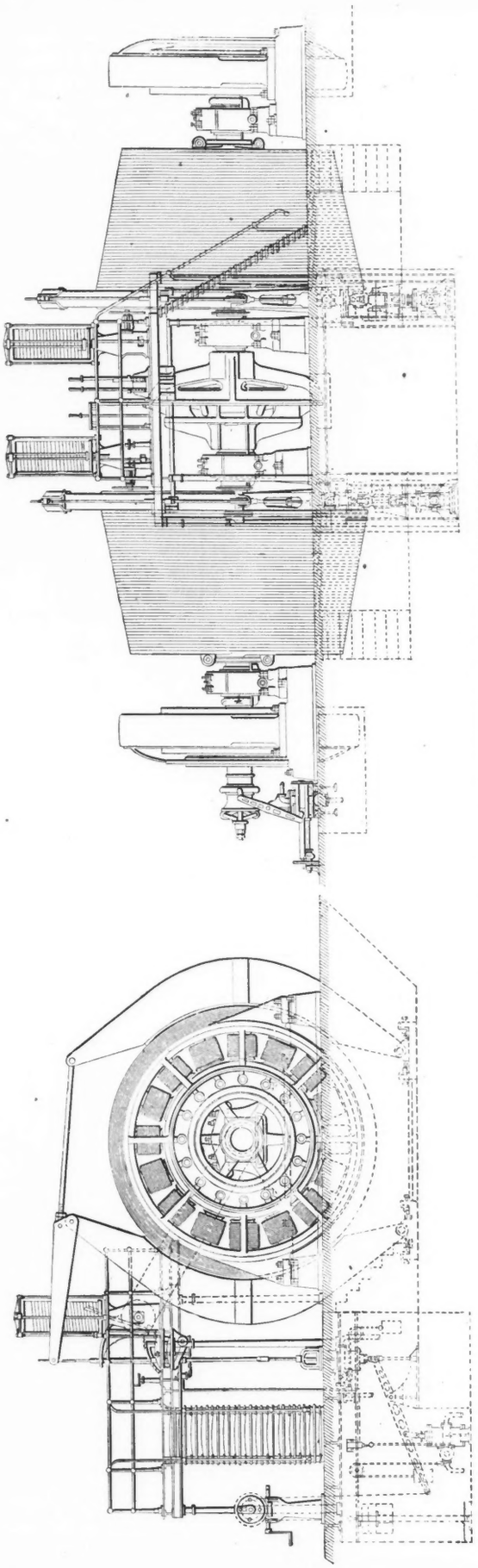


FIG. 2. LONGITUDINAL AND END-VIEWS OF HOISTING DRUMS AND ELECTRIC MOTORS

hours. Winding, however, and surface work are carried on only during one shift of 8 hours, the machinery being capable of raising in this time the whole amount of ore won in 24 hours. The daily output is, at present, about 1200 tons, and the company has a capacity of 400,000 tons per annum.

Electrically Operated Hoists

As shown in Fig. 2, there is a motor at the outer end of each winding drum, the armatures being mounted directly upon the drum shafts with no outer bearing. Each motor is a 16-pole machine, designed for an output of 500 brake h.p. at a speed of 38 r.p.m. The two motors, weighing 45 tons each, have armatures 8 ft. in diameter and commutators 6 ft. in diameter, with 1248 segments. The field magnets are compound-wound, the ratio of shunt ampere turns to series ampere turns being 3:2 at normal full load and 9:11 at starting. The current density in the armature conductors is extremely high, being 10,000 amp. per square inch section at starting. At present winding is done from a comparatively shallow shaft, and the two machines are coupled in series giving a speed of only 19 r.p.m. They will be coupled in parallel and the speed doubled when the shaft is deepened. The controlling apparatus, which is shown in Fig. 1, is extremely simple and effective. All operations are controlled by one lever which works in an inverted U-shaped slot in the steel plate and is shown in the shaded portion of Fig. 1 in the "off" position. The direction of rotation of the motors and winding drums depends upon which side of the slot the lever is pushed forward in. The movement of the lever from the "off" position into the short tail-slot puts on the brake gear. The circuit is always made and broken on two single-pole circuit breakers fitted with magnetic blow-outs.

Control of Armature Circuits

The rheostat for inserting and cutting out resistance in the armature circuits consists of a large commutator (shown in the lower right-hand corner of Fig. 1). The commutator is mounted with the segments vertical and in a fixed position; an arm carrying carbon brushes mounted on a vertical axis is moved round the commutator by means of a rack and pinion, and in rotating cuts out the resistance gradually segment by segment. The resistance consists of cast-iron V-shaped strips bolted between the commutator arms, and these are easily removable should a burn-out occur. The rack, which gears with the pinion keyed on the movable brush arm, is operated by air pressure, the air cylinder being shown on the right-hand side of the circuit breakers below the commutator. A vacuum dash-pot cylinder, not shown in the illustration, is fixed in tandem with the pressure cylinder, and controls the rate of movement of the

piston; it provides an easy adjustment of the length of time which is desired to elapse for the cutting out of the resistance.

The method of operation is as follows: Forward movement of the lever in either slot causes the lever to catch against a trigger which opens a valve and admits compressed air to a cylinder, which in turn forces the two circuit breakers on that side to the "on" position, thus closing the main circuit. Air pressure is also admitted to the cylinder which operates the rheostat arm by means of a double-piston valve, linked up to the starting lever, as shown in the illustration. The rack is then pulled downward with a slow uniform motion, and the resistance is gradually cut out of the armature circuit. In stopping, the lever on its return movement trips the lower trigger in the slot, and mechanically knocks off the "hold-on" catches of the two circuit breakers, thus breaking the circuit. Also it first moves the bell-crank lever, connected to the valve rod of the pressure cylinder, and admits the compressed air to the bottom end of the cylinder, which then returns the moving arm of the rheostat quickly to the starting position and inserts all the resistance in the armature circuit.

Regulating Speed

Other attachments connected with this air-pressure cylinder operate as follows: A toothed quadrant, also gearing with another pinion on the rheostat arm, is connected by a rod to the connecting rod between the starting lever and the bell-crank lever which operates the valve. As the rheostat arm rotates, the quadrant is moved downward. This pushes the connecting link closer to the fulcrum of the bell-crank lever, which is slotted for this purpose. Having moved the connecting rod closer to the center, it is evident that a small backward movement of the starting lever will not only move the valve to the "off" position, but will open the valve to admit air pressure to the lower side of the piston. In this way the engineman can control the speed of winding when approaching the end of each wind, because he can insert as much resistance as required in the armature circuit. Having moved the starting lever to the "off" position, the operator can throw on the brakes by pulling the lever back into the tail-slot; this opens a valve to admit compressed air to the brake cylinders. Should anything fail in this valve gear, a treadle connected with another valve and the air supply gives additional control. There are also emergency hand and foot brakes in case the compressed air supply fails. Moreover, should overwinding occur from any cause, the brakes are put on automatically by the winding drums themselves which, under such conditions, trip a heavy weighted lever. I was informed that a device had also been arranged for short-circuiting the armatures and series windings on themselves to give braking effect, but whether this is actually installed at present I cannot say.

Air Supply

The air pressure is supplied by a large compressor, driven by an induction motor in the winding-engine house, and supplies compressed air for rock drills and other purposes in the mine at 75 lb. per sq.in. The gear, shown in Fig. 2, on the left-hand side of the motor, is used for operating the friction-clutch mechanism, when required, through the hollow shaft of the winding drum. Men are lowered and raised by a separate drum driven by an induction motor. This calls for no special description. There is also in the hoisting-engine room a 100-kw. motor-generator for supplying direct current at 500 volts to the mine locomotives.

A striking feature of the surface plant at the mine is the great distance between the shaft and the hoisting house. This wide interval, which in this case is about 110 yd., is according to the usual German practice. The Swedish engineers have apparently copied the Germans. Another feature is the great hight of the headframe, which is about 130 ft. from the ground level. The mean speed of

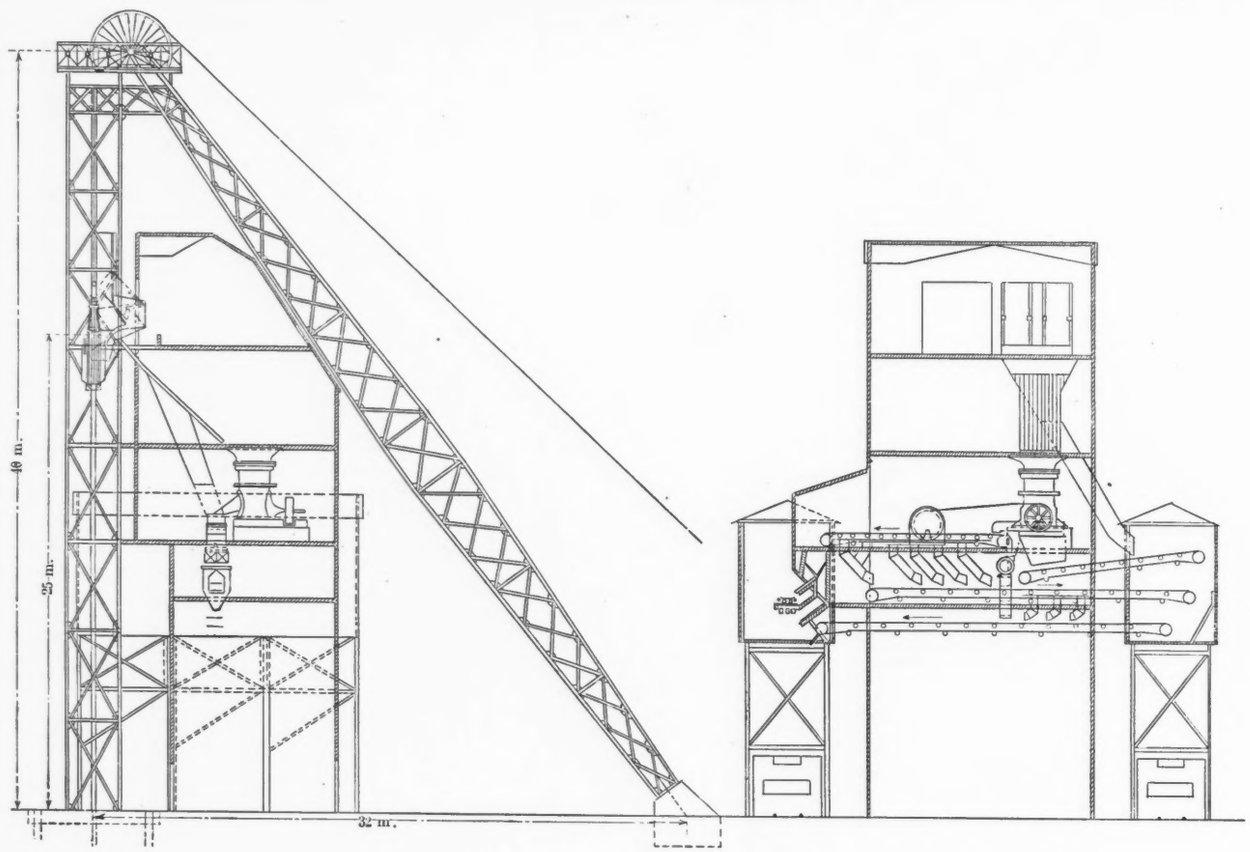


FIG. 3. CRUSHING, SCREENING AND CONVEYING APPARATUS IN THE HEAD-FRAME

winding is 10 ft. per second for a shaft depth not exceeding 900 ft. When the shaft reaches greater depths the motors will be put in parallel and this mean speed will be doubled. The normal load in the cage bucket is five tons of material, but about 1300 amp. for a few seconds, about one-half of which is supplied by a storage battery.

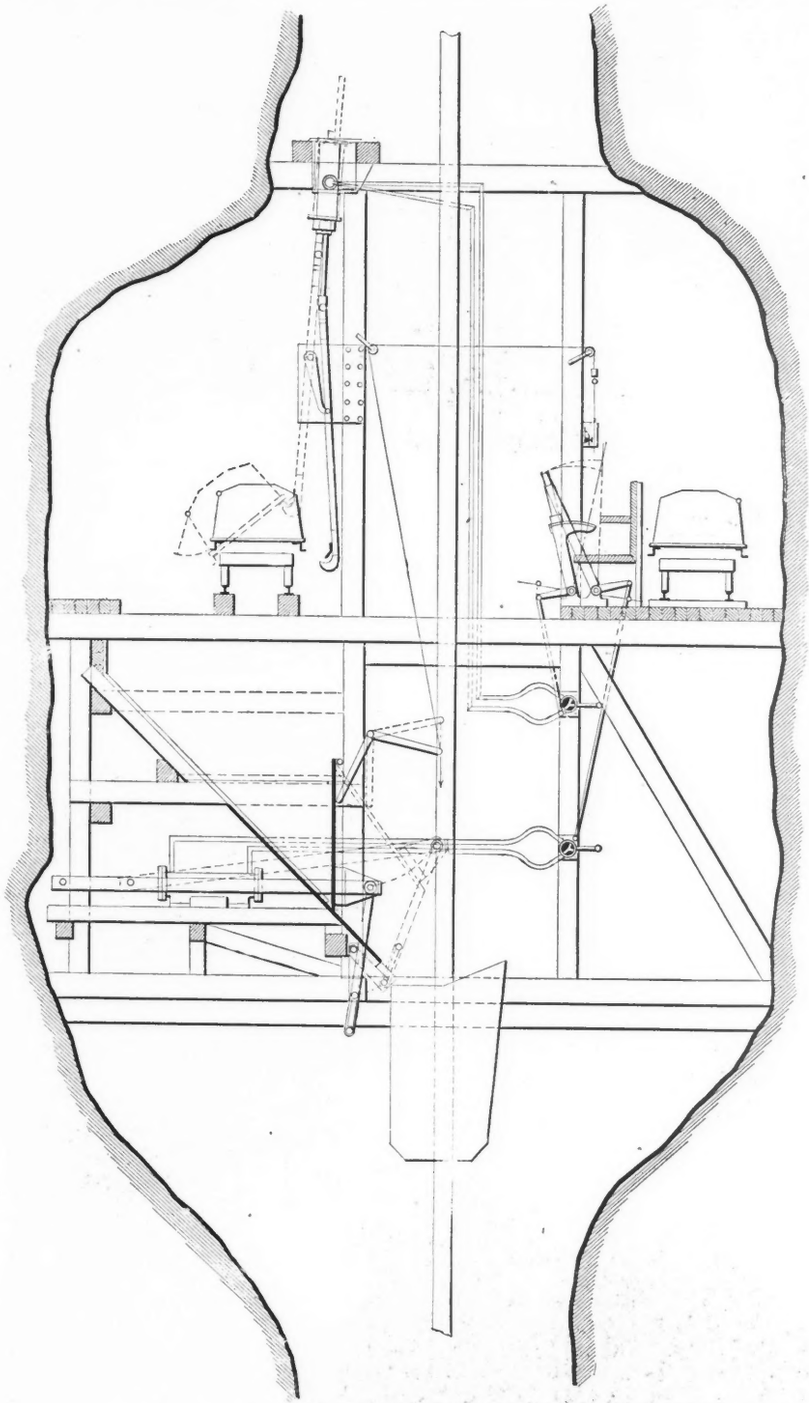


FIG. 4. UNLOADING CARS INTO CHUTES AT THE SHAFT-BOTTOM

it may reach 7½ tons, owing to the variation in the weight of a given bulk of material, depending on the proportions of iron ore to rock, etc. The bucket and the unbalanced weight of rope bring the total up to a maximum load of 10 tons, the load used as a basis of calculation. The time for acceleration is about 10 seconds, and the current reaches a maximum of

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According to the *Scientific American*, artificial sapphires have reached New York from Paris. Hydrofluoric acid has no effect on the new sapphires. The imitation, however, has a specific gravity considerably lower than that of the real sapphire, and is softer. Another difference is that, while the natural stone refracts different colors brilliantly from different surfaces, the imitations do this only slightly, or not at all.

The Boundary District of British Columbia

SPECIAL CORRESPONDENCE

All the larger copper mines and the three smelters in the Boundary district of British Columbia have been closed, owing, it is stated by the companies concerned, to the low price of copper and the high cost of labor and materials. While it is not admitted that to the latter, rather than the former, may be attributed the decision of the managements of the several companies to suspend operations, the general opinion throughout the district inclines to the view that had the miners' and smeltermen's unions given any indication that the men would be willing to accept lower wages than those demanded and agreed to by the companies when copper was high, and that fair value would be obtained for the wages paid, there would not have been a general shut-down. As it is, the whole district is in a state of suspense, with more than 2000 men discharged at very short notice, this total including men lately employed on ore trains by railway companies as well as those in mines and smelters.

The companies whose properties are now idle are the Granby Consolidated Company, with mines at Phoenix and smelter, capacity about 3000 tons per day, at Grand Forks; the British Columbia Copper Company, with the Mother Lode and several other local mines, and smelting works. capacity about 2000 tons per day, at Greenwood; the Dominion Copper Company, with several mines at Phoenix and elsewhere in the district, and smelter, daily capacity about 1400 tons, at Boundary Falls; and the Consolidated Mining and Smelting Company of Canada, working the Snowshoe mine at Phoenix, under lease.

Several small mines around Greenwood having high-grade silver-gold ore, and the Jewel gold-quartz mine in Long Lake camp, are still being worked. Except for these, the mining and smelting industries of the whole district are at a standstill.

According to a press bulletin of the Geological Survey, selenium is variously quoted at from $14.33 per kg. (2.2046 lb.) to $2 per oz., as there is no steady market and the prices vary with different dealers.

According to the Geological Survey, no selenium is known to be produced commercially in this country, but during 1906 one copper refinery made some in an experimental way, and it is possible that it was produced at other refineries also. At this refinery the selenium was obtained from the anode slimes or mud, where it is left with gold, silver and other residues in the electrolytic refining of copper.

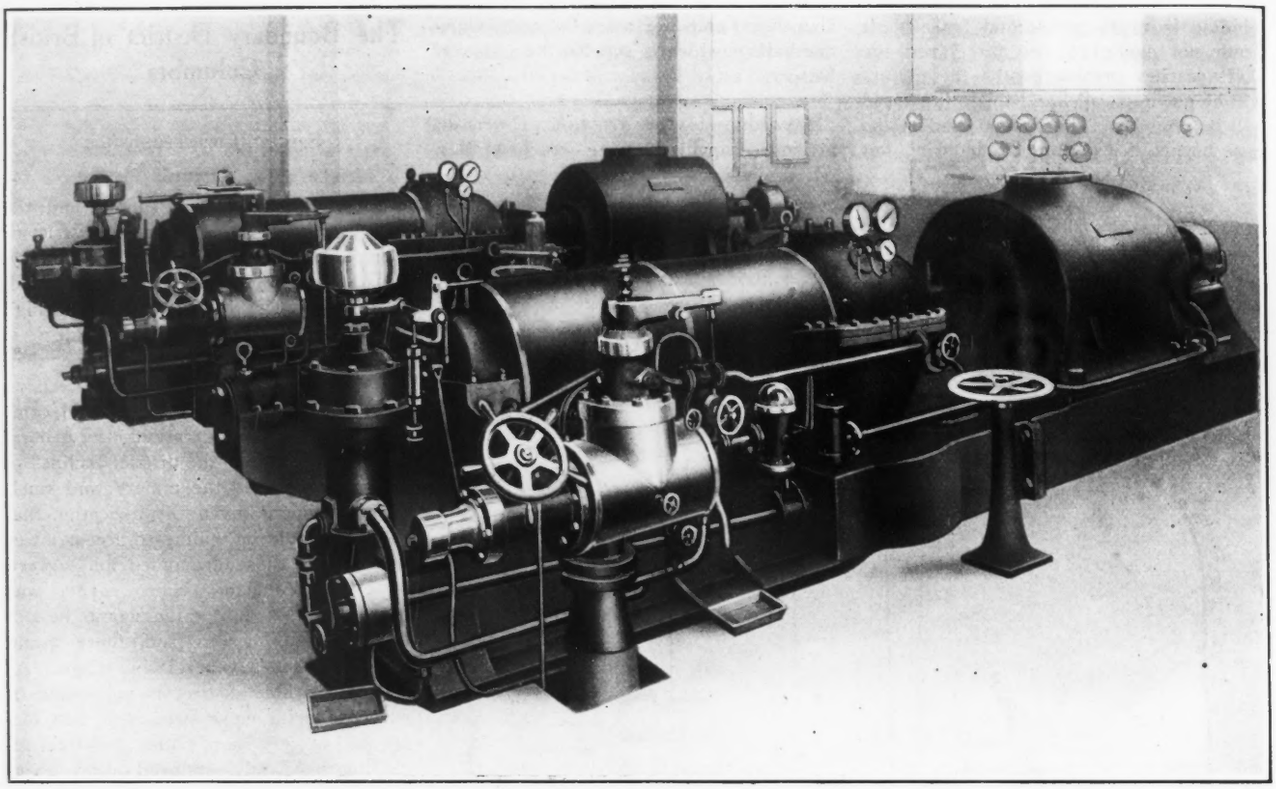


FIG. 1

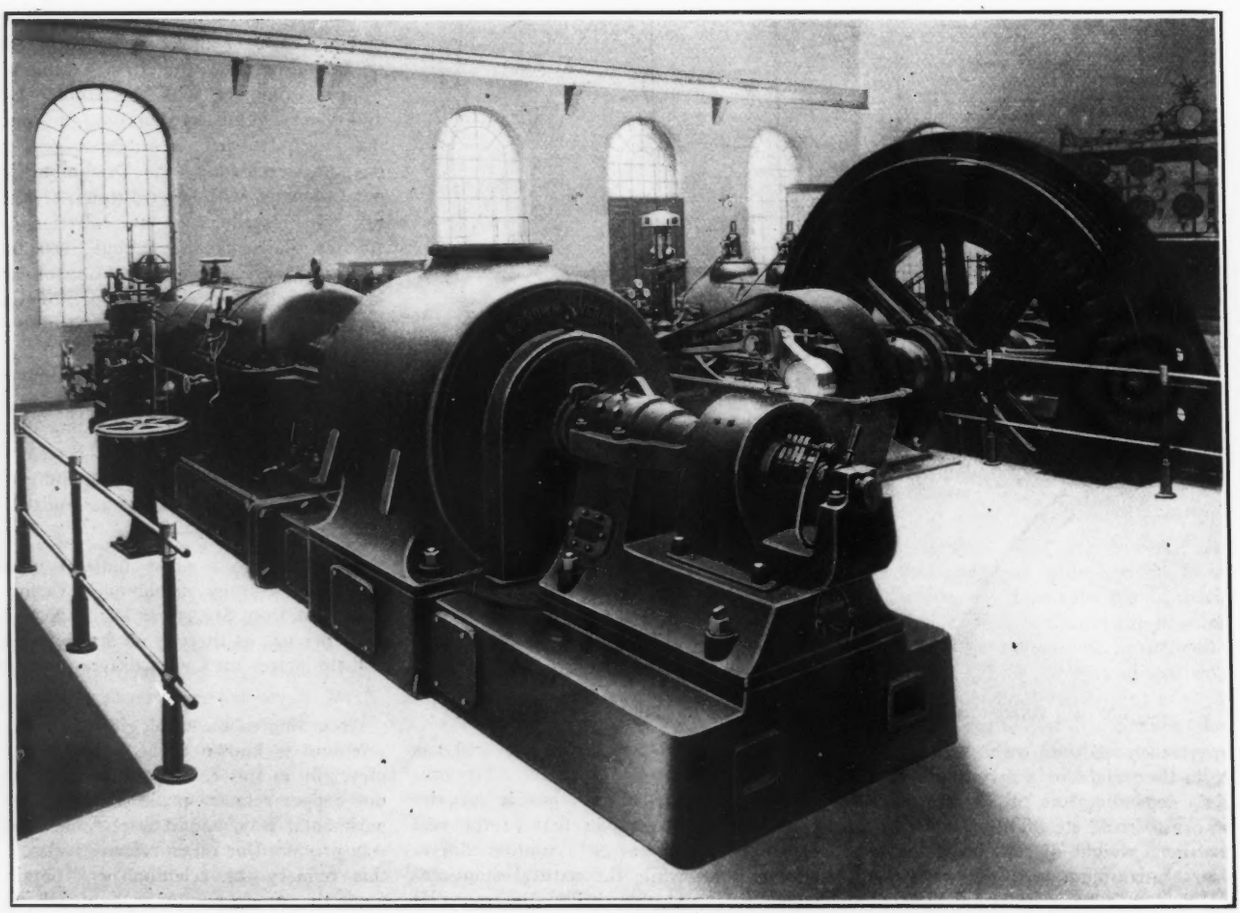


FIG. 2. STEAM TURBINES IN GERMAN MINING PRACTICE

Steam Turbines in German Mining and Metallurgical Plants

By Alfred Gradenwitz*

Steam turbines are being adopted extensively as power producers in German mining and metallurgical works. They are used not only as prime movers in driving electric generators but also for the operation of high-pressure centrifugal pumps and compressors. The illustrations show two typical Brown-Boveri-Parsons turbine plants installed, in the course of the last few years, in the Rhenanian-Westphalian district of Germany.

The Hibernia Mining Company at Herne possesses in each of its pits a special 1000-volt power station, the generators of which are operated either by reciprocating steam engines, coke-gas motors or steam turbines. It is interesting to note that in connection with all the new pits constructed in the course of the last few years reciprocating engines have been abandoned entirely. Owing to the lack of uniformity in the output of coke-oven gas, which is used mainly under the boilers, a power reserve for the several pit power stations, some of which are several kilometers apart, has been obtained by connecting these stations by means of a 5000-volt cable system. A number of transformers, each of 300 kw. capacity, serve to raise the pressure of the generator from 1000 volts to the transmission tension of 5000 volts.

The steam turbines at present installed or in course of construction for this extensive mining plant comprise 11 units of an aggregate output of about 10,000 h.p.

Fig. 1 represents two turbo-generators of 750 h.p. each, installed in the power station of the General Blumenthal pit. The switchboard, constructed by Brown-Boveri & Co., is also shown. Fig. 2 represents a 1350-h.p. Brown-Boveri-Parsons steam turbine installed at a pit of the Dahlbusch Mining Company at Rotthausen. The electric generator directly coupled to this turbine produces rotary current at 2000 volts and 50 cycles, running at 1500 r.p.m. The steam-engine driven rotary-current generator visible in the same figure has an output of 450 horse-power.

According to the *Min. Journ.* (Oct. 12, 1907) a decree has been issued to governors of Chinese provinces relating to the production and use of gold. Provinces are to buy up all gold and send it to the Tien-Tsin mint, coining tests are to be made and a uniform rate of exchange established; custom duties are to be paid in gold and gold coins are not to be exported under any pretext nor destroyed.

*Berlin, W. 50, Regenburgerstr; 3.

Dredging in the Yukon

Special Correspondence

The results obtained by dredging for gold, with what has been described as the smallest dredge ever taken north, have recently been made public. Several years ago the Lewes River Dredging Company had a small dredge taken over the White pass into the Yukon country. J. Moore Elmer set the machine up on what was known as the Cassiar bar, but after operating for a time it was found that no gold was there to be recovered. The dredge was moved down-river to Dawson, there taken apart and hauled thence to Bonanza creek, where, after reconstruction, it did effective work on a lay; the company owning the dredge making good profits while the owner of the ground received quite a fortune as his share.

Later Discovery claim, together with No. 1 below and No. 1 above, comprising in all 2000 ft. of the creek, was purchased. This property had already been worked by other placer-mining methods and had yielded a lot of gold, but Mr. Elmer was given a free hand, both in regard to its purchase and systematic dredging. Start- at the lower end of the claims, all the wash was put through—old tailings and unworked ground alike—from the center of the creek to the rim on the right limit. After the full 2000 ft. had been covered the dredge was turned around and worked back, doing similar work on the left limit. Five seasons have been occupied in dredging thoroughly the gravel on the three claims. In the course of the work it was found that even tailings that had been passed through sluice boxes more than once still contained gold recoverable by the dredge. The discovery of a paystreak hardly touched prior to dredging helped to swell the total recovery of gold, which was rather less than $1,250,000. The results gained have served as an object lesson, indicating that creeks already regarded as worked out may prove well worth dredging.

Hastings (B. C.) Exploration Syndicate, Ltd.

Special Correspondence

The tenth general meeting of shareholders in this company was held in London, England, Oct. 22. The directors' report and statement of accounts were adopted. The following are extracts from the report of Leslie Hill, of Nelson, B. C., the company's local manager and consulting engineer:

At the Arlington mine, Erie, Nelson mining division, the development work done comprised 998 ft. of drifts, 249 ft. of crosscuts, 50 ft. of winzes, 132 ft. of raises, and 85 ft. of old drift reopened, making a total of 1514 ft. The total cost for labor on this work was $11,284, making an average cost of $7.45 per foot. The ground has been much harder, and the cost per foot $1.47 more than that of the year immediately preceding.

There were shipped 1409 tons of ore, having a gross value of $64,838, equal to $46.02 per ton. The net smelter value was $52,076, equal to $36.96 per ton. The cost of mining and shipping was $40,225, leaving a gross profit of $11,851. The cost per ton of ore shipped was $28.55, which would equal a cost of $2.60 per ton mined. The cost of development per ton of ore shipped was higher and that of stoping lower than last year. The total cost for mining, sorting and shipping was $2.71 per ton lower than last year, but the net value was $5.85 per ton less, making the gross profit $3.14 per ton less than that of last year. The wages of all classes of labor increased during the year. On June 1, the wages of all men employed at the mine were raised 25c. per day. At the same time the prices of all supplies have advanced, making it very difficult to operate at a profit.

On the coal lands at Blairmore, Alberta, the third instalment was paid to the Dominion government of Canada on June 1. The final payment will be due on June 1, 1908. A negotiation for sale of this company's interest in these coal lands was lately in progress, but the matter was not closed.

Erratum

By an accident the article entitled "Multiple Arrangement of Drills on the Rand" in the Journal of Sept. 28, 1907, was published under the signature of Edgar Nichols. The author of this article was Eustace M. Weston, of Brakpan, Transvaal. The mistake failed to be noticed and was not called to our attention until receipt of the last African mail, wherefore the delay in making this correction.

The *Electrician* reports that the Chinese Engineering and Mining Company has spent nearly £110,000 on new electric lighting and power plants at the Tongshan and Linsi mines.

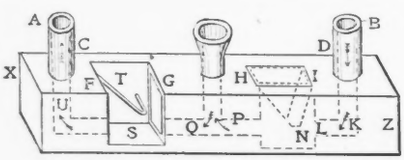
A method of removing broken stems from stamp heads is described in the *Journ.* Chem. Met. and Min. Soc. of South Africa. The pressure of a 140-ton hydraulic press was insufficient to press out the stem. The application of a blow-lamp so as to expand the metal of the head resulted in allowing the press to squeeze out the broken ends with only half the pressure which was at first unsuccessful.

Ancient Breathing Apparatus

By E. P. Buffet

It is possibly unknown to most mining engineers that the idea of a respiratory service for use in entering gassy mines is a very old one. Such an apparatus was described in the *Universal Magazine*, a British publication, issued in June, 1752. The breathing machine is, therefore, upward of a century and a half old. Its construction is shown in the accompanying illustration, reproduced from an engraving in the magazine. The language there employed in explaining its operation is followed in the account here given.

"The figure shows an instrument invented for going with safety into damp and other noxious air. *X Z* represents a square piece of alder, or willow, a foot long, and 2 in. both in breadth and depth, with a hole *K, L, Q, U,* ⅝ in. in diameter bored through it, and at *C D* short fossets with like holes bored through them, to which fossets hollow reed canes are to be fixed by means of short supple leathern pipes so as to be flexible at these joints. *N, T, S,* are square holes, 2 in. deep, and



ANCIENT BREATHING APPARATUS

1¾ in. wide, with their leathern covers *F G, H I* nailed over them. *I N* is a broad leathern valve, moving on joints at *I*, so as to open by the force of the air which passes down the pipe *B, K, L,* when the breath is drawn in by the mouth at the middle fosset, which stands ⅝ in. above *G H*. *G S* is another like valve, which shuts the hole at *Q* close, while the breath is drawing in through the middle fosset; but when, on the contrary, the person breathes out through the middle fosset, the valve *I N* closes the hole *L;* and the other valve *G S,* opens for the breath to pass freely off thro' the pipe *U A,* by which means the person always draws in fresh air. There are two stiff wires, as *T,* fixed to prevent the valves opening too far, lest the force of the breath which is but small, should not shut them.

"This instrument is to be fixed to the mouth by a tape or cord, tied round the head; and it will be convenient to have cushions at the corners *C* and *D,* for the cheeks to bear off a part of the pressure of the ligature from the mouth. By the help of this instrument a person may go into a suffocating air as in some mines, his nostrils being stuffed with cotton, without any danger of suffocation."

The foregoing description would have been more nearly complete had it told whence the inspired air is to be derived, whether from a reservoir carried by the person, or otherwise, or through a tube reaching to the external atmosphere.

It may be added that at the date 1752 mechanical ventilators were not unknown, for on the same plate that contains the figure of the breathing instrument are illustrations of a system that had been installed to ventilate old Newgate. Some method for sweetening the air of that prison had become a humanitarian need, since its effluvia were not only a nuisance to the neighborhood, but even annoyed honorable judges on the bench of the adjoining courthouse. Power to drive the ventilators was supplied by a windmill on the roof.

A British Columbia Extralateral Case

Special Correspondence

The Full Court of British Columbia has given its decision on the appeal from the judgment of the chief justice in the Slocan extra-lateral rights case of Star vs. White. Two judges allow the appeal, but the third judge dissents from their finding. Justice Irving, in a lengthy judgment, adversely criticizes the evidence of the expert witnesses for the defendant, and compliments F. L. Sizer, of Helena, Mont., and S. S. Fowler, of Nelson, B. C., on their expert evidence for the plaintiffs. Full costs are awarded plaintiffs in all courts, an injunction is granted restraining defendants from further operating in the disputed ground, and an inquiry is directed to ascertain quantity of ore taken out by defendants.

This action was commenced on July 30, 1901, when the Star Mining and Milling Company issued a writ against Byron N. White & Co., claiming that defendants had trespassed upon plaintiffs' Heber Fraction and Rabbit Paw claims, adjoining defendants' Slocan Star, Silversmith, and other claims situated in the Slocan district of British Columbia, and had taken therefrom ore to the value of $500,000. The defendants claimed the right to follow and mine the ore, since the apex was on its ground.

Following earlier proceedings before the courts, the case was on trial in February and March, 1904, before Chief Justice Hunter without a jury. After hearing evidence the judge, who made a close personal examination of the mine, directed that certain extra and explanatory work be done in and around the actual mine workings in the hope that this new work would make clear some of the points in dispute, among them the plaintiffs' claim that a "black fissure" existed, there being direct contradiction in the evidence of eminent experts called by the respective sides. After some delay the work was done, and in July, 1905, the trial was resumed, lasting about 10 days. Plaintiffs then applied for leave to do further work but this was refused. Subsequently judgment was given in favor of defendants, the judge holding that plaintiffs' contention that a "black fissure" existed was "a myth." Plaintiffs' action was accordingly dismissed and all costs were awarded against them.

Plaintiffs next appealed to the Full Court of British Columbia, claiming that they had been wrongfully refused the right to do further explanatory work, and that the main finding of the chief justice was wrong. The Full Court decided that further work should be done, directed what it should be and how carried out, and stayed the hearing of the main appeal until after completion of this extra work, which was afterward done under the supervision of W. E. Zwicky, of Kaslo, manager of the Rambler-Cariboo mine, also situated in the Slocan. In April, 1907, the whole case was practically re-heard before the Full Court, the decision of which has now been made known after months of delay. Counsel for the defendants states that an appeal will now be taken to the Supreme Court of Canada for a decision.

Lead and Silver Deposits in Russia

A. F. Stahl in the *Montan-Zeitung* (Oct. 15, 1907) gives information as to the situation and extent of the more important lead-silver deposits of Russia. Deposits are known in Donetz-Becken, in the province of Olonez, in the northern part of the Empire, and on the White Sea, but they are not exploited. In the Caucasus and Trans-Caucasia there are nearly 100 different deposits, of which only very few are worked. The Sadon mine was worked in past years, its ores being smelted on the Ardon river. The Urals are not particularly well provided with silver-bearing lead ores, but rich silver ores and some gold-bearing ores exist in the region around Berezowsk. Other silver-lead deposits lie in the Akmolinsk and Atabarsk districts of Siberia, also in the region about Semipalatinsk; another district is in the Tomsk province in the Atlai region and in the valley of the Yenisei river; also in the Nertschinsk district in Transbaikal there are about 90 mines, of which only four are worked.

The mines which are already producers are becoming less and less active and the output diminishes from year to year. The chief cause of the recession in lead mining is in the fact that the lead cannot support heavy transportation charges and the silver value of the ores is not always sufficient to make up for this disadvantage. The mines lie, for the most part, remote from the large centers of trade and industries in which lead finds application.

Mining Anthracite Coal in the Wyoming Valley

Steel Beams Are Used to Support the Roof. The Many Advantages Justify the Greater Initial Cost

BY M. S. HACHITA

Ranking high among individual producers of anthracite coal is the Alden Coal Company. For more than 30 years this corporation has worked its rich seams of coal, located in the southern part of the Wyoming Basin of the anthracite field, about two miles below Nanticoke.

In the early 70's, a tunnel was driven in a southern direction for 1800 ft. from the surface, cutting the Bennett, Twin, Ross and Red Ash beds respectively, and from these seams the early supply of fuel was shipped to market. In 1880 the first shaft 12x26 ft. was sunk from the surface to the Red Ash vein, cutting the Bennett, Twin, Ross, Rosey or Top Split, Red Ash and Bottom Split Red Ash veins, making a total depth of 585 ft. By the rapid development in the shaft workings a connection between the shaft and tunnel was effected through the Twin and later through the Ross and Red Ash seams, thus a second opening was secured for the shaft workings.

Many Faults

From Fig. 1 it is obvious that the country is highly faulted. There are eight principal anticlinals which run across the valley; they are, in general parallel to each other. There are at least three anticlinals, the Newport center No. 3, 4 and 5 which run across the Alden Coal Company's property north of the No. 2 shaft. The pitch of the seams north of the No. 1 shaft run irregularly from nothing to 90 deg., while the dip south of the shaft is quite regular; at the foot of the shaft it pitches about 20 deg. to the north and gradually increases to about 75 deg. near the outcrop. Fig. 2 shows the geological section south of No. 1 shaft. The following are the intervals of the measures:

Name of Strata.	Thickness of Measure.	Thickness of Coal.
Washington	50 ft.	
Rock	70 ft.	
George vein (No. 2 shaft)		3 ft. 6 in.
Sandstone	80 ft.	
Mills		6 ft. 0 in.
Sandstone	70 ft.	
Hillman		4 ft. 0 in.
Sandstone	150 ft.	
Cooper		6 ft. 0 in.
Sandstone	100 ft.	
Bennett		4 ft. 0 in.
Sandstone	70 ft.	
Twin		3 ft. 6 in.
Sandstone and slate	135 ft.	
Ross		4 ft. 10 in.
Sandstone	105 ft.	
Rosey		3 ft. 0 in.
Sandstone	40 ft.	
Red Ash		5 ft. 0 in.
Total	790 ft.	39 ft. 10 in.

The coal has a very light luster, a hardness of about 2½ and a specific gravity of 1.49, and is practically free from impurities such as slate, bone, sulphur, etc., and is free burning. On account of its purity, condemned coal is almost unknown. The output of the mine is on an average 25,000 tons per month, or 300,000 tons per year; this product is shipped on the Central Railroad of New Jersey to points in Pennsylvania, New York and New Jersey. Fig. 3 shows the workings in the Red Ash south of the No. 1 shaft. This seam is about 5 ft. thick and is comparatively free from the parting slate and other impurities. A glance at the map shows that the system used in mining this vein is decidedly irregular with the exception of one upper left which has a gradual pitch of from 30 to 75 deg.. This is due to local conditions, such as faults, insufficiency of grade to chute the coal down the chambers, etc.

Method of Working

In working the upper left, the gangway and airway were driven at about 1½ per cent. grade in favor of the load and the chambers were turned off at right angles to the strike. They were driven 20 to 30 ft. wide, and 50 ft. center to center, and since the pitch of the seam is greater than 30 deg., the coal slides down on the bottom without the aid of sheet iron. At the foot of the chamber a battery is built to check the overflow of coal and a chute which is attached to the battery is built sufficiently high to allow the empty cars to run under it. The ventilation of the workings is effected through the crosscuts which are driven every 50 to 70 ft. All gob is placed on one side of the breasts. In driving gangways and airways sheet iron 4x10 ft. and 3/16 of an in. in thickness is placed on the bottom close to the face, before the shot is fired. This sheet iron accomplishes two purposes; first it aids in shoveling the loose coal; second, it saves fine coal otherwise lost. Before firing, enough loose coal is placed on top of the sheet to weigh it down, for unless securely weighed down heavy shots are apt to lift it and mix it with the coal.

The Mine Tracks

The gangway is laid with a single track of 30 in. gage and the rails are all 25-lb. with the exception of those used on the mechanical haulage roads where 40-lb. rails are used. All ties on the gangway are 5x6 in.x5 ft. and placed 18 in. center to center. The spikes used in holding the rails are 7/16x3½in. and the length of the point is equal to twice its width. The capacity of the mine car is 2½ tons with 6-in. topping and it has the following over-all dimensions: Length, 10 ft.; width (top), 4 ft. 10 in.; width (bottom), 4 ft.; depth, 30 in. The bottom of the car is lined with sheet iron 3/16 of an in. thick, which is intended to resist the wear and tear and also to diminish the friction when dumping the coal at the head of the breaker.

Miners' Wages

The miners are paid $1.15 per car and some yardage is allowed in development work. But in the Rosey vein on account of its thinness the miners receive $1.35 per car. Under all conditions the workmen furnish their own tools, powder and labor. At present the digging force consists of 140 miners and 100 laborers. On account of the thinness (3 ft.) of the Rosey vein and the somewhat friable nature of the roof, the officials of the company decided to use the longwall retreating system in working this seam. At present a few gangway headings have been started from the shaft level and as soon as they reach the property lines the panelling system will be used.

The Red Ash, Ross, Twin and Bennett veins have been extensively worked south of the No. 1 shaft, but on account of the many anticlinals north of the shaft there is a large acreage of virgin coal yet to be mined.

The No. 2 shaft, which was sunk in 1896, is 12x30 ft. and 617 ft. deep to the Cooper vein. The pitch of veins in this locality is very steep and irregular on account of the Newport center anticlinal No. 3, 4 and 5 and the developments in this locality are in their infancy.

The Mine Stables

Mules are generally used in hauling coal inside, there being 70 in daily use. The stables are located in the Rosey vein about 400 ft. from the foot of No. 1 shaft (see Fig. 3). They are constructed of plain wood, each stall is 5x10 ft., the floor is made of planks and has a pitch of 1½ in. to 10 ft. The mangers, made of 3-in. boards, are 14x30 in. and 12 in. deep. The troughs are made of cast iron and have a capacity of five gallons. The mules are fed twice a day, in the morning and evening. The order of feeding is as follows: First, water; second, hay; third, grain. The average amount of hay per mule is from 13 to 15 lb., depending on the mule; the amount of grain is 12 lb. of corn and oats mixed in equal parts by measure.

Pumping

There is very little water in this mine. It is concentrated by means of siphon gravity and a few small pumps, at the main sump at the foot of the No. 1 shaft in the Red Ash seam, a 12x8x16-in. duplex plunger type of pump at the foot of the shaft can handle all the water in one shaft. There is an emergency pump at the foot of No. 1 shaft in the Twin vein, which is of the 16x24x12x18-in. compound duplex type. This pump is not in use at present.

Complete timbering is sometimes employed in gangways wherever the roof is treacherous or the tendency of the coal is to fall on the haulage road in the pitching places. The style of timbering in general use is shown in Fig. 4. The legs are well embedded in the floor. Wooden wedges which force the collar firmly into its position are usually used and sometimes wedges are driven in at both ends of the collar. A ditch on the lower side of the road is provided as is shown in Fig. 4.

Steel Props Used for Supports

The airway in the pitching places is not much more than a crosscut, for it cannot be used as a haulage road, because it is not usually timbered and is driven as small as possible; if it had too large a sectional area, the pillars to protect the gangway would be weakened and it would then have to be timbered. The Alden Coal Company is one of the pioneers in the Wyoming valley in the use of the steel I-beams for timbering. The officials of the company have decided to timber all the main haulage roads with steel wherever timbering is necessary. The way in which the steel is used is shown in Fig. 5, which is a sectional view in the Rosey vein at the intersection of the tunnel and the barn road on the No. 1 shaft level. The 15-in. I-beam is placed squarely across the 18-ft. gangway and is fitted into the wooden leg at each end. The legs are cut before they are taken into the mine. The dimensions of the cut in the upper end of the leg is shown in Fig. 6.

The superintendent claims that it is much easier and takes less labor, consequently it is much cheaper, to put up steel than the corresponding size of wooden timber. He further claims that it is much easier to make any kind of repairs, such as replacing an old leg with a new one than when the whole structure is of wood. The I-beam timbering has many advantages over wooden timbering, especially at the foot of a shaft, at turn-outs, etc., as it does away with the use of center props which are a constant source of accidents to mules and the cause of a considerable number of accidents to drivers and miners. The first cost in constructing steel timbering is considerably greater than the cost of wood timbering, as a 15-in. I-beam weighs from 60 to 75 lb. per linear foot, according to the thickness of

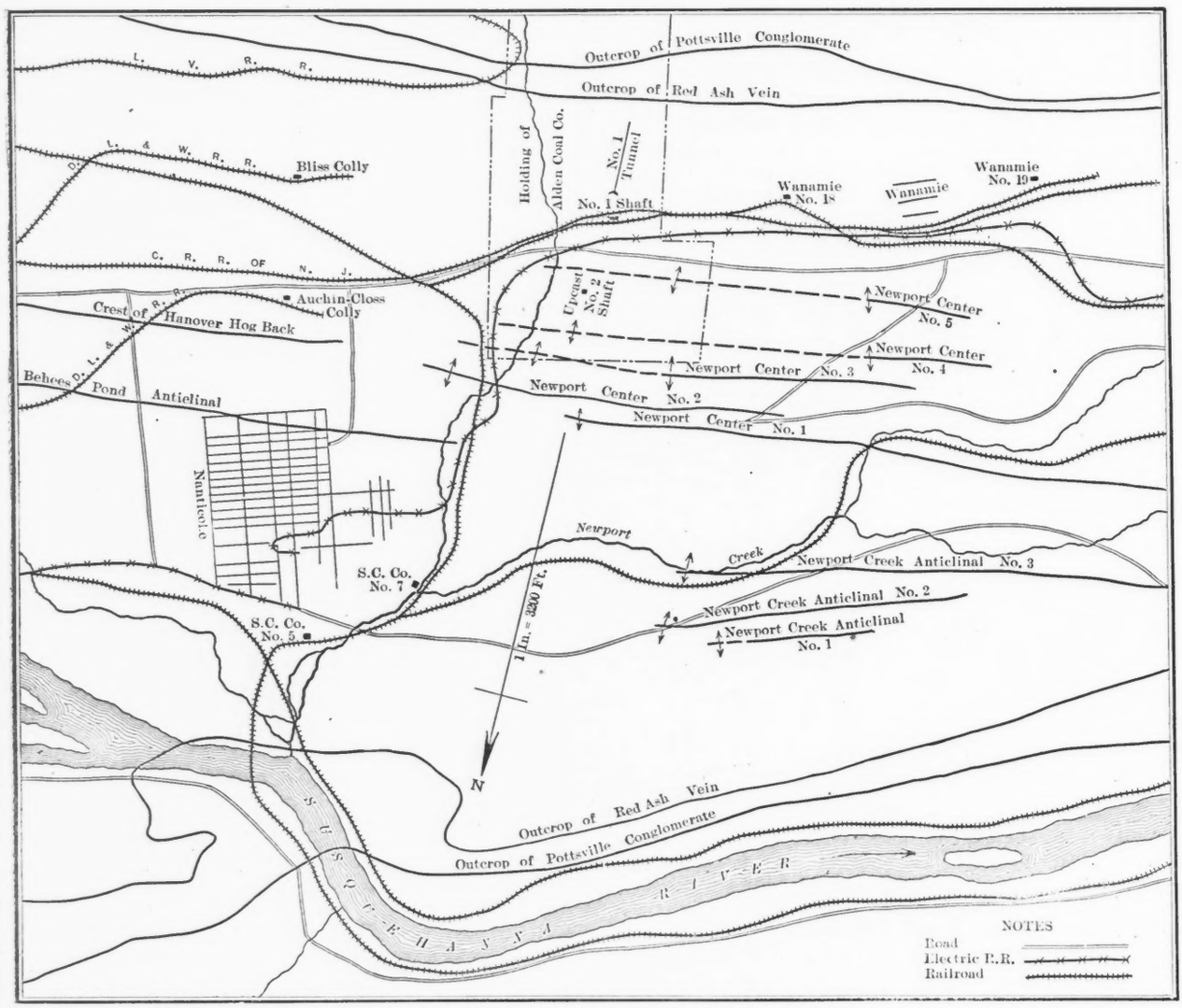


FIG. 1

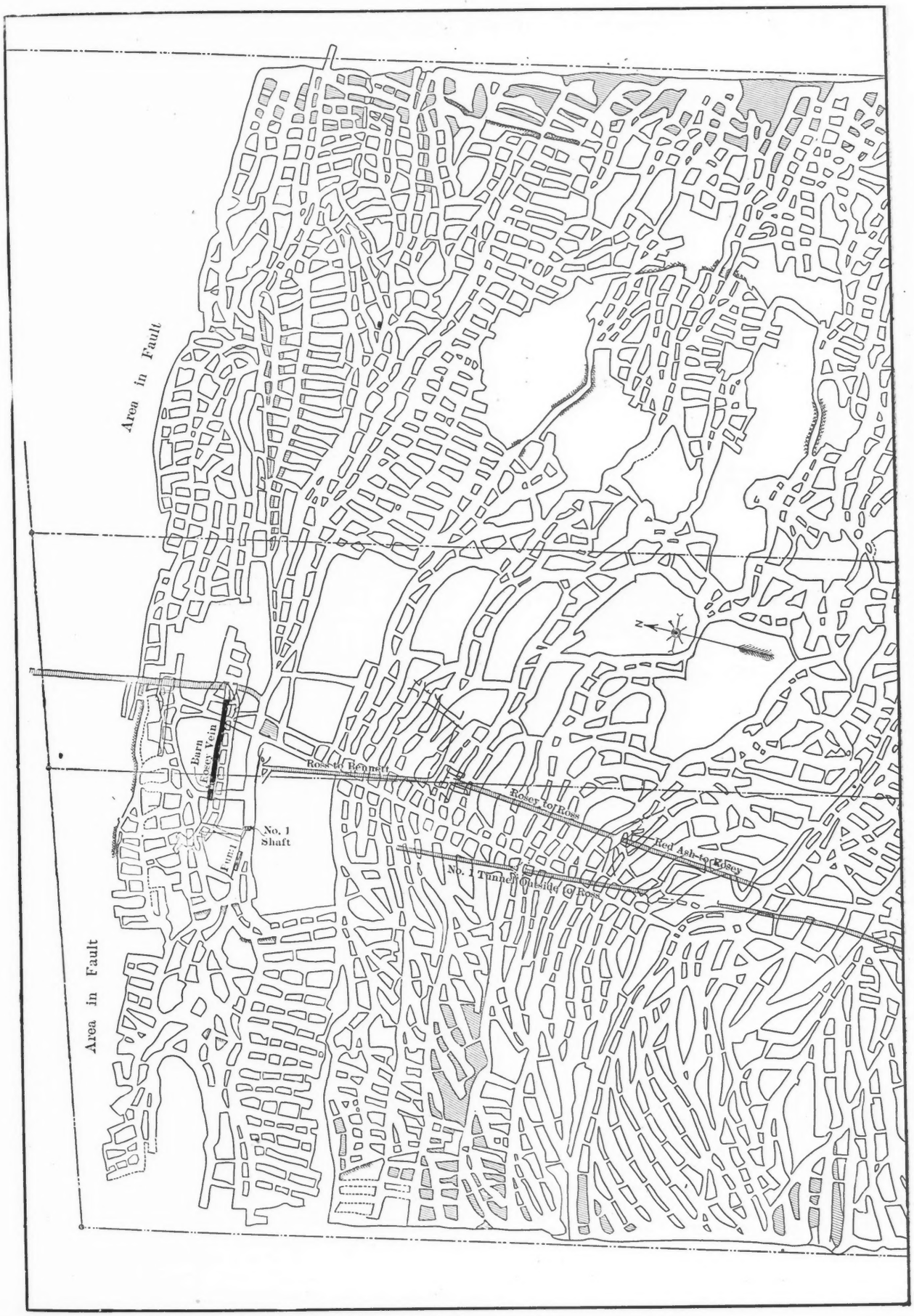

Area in Fault
Area in Fault
Barn
Rosey Vein
No. 1
Shaft
Tunnel
Rosey to Ross
Rosey to Ross
Red Ash to Rosey
No. 1 Tunnel Outside to Ross
N

FIG. 3

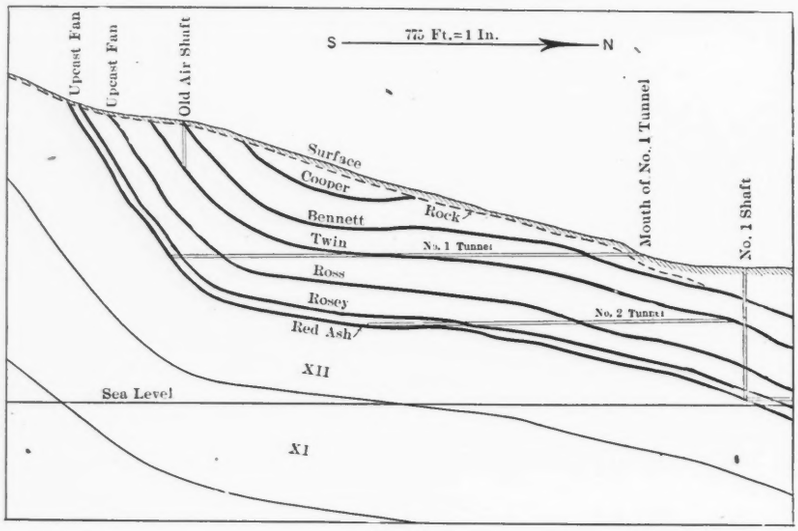


FIG. 2

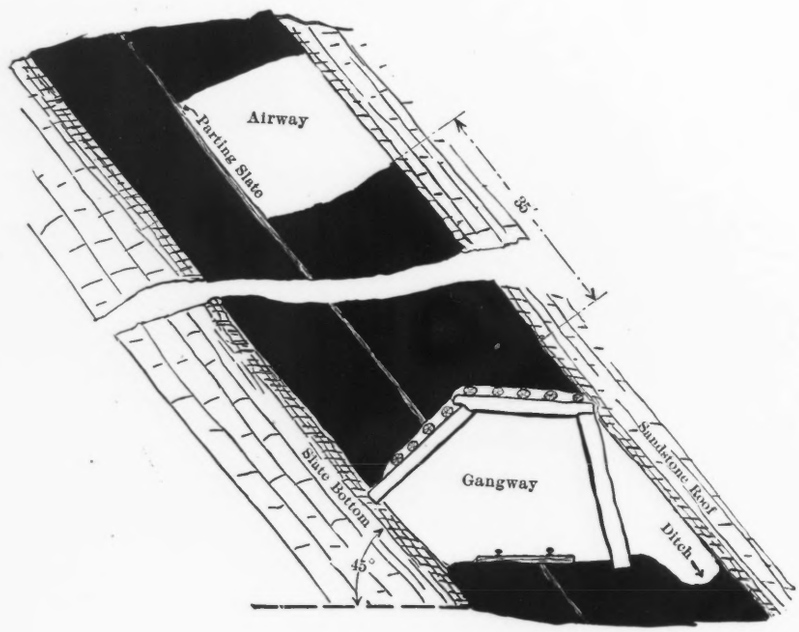


FIG. 4

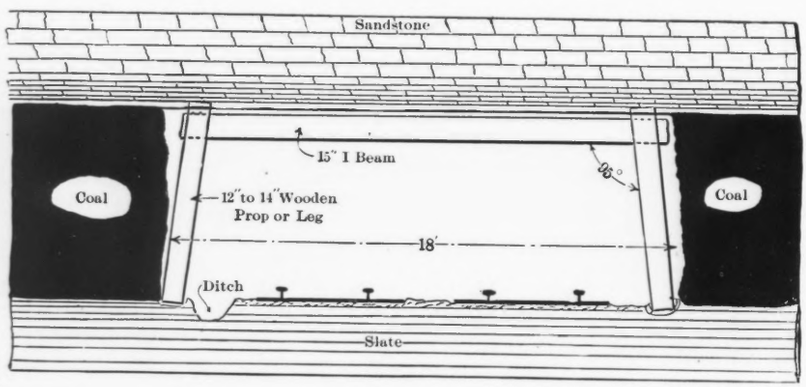


FIG. 5

the web and the width of the flange. The replacing of wood with steel is natural as the former is becoming scarcer and dearer each year and in a few years it will be next to impossible to secure 18- or 20-ft. logs.

VENTILATION

Ventilation is effected by four fans, two 15-ft. fans on the mountain, each driven by a 12-ft. by 18-in. engine running 65 r.p.m. and producing 75,000 cu.ft. of air per minute; these fans ventilate all the workings to the south of the No. 1 shaft. A 24-ft. fan is located at No. 2 shaft and is driven by an 18x36-in. engine running 65 r.p.m. This fan ventilates the Cooper,

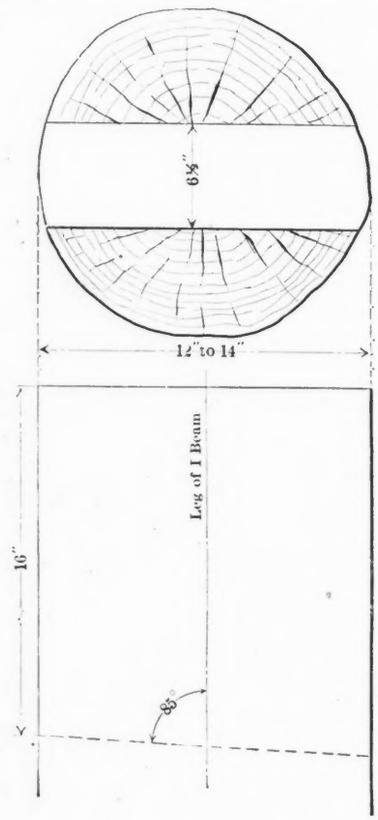


FIG. 6

Hillman and Bennett seams through 13 splits with 120,000 cu.ft. of air. The fourth fan is located about 700 ft. north of No. 2 shaft; it is a 24-ft. steel fan running 65 r.p.m. and pulls 80,000 cu.ft. of air per minute through the George and Mill veins. The four fans have a combined capacity of 350,000 cu.ft. of air per minute.

The mine is decidedly gassy and open lights, in any part of the workings, are prohibited. Clanny lamps are used.

A batch of car wheels, some of which made nearly 200,000 miles without wearing off more than an eighth inch of the chill were found by the St. Thomas Car Wheel Company to have been made from iron ore high in titanium.

Colliery Notes, Observations and Comments

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

DEVELOPMENT AND MANAGEMENT

In all collieries it is advisable to have the fan reversible so that in case of fire, the current of air can be changed and made to burn back over its own track where it will find comparatively little to feed on.

The earliest known mention of the existence of coal in the United States was by Father Hennepin, who in 1679 found soft coal near where the city of Ottawa, Ill., now stands. The first coal mined was in the Clover Hill coalfield, outside the city of Richmond, Va.

In preparing a "primer" two or three inches of the coil of fuse should always be cut off and thrown away, as it may have absorbed moisture. The end of a fuse should be cut squarely in order to secure a better fit, and fresh powder at the end. Care should be taken not to jam or force the fuse against the filling of the cap.

The value of an explosive depends largely on two things: (1) strength; (2) safety and stability or keeping qualities. It is poor economy to use a cheap grade of explosive, for while a first-class explosive costs more, the saving on labor and material possible when a high-class powder is used is not inconsiderable; fewer drill holes are required, necessitating fewer laborers; also there is less wear on steel and fuse.

When electric locomotives are employed in coal mines the controller cover should be removed at least every day and the controller mechanism thoroughly inspected. All parts should be kept clean and the contacts should have a bright polish and be kept properly adjusted. It is desirable to rub a small quantity of vaseline on the controller contacts every day; this keeps them in good condition and prolongs their life.

When boulders are to be removed a short distance to a steam shovel, derrick, or dump, as is often the case in stripping anthracite coal, a stone sled may be used. If many boulders are to be moved to the dump three sleds and chains for each team may be used to great advantage. By having dumping and loading screws with extra sleds, the team is kept moving continuously. With boulders from ¼ to 1 cu.yd. this method is cheaper, than blasting and loading into wagons.

Statistics show that there are at present fewer colliery explosions than formerly, but those which do occur are more extensive and the loss of life per explosion is greater than during the past. The decrease in the number of explosions is due to the better ventilation, extensive use of safety lamps and the use of flameless powder in gassy mines, while the higher death rate per explosion is due to the fact that the mines are deeper and drier, consequently they are more dusty than they used to be, and more men are now employed under ground than in the past.

Timbering in long wall workings should be set at regular intervals and systematically withdrawn when no longer required. The roof at the working face should be partly supported by the timber and partly by the coal itself. It is important that the timber be so arranged that the coal will have just enough pressure upon it to cause it to work easily. Two rows of props are generally used at the face and the back timber is systematically withdrawn and the roof allowed to fall behind the second row. When the roof is bad, bank bars are sometimes used in addition to the props so as to prevent the roof from falling between the props.

Nyalite, a new high explosive, has been recently introduced by the Du Pont company. It is said to be especially designed for use in mining coal, and when properly loaded, tamped and fired, is claimed to be safe in gaseous, dusty and dry mines. It has a rending and heaving action on the coal without unduly pulverizing it, and is not affected by ordinary ranges of temperature. It does not freeze, and until the detonator is inserted is safe to handle, store and transport. Among the advantages claimed may be mentioned the fact that it cannot be made to explode by friction, shock, pressure or by the application of flame. A nyalite brand of caps and electric fuse is also manufactured and their use is necessary to insure satisfactory results with this explosive.

In the coalfields of the United States, steel girders of H section are now frequently used instead of wooden timber for supporting the roof in the main roads. They are set like wooden timber, and are strongest when set with the web vertical. The ends may be let into the sides or ribs when the latter are sufficiently strong to carry them, or they may be supported by props or by side walls of masonry. Cast-iron props have been tried at several places but have not met with success, as sudden strains cause them to break without warning. The girders will bend considerably before they break, and when bent, can be used again by turning the convex side toward the roof or wall to be supported. The strength of girders may be increased by arching about 1/20 of the span. The ends of the girders should be wedged up with hard wood.

Direct-current motors used in coal-cutting machines, no matter how well designed, are always liable to sparking and even "flashing over" on the commutator, especially if overloaded, as a coal-cutter motor is sometimes liable to be. Under normal conditions there should be no sparking at the brushes. When sparking does occur, the cause should be promptly ascertained and removed. As a matter of precaution it is absolutely necessary that the brushes, brush-holders and commutators should be kept clean and free from oil or grease. With the alternating three-phase motor the sparking may be provided by a defective brush-contact or broken brush spring. When a coal cutter encounters nodules of iron pyrites, it is under a severe strain which produces great vibration. When a break-down occurs in the motor it is usually traceable to the vibration from the gearing of the motor, hence a good flexible coupling with rubber blocks should be used, wherever possible, to prevent undue vibration being transmitted to the motor. In some cases spring couplings are used, but they do not absorb the vibration as well as rubber blocks.

In setting a pump, experience has shown that if long pipes are to be used the diameter must be increased to allow for the increased friction. The elbows, tees and valves should be limited to the least possible number as they increase friction more rapidly than pipe length. Guard against leaks in suction pipes as it takes only a small leak to destroy the effectiveness of a section pump. The water supply should be constant to prevent hammering. Drip plugs and corks should be left open in cold weather to prevent freezing. For pumping very hot water the supply should be placed high enough so that the water can gravitate to the pump as water at a high temperature cannot be raised any great distance by suction. Pumps running at high speed should be supplied with a large suction chamber placed on the suction pipe close to the pump. Suction and discharge pipes should have unions inserted near the pump to facilitate disconnecting when desired and a check valve should also be placed in discharge pipes near the pump. An automatic relief valve inserted near the pump will prevent the discharge pipe from becoming frozen or clogged.

THE ENGINEERING AND MINING JOURNAL

Issued Weekly by the

Hill Publishing Company

JOHN A. HILL, Pres. and Treas. ROBERT MCKEAN, Sec'y.

505 Pearl Street, New York.

London Office: 6 Bouverie Street, London E. C., Eng.

CABLE ADDRESS "ENGMINJOUR, N. Y."

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

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

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

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

For sale by all newsdealers generally.

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

During 1906 THE ENGINEERING AND MINING JOURNAL *printed and circulated* 462,500 *copies, an average of* 8896 *per issue. Of this issue,* 9500 *copies are printed. None sent regularly free. No back numbers beyond current year.*

Contents

The Question of the Public Lands

The public would be less surprised at the great number of Federal indictments found against individuals and large corporations if it understood how inadequate are the laws to the present requirements of the country. The existing land, mineral, coal and timber laws were passed, often in ignorance, when the country was in a far less advanced stage of industrial life than it has of late rapidly attained. They were liberal to a fault, and were intended to tempt population into the country (they succeeded in so doing) and to induce capital to undertake the development of its resources. Public lands have been given away to natives of every foreign country, except China; the coal lands have been sold for a trifle, so that only the least desirable in locality or in quality of fuel remain unsold; our mineral resources are alienated almost without any compensation to the State; and to induce the building of railroads, general State and Federal acts encouraged the construction of competing roads, and the Government gives the right of way gratuitously over the public domain.

The result has been what was expected—and a little more. It is this little more which is at present exciting so much indignation and causing the demand for a perhaps too radical reversal of the old policy. The farmer who paid nothing for his land is crying out against the railroad corporation which paid nothing for its franchises; and all are shocked at the enormous fortunes made out of our national mineral resources, which were virtually given away, and from which the public in its ignorance cannot see that it is deriving any benefit.

It certainly is high time to consider the subject calmly, to trace effects back to their causes, and to remedy the evils incident to the policy adopted; but there is no justice in heaping abuse on those who have taken advantage of the policy, and worked it out to its inevitable issue. But for that policy our population would not be 90,000,000; we should not have 230,000 miles of steam railroads and 30,000 miles of electric roads; we should not be making more copper than is made by all the rest of the world; and we should not stand far ahead of all competitors in the manufacture of iron and steel. The men were found to accept the policy of the nation, and to work it out to its fulfilment. They should be commended; but the evils which the policy has inevitably engendered should be calmly reviewed, and the remedy applied; not by exciting class against class, by making a political issue of the evils and their proposed cure; but by endeavoring to trace them back to their source, by discovering some correction for the defects of the system, and passing amendments of our laws, without abolishing such features of the system and the laws as have undoubtedly effected widespread good.

The laws should probably have been amended before this, as population increased, and the conditions of trade and commerce changed from those which existed when they were passed, and when it became apparent that industrial operations could not be conducted without infraction of some of the provisions which, apparently wise at the time when they were enacted, have unquestionably become antiquated and detrimental.

The laws in which our readers are most immediately interested are those affecting the acquisition of coal and mineral lands. With regard to the former, the President sent two messages to Congress at its last session, urging that legislation be passed to correct admitted defects. In his message of Dec. 17, 1906, he said, "I am gravely concerned at the extremely unsatisfactory condition of the public land laws, and at the prevalence of fraud under their present conditions. For much of this fraud the present laws are chiefly responsible. . . . . The present coal law limiting the individual entry to 160 acres puts a premium on fraud by making it impossible to develop certain types of coal fields and yet comply with the law. It is a scandal to maintain laws which sound well, but which make fraud the key without which great natural resources must remain closed." In his message of Feb. 13, 1907, the President, citing 2300 cases of public land entries in four districts, said that non-compliance with the law was found in more than half of them, and deliberate fraud in very many cases.

In response to his warning not less than 10 bills were introduced in the Senate and House of Representatives during the last session of Congress. They all agreed that the unceded coal and oil lands should be retained in whole or in part by the United States. Some of the bills suggested a rental price, some of them a royalty, and

some of them both. One of the bills advocated a perpetual lease under conditions. Most of them, however, limited the lease to a period of years—one 30 years, and another 25 years. There was considerable variation in the different bills as to the size of the area which any individual or corporation should own. All of the bills left a large margin of interference by the Secretary of the Interior, one going so far as to allow him to fix the price of coal mined from leased mines.

When a bill covering this question is passed, it is to be hoped that it will be so explicit as to require as little interference as possible by the Department in carrying out its provisions. That a limit should be put to the time of the lease, as long as the rental is paid, seems unreasonable. If the rental is high enough, and the national treasury therefore acquires the value that it demands, one tenant might be assumed to be as good as another tenant, provided the restrictions as to the methods employed in mining are strictly enforced on both. The heavy expense involved in opening and equipping mines and coking plants would never be undertaken on a short lease of a small area. Interference with the price of the product would simply be playing into the hands of the owners of the still larger areas of land whose titles cannot be interfered with.

When therefore it comes to the framing of a bill, it ought to be in the simplest terms compatible with the receipt by the Government of a proper revenue, and the imposition of proper conditions for safe working, and economical recovery. If the rental is high enough, and the area large, the gross rental paid will prevent individuals or corporations from selfishly holding a larger undeveloped territory than they see the possibility of utilizing profitably within a given period.

The present law with reference to coal allows an entryman to locate 160 acres and four entrymen to combine and organize an association, but requires the entryman to swear that he has made no arrangement to dispose of his 160 acres. The wording of this clause of the entryman's affidavit is: "That I am now in actual possession of said mines, and make the entry in good faith for my own benefit, and not, directly or indirectly, in whole or in part, in behalf of any person or persons whomsoever."

The affidavit is so worded, under certain interpretations, that it renders every entryman liable to prosecution for perjury who has even a remote intention of selling his claim, and not working it himself. As the Department knows, every body of coal lands large enough to be economically worked has been acquired by entrymen who were technically guilty of fraud. But the law has been generally administered with reasonable latitude. There is a difference between cases (1) where entrymen have taken up coal lands with the expectation of selling them, and paid for them, even if with borrowed money for which they have given their claims as security; and (2) cases where coal lands have been taken up under the Homestead Act, or with scrip applicable only to agricultural land, and the Government defrauded out of the $10 or $20 an acre due the country. However, when it pleases the Department of Justice to make a record for vigilance and activity, and it sends forth an army of special attorneys and special agents, whose jobs depend upon their securing indictments, there is no difficulty in obtaining by the thousands apparent breaches of the above affidavit, and persuading grand juries to bring indictments, though these agents of the Department of Justice are perfectly aware that their efforts will seldom be rewarded by conviction.

Resuming, however, the discussion of the main features of the law which limits each entry to 160 acres: Such a small area, even when covering a 6-ft. vein, at the rate of 8000 tons to the acre, renders available only 1,280,000 tons of coal. Four entries will contain substantially 5,000,000 tons.

Most Western coal costs for extraction about 80c. per ton, and sells as run-of-mine, in ordinary times, at $1.15 a ton on cars, leaving 35c. per ton profit to cover the cost of the coal lands, the cost of mine opening, the cost of safety appliances, such as blowers to insure ventilation and batteries and wiring for electrical firing, and the cost of a tipple for loading cars.

If the coal is a coking coal, there must be provided a washery for separating the slate, and ovens for coking the washed coal. Inasmuch as most Western coking coals carry 12 to 15 per cent. of ash, and as two tons of coal generally enter into one ton of coke, the ash of the coke would be 25 or 30 per cent. and would render it almost worthless for metallurgical purposes. The crushed or screened coal is therefore submitted to the process of mechanical washing, by which the slate is more or less perfectly separated from the coal. This is merely preparatory to the operation of coking, for which an expensive plant, with trolley systems for charging the ovens and railroad cars and tracks for carrying away the coked products, has to be provided.

The demand for coke in the Southwest has grown beyond the capacity of the Western plants to provide it, and the equipment of the railroads to handle it. This is true to such an extent that to supply the extraordinary needs of Arizona and Northern Sonora alone there were imported in 1906 and the early months of 1907 some 356,000 tons of coke from Connellsville and West Virginia.

In order, however, to render this section of the Southwest self-supporting, there are at the present time being erected in northern New Mexico washeries and coke ovens which will cost at two establishments alone, $4,000,000. These two establishments—to supply the demands of the railroads and smelters which look to them for fuel in the form of coal and coke—must mine not less than 250,000 tons of coal a month, or empty the 6-ft. beds of one quarter-section every five months, or extract all the fuel from the maximum area, which can be consolidated legally, in twenty months.

The construction accounts of a certain Western coal-mining and coke-manufacturing company show, for example, that there was appropriated for the coke-oven plant $750,000, and it cost slightly more; for the power-generation plant for running the trolley system within the mine and between the mine and the tipple, ovens, washery and pumping plant, $207,000; for a washery, in a thoroughly fireproof building, $250,000 was appropriated, and the cost reached $300,000; for merely developing two new openings, building railroad approaches, and putting them into condition to produce coal, $40,000; and for introducing electric shot-firing system into each of six mines, $3200. The total cost of this one installation will be fully $2,500,000.

Allowing, therefore, even 40c. per ton profit on the coal, and this is more than the average profit on coal which enters the coke ovens as well as the market, the gross profits from the coal contained in

four quarter-sections would be $2,000,000, or only 8o per cent. of the cost of installing the surface plant of the establishment in question. No small mine could supply such a quantity, and no reliance for regularity of supply could be placed upon a number of small mines owned by farmers or poor individual operators. Only corporate wealth under corporate management could work on such a scale and erect such costly plants, and neither the banks nor the public would subscribe to a company doomed to such speedy and ruinous extinction.

There is another anomaly in the law affecting the purchase of coal lands: The entryman must swear that he has discovered coal. Coal beds generally crop out along one exposure, and the coal at any great distance from the outcrop must be reached by sinking before it can be mined, or by boring before it can be claimed under a coal entry. But the cost of determining its existence by these expensive methods is beyond the financial resources of the poor man. If, however, he secures the surface under the Homestead or other entry, knowing the land to be more valuable for coal than it is for agriculture, and is aware that he is locating over valuable coal beds, he is subject to prosecution, and if coal is actually discovered on his Homestead entry, though he was ignorant of the fact when he made it, he is certain to get into trouble. In fact, the anomalies of the law are very manifest and very curious. A farmer, for instance, took up land under the Desert Land Act. The law requires that certain portions of such desert land under every entry shall be irrigated. He intended to do so, but found that by constant and scrupulous pulverization of the soil during the growth of the crop, he could raise it without irrigation. The ingenious and enterprising man is being prosecuted for fraud for disobeying the law upon which he has so notably improved.

There is, however, no question that when infractions of the law come to be generally made, even with the knowledge and concurrence of the Government officials, such a laxity leads to a certain moral obliquity of vision and opens the door to fraud of every kind. There is, moreover, and perhaps as a consequence, little doubt that very large quantities of coal land in the public domain have been secured under Homestead and other entries, for which the Government received nothing. The President's action in withdrawing temporarily all coal lands from entry is therefore commendable from a national economical standpoint, provided his action be followed speedily by good legislation. Meanwhile the innumerable suits for infringement of the law in the past, even though these infringements in most cases may have been strictly in conformity with usage well understood and recognized by Government officials, will undoubtedly have the effect of making both the public and the Government officials more scrupulous in the future than they have been in the past. But considering the glaringly defective character of the laws, the Department of Justice ought to discriminate between cases of intentional fraud and cases of technical shortcomings, inevitable under the statutes, if the requirements of the country's trade as well as obedience to the law are to be observed.

The Independent Anthracite Operators

The presentation of charges by an anthracite coal mining firm against the Lehigh Valley Railroad Company has drawn attention once more to the independent operators in the anthracite region, who were at one time a factor of some importance in the trade. The charges were recently presented to the Interstate Commerce Commission and allege discrimination in rates and in transportation facilities granted. They will, doubtless, be considered during the investigation which the commission propose to make of the general position of the anthracite mining and transportation companies.

In recent years, since the anthracite trade came to be practically consolidated, a number of the independent operations have passed under control of one or other of the large anthracite companies. The corporation of Coxe Brothers & Company, long the leader of the independent operators, succeeded in forcing recognition as one of the great companies; but after the death of Eckley B. Coxe, its head, it ceased to be aggressive, and last year sold out to the Lehigh Valley Railroad Company.

The last attempt of the independent operators to assert themselves was made during the great strike of 1902-3; and that was so badly managed and resulted so disastrously to some of them that the effort has not been repeated. They have been contented to accept the terms of the transportation companies, which have taken their coal at a fixed proportion of the tidewater price—usually 60 per cent.—and have marketed it with their own product. The railroad companies regulate their supply of cars and practically the quantity they mine. Whether the arrangement is such as to warrant charges of discrimination under the law, will probably be determined at the hearing.

At the present time there are only two operators outside of the great companies who are in a position to be called independent. The first of these is the Lehigh Coal and Navigation Company, the oldest of all the anthracite companies. This company last year shipped 2,383,236 tons of coal, or 4.3 per cent. of the total anthracite output. It controls the Lehigh and the Delaware Division canals which, with a moderate expenditure, could be made to carry a considerable tonnage to tidewater. The company has, in the past two or three years, shown a disposition to adopt an aggressive policy. It has consolidated and improved the Lehigh & Hudson River and some allied railroads, which already carry a considerable local tonnage to northern New Jersey and parts of New York; and which could easily be made into a line reaching tidewater on the Hudson river. On the other hand the company is bound, under the contract by which it leased the Lehigh & Susquehanna Railroad to the New Jersey Central years ago, to give a certain proportion of its tonnage to that line, a provision which would hamper its independent action to a certain extent.

The New York, Ontario & Western Railroad Company owns lands in the Wyoming district, from which it shipped last year 2,444,273 tons, or 4.4 per cent. of the total anthracite production. It is controlled by the New York, New Haven & Hartford Company, which bought the stock three years ago, partly to be able to control a supply for the New England market, and partly to furnish traffic for the Poughkeepsie Bridge line, which it had then recently acquired. So far, neither object has been attained, chiefly because the reconstruction of the Poughkeepsie Bridge line, to enable it to carry heavy traffic economically, has not yet been completed. Meantime the New Haven management has been content to follow the

lead of the other anthracite companies, and has made no change in policy. Moreover, the New Haven company has lately shown a disposition to use its control of the Ontario & Western as a counter or make-weight in securing advantages in other directions; so that it is quite possible that its stay in the anthracite field may be brief.

Under all the circumstances, it looks as it the influence of the independent anthracite operators had passed permanently, and the probability is that they will be gradually absorbed at the convenience of the larger companies.

The Situation at Goldfield

The President has sent a commission to investigate the situation at Goldfield. This is proper, although the action appears to be inspired by the criticism that he despatched Federal troops there with undue haste. The fact is that he had no option to do otherwise after being requisitioned for aid by the Governor of Nevada. It is said that the Governor was either needlessly frightened or otherwise misled. On the contrary the Governor displayed a knowledge and a spirit which are worthy of emulation by other executives under similar conditions. It is their highest duty to preserve order, not merely to restore it after a mill has been dynamited, some "scabs" murdered, and a superintendent or two assassinated. Every well-informed mining man knows that there has been enough disorder at Goldfield, both in respect to physical violence and in robbery of the mine owners; as to the latter the Geological Survey can report to the President if he asks it; and when the operators, no longer able to stand such tyranny, determine to throw off the yoke, demand and secure protection, it provokes a smile to hear the union leaders say that their innocent and gentle miners were not going to do anything bad and express surprise and indignation that troops should be sent to guard against them.

Conditions at Goldfield have been worse than they ever were at Cripple Creek. The idea of confiscation by the miners has been applied there with a vengeance. After the miners have skimmed the cream of the rich ore all that the owners of the mines are expected to do is to accept the returns of what is left, meet the exorbitant pay-rolls, which add indignity to injury, pay the other expenses, and comply with the tyrannous rules of the union. They have been utterly deprived of the right to employ non-union men, for where is the non-union man who would have dared seek work at Goldfield? Anyone falling into the disfavor of the union has been immediately expelled from the district, the banished man being generally beaten and robbed and then escorted out into the desert.

The President has sent the following instructions to Col. Reynolds, in command of the troops at Goldfield:

"The troops are not sent to take the part of either side in a purely industrial dispute, as long as it is kept within the bounds of law and order. They are to be neither for nor against either the strikers or the employers. They are to prevent riot, violence and disorder, under and in accordance with the Constitution and the laws of the land. No man is to be interfered with so long as he conducts himself in a peaceful and orderly manner."

This, of course, is proper. There ought not to be any repetition of the charges, once made in Idaho, that Federal troops are used without warrant of law in the interest of the mine owners and to the injury of the miners. If the troops prevent riot, violence and disorder their duty will be done. But if they do that the men who want to work in the mines under the fair conditions offered by the mine owners will be able to do so, which is simply their right under and in accordance with the Constitution and the laws of the land.

The latest reports are that the mines are slowly resuming work with non-union men, without interference, except that the wires bringing electrical power from Bishop, Cal., have been cut. The Presidential commission has arrived at Goldfield and begun its investigations.

Determining the Number of Men in a Mine

The explosion of gas and dust which caused the loss of so many lives at the Monongah mines in West Virginia, has called attention to several things that deserve careful consideration. The first report from the disaster stated that about 500 men were entombed, while each succeeding day gave us new estimates of the number. A full week after the accident occurred, it was impossible to state exactly how many men were killed, and only from a careful census of the town and by counting the bodies removed have the officials been able to determine the number of men underground at the time of the explosion.

This emphasizes the necessity of a careful check-off system whereby it will be possible at any time to determine the exact number of day-men and miners underground. Many advantages result from having a carefully designed check-board, large enough to be properly spaced with nails at equal distances, so that numbered checks can hang in order, and the check-clerk can quickly pick off any number from the board. After the day's work has started, the superintendent can closely figure how many tons of coal he will probably produce for the day, by looking over the board and noting the number of men underground. Of course, the day-employees and miners should be grouped separately.

A further advantage of a careful system of this sort is that no man can be injured by falls of roof or local explosions and be left in the mine without his absence being immediately noted at the close of the day's work. This enables assistance to be sent and an immediate examination as to the cause of the non-appearance of any miner to be made. Not only is it possible in this manner to tell the names of the men who fail to appear, but it is also known in what portion of the mine they are employed.

When a plan of this kind is followed, each employee soon realizes the advantage of the system to him, and knows that if he does not go to the check office when he reports for work, and receive his check, his time will not be put on the sheet. It is also as necessary for him to return his check in the evening; hence, all are prompt in calling at the check office when coming from or going to their places in the mine.

In the case of the Monongah mine, there were several openings in the outcrop at various points distant from the mouth of the mine, and a number of miners who lived near these openings often went underground by those short cuts and no careful and immediate record of their presence in the mine was kept.

Views, Suggestions and Experiences of Readers

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

CORRESPONDENCE AND DISCUSSION

Production of Coal in China

Allow me to call attention to an article about the coal production of China, by Prof. N. F. Drake, of the Imperial Tientsin University, appearing in the *Iron and Coal Trades Review,* London (March 22, 1907), as a supplementary remark on W. H. Shockley's correspondence which appeared in the JOURNAL of Nov. 2, and which gives 25,000,000 tons as the probable production of coal in China during the year 1906.

The accompanying table gives Professor Drake's estimates for 1906:

PRODUCTION OF COAL IN CHINESE PROVINCES.

Province.	Tons Mined by Improved Methods.	Tons Mined by Native Method.	Total.
Feng Tien.....	100,000	150,000	250,000
Chili.....	1,200,000	1,000,000	2,200,000
Shansi.....	.....	3,000,000	3,000,000
Shensi.....	.....	500,000	500,000
Kansu.....	.....	500,000	500,000
Shan Tung.....	300,000	500,000	800,000
Honan.....	100,000	700,000	800,000
Szechuan.....	.....	100,000	100,000
Che Kiang.....	.....	10,000	10,000
Kiang Si.....	130,000	50,000	180,000
Hunan.....	.....	200,000	200,000
Kwangtung.....	.....	50,000	50,000
Kiang Si.....	.....	100,000	100,000
Other provinces..	.....	200,000	200,000
Total.....	1,830,000	7,060,000	8,890,000

In round numbers the coal production of China during 1906 was not far from 10,000,000 tons. China should be ranked as the seventh among the coal-producing countries of the world. C. Y. WANG.

Chinese Legation, Brussels, Belgium, Nov. 15, 1907.

Negative Results in Pyritic Smelting

Referring to the interesting articles appearing in the JOURNAL of Aug. 24 and Sept. 28, 1907, by two well known experienced metallurgists, I think that Lewis T. Wright, in his reply of Nov. 2, covered the subject so fully that little can be added.

Quoting Mr. Wright's closing remarks, "The only conclusion I can draw from the trials, is that not enough fuel was present to hold the furnace up to a working temperature," which fully agrees with the conclusion I came to. Three important points must be watched in smelting:

(1) Be sure of the chemical composition of the slag to be made and work up to those results, especially if you are in doubt as to your machinery and feeders.

(2) Be sure that your furnace will be hot enough by using sufficient fuel.

(3) Be sure that you have plenty of blast in volume (pressure is no especial guide), and a large volume of blast requires more fuel either in the ore as sulphides rich in sulphur or fuel added.

Our experience at Ingot, Cal., shows that while we did not use as small a per cent. of coke in the blast furnace as would be expected under ideal conditions with hot blast, yet the saving in coke was so great as compared with cold blast while smelting the same ore, that it made a net saving of $267.25 per day in favor of hot blast in coke alone.

We have not found it necessary to roast any of the ore here, although we find occasionally some oxidized ore near the surface which mixes in to good advantage with silicious ore for re-smelting matte, too low a grade for shipping, produced by our first smelting operations.

S. E. BRETHERTON.

Ingot, Cal., Nov. 9, 1907.

Market for Soapstone

Will you kindly advise me what are the principal uses of soapstone and where I can obtain a market for it? Also about what is its value?

W. C.

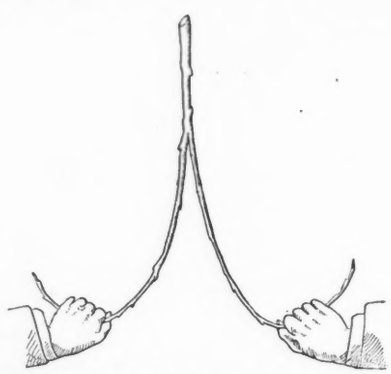
Cid, N. C., Oct. 21, 1907.

Rough blocks and sawed slabs of soapstone are chiefly used in the manufacture of bath and laundry tubs, hearthstones and mantels, brick and tiles for stoves, sinks, griddles, slate pencils and various other articles of common use. Ground talc is employed for paper making, for foundry facings, as a lubricant, and for dressing skins, leather, etc. By far the largest part of the fibrous talc production of the United States is used for paper filling in connection with the wood pulp industry; it is used to a less extent for the manufacture of wall plaster and in the preparation of paint. It is impossible to quote any price for soapstone or talc products without seeing a sample of the material. Masses of soapstone capable of being sawed into slabs are most desirable and bring the highest prices.

The following New York City dealers quote prices if samples are submitted to them: W. H. Whittaker, 245 Front street; Hammill & Gillespie, 240 Front street; R. J. Wardell, 52 Beekman street; and Fuerst Bros., 2 Stone street. In St. Louis, Mo., Nulsen, Klein & Krause deal in talc and soapstone.

The Divining Rod

A short article on the divining rod, that appeared recently in the JOURNAL, recalled one of my first experiences as a tenderfoot in Colorado. I noted particularly that the "downward movements of the rod were found to be due to slight and unconscious changes in the inclination of the body of the operator." The experience that I refer to was a chance encounter with a stranger on a hillside. The conversation drifted to this topic and he assured me that though he did not believe in the rod as a means of detecting anything, yet there was no doubt that it did bend downward and upward independently of his will. Without rising he turned around, cut a fork from a bush back of him and we proceeded to try it with the result—astonishing to me



A DIVINING ROD

—that the rod did, apparently, bend down at points independently of my will. I wish it understood that the arc of travel was something that could not be attributed to such a cause as change in the inclination of the body, say 45 deg. I took the rod home, kept it a few days, tried it again and it refused to work. I called it to the attention of one of the faculty at the State School of Mines, and he gave the following explanation, which explanation I believe to be the true one:

The shrub employed was green; it was of a type in which the bark is not firmly joined to the stem, but is loose enough so that the stem could turn slightly in the bark; it would be aided in this by a moist pith that acted as a lubricant between the two. The position in which I held my hands is best exemplified by the accompanying rough sketch, from which it will be seen that the fork was under

a stress due to the bending of the branches. If anyone will try this, they will perceive how slight a variation of the pressure permits the fork to rise or decline through a considerable arc.

This is merely the effort on the part of the elastic green branch to assume its original green form, just as all vessels with a uniform pressure from within, tend to assume the form of a sphere. Because of the ease with which the stem turned inside the bark, it was really turning as readily as if it had been loosely held in the hand, a thing which the unsuspecting would not perceive. The unconscious small variations of pressure that made it travel through this wide arc were, of course, provided by the shifting and change due to walking over a rough hillside. I have tried it since then a number of times, with varying success, due to the fact that only a few shrubs will turn inside their bark as readily as did this one. The reason why it did not bend after I had preserved it a few days, was because it had become stiff and the bark had dried and shrunk on the stem.

I would recommend that other readers of the JOURNAL experiment in this direction.

ARTHUR R. TOWNSEND.

New York, Nov. 30, 1907.

Filing Notes and Clippings

I have read the article by E. E. White in the JOURNAL of Nov. 9, on filing notes and material clipped from periodicals. Let me add a description of the method which I have adopted.

I first tried indexing interesting articles on 3x5-in. cards, giving a synopsis of the article and a reference to the journal, volume and page number. This method I found too slow; when looking for a subject I would find several cards referring to different articles in different journals, and it involved considerable trouble to find and compare them. I gave up the card system in favor of one similar to that described by Mr. White. I separate the articles and number them according to the Dewey decimal system of classification and file them in numbered folders. Should two articles be on one page I number the sheet at the top according to the classification of the more important article and put the number of the other article beside the main number in parenthesis. I also put the same number on a sheet of paper together with the number under which it is filed, and file this sheet in its folder.

The advantage of this system over the card system is that all the articles on one subject are found in one folder and can be compared without handling several volumes. The advantage over Mr. White's system is that the articles are classified according to a standard system which has been very well arranged to cover most subjects and can easily be expanded.

The engineering experiment station of the University of Illinois publishes a bulletin that gives a good description of this system. Its title is "Bulletin No. 9, An Extension of the Dewey Decimal System of Classification Applied to the Engineering Industries." I have based my classification upon the method outlined in this volume.

C. E. HOLBY.

Bessemer, Mich., Nov. 2, 1907.

Prices of Machinery

About the middle of last June I requested the JOURNAL to notify its advertisers of mining, milling and copper-smelting machinery and supplies, that I would shortly be in the market and that I desired copies of their catalogs, price lists and discount sheets.

Many replies are beginning to arrive, but they almost invariably fail to give prices, the writers stating that upon receipt of a letter giving specifications, etc., they will be pleased to quote prices, etc. While in cases of specially built plant this is permissible, in the ordinary run of standard machinery of standard sizes, there is absolutely no reason why approximate prices should not be quoted. I wonder if these "hustling" manufacturers realize that it requires from six weeks to two months for a letter to reach New York from here and the same length of time for a reply to return. I wonder that it has not dawned upon them that it might at times be necessary for a firm here to order by cable in order to save time, and that in this case it might be desirable to have some idea as to cost before ordering.

At the same time that I requested data of this class from the United States, I also sent to European manufacturers for similar information, which was given promptly and fully. As a result I have just placed orders for about £15,000 of machinery in England, and I shall continue to trade there until I can find American firms who are not troubled with this nonsensical secrecy in regard to prices.

ROBERT HAWXHURST, Jr.,
General Manager, Poderosa Mining Company.

Collahuasi, Chile, Oct. 3, 1907.

According to the *Eng. News*, a magnetic crane unloaded a steel gondola car containing 109,350 lb. of sand cast iron, in 2 hr. 5 min., with an average lift of 785 lb. The cost of current was 25c. and only one man, the crane operator, was required.

In an article in the *Iron Trade Review* it is stated that when titanium is introduced into molten steel it forms a stable nitride with the nitrogen and this compound prevents the formation of blow holes.

New Publications

THE COMMERCIAL ASPECTS OF RAND "PROFITS." By George A. Denny. Pp. 40. 5¼x10¼ in.; paper, 1s. London, 1907: *Mining Journal.*

MAP OF THE TAQUAH BANKET RANGE, GOLD COAST COLONY, AFRICA. Part I, Sheet II. 23x29 in.; paper. London, E. C., 1907: Richard Mayer.

DIE BERGWERKS-INSPEKTION IN OESTERREICH. Berichte der k. k. Bergbehörden über ihre Tätigkeit im Jahre 1904 bei Handhabung der Bergpolizei und Beaufsichtigung der Bergarbeiterverhaltnisse. Veröffentlicht vom k. k. Ackerbauministerium. Dreizehnter Jahrgang 1904. Pp. 456. 6x9 in.; paper. Wien, 1907; Kaiserlich-königlichen Hof- und Staatsdruckerei.

HYDRAULICS. Vol. I. By S. Dunkerley. Pp. 343; illustrated. 5½x9 in.; cloth. New York, Bombay and Calcutta, 1907: Longmans, Green & Company.

Contents. The flow of a perfect fluid. Fluid friction. Hydraulic-pressure machines. Reciprocating pumps. Simple machines—turbines. Centrifugal pumps. Professor Osborne Reynold's researches. Examples. Index.

TESTS FOR ORES, MINERALS AND METALS OF COMMERCIAL VALUE. By F. List McMechen. Pp., 151. 4x6½ in.; cloth, $1. New York, 1907: D. Van Nostrand Company.

Contents. Index of rocks. Index of minerals and metals. Part I—Rock formations. Part II—Ore and vein formations. Part III—Chemical properties. Part IV—Metals and minerals—their occurrence, uses and tests. Part V—Glossary of mining terms; working processes, theories, etc. Addenda—Value and production of California minerals.

PLANE SURVEYING. By Alfred E. Phillips. Pp. 207; illustrated. 6½x9¼ in.; cloth, $1.50. Chicago, 1908: American School of Correspondence.

Contents. Measurement of lines and angles. Leveling instruments and leveling. Land and topographical surveying. Index.

This volume is intended especially for self-instruction and deals with plane surveying in simple, clear language, avoiding technical terms and formulas of higher mathematics; yet the requirements of practical instruction have not been sacrificed to simplicity. The text is well supplied with practical examples, diagrams and illustrations and the usual instruments of precision are described and their necessary adjustments explained.

ROAD MAKING AND MAINTENANCE. A PRACTICAL TREATISE FOR ENGINEERS, SURVEYORS AND OTHERS, WITH AN HISTORICAL SKETCH OF ANCIENT AND

MODERN PRACTICE. By Thomas Aitken. Second edition. Pp. 527; illustrated. 6¼x9 in.; cloth, $6. London, 1907: Charles Griffin and Company, Limited.

Contents. Historical sketch. Resistance to traction-wheels and weights on them. Laying out new roads and the improvement of existing lines of communication. Earthworks, drainage, retaining walls, culverts, bridges, and protection of roads. Road-making materials. Quarrying. Stone-breaking and haulage. Road-rolling and scarifying. The construction of new and the maintenance of existing roads. The prevention of dust. Carriageways and footways—preliminary remarks—foundations and pitched pavements. Wood pavements. Asphalt pavements. Brick pavements for carriageways. Tar macadam. Conclusions. Footways—paving materials for footpaths, curbs, channels, gullies. Testing the surfaces of carriageways. Subways. Appendix. Index.

THE ECONOMICS OF MINING. By T. A. Rickard, W. R. Ingalls, H. C. Hoover, R. Gilman Brown and others. Edited by T. A. Rickard. Second edition revised. Pp., 380. 6x9 in.; cloth, $2. New York, 1907: Hill Publishing Company.

In bringing out the second edition of this book a few typographical corrections of the pages comprised in the first edition have been made, but otherwise there are no changes except the addition of "Cost of Mining—III," by W. R. Ingalls, completing the series of articles on that subject which appeared in the JOURNAL after the first edition was on the press; and two articles on "Cyaniding Sulpho-Telluride Ores" and "The Diehl Process," by Philip Argall, which were overlooked in making up the first edition. The first of these articles by Mr. Argall appeared in the JOURNAL of July 11, 1903, and was the direct inspiration of Mr. Hoover's article, "Ore Treatment at Kalgoorlie." Mr. Argall replied to Mr. Hoover in a later issue. It is fitting, therefore, that both of Mr. Argall's articles should be reproduced in order to round out the discussion of a subject which is still of live interest. The appreciation with which this book has met is manifested by the fact that a second edition has been required about two years after the appearance of the first.

TRANSACTIONS OF THE AMERICAN ELECTROCHEMICAL SOCIETY, Vol. XI, 1907. Eleventh General Meeting, Philadelphia, May 2, 3 and 4, 1907. Pp. 426; illustrated. 6x9 in.; cloth, $3. South Bethlehem, Penn., 1907: Published by the Society.

Contents. Electrolytic corrosion of brasses, by A. T. Lincoln. Electric conduction, by C. P. Steinmetz. Recent improvements in electrochemical analysis (a discussion). Electrolytic deposition of zinc, by R. C. Snowden. The electrolytic deposition of nickel-zinc alloys, by E. P. Schoch and A. Hirsch. The effect of stress upon the electromotive force of soft iron, by W. H. Walker and C. Dill. Changes of concentration and migration velocities, by C. J. Reed. Polarization voltages of silver nitrate solutions, by J. A. Wilkinson and H. W. Gillett. Electrolytic pickling of steel, by C. J. Reed. The work done in electrolysis, by J. W. Richards. The current efficiency of an electrolytic cell, by W. R. Mott. On the density, electrical conductivity and viscosity of fused salts, by H. M. Goodwin and R. D. Mailey. Rapid measurement of electrolytic resistance, by C. F. Burgess. Henri Moissan, by G. F. Kunz. On the estimation of high temperatures, by G. K. Burgess. A bomb calorimeter for use with substances whose oxides are solids, by H. N. Potter. The electro-metallurgy of zinc and its relation to present practice, by W. McA. Johnson. The action of carbon on magnesia at high temperatures, by O. P. Watts. On the electrical reduction of titaniferous iron ores, by G. Gin. A closed electric furnace for reducing and distilling metals from their ores, by E. R. Taylor. Electric tube furnace for temperature measurement, by S. A. Tucker. A granular carbon resistance furnace, by S. A. Tucker. On carbons for electrometallurgy, by F. A. J. Fitzgerald and J. Forssell. A practical limitation of resistance furnaces: the "Pinch" phenomenon, by C. Hering. Power costs, C. E. Lucke. Electrochemical processes as station load equalizers, by J. Meyer. The helion lamp, by H. C. Parker. Surface properties of aluminum and zinc, by W. J. Hammer. Energy changes accompanying absorption, by H. E. Patten. Appendix.

DREDGING FOR GOLD IN CALIFORNIA. By D'Arcy Weatherbe. Pp. 217; illustrated. 6x9 in.; cloth, $4. San Francisco, 1907: *Mining and Scientific Press.*

D'Arcy Weatherbe has written a book that is worth while. He includes generally apt and clear descriptions of the dredging operations at Oroville, Yuba, and Folsom in California. These are aided by numerous photographs and several sketches and drawings. He has not attempted to treat his subject exhaustively and there is therefore much that could be dealt with in more detail. While Mr. Weatherbe is inclined at times to draw conclusions that must have resulted from conversations with operators who were somewhat prejudiced, in the main they are made with a proper consideration for the circumstance that generalized statements concerning an industry so young as gold dredging in California are dangerous. His arragement of chapters is a happy one. The introductory chapter, by the way, is rather optimistic in attributing financial success to all the dredging companies in the district he describes. This chapter also treats of the geology of the California gravels but in a way that will not be accepted by many who have investigated this most fascinating subject more intensively than has Mr. Weatherbe. His second chapter is devoted to prospecting dredging ground. The valuable part of this chapter is that of the tabulations and other data showing the relations of prospecting to recovery value. The contradictory results he quotes are puzzling and it must be remembered that this subject is a difficult one that requires broad treatment. The third chapter treats of dredging machines and is interesting. The fourth chapter describes operation and, while sketchy, it avoids as a result the discussion of much mooted features with grace and good taste. Chapter five is called the Metallurgy of Dredging. This is the best chapter in the book, recording, as it does, the result of pains-taking and intelligent observation. Mr. Weatherbe's conclusions on several features may well be questioned, but he has treated his subject very fairly. His remarks on the crudeness of some of the gold-saving practice are timely. The sketches showing the several arrangements of gold-saving devices are instructive. The detailed descriptions of clean-up manipulation are good. The sixth chapter is devoted to the cost of dredging. Casual reading of this chapter may lead to wrong conclusion, for costs quoted are for operation and are not total costs. Thus, unless this is realized, one is apt to conclude after reading this chapter that dredging cost is lower than it is in reality. Dredging cost similar to that given by Mr. Weatherbe is often quoted as a criterion; this is not only a mistake, but it has led to distinctly misleading assumptions by those who would apply the dredging method elsewhere than under favorable conditions like those of California. To the hysterical disciple of estheticism and to the economist who without knowing much about it have raved at the harm done by dredging, the chapter called "The Horticultural Question" should be most valuable. This shows very well that there has been much exaggeration and that the net result of dredging is unquestionably good. Chapter eight is called "General" and is interesting in chronicling a description of various dredges, etc. Then follows an appendix composed of letters from writers on dredging to the editor of the *Mining and Scientific Press*, the publisher of the book. These letters show very well how different are the opinions on various phases of dredging practice, and also contain much of interest. Mr. Weatherbe's book is an honest one and as such is very different from those on the same subject that in pretending originality are only scrap books. It should be read by all who would know something of dredging for gold in California.

Resolutions Adopted by Goldfield Mine Operators' Association

On Dec. 9 the Goldfield Mine Operators' Association adopted the following resolutions:

Resolved, That the mines of this district re-open upon a wage scale to be agreed upon at this meeting.

Resolved, That the following rate of wages be adopted as the scale to be paid in the Goldfield mining district by all operators, members of this association:

	New.	Old.
Miners	$4.00	$5.00
Machine men	4.00	5.00
Chuck tenders	3.75	5.00
Muckers	3.75	5.00
Carmen	3.75	5.00
Top carmen	3.75	5.00
Pumpmen	4.00	5.00
Timbermen	4.50	5.00
Carpenters	5.00	7.00
Machinists	5.00	5.00@6.00
Engineers (lic.)	5.00	5.00@6.00
Electricians	5.00	7.00
Blacksmiths	5.50	5.00
Tool sharpeners	5.00	5.00
Blacksmith helpers	4.00	4.00
Surface laborers	3.50	4.50
MILL MEN		
Amalgamators	4.00	5.00
Vannermen	4.00	5.00
Laborers	3.50	5.00

All other positions on salary.

Resolved, That no member of this association employ in or around his mine or mill any member of Goldfield Local Union, No. 220, of the Western Federation of Miners, or of any union connected with or affiliated with said Western Federation of Miners, and that all men hereafter employed by any member of this association in or around his mine or mill be required as a condition of his employment to sign a written contract, substantially as follows:

"In consideration of my being employed by the company for such time as my services shall be satisfactory at wages heretofore fixed by said company, subject to the rules and regulations fixed by said company and by the Goldfield Mine Operators' Association relating to the employment of men in and around mines of the Goldfield mining district, I hereby covenant and agree with said company that I am not now and will not be during the time I am working for said company, a member of Goldfield Miners, Union, No. 220, of the Western Federation of Miners or of any other union in Goldfield or elsewhere that is directly or indirectly affiliated with or has any connection of any kind, nature or description with said Western Federation of Miners."

Resolved, That the mines of the Goldfield mining district resume operations at 7 a.m. on Thursday, Dec. 12, 1907, with men who agree to the foregoing conditions and that all old employees of the members of this association be given the preference at all mines, provided such employees present their applications at the office of the association or the mines formerly employing them before 7 a.m. of Thursday, Dec. 12, 1907, and that the office of this association and of said mines be open for the purpose of receiving said applications from 9 a.m. to 6 p.m. of each day until said time.

Resolved, That it is the sense of this association that the cost of living in the Goldfield mining district be reduced at least 20 per cent. from what it now is.

The Goldfield Mine Operators' Association also wishes to announce that it has been compelled to adopt the above course against the Western Federation of Miners for the reasons set forth in its statement of Dec. 7, and that if there are not a sufficient number of men willing to go to work upon the above terms on or before Dec. 12, 1907, it will employ men from such sources as it may be able to secure them.

Winter Meeting of the Coal Mining Institute

The mid-winter meeting of the Coal Mining Institute of America, which was held at the Court House in Pittsburg, Penn., on Dec. 10 and 11, presented an interesting program, which would have been most instructive had it been carried out. Unforeseen circumstances, such as the Naomi and the Monongah explosions, prevented the attendance of many coal men who were compelled to devote their time and attention to these disasters.

On Tuesday morning, Dec. 10, the president's address, delivered by Fred C. Keighley, was interesting and held the close attention of all present. In his address President Keighley defended the attitude of President Roosevelt toward large corporations, and farther on, called forcible attention to the present labor conditions in our coal-mining camps, where in many instances 90 per cent. of the laborers are foreigners, many of whom leave our shores whenever a business depression occurs, and in many cases never again return. Mr. Keighley stated further, "that every laborer who returns to a foreign land takes from us not only tangible wealth, but latent wealth that cost this land untold sums in the waste of precious minerals during their apprenticeship, through their ignorance and inaptitude for their work. The laborer that gets his training here at a ruinous price in the way of wasted coal, and gathers up wealth, has a right to stay and help to bear the burden of adversity as well as to reap the fruits of prosperity."

Mr. Keighley also stated that labor is now looked upon by the younger generation as something degrading and contaminating, and, unless a different feeling is instilled into our children, this weakness will certainly be the ruin of the land.

In continuing his address, Mr. Keighley said that the cry of over-production in coal and coke will fall flat, for the reason that the production of coal and coke generally keeps pace with the demands. Heavy stocks of coal and coke are not carried, for the reason that their bulk prevents the accumulation of excessive quantities. Imagine a stock of 5 per cent. of the production of 1906—that would not be much of an over-production—and then figure bin room for 20,000,000 tons of coal. Twenty per cent. is not considered an alarming stock in many lines, but in coal and coke it would be a literal and actual impossibility, as it would mean the storing of 80,000,000 tons. Coal is a perishable commodity, therefore when not wanted it is not produced for storage purposes in quantities that would cut any figure compared with 416,000,000 tons. He thought there is no foundation for alarm as to the future of coal and coke as a business, but there should be a fear that not many years hence there will be both a coal and coke famine.

After the president's address, the following officers were elected: B. F. Jones, of Irwin, Penn., general manager of the Westmoreland Coal Company, president; E. W. Parker, Washington, D. C., H. H. Stoek, Scranton, Penn., J. B. Hanford, Morgantown, W. Va., T. C. Conners, Zanesville, O., vice-presidents; and C. L. Fay, Greensburg, Penn., secretary and treasurer.

After the election of officers, a paper, "Preparation of Coal for the Market," was read by W. P. Young, superintendent of inspection for the Somerset Coal Company, of Meyersdale.

A considerable discussion was started by the reading of a paper by S. A. Taylor, mining engineer, of Pittsburg, in which the reader advocated the placing of one-half cent a ton tax on bituminous coal mined for general use, one cent on every ton mined for coking purposes and one cent on every ton of anthracite coal. The engineer further suggests that half the money thus raised be appropriated for the purpose of a system of pensioning old miners and paying benefits to sick or injured ones.

At the second day's session, papers were read by E. W. Parker on "Some Observations on the Present Statistical Situation in Coal;" M. R. Campbell, of the United States Geological Survey, on "A Practical Classification of Low Grade Coals;" R. B. Woodworth, of the Carnegie Steel Company, on "Steel Mine Timbers;" Clarence Hall, of the U. S. Geological Survey, on "Statistics Relative to Mine Accidents," and a brief talk by Floyd W. Parsons, of New York, on the "Monongah Mine Disaster."

One of the important matters taken up by the Institute, was the question of urging Congress to locate a Government coal-testing plant in Pittsburg. The committee in charge of the movement is James Blick, S. A. Taylor and James McKay.

The exportation of zinc ore from Asia Minor is rapidly increasing, having amounted to 10,315 metric tons in 1906.

Personal

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

J. H. Plummer, president of the Dominion Iron and Steel Company, has returned to Canada from England.

Eugene Coste, of Toronto, Ont., is making explorations for petroleum and asphaltum on Vancouver island, British Columbia.

Henry K. Preston has been elected president of the Cresson & Clearfield Coal and Coke Company, vice J. Blair Kennerly, resigned.

W. T. Copeland, manager of the Cariboo Gold Mining Company, recently proceeded to the coast of British Columbia from Bullion, Cariboo.

Wm. Gardner, of London, England, secretary of the Tyee Copper Company, is temporarily in charge of the company's business in British Columbia.

R. J. Mackenzie arrived at Manila, Philippine Islands, Nov. 3, and is now engaged in examining the coal deposits of Batan for the war department.

E. Grebe, consulting mining engineer, has arrived at Nelson, B. C., after an examination of properties in the West Kootenay district of British Columbia.

Daniel R. Blower, of Uniontown, Pennsylvania, has been appointed mine inspector of the Nineteenth Pennsylvania bituminous district, to succeed William J. Neilson, of Irwin, resigned.

Einer Lindeman is returning to Ottawa, after having spent six months on Vancouver island and in its vicinity examining known occurrences of iron ore for the Dominion department of mines.

James Taylor has resigned his position as State mine inspector in Illinois and has accepted the position of general superintendent of the Canada West Coal Company, at Taber, Alberta, Canada.

R. D. Featherstonhaugh, who has been in charge of different hydraulic gold-mining enterprises at Atlin, B. C., during several years, lately left that camp for the winter, going thence to Vancouver.

W. B. Fisher, general superintendent of mines of the Federal Mining and Smelting Company, Wallace, Idaho, has resigned his position and will devote his time to his personal mining interests.

J. P. Jackson, professor of electrical engineering at the Pennsylvania State College, has recently been appointed by the board of trustees of that institution to the position of dean of the school of engineering.

Augustus W. Carey has been appointed traffic manager of the Tennessee Coal, Iron and Railroad Company, and the Birmingham Southern Railroad, with headquarters in the Woodward Building, Birmingham, Alabama.

J. M. Ruffner, manager of the Pine Creek Power Company, and the North Columbia Gold Mining Company, both operating in the Atlin district of British Columbia, has been visiting Victoria, B. C., on his way to the United States.

R. H. Sweetser, superintendent of blast furnaces of the Algoma Steel Company, Sault Ste. Marie, Ont., since the furnaces were first started in 1904, has resigned to become superintendent of the Columbus Iron and Steel Company, Columbus, Ohio.

John Hampson, of Nelson, B. C., left Canada for England, Dec. 13. He expects to return next spring. Mr. Hampson was in charge of the Brown-Alaska Company's Mamie mine near Hadley, Alaska, until the recent suspension of operations there.

J. B. Fleming has resigned his position with the Joshua Hendy Machine Works, San Francisco, to take the position of mechanical engineer of the Goldfield Consolidated Mines Company, at Goldfield, Nev. He is now designing a 100-stamp mill for the company.

Prof. Willet G. Miller, provincial mineralogist of Ontario, has been nominated for president of the Canadian Mining Institute by members resident in Toronto and Cobalt. Dr. A. E. Barlow, of the Dominion Geological Survey, has been nominated for vice-president.

Obituary

Harold D. Haddock, who died at Hancock, Mich., Dec. 7, aged 60 years, had been in the Lake copper district over 30 years. For eight years past he had been clerk of the Isle Royale mine.

Daniel T. Montgomery, a native of Rock Island, Ill., died at Vantanas, Durango, Mexico, Oct. 30, at the early age of 25 years. For two years past he was engaged by David Pullinger, of London, England, as field assistant to F. C. Roberts. He had attended the Colorado School of Mines and later graduated from the mining engineering department of the University of California.

Henry E. Miller died in the Holy Cross hospital, at Salt Lake City, Utah, Dec. 4. He was a resident of Hailey, Idaho, and was one of the pioneers of the Wood River district, having come to Bellevue from California in 1880, to engage in mining. He supplied the funds to develop the Minnie Moore sufficiently to admit of its sale for $500,000 to an English syndicate. He also opened the Relief group, adjoining the Minnie Moore, assisted John Q. Packard, of Utah, in the operation of the Tiptop group and supplied the capital for the Monday and other lode claims. Mr. Miller was also heavily interested in Nevada mines. In addition to his mining activity there, he also farmed on an extensive scale and owned some of the best ranches in the Wood River valley.

Dr. Bernard J. Harrington, professor of chemistry in McGill University, Montreal, died in that city Nov. 29, aged 59 years. He had been suffering for some time. He was born at St. Andrews, Quebec, and graduated at McGill in 1869, continuing his studies at Yale. He was appointed lecturer in chemistry and mining at McGill in 1871, and subsequently was chemist and mineralogist to the Canadian Geological Survey for seven years. In 1883 he was appointed professor of chemistry at McGill, holding that post until his death. He was prominent as a writer on scientific subjects, more especially Canadian mineralogy, and held offices in several scientific organizations. Dr. Harrington was a fellow of McGill University, and of the Royal Society of Canada, member of the American Institute of Mining Engineering and of the American Chemical Society. He married, in 1876, the eldest daughter of the late Sir William Dawson, and leaves a family of four daughters and three sons.

Martin Walton Brown, secretary of the (British) Institution of Mining Engineers, and one of the best known men in the profession, died suddenly at Newcastle-on-Tyne, England, Nov. 22, aged 52 years. He served his time as a mining engineer at Killingsworth, under S. C. Crone and afterward went to Hamsteels Colliery. He came to the mining and mechanical engineers' department of the Coal Trade Office under the late Mr. Bunning, being appointed clerk to the general committee of the Durham Coalowners' Association in 1880; on the retirement of Professor Lebour he was appointed secretary of the North of England Institute of Mining and Mechanical Engineers, and secretary of the Federated Institute of Mining Engineers, in the organization of which he took an important part. He was also secretary of the Board of Examination of the Newcastle mining district. One of Mr. Brown's most onerous duties was the editing of the *Transactions* of the Institute, to which he also made frequent contributions displaying a knowledge almost encyclopedic in its range. He leaves a widow and two children.

John Irving Williams, a pioneer in the iron industry of the country, died at his home in Youngstown, O., Nov. 28, aged 83 years. He was born of English parentage at La Longe de Biegny, France, and at an early age was brought to America by his family, which took up its residence at Boonton, N. J. Mr. Williams, at the age of 13, began an apprenticeship in a rolling mill at Boonton. In 1838 the family moved to Pittsburg, the young man later becoming superintendent of a rolling mill at Kittanning. In 1847, with his father and others, Mr. Williams purchased

the mill and furnace at Hanging Rock, O., where he operated successfully until 1854, when he built the Scioto rolling mill at Portsmouth, O. Upon returning to the Pittsburg district in 1862, Mr. Williams took charge of the mills of Graff, Bennett & Co., at Millvale. Here he remained until 1877, when with H. M. Long and N. M. McDowell, he purchased the Keystone rolling mill at Hazelwood. In 1881 he went to Youngstown and took charge of the plant of the Brown-Bonnell Iron Company, becoming superintendent and continuing in that capacity until the consolidation with the Republic Iron and Steel Company in 1899.

Societies and Technical Schools

American Electro-chemical Society—At the regular meeting of the New York section, held at the rooms of the Chemists' Club, Dec. 17, the papers read and discussed were as follows: Lawrence Addicks, superintendent United States Metals Refining Company, Chrome, N. J., "The Refining of Copper"; Harold Martin, formerly of the Chloride Accumulator Company, "The Modern Developments in the Storage Battery."

American Museum of Safety Devices and Industrial Hygiene—A friend has offered a prize of $100 for the best essay on the "Economic Waste of Accidents." The committee of award consists of Richard Watson Gilder, George Gilmour and W. H. Tolman. Professor F. R. Hutton is the chairman of the committee on admission of exhibits; the museum, which is at 231 West 39th street, New York. The museum desires exhibits of devices and processes for safeguarding life and limb in connection with wood-working machinery, railway and marine transportation, mining, agriculture, manufacturing of all kinds. All exhibits accepted by the committee on exhibits will be eligible for the gold medal offered by the *Scientific American* for the best device, exhibited at the museum, for safeguarding life and limb. All inquiries regarding exhibits should be sent to Dr. W. H. Tolman, director, at the museum.

Industrial

The old firm of H. L. Roper & Co., El Paso, Texas, has been absorbed by a new corporation known as the Roper-Morgans Machinery Company, which will extend the business of dealing in power-plant, mining and other machinery.

The S. J. Smith Machinery Company and L. Booth & Sons, Los Angeles, Cal., have been consolidated as the Smith-Booth-Usher Company, with offices and works at Los Angeles. S. J. Smith is president; Franklin Booth, vice-president; H. P. Usher, treasurer; W. H. Booth, secretary.

J. R. Robinson, formerly of Monongahela City, Penn., has assumed management of the Scottdale Foundry & Machine Company, at Scottdale, Penn. This company, prior to Mr. Robinson's management, built Corliss and hoisting engines, haulage engines and general mine equipment. This line will be continued and the well-known Robinson fans added.

In the Monongah mine explosion in West Virginia, the 20-ft. centrifugal fan at mine No. 8 was completely destroyed. S. B. Stine, Osceola Mills, Penn., was called upon to replace it, and two fans of Stine make were promptly put in. Both fans were in operation within 56 hours after the explosion. One of these fans, 7 ft. in diameter, was secured from one of their other mines near by; the other, 8 ft. diameter, was taken from the Stine factory.

Owing to the falling off in the demand for pig iron, the following furnaces in the Birmingham district, Alabama, have been shut down in the past three weeks: Birmingham and North Birmingham furnaces of the Sloss-Sheffield Steel & Iron Company; Oxmoor, Alice and three of the Bessemer furnaces of the Tennessee Coal Iron and Railroad Company; two of the Thomas furnaces of the Republic Iron and Steel Company; one of the Woodward furnaces of the Woodward Iron Company; Trussville and Gadsden furnaces of the Southern Steel Company. This has also resulted in the blowing out of about 4000 coke ovens in the district, and has made a considerable curtailment in coal production in some quarters.

Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

Hendrie & Bolthoff Manufacturing and Supply Company, Denver, Colo. The Hoist Question. Pp. 64, illustrated, paper, 5x7 in.

B. F. Sturtevant Company, Hyde Park, Mass. Bulletin 151. Steam Turbines. Pp. 16, illustrated, paper, 6½x9 in.; November, 1907.

Anderson Forge and Machine Company, Detroit, Mich. Forgings, Cold Chisels and Automobile Tools. Pp. 23, illustrated, paper, 4x8½ in.

Canadian Rand Company, Limited, Sovereign Bank building, Montreal, Quebec. Pumping by Compressed Air. Pp. 20, illustrated, paper, 3¼x5½ in.

New York Engineering Company, 2 Rector street, New York. The Empire Hand Prospecting Drill; also Price List. Pp. 48, illustrated, paper, 6¼x9½ in.

Jeffrey Manufacturing Company, Columbus, Ohio. Catalog D. Jeffrey Coal and Ashes Handling Machinery in Power Plants. Pp. 56, illustrated, paper, 6x9 in.

Sullivan Machinery Company, Railway Exchange, Chicago, Ill. Catalog No. 60. The Excavation of Rock by Machinery. Pp. 80, indexed, illustrated, paper, 6x9 in.; 1907.

Sprague Electric Company, 527-531 West 34th street, New York City. Greenfield Flexible Steel Conduit and Flexible Steel-Armored Conductors. Pp. 24, illustrated, paper, 4x9 in.

Pennsylvania Salt Manufacturing Company, 115 Chestnut street, Philadelphia, Penn. Catalog A. The Wedge Furnace for the Mechanical Roasting of Ores. Pp. 28, illustrated, paper, 7x9½ in.; 1907.

Willans & Robinson, Ltd., Queen's Ferry, S. O., Flintshire, Eng. G. F. Ehrenzeller, Pennsylvania Building, Philadelphia, Penn., United States and Canadian Agent. Vanadium Steel. Pp. 23, illustrated, paper, 9x11 in.

Fort Wayne Electric Works, Fort Wayne, Ind. Bulletin No. 1097. Portable Wattmeter Calibrators, Type KM-1. Pp. 4, Aug. 15, 1907. Bulletin No. 1099. Enclosed Direct Current Multiple Arc Lamps Type DCM-Form C. Pp. 10, Sept. 1, 1907. Bulletin No. 1101. Multiple System of Street Arc Lighting. Pp. 8, Oct. 15, 1907. All illustrated, paper, 8x10½ in.

The department of mining engineering, Lehigh University, is planning to get together a complete set of catalogs devoted to mining and metallurgical machinery for reference and class use, and will be glad to receive such catalogs from manufacturers. Catalogs may be sent to Joseph Daniels, Mining Engineering Department, Lehigh University, South Bethlehem, Pennsylvania.

Construction News

Hopkinsville, Kentucky — The Terry Coal Company proposes to put in an electric plant at its mine. Address at Hopkinsville.

Millican, Texas—A coal mine is to be opened on a tract of 650 acres near Millican. Dr. R. C. Wallace, Rockdale, Texas, is owner.

Cariboo, British Columbia—The Slough Creek, Ltd., an English company operating a deep-drift gold mine on Slough creek, in the Cariboo district, has adopted the recommendation of its local manager, H. H. Watters, to substitute hydro-electric power for steam to run its big pumps and other machinery. The preliminary work for building a dam across Slough creek will be commenced shortly.

Boulder County, Colorado—At the Two Brothers tunnel, a Rand duplex belt-driven compressor with a capacity of 1150 cu.ft. of air a minute is being installed and power will be furnished by the United Hydro Electric Company. It is reported that the company will build its own power plant at Idaho Springs, and also figure on the erection of its own concentration mill. A. M. Welles, Equitable building, Denver, Colo., is manager.

Special Correspondence from Mining Centers

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

REVIEWS OF IMPORTANT EVENTS

San Francisco

Dec. 11—The statistics of gold production for 1906 issued by the United States Geological Survey credit California with an output of $18,732,452. The silver, at commercial value, was $817,830. The most notable feature of the gold output is that Butte county, where many dredges are in operation, leads Nevada county in gold production, wresting the title of "the banner gold county" from the latter. The Nevada county mines are mainly quartz, while the gold from Butte county is derived almost entirely from the auriferous gravels and river sands which are found at Oroville. Almost all the gold of the county came from within a radius of a few miles where the river debouches from its narrow rocky channel at Oroville on to the plains of the Sacramento valley. The gravels of the State which were the original source of the gold in the "days of '49," have for some years not yielded nearly as much as the quartz mines. Indeed, the larger percentage of gold still comes from the quartz properties, but the county which produced the most gold in 1906 did so from the gravels or placers. This has been rendered possible only by the operations of the gold dredges, which now vie for supremacy in gold-getting with the stamps of the mills.

But while Butte county yielded over $3,000,000 in gold, Shasta county made a total yield in 1906 of $5,745,843, from its gold, copper, etc., thus placing it in the lead of all the counties of the State from that year. Of this amount $4,338,124 was from copper. Shasta county is not only the largest producer of copper, but of silver also, yielding over half of all the latter that is produced in the State. Kern county with its petroleum comes pretty close up to Shasta with its copper, the value of the output of the former county for 1906 having been $5,417,828, including oil and all other substances. These latter figures are from the report of the State mineralogist just issued.

Over a million feet of mining timber has been cut in Lassen county, Cal., for the mines in Virginia City, Nev. This is by far the largest timber contract let by the Virginia mines in many years, and shows that the old properties are planning work on a larger scale during the next year.

Dec. 10, at Angels Camp Calaveras county, all the underground men of the Lightner Mining Company refused to go on shift. This action is due to a notice posted by the officers of the company informing the men that hereafter they must give nine hours' work daily underground, or in other words, they cannot take out time for changing and going to work.

Since the closing down of the California or Gaston mine at Gaston, Nevada county, the place which was last year thriving is now depopulated, and the post office has been removed to Washington. No stage line will be run to Gaston this winter.

Shasta county has a new railroad, known as the "smelter road," 16 miles long. The road is called the Sacramento Valley & Eastern and extends from Pitt station on the Southern Pacific to De Lamar, a distance of 16 miles, all of which has just been completed. Some $600,000 has already been expended upon the road and its equipment.

The election held Dec. 10 in that portion of Fresno county south of the fourth standard parallel, to determine whether the territory should be annexed to Kings county, resulted in the defeat of annexation. The election was very hotly contested, especially in the Coalinga oilfields, which were really the bone of contention. Both Fresno and Kings county made a hard fight, Kings to increase its territory and Fresno to retain it.

There seems to be quite a little "boom" in hydraulic mining just now, which is something which has not happened for a long time. The California Debris Commission has received application for permits to mine by hydraulic process from G. A. Julian, in Flat Creek and Salt Gulch mines, near Stella, Shasta county; J. P. Lessman and I. Blomquist, in Brown Bear mine, near Clio, Plumas county; J. N. and A. Papineau, in Tiger Lily mine, near Fairplay, Eldorado county; Jim Chung, Wee Coon, Yis Coon, in Secret Diggings mine, near La Porte, Plumas county; Indian Hill Hydraulic Mining Company, in Indian Hill hydraulic mine, near Camptonville, Yuba county; Stewart Pearse Mining Company, in Gold Run placer mine, near Gold Run, Placer county; California Mohawk Mining and Lumber Company, in Fairplay placer mine, near Fairplay, El Dorado county.

W. P. Hammon states that the extensive Boston machine shops at Oroville, which were burned down a short time since, will shortly be rebuilt. These shops were engaged almost entirely in the repair work necessary to the dredges in the Oroville field, and it was at one time thought they would be reconstructed at Marysville instead of at Oroville.

Salt Lake City

Dec. 17—Another chapter in the smelter smoke cases was enacted Dec. 11, when the farmers of the Sale Lake valley gathered in mass meeting and by a vote of 130 to 34 passed a resolution favorable to allowing the Utah Consolidated Mining Company to continue the operation of its present plant until March 1, 1909; provided, however, that the mining company agrees to compensate the farmers for the privilege. It is believed that right here is where a hitch will come and that the negotiations will fall through. It is understood that the farmers will demand as much as $300,000, and if this is the case the management will probably refuse to consider the proposition and close down its smelter. The Utah Consolidated recently approached the farmers on the matter of filing a stipulation with the court asking for a modified decree permitting the smelter to be operated at its present location until a new one could be built and made ready for commission at the site selected for it in Tooele county. The mining company is willing to adjust any damage which may accrue to vegetation through the operation of its works; but any exorbitant demands on the part of the ruralists will be promptly rejected.

The lower scale of wages to become effective on Jan. 1 in Bingham will be accepted by the miners of the camp with scarcely a murmur of discontent. Through the influence of the Mine Owners' Association, the merchants of the camp have agreed to lower their prices on the necessities of life, which will probably more than make up for the losses sustained in wages.

The report originating in the East to the effect that the Utah Copper Company would shortly curtail its output has been denied by the local management. On the contrary, it is the intention to increase the tonnage from the mines by placing the eighth section of the Garfield mill in commission.

An inventory filed by George W. Parks, receiver of the Sevier Consolidated Mining Company, fixes the valuation of the properties of that corporation located in Sevier and Juab counties at $374,543. An actual indebtedness of $213,374 is reported; and what is termed a contingent indebtedness of $243,086, which was created by Seymour W. Tulloch, president of the organization, who owned a large amount of stock, sold it and turned the money into the company. The re-

ceiver makes a request to negotiate a loan of $10,000 with which to prosecute development work upon the various properties of the company.

The Daly West Mining Company has cut the usual quarterly dividend one-half, or to $54,000. The Uncle Sam Consolidated will pay this month the usual amount, $15,000; May Day, $12,000; Grand Central, $10,000; Colorado, $60,000.

It is stated that the new zinc mill being erected by the Grasselli Chemical Company, of Cleveland, Ohio, at Park City, will be ready for commission some time during February. It will operate on ore from the Daly Judge mine.

Denver

Dec. 13—In the Cripple Creek district, the Golden Cycle mill has completed its furnace building, and four of the eight furnaces have been started up on ore accumulated at the plant. The plant for crushing preparatory to roasting is also finished, and operations will soon begin on ore accumulated in the bins at the time of the fire.

People are naturally curious to know when this company will re-enter the Cripple Creek district as competitor to the United States Reduction and Refining Company. The big storage bins and sampling plant destroyed by fire last August have not been re-built, so that at this writing probably half the plant destroyed by fire has not been re-constructed. It is presumed that when the company re-enters the market, it will rent and operate one of the sampling mills in the district until such time as its own plant is completed. Meanwhile, the usual rumors of war are persistent. The restored Golden Cycle mill will have a capacity of 22,200 tons per month, and the United States Reduction and Refining Company has a similar capacity in its two mills situated at Florence and Colorado City. The American Smelting and Refining Company takes about 6000 tons per month. This gives a total call for 50,000 tons per month, while the output of the camp is at present less than 40,000 tons.

When the Golden Cycle mill was started last spring, the United States Reduction and Refining Company was forced to close its Union mill at Florence, but with the recent increase in the camp's production, this mill has again been started. So that at the present time the latter company is treating between 20,000 and 25,000 tons of ore per month, and from the present condition of the Golden Cycle mill, it will be some considerable time yet before it reaches its full capacity. It is not probable, therefore, that the rate war predicted by the daily press will immediately eventuate.

Butte

Dec. 13—The orders have come from New York from the directors of the Amalgamated Copper Company for a complete suspension of all production at all the mines of the subsidiary companies of the Amalgamated with the exception of three mines of the Boston & Montana company. These orders are being put into effect as rapidly as possible and by January all the mines of the Anaconda Copper Mining Company, the Butte & Boston, Trenton and Washoe companies, and the big Washoe smelter at Anaconda will be closed. Prior to this last order there had been laid off fully 8000 men at the mines and smelters of the Butte district, and the latest order will add fully 3000 more to the list of idle men. In connection with the promulgation of the new order it was announced that the output of the Boston & Montana would be increased, so that the actual reduction would not be material, and that the production would in fact be largely a transfer to the Boston & Montana. However, the Boston & Montana is not able to work three of its largest mines—the Leonard, West Colusa and Gambetta—because of the fire prevailing in the Leonard and West Colusa, and its mining is confined entirely to the Mountain View, the East Colusa and a part of the Pennsylvania mine. One reason given for transferring the production to the Boston & Montana is that the latter has a refinery in operation at Great Falls, which the Anaconda company has not in connection with the Washoe smelter. The Great Falls refinery has a capacity of 5,000,000 lb., and the smelter a capacity of 8,000,000 lb. per month. The combined output of both the Great Falls and Washoe smelters for several months has been about 8,000,000 lb.

The shut-down of the Amalgamated mines is accompanied by complete suspension at the mines of the North Butte and Butte Coalition companies. The Coalition company has been doing development work only for a month, but that has also been stopped and ore shipments from the North Butte have ceased.

The duration of the shut-down is, of course, unknown. If it depends upon the copper market, which is the reason given for the order of suspension, it may not be long. However, some people of Butte fear there is another cause that contributed to the determination to shut down. There is now pending in the Federal court the injunction suits brought against the company by a syndicate of farmers of the Deer Lodge valley, by which it is aimed to close the Washoe smelter. In view of the recent decision of the United States Circuit Court of Appeals in the Utah cases, it is feared that an injunction may be granted in the Washoe cases.

Toronto

Dec. 14—Hon. W. S. Fielding, Canadian minister of finance, has asked for an appropriation of $230,250 for the Mines and Geological Survey departments, being an increase of $78,200 over last year's appropriation. Of this amount, $47,000 is for the investigation of the ore deposits and economic minerals and the fuel values of Canadian coals and peats. In addition $3000 is asked for the Canadian Mining Institute and $25,000 toward defraying the expenses of the meeting of the British Association for the Advancement of Science at Winnipeg.

J. H. Plummer, president, and F. P. Jones, manager, of the Dominion Iron and Steel Company, have closed a deal with the Cumberland Railway and Coal Company for the Cow Bay coal areas, belonging to the latter, situated about ten miles from the Sydney plant. These lands cover about 30 miles of territory and are estimated to contain 150,000,000 tons of coal. It is understood that a new company, controlled by the Dominion Steel interests, will be formed to take them over, and it is anticipated that the Steel company will be able to obtain an adequate supply from this source within two years.

A deputation of the Canadian Mining Institute, including R. W. Leonard and Col. A. M. Hay, of Haileybury; Eugene Coste, Toronto; H. Mortimer Lamb, secretary, Montreal, and David H. Brown, of Copper Cliff, waited upon Hon. Frank Cochrane, Ontario minister of mines, on Dec. 12, to urge their views on the question of mining taxation. They stated that while they did not oppose reasonable taxation, they objected to the royalty system as a breach of faith on the part of the Government and a deterrent to the investment of capital in mining enterprises, and asked for the appointment of a royal commission to consider the whole question. The minister suggested a conference with the officials of the mining department before any further steps were taken, which was assented to.

Some of the Cobalt mine owners have forwarded samples of ore to smelting companies in England and Germany in the hope of inducing them to enter the market.

Returns to the Ontario Bureau of Mines of the output of the metalliferous mines and works of the province for the nine months ending Sept. 30 are as follows, in short tons, except for silver, which is reported in troy ounces: Silver, 6,919,987; copper, 5111; nickel, 8087; iron ore, 141,719; pig iron, 180,663; steel, 120,077; zinc ore, 400. Last year's total silver output was 5,401,766 oz., valued at $3,667,551. Owing to the decline in the price of silver the value for the nine months' production will be considerably less.

Mining News from All Parts of the World

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

THE CURRENT HISTORY OF MINING

Alabama

JEFFERSON COUNTY

Tennessee Coal, Iron and Railroad Company—This company has resumed construction on its coal mine No. 12, which was stopped about two months ago. The hoisting shaft and air shaft had just reached the coal. The mine will be equipped with steel head-frame and skip hoists and will have a capacity of 2500 tons per day. A Stewart jig coal washer will also be part of the equipment. This mine is on the Pratt vein. The Birmingham Southern Railroad is being extended to reach the mine.

Woodward Iron Company—This company is just completing the erection of a third blast furnace at Woodward; also a large central electric power plant from which power will be transmitted to the coal mines on one side and the ore mines on the other. This power plant consists of three alternating-current generators, each with capacity of 3400 volts and 68 amp.; and is operated by direct-connected compound engines. The company is also building a large storage reservoir with concrete dam, and a We-Fu-Go water softening and purifying plant with a daily capacity of 500,000 gallons.

Arizona

COCHISE COUNTY

Tombstone Consolidated Mines Company—The amount of water pumped Dec. 5 was 4,667,000 gal., showing a decrease of 633,000 gal. in the daily rate since Oct. 1. In the winze of the Emerald mine, where promising copper ore has been discovered, a depth of 63 ft. below the ninth level has now been obtained and water has not yet been encountered. The burning of the shaft house of the Lucky Cuss mine, Nov. 28, made it impossible to continue further developments on the body of high-grade ore recently opened in that mine. However, the damage was unimportant except for the loss of time, and it is expected that development work will be resumed soon after the middle of December.

California

ALPINE COUNTY

Hercules—The reconstruction of the dam of this company is complete, and the electric power has started up the mill, compressor, drills, etc. The ore in the mine runs about $8 per ton.

BUTTE COUNTY

Stanley—At the Cape Horn mine of this company, the road is completed, and the necessary buildings constructed. A new working incline is being constructed.

CALAVERAS COUNTY

Sheep Ranch—The electric power has been shut off and the mine finally closed down, after some desultory work running over several months.

DEL NORTE COUNTY

Salt Lake-California Copper Company—At this copper mine, formerly the Union, 15 men are at work cleaning out old tunnels, etc., preparatory to shipping ore.

KERN COUNTY

Long Tom—The old Long Tom mine is being reopened by this new company, with Oscar G. Rogers as superintendent. The mill is to work up the old dump at once, and there are about 3000 tons of ore ready for stoping.

LAKE COUNTY

Helen—This quicksilver mine, near Middleton, is being reopened. During the summer retorts have been built.

MONO COUNTY

Sunny Jim—At this property the tunnel is being driven to tap the ledge and a shaft is also being sunk. Water is being piped in and a reservoir is being built.

NEVADA COUNTY

Birchville—The development operations in this mine at Graniteville, Fred Medlin, superintendent, have been stopped for the present; work will be resumed in the spring.

Champion Mines Company — These mines at Nevada City now have a new superintendent in the person of George Mainhart, of Grass Valley. An assessment has been levied on the stock recently.

Floriston—The Nims claim at Floriston, where there is considerable excitement just now, shows a 10-ft. ledge of high-grade rock.

Hendrick—In this old claim, adjoining the Eureka ground, the owner, Michael Hogan, has encountered specimen rock.

PLUMAS COUNTY

Dutch Hill—This mine near Quincy, B. F. Barbee, superintendent, will be operated all winter. About 2800 ft. of channel remains unworked.

SAN BERNARDINO COUNTY

California Gold and Copper Company—A carload of ore from this mine, in Exchequer district, yielded 10 per cent. copper. A smelting plant is to be erected on the property.

SHASTA COUNTY

Little Nellie—The owners of this mine near Iron mountain have arranged to have the ore treated at the Mammoth smelter, Kennett, instead of at Keswick, as heretofore.

Oriole—Work has been resumed on this mine and a 4-ft. vein of $6 rock has been uncovered.

SIERRA COUNTY

Papoose—This mine has been paying well for some time with a five-stamp mill, "jewelry" ore having been mined in the lower tunnel. Five more stamps are to be added to the mill.

South Fork—The main tunnel of this mine, Forest City, is in 4900 ft. and is very close to the Maple Grove ground, the extreme southern extension of the Bald Mountain lead.

SISKIYOU COUNTY

Bennet Mining Company—This company, at Forks of Salmon, has put in readiness for hydraulicking when the water comes, the Bloomer, Nigger Hill, Crapo and Knudson mines.

TEHAMA COUNTY

California & Massachusetts Copper Mining Company—The large cylinders for the air compressors have been delivered at the Tom Head mine, and the smelting machinery will be delivered later.

TRINITY COUNTY

Bear Tooth Group—On this group development work is to be commenced at a new point.

YUBA COUNTY

Mount Pleasant—Heavy nuggets have lately been taken from this mine above Camptonville, where the gravel bed is found to be wide and deep. Adjoining claims have also recently struck rich gravel.

Colorado

DOLORES COUNTY—RICO

Pro Patria Mill—This mill, with 60 tons daily capacity, will start Jan. 1, and possibly ten days earlier. The United Rico

Mines Company, which recently acquired this plant from B. N. Griffing, of Shelton, Conn., has upward of 10,000 tons of high-grade milling ore blocked out and enough development work planned to keep the mill in continuous operation.

Rio Dolores—At this property, two miles north of Rico, Superintendent J. W. Burns announces that he will continue development throughout the winter and pay the men in cash.

United Rico—During the time when miners were scarce this company voluntarily raised wages of miners 50c., making them $3.50 per day. On Dec. 1 the old scale of $3 per day was resumed and accepted by the men without protest.

A body of contact ore of unusual thickness and richness has been disclosed on the Ute vein of this company. It was cut by a raise 40 ft. north of a large cross-vein, and at the point of intersection the ore was 3 ft. thick and assayed well in gold and silver, with some lead, copper and zinc. The length and breadth can only be determined by development. The stratification is faulted south of the cross-vein. The contact on the south side is 50 ft. higher than on the north side. The ore has all the characteristics of Newman hill contact, that is to say, a white quartz showing silver glance, brittle silver and rhodochrosite. The latter is the unfailing indicator of high-grade ore in this camp. Drifting upon the contact has already begun and Manager Sheard will make shipments as fast as the ore is taken out.

Wellington—This property, controlled by David Swickhimer, of Rico, and operated under lease by Louis Habermann, one of the owners, has a body of copper ore in sight. Shipments have been suspended, but it is understood they will be resumed after Jan. 1. New air courses have been opened up and the property can be operated at reduced cost.

Lake County—Leadville

On account of adverse market conditions the mining of silver, lead and zinc ores in the district is dull. The operators are taking advantage of the present stagnation to place their properties in better physical condition and also to carry on prospecting in new territory. A number are turning their attention to the gold belt, and several new shafts will be sent down after the first of the year in South Evans and Breece hill.

The usual tonnage of silicious ores is going out from the Dunkin, Robert E. Lee, etc., on Fryer hill. The present output of iron from Fryer hill is heavy, as there is a demand on part of the smelters for this class of ore, and every working mine on the hill is sending out a good tonnage.

American Zinc Extraction Company—The manager of this mill, on the south side of California gulch opposite the mouth of the Yak tunnel, states positively that the mill will not close down during the present stringency, as he has large stocks of ore on hand that will keep the mill busy for several months to come. When the bulk of this is treated the mill will be in the market for more.

Emerald Tunnel—This tunnel, Chalk ranch, is now in 450 ft., and in another 50 ft. should open up the mineral. Recently the tunnel passed through some pretty hard quartzite, but the formation at the breast is now changing, the ground becoming softer, and several small streaks of mineral have made their appearance, which are probably stringers from the main vein.

Musk Ox—Arrangements have been made by this company, Thompson gulch, to continue work during the winter. The company is prospecting the contact from the 450-ft. level, and although a large body of low-grade mineral has been opened the main ore-bearing horizon has not been located. The work of prospecting will be pursued during the winter.

Rock Hill—With the recent strike of a good body of ore in the Coon valley and a fair body of ore opened in the Alhambra, operators are again turning their attention to this section of the district and securing ground. At the Bessie Wilgus several streaks of good ore have been encountered and are being followed, but the management is of the opinion that the main ore-shoot will be opened in the gulch to the south; drifts are now being driven in that direction. The lessees on the Stone and Dome are shipping an excellent grade of iron, and from the Crecentia the regular 50 tons daily of iron and sulphides are being sent to the smelter. The Delaware shaft is now in the lime.

South Evans Gulch—On account of necessary repair work at the smelter at Salida shipments of medium grade ore have been curtailed for the present from the Cleveland; the rich gold ore, however, goes out regularly. As the drifts to the north and south are driven ahead the vein in both of them becomes wider and the mineral is in more compact bodies. At present nothing but development work is being carried on where the rich ore is found and no work is being done on the low-grade orebodies. The Best Friend and the Favorite, to the south of the Cleveland, are shipping a good grade of ore.

Park County

Dell—Several men are at work on a contract on this property which is being worked by the Howell Mining Company. Some good-looking copper ore has been found, both the native and oxide as well as some sulphide. As yet no ore has been shipped. G. J. Howell, of Guffy, is in charge of the property. It is situated in the southern part of the county in the Freshwater district.

Swope—Work has recently been resumed on this property which is a part of the Lloyd ranch. A winze is being sunk from the tunnel. Some good copper ore has been found in this place.

Teller County—Cripple Creek

The general mining situation in this district is quite encouraging, and it seems probable that before the first of the year there will be a noticeable improvement. Several of the properties that have been shut down for some time on account of the burning of the Cycle mill are preparing to resume operations. On account of the falling off of work in a number of the Nevada districts a number of men have returned to the district, and labor is quite plentiful. A number of new leases are being started, chiefly by small operators who have returned from the outside. The stringency of the money market has not been felt to any great extent here as there has not been much outside money coming in of late.

Isabella—This property is reported as doing very well, both on company account and by lessees. Some good ore is being mined on the Sharpe lease on the 1000-ft. level. The low-grade ore from the mine is being handled at the mill. A number of lessees are at work on the property.

Stratton's Independence—This property is producing a fair amount of ore, taken out by lessees. The production will probably be increased to a considerable extent when the new mill is completed. This mill is being erected by Philip Argall, of Denver, and is designed to treat the ore by the cyanide process. The decision of the State Supreme Court in Denver in the case between this company and the Portland has not yet been rendered. C. M. Becker is general manager of the property.

Illinois

Figures compiled by State Bureau of Labor Statistics show that the coal production for the fiscal year ended June 30, 1907, was 46,658,875 short tons. This compares with 38,317,581 tons for 1905-6, showing an increase last year of 8,341,294 tons, or 21.8 per cent.

Indiana

Albert A. Sams, deputy State mine inspector, has brought two suits against Charles Menden, of Evansville, for violating the State mining laws, in failing to provide a stairway in accordance with the law, and for failure to visit his mine each alternate day. The mining laws require the State inspector to prosecute all such cases.

The two day's examination conducted by State Mine Inspector Epperson, at Terre Haute, of applicants for licenses as mine bosses and engineers closed, Dec.

6, with a large proportion of those who tried the written examination dropping out before the oral examination began. In the beginning there were 41 applicants for license as mine bosses and fire bosses and 21 for hoisting engineers.

CLAY COUNTY

The average daily output of the clay mines and clay plants of this county is computed at 55 carloads of products, 25 tons to the carload. As these mines and plants are operated practically every day, the year round, the annual production is not less than 400,000 tons, the market value of which is nearly $2,500,000.

MARION COUNTY

Carter Coal and Coke Company—This company has been incorporated, capitalized at $100,000, to carry on the business of mining coal, oil, gas and other minerals. The headquarters will be in Indianapolis. John B. Carter, William T. Hicks and Charles A. Dennen are directors.

SULLIVAN COUNTY

Commercial Coal Company—This is the latest to organize and incorporate for the purpose of doing a general mining business. The capital is $30,000 and the headquarters in Dugger. M. E. Merrick is president.

VERMILLION COUNTY

The strike situation in the Clinton district is clearing and five of the six mines were running the greater part of the week. Mine No. 6 cannot be reached by the miners except by train, but the railway company has withdrawn this train till the miners sign an indemnity bond, agreeing to pay for all damage to the coaches caused by riots in the future. The miners accepted their pay partly in checks before returning to work.

WARRICK COUNTY

Black Diamond—These coal mines west of Boonville have been closed as a result of the mine labor disturbances and will probably remain shut down until a better understanding prevails. Louis Stoek is one of the principal operators.

Iowa

Iowa Coal Operators' Association—At the annual meeting in Des Moines recently, the principal discussion related to the striking of the miners whenever they were under the impression that they had a grievance. The operators maintained that under the agreement with the United Mine Workers the miners should remain at work while the grievance was being adjusted by the arbitration committees of the operators and the mine workers' union. In the present agreement there is a clause covering this point, but the miners have violated it at frequent intervals. The association instructed President H. L. Waterman and Commissioner John P. Reese to enter a protest to the miners' officials before the next annual meeting against these violations of the joint agreement. There was an informal discussion of the new agreement and wage scale, but no definite recommendations were made. The annual election of officers resulted as follows: President, H. L. Waterman, of Ottumwa; vice-president, David Denning, of Cincinnati; treasurer, E. C. Smith, of Des Moines; secretary and commissioner, John P. Reese, of Albia; executive committee, Alexander Dargavell, of Centerville; B. C. Buxton, of Buxton; S. W. White, of Oskaloosa; E. C. Smith, of Des Moines, and Samuel Maclure, of Fort Dodge. In addition to the above officers and members of the executive committee, the scale committee will include David Ladwick, of Mystic; Henry Phillips, of Ottumwa; W. A. Durfee, of Bussey; Samuel Blount, of Des Moines, and H. H. Canfield, of Boone.

Michigan

IRON

Lake Superior Iron and Chemical Company—The Newberry furnace belonging to this company, went out of blast Dec. 4 for an indefinite period. Its Chocolay furnace, although rebuilt this year, has not yet been blown in and no plans for its operation have been decided upon.

Munro—This mine, at Iron mountain, has shut down for the winter and about 60 men have been laid off. The Buffalo & Susquehanna Steel Company, which operates the mine, extracted about 50,000 tons of ore or about 3000 more than in 1906.

Missouri

JOPLIN DISTRICT

Gerke Mining Company—The 250-ton mill of this company on the Continental land west of Joplin is nearing completion. Several thousand dollars worth of ore is piled on the dumps ready for milling.

Rabbit Foot Mining Company—Owing to the explosion of a boiler this property is closed down.

Columbia Zinc Company—This company has started to drift from its west shaft to the mill shaft 300 ft. east. The latter is now down 76 ft. This drift will be completed by the time the shaft is down to the ore at 190 ft.

Sheet Ground District—Five drills are at work on the square mile northwest of the Columbia Zinc Company property.

Smoot & Wheat—A rich lead strike was made south of Webb City by Smoot & Wheat, of Joplin.

Whitsett—The mine of the Old Dominion Mining Company, one of the largest producers in the district, has shut down owing to low ore prices.

United Zinc Company—A cave in at the mine of this sompany disclosed ore so near the surface that stripping was resorted to and a large amount of ore was taken out in this way before the orebody was exhausted.

Montana

SILVER BOW COUNTY

A few of the companies that were organized during the copper boom days are still working and prosecuting development work. Among those that appear to have sufficient resources are the Butte & London, Pilot-Butte, Colusa-Leonard Extension, North Butte Extension and Raven.

Raven—The company has sunk the shaft to a depth of 975 ft. A station has been cut at the 900 and a cross-cut has been started south to the veins. At the 700 drifting is being done on the vein and an orebody 3 ft. wide, carrying gold and silver and assaying 3 per cent. copper, has been opened. This find is considered especially encouraging because it is under the workings of the 500 where the ore was largely zinc and of little value.

Butte Coalition—The company is prosecuting development work but is mining no ore. The new steel gallows-frame, 108 ft. high on the Tramway, has been completed in record time, the work having been done in 27 days.

Butte & New York—The shaft on the Colonel Sellers has reached a depth of 740 ft., and a station has been cut at the 700-ft. level, where a pump and tank are being installed. The shaft, which is in solid granite, will be carried to a depth of at least 1000 ft. before the veins will be explored.

Pilot-Butte—A record in shaft sinking was made by the company in November. During that month a depth of 125 ft. was attained, making the shaft on the Pilot 340 ft. deep. Three veins have been cut by the shaft, the last at a depth of 300 ft. They will be crosscut at a depth of 500 feet.

Nevada

ESMERALDA COUNTY—GOLDFIELD

Proposed Mills—Local mine owners have made up their minds to get away from the high charges of the smelters and the transportation companies. The success of the Combination, the Nevada-Goldfield and the Kinkead plants shows that the extraction of the values can be made from ores that cannot possibly be shipped to the smelters. The Florence company has all the surface work on its plant completed, and all that is necessary is the machinery, which has been on the road for months from different points throughout the country. The Consolidated company will have a 500-ton mill in operation just as soon as it can be constructed. Other corporations will follow suit.

NYE COUNTY—BULLFROG

Aurora—Sinking has been resumed on this property under the management of T. C. Blair. The present depth of the shaft is 100 ft., but it will be carried down to the 250-ft. level without delay and to facilitate the work the company will shortly erect a power hoist. Lateral work will be started at the 150-ft. level to intersect and develop the ledge opened in the 70-ft. level, which prospects well.

Gibraltar—The mine is being developed by lessees. The Phillips & Moesser lease is raising shipping ore averaging $300 per ton. Several other leases have promising ore opening up.

Golden Scepter—The new tunnel has cut the Hobo vein at a distance of 230 ft. from the entrance, and at a depth of 150 ft. The vein is about 12 ft. in width and is well mineralized. Drifts will be run in both directions along the vein.

Homestake-King—This company has made a contract with the Nevada-California Power Company for 400 h.p., the contract covering a period of 10 years. A five-mile spur from the Rhyolite substation will be built at once to accommodate the Homestake-King and Gold Bar mills. The mill will be built at the mine, close to the workings, at a point only a few hundred feet north of the Gold Bar plant. The company decided to put in a larger mill than they at first had planned, the accepted plans calling for 25 stamps, which means a daily capacity of 125 tons. The survey for the millsite has been made and excavation work will be started at once.

Keane Wonder—The first clean-up of the new mill on this property has been made; 900 tons of ore were crushed for a return of $18,000 gold. A large amount of gold was absorbed by the plates, but next month a greater yield is expected.

Midas—Two shifts of six men are driving a crosscut tunnel on the Bullfrog Midas, located in the Grapevine district, about eight miles from Rhyolite. The tunnel is now in 60 ft. and a vertical depth of 500 ft. has been attained.

Mogul—This company proposes to resume work on this property, situated in the Springdale district. The shaft is down 90 ft. and will be continued to the 300-ft. level before lateral work is undertaken.

National Bank—It is estimated that the ore of milling grade in the dump is over 30,000 tons, and large quantities of ore of similar grade are blocked out in the workings, awaiting milling facilities. The new surface ledge is opening up well and high-grade shipping ore is being mined from it.

Shoshone—The management states that the mill crushed 4200 tons of ore during November for a return of $105,000. In the same period, 400 tons of high-grade ore, averaging $100 per ton, were shipped to the smelters. This makes the gross output of the mine for the month $145,000. The new mill is running well.

West Extension—Ore has been cut in the workings at the 200-ft. level. Quartz similar to that opened in the vein in the upper levels is showing in the drives. Some seams of high-grade shipping ore are showing.

NYE COUNTY—ROUND MOUNTAIN

Round Mountain Sphinx—On the 200-ft. level of this mine about 60 miles from Goldfield two veins of good width, carrying values of $20 to $40 a ton have been opened up. The company has placed an order with the Allis-Chalmers Company, Milwaukee, Wis., for a Huntington mill plant of 25 to 30 tons capacity. The power plant and crusher will be sufficient to operate additional units.

NYE COUNTY—TONOPAH

Belmont—Mining developments in the lower levels are satisfactory. A large amount of milling ore is blocked out ready for stoping.

Extension—Good progress is being made in the north crosscut on the 1050-ft. level at the Tonopah Extension, with no change in the formation since last report. Stoping is progressing as usual on all levels above the 600-ft. level.

Jim Butler—The new compressor plant at this mine is working smoothly and machine drills are in operation on all levels. The usual shipments are going forward to the smelter.

Little Tonopah—The north crosscut on the 850-ft. level is out about 500 ft. and stringers of ore carrying good silver values are being encountered. The ground is being developed by the Tonopah Geodetic Company, composed of Los Angeles capitalists, and the work has been pushed without interruption for the past two years. The lode porphyry was struck in the shaft at a depth of 810 ft., and after penetrating the porphyry 40 ft., stringers of mineralized quartz were recently encountered. The mine is well situated west of the Midway and Tonopah mines.

Montana—The mill is running regularly to its full capacity of 40 stamps, and the output averages about 1100 tons a week. The saving of values is up to expectations. The ore sent to the mill is being "sweetened" from the rich shoots that have been opened up at various points in the mine, and the clean-ups are becoming more frequent and are showing a material increase in value. Development work is progressing as usual in the mine.

West End—Work is progressing as usual on the 400-ft. level, and the customary quantity of ore is being extracted from the stopes. Prospecting is being carried on systematically on the 200 and 275-ft. levels, with excellent results. Sinking will be resumed in the new double-compartment working shaft early next month and will be continued until the 500-ft. level is reached.

WHITE PINE COUNTY—OSCEOLA

Panguitch—A rich gold strike has been made in the ground of this company, where 4 ft. of free-milling ore, running high in gold, has been opened. The company began work about three months ago and has been running a tunnel crosscutting the formation. In driving the tunnel 100 ft. they have gone through three veins of gold ore. The ore is being sorted and sacked for shipment.

Tybo—General Manager E. J. Collins, of the Nevada Smelter and Mines Corporation, states that the Tybo mine has been at last pumped out and that a big body of ore has been encountered on the 300-ft. level, the values being in gold, silver and lead. The Tybo mine is an old mine, but had been lying idle for more than 20 years, when the present owners took hold of it. W.R.I.

Oregon

CURRY COUNTY

Elzie Holderman and A. P. Churchill, two Bohemia miners, recently went to Curry county in search of copper and brought back some fine specimens of native metal. They found that the copper was confined to detached boulders. The formation is serpentine and very treacherous rock to work in. They found many tunnels which have been driven by prospectors, but no ledge has been found in place.

DOUGLAS COUNTY

Twin Rocks—Lewis Hartley, manager of this property at Bohemia, has shut down for the winter. Work in this mine has recently been in a hard rock crosscut which was excavated to a depth of 150 ft. The company opened the ledge on top to a depth of 30 ft., where it left quartz that assayed $11 to the ton free milling. Work will be resumed in the early spring.

LANE COUNTY

Bohemia Seven—Assessment work for 1907 has been completed on this property near Mineral, and the management now plans to survey the seven claims for patent to do considerable development in the spring.

Combination—Clark Brothers, who operate this mine at Mineral, are encountering good ore in the lower drift. They are now in on the ledge over 300 ft. and have exposed a body of silver-gold ore. The ore is base, and Sherman Clark, engineer and manager, says that they have a first-class concentrating proposition.

Golden Rule—Manager Wechter, of Salem, will prosecute work all winter on this property at Mineral. He recently sent in an assayer and engineer to sample the mine and lay plans for future development.

Great Eastern—This company, near Mineral, has completed the assessment

work on the Minturn claims, but will do no more this season owing to the money stringency.

Star Consolidated—This company is trying to secure patents to its group of 13 claims, but is meeting with some trouble, as the property is on the Cascade forest reserve.

Vesuvius—F. G. Hard, manager of this property and also manager of the Bohemia Supply Company, is doing development work all winter. He is not operating the 10-stamp mill, but is pushing the Wild Hog drift, which is now about 900 ft. in.

West Coast Mines Company—The miners working in the tunnel at this mine, at Orseco, in Bohemia district, have encountered very hard rock. This tunnel, now 60 ft. long, was recently started to tap the Champion ledge at a depth of 1500 ft., and will be nearly 2000 ft. long when it reaches the ledge. The first snow of the season fell on Nov. 25, to a depth of 18 in. Work will be pushed as rapidly as possible on this property.

Pennsylvania

Anthracite Coal

Philadelphia & Reading Coal and Iron Company—This company's statement for October and the four months of the fiscal year from July 1 to Oct. 31 is as follows:

	October.	Four Mos.
Earnings	$4,397,071	$13,165,613
Expenses	3,930,496	12,116,288
Net earnings	$ 466,575	$ 1,049,325

For the four months there were increases of $2,923,131 in earnings; $2,184,147 in expenses; and of $738,984 in net earnings.

South Dakota

Lawrence County

Reliance—Three carloads of machinery have arrived for installation in the mill and mine on Annie creek. The consignment includes a fourth Huntington crusher, a 100-h.p. electric motor and a 10-drill air compressor with drills. The capacity will thus be increased in order to take care of new ore reserves just opened.

Homestake—The company has commenced to install skips throughout the hoists to supplant cages. New stations are being cut on the levels and the hoisting capacity will be greatly increased by the change. A. G. Kirby, head metallurgist for the Goldfield Consolidated Mining Company, has spent some time here studying Homestake metallurgical methods as applied to diversified ores. The ore in these properties is similar. The directors of the company decided not to resume dividend payments until January at which time the old rate of 50c. per month will prevail.

North Homestake—The improvements are nearly completed and it is expected to resume operations in both mine and mill in another month. Electric power is being installed in both. The main shaft is being enlarged to three compartments previous to being sunk to quartzite.

Golden Reward—William Russell, of Colorado, has taken charge of the mill as superintendent, succeeding O. N. Brown, who went over to the Branch Mint. The test of the new filter press will be made in a few days.

Mogul—A tube mill for regrinding high-grade sands is being installed and it is expected to increase the extraction 10 per cent. This is the first tube mill to be used in the Black Hills, and other companies are watching the experiment.

Pennington County

Victor Anna—A number of men from Broken Bow, Neb., are at Redfern making preliminary arrangements for the formation of a company to take over this group and operate it. It consists of 440 acres which carry an average gold value of $6.

Ohio-Deadwood—The ground of this company in the Rochford district has been deeded back to the original owners, Messrs. Kearney, Billups and Swanson, because of failure to meet back payments for several years. The ground will be operated again by the owners.

Gertie—The famous suit of E. C. Johnson against W. L. Moyer, of Philadelphia, for possession of the property and damages for alleged mismanagement, and its counter suit by Moyer, was decided in favor of Johnson, who was given full possession of mine and machinery. He will commence at once preliminary steps to operating the mine, which it is claimed shows 2½ per cent. tin. No damages were allowed either side and the fraud charges were dismissed.

Provident—About 30 tons a week of amblygonite is being shipped regularly from the Peerless property and it is the intention to ship at least 250 tons more before the season closes.

Canada

British Columbia—Crow's Nest Pass.

The output of the Crow's Nest Pass Coal Company's collieries during four weeks ended November 29 totalled 84,486 tons. This gave an average per day for 24 working days of 3520 tons. The daily average for the last week of November, 1906, was 2289 tons. The increase in output is therefore about 54 per cent. The aggregate of the company's payrolls for October at its three collieries—Coal Creek, Michel, and Carbonado—was $205,416.

British Columbia—Golden Division

Giant—An Elmore vacuum oil plant is to be installed at this zinc-lead mine in the Golden mining division. The machinery for it has been received and is being put in place under the direction of H. H. Claudet, of Rossland, the Elmore company's representative in British Columbia.

British Columbia — Vancouver Island

Britannia Smelter—The tonnage of ore smelted at this company's smelter at Crofton in 1907 will be about 73,000 tons, yielding about 3,300,000 lb. of copper. This tonnage includes about 32,000 tons of ore, and 3900 tons of concentrates from the Britannia mine, and 29,000 tons of ore from the Mt. Andrew mine, on Prince of Wales island, Alaska.

New Brunswick

Londonderry Iron and Mining Company—This company, controlled by the Drummond interests of Montreal, has leased iron-mining areas in Gloucester county, embracing 25 square miles, located on the Nepisiquit river, 11 miles from Bathurst. These deposits are claimed to be very rich, recent tests showing a depth of 324 ft. of hematite ore of excellent quality, which can be mined economically. The existence of these deposits was only known locally and the property was quietly secured by a syndicate. The price paid is said to be $80,000, the terms on which the lease is held including a royalty to the province of 5c. per ton on all ore mined. The project of the company for development includes the construction of a branch railway to Bathurst and the erection of blast furnaces probably at that point.

Nova Scotia

Dominion Iron and Steel Company—This company has leased the iron-ore areas of the New Brunswick Iron Company at Point Lepreaux, New Brunswick, for 80 years, on a royalty basis of 25c. per ton of the output.

Dominion Coal Company—The output of coal for November, 1907, was 335,811 tons, as compared with 308,367 for November, 1906.

Nova Scotia Steel Company—This company proposes extending its operations, and is negotiating for some additional areas of coal land over which prospecting has been carried on for some time.

Ontario—Hastings County

Big Dipper—A concentrator with a capacity of 100 tons of ore per day has been contracted for, as well as an amal gamating machine.

Nova Scotia

Maritime Coal, Railway and Power Company—At a special general meeting held in Montreal, Dec. 7, for the purpose of ratifying a new bond issue, David Mitchell, general manager, stated that development work in the collieries was being rapidly pushed. At the colliery at Chignecto the main shaft had been sunk a further distance of 500 ft., at which point

levels will be opened to work a 6-ft. seam of first-class coal. The new slope on the property taken over from the Canada Coal and Railway Company, is down 700 ft., and about 60 tons of coal per day are being raised. The slope will be driven a distance of 1700 ft. and levels run.

ONTARIO—COBALT DISTRICT

Ore Shipments—Shipments of ore for the week ending Dec. 7 were as follows: Buffalo, 160,000 lb.; Coniagas, 175,890; La Rose, 171,600; McKinley-Darragh, 253,050; O'Brien, 60,780; Silver Leaf, 50,100; Temiskaming, 45,600; total, 917,020 pounds. Shipments of ore for the week ending Nov. 30 were as follows: Foster, 98,500 lb.; Hudson Bay, 134,000; Kerr Lake (Jacobs), 44,000; La Rose, 1,265,000; Nova Scotia, 92,230; Silver Queen, 120,000; Trethewey, 53,750; Townsite, 42,200; Temiskaming, 63,000; total, 1,912,680 lb.

Cobalt Majestic Silver Mines, Ltd.—A new company, which is being organized under this name, has acquired the properties of the Abitibi & Cobalt Mining Company, the Empress mine, and a native silver proposition in James township. The stockholders of the Abitibi are to receive share for share in the new company.

Colonial—This mine was closed down recently, throwing about 30 men out of employment.

Coniagas—At the annual meeting, held in St. Catharines, Ont., Nov. 30, the directors' report, for 11 months ending Oct. 31, showed gross returns $779,225; working expenses, organization, etc., $154,533; net returns $624,762; paid and payable in dividends and bonus $300,000; balance $324,762. The value of ore stored on dump for concentration after allowing expenses of treatment is estimated at $100,000.

Golden Fleece—The New York syndicate which has been operating this gold mine for several months, under option, has completed its purchase. A shaft has been sunk 80 feet.

McKinley-Darragh—The union miners employed by this company have protested against the reduction of 25c. per day and the increase from nine to ten hours, which they were notified would come into effect Dec. 15. They have applied to the labor department of the Dominion government asking for the appointment of a board of conciliation to inquire into the matter, in accordance with the provisions of the Lemieux act.

McKinley-Darragh Mining Company—A strike has been made on the location of this company, in Bucke township, at a depth of 100 ft. The vein is smaltite with good silver contents.

McKinnon—Bucke township, Cobalt. It is reported that a calcite vein of considerable width, with a good showing of native silver, has been struck at the 86-ft. level of the main shaft of this mine in Bucke township. A second shaft on the property is down 25 feet.

Red Rock—In drifting from the south main shaft two veins have been encountered showing from 12 to 18 in. of concentrating ore; there is also a narrow vein of cobalt showing native silver.

QUEBEC

Nichols Copper Company—The plant for the manufacture of sulphuric acid, recently established at a cost of about a million dollars. is in successful operation turning out about 16 tons of acid daily. The company is now mining mundic on a large scale and purchasing the product of other mines. A large increase in the capacity of the works is contemplated.

SASKATCHEWAN

The provincial government has decided to open and operate a coal mine in the Eagle lake district, at a point 40 miles from the nearest surveyed line of railway and in a country quite bare of timber. The question of providing fuel in the district mentioned is one of the utmost importance to the settlers there, who will have to go elsewhere if sufficient provision for their requirements is not made.

YUKON TERRITORY—WHITEHORSE DISTRICT

Arctic Chief—W. J. Elmendorf, manager of this company, has returned from a trip to Portland Canal, B. C. He states that operations will be continued throughout the winter at the copper mine.

Grafter—Grading work is in progress within 1½ miles of the Grafter mine on the branch the White Pass & Yukon Railway Company is building to the copper mines. It is believed it will be practical to work on the grade nearly all winter.

Valerie—A. B. Palmer has 14 men employed at the Valerie mine, eight underground and six in cutting and hauling mine timbers in readiness for enlarged operations after the railway shall have been completed. The shaft is down 100 ft. and a drift from it is about 50 ft. to the face. Cross-cuts show the ledge to be 18 ft. in width.

Mexico

AGUAS CALIENTES

Paso de Sotos—These tin mines near the western border of the State have been sold to the American & Mexican Mines Company.

CHIHUAHUA

Dolores—According to press despatches, the judge of the Federal court at Chihuahua has rendered a decision adverse to the American claim to this mine, situated at Santa Eulalia. The mine was purchased more than a year ago by a representative of American capitalists. The property was later seized by a Mexican claimant and held with a force of armed men. The Americans brought suit for recovery, but both the lower and the higher courts decided for the Mexican claimant.

COAHUILA

Torreon Smelter—An explosion at the works of the Compania Metalurgica de Torreon wrecked the machinery in the blower room and started a fire which caused considerable damage before it was brought under control. The main engine was wrecked and the walls of the building suffered more or less damage. A reserve engine and blower enabled the works to resume after a short delay.

JALISCO

Casados—The work of unwatering this old mine in the Hostotipequilo district has been completed, disclosing the expected bonanza ore at the bottom of the old workings. The construction of a permanent shaft will be pushed. The ore is silver sulphide carrying gold.

VERA CRUZ

Tezuitlan Copper Company—This company has notified the various ore buyers that no more ores are wanted for the present. The smelting plant has been closed down, the low price of copper being assigned as the cause.

Africa

RHODESIA

Gold production in November is reported at 50,891 oz. bullion, being 2932 oz. less than in October. For the 11 months ended Nov. 30 the total was 503,566 oz. bullion in 1906, and 559,339 oz. in 1907; an increase of 55,773 oz. The bullion reported this year was equal to $10,289,774, or 497,812 oz. fine gold.

Africa

TRANSVAAL

Much interest is being taken in the Valentine Platinum Syndicate, which has a stretch of ground about 20 miles from Grahamstown, on the Assegai river. It is said that many promising indications of platinum have been obtained. An influential firm in London, apparently satisfied with their prospects, has offered to float the syndicate into a company with a capital of £350,000. It is not known as yet whether this prospect will develop into a paying concern, but the property is to be carefully prospected.

Australia

WESTERN AUSTRALIA

Gold production in November is reported at 145,825 oz., a decrease of 333 oz. from November, 1906. For the 11 months ended Nov. 30 the total was 1,648,349 oz. in 1906, and 1,543,103 oz. in 1907; a decrease of 105,246 oz. this year.

Metal, Mineral, Coal and Stock Markets

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

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, Dec. 18—Coal trade in the West is rather quieter, notwithstanding some help afforded by cold weather. A decrease in demand for steam coal has offset the gain in domestic sales. Car supply is good everywhere; few or no complaints are heard. Financial conditions are better and there is less trouble about pay-rolls.

The bituminous trade in the East is dull, and the market is generally weak. A surplus of coal is feared, unless there is some curtailment of production at the mines.

The anthracite trade has improved a little, owing chiefly to colder weather. The coastwise trade is falling off, but that is usual at this season.

A heavy reduction in coke output is reported, due to the stoppages in the iron trade. In the Connellsville region production has fallen off 50 per cent. since October.

Coal Traffic Notes

Chesapeake & Ohio Railway, four months July 1 to Oct. 31, short tons:

	Coal.	Coke.	Total.
New River.....	2,038,013	83,870	2,121,883
Kanawha.....	1,829,251	38,592	1,867,843
Kentucky.....	100,413	.....	100,413
Connecting lines...	101,066	38,551	139,617
Total	4,068,743	161,013	4,229,756
Total, 1906..	3,134,210	116,007	3,250,217

Tidewater deliveries this year, 1,262,735 tons coal.

Pennsylvania Railroad east of Pittsburg, year to Dec. 7; short tons:

	1906.	1907.	Changes
Anthracite..	4,277,745	5,298,065	I. 1,020,320
Bituminous.....	30,318,015	37,224,427	I. 6,906,412
Coke.....	11,936,127	12,681,548	I. 745,421
Total.....	46,531,887	55,204,040	I. 8,672,153

Bituminous coal and coke shipments, Pennsylvania and West Virginia, 10 months ended Oct. 31:

	Coal.	Coke.	Total.
Balt. & Ohio.....	22,096,484	5,244,413	27,340,897
Buff., Roch. & Pitts.	6,033,760	520,862	6,554,622
Penn. lines, N. Y. C.	6,913,672	65,527	6,979,199
Pitts. & L. Erie.....	9,221,248	4,448,486	13,669,734
Norfolk & Western.	10,272,324	2,150,258	12,422,582
Total.....	54,537,488	12,429,546	66,957,034
Total, 1906.....	49,217,184	11,007,691	60,224,875

Baltimore & Ohio anthracite, 752,939 tons in 1906, and 823,293 in 1907; an increase of 70,354 tons.

Coal receipts at St. Louis, 10 months ended Oct. 31, were 6,105,658 tons in 1906, and 6,597,393 in 1907; an increase of 491,735 tons.

New York

Anthracite

Dec. 18—The hard-coal market is fairly active, especially in stove coal and in pea size. These two sizes are quite short, and the demand has increased considerably during the past week. Prices are quoted as follows: Broken, $4.50@4.75; egg, stove and chestnut, $5; pea, $3.25@3.50; buckwheat No. 1, $2.75@3; buckwheat No. 2 or rice, $2.15@2.25; barley, $1.75; all f.o.b. New York harbor.

Bituminous

Trade is dull and there are some accumulations at shipping ports, a condition which has not occurred for six months or more. New York harbor trade is extremely dull and prices have fallen off. Good grades of steam coal bring only $2.50 f.o.b. New York harbor shipping ports and the demand for the better grades is not much stronger. Some coal on demurrage is offered at considerably lower prices. Producers of the better grades are still working on old contracts to a limited extent, but the lower grades are not booked ahead to any extent.

Trade in the far East is taking coal, on old contracts, to a greater extent than other territories. Trade along the Sound is still calling freely for some of the specialties, but does not seem to care for the lower grades. All-rail trade is quiet, but steady, and prices are higher, as a rule, than tidewater business. Transportation from mines to tide is slow, coal taking 10 days to run through. Car supply is up to all demands.

In the coastwise vessel market some charters have been made at very low figures. One large craft was chartered at 80c. from Philadelphia to Boston, but the prevailing rate between these points is 10c. higher. Vessels are in good supply and, as all ice-making ports are practically closed, some of the smaller vessels are laying up for the winter. Freight rates from Philadelphia to Portsmouth are 95c.@$1; to Lynn and Newburyport, $1.05@1.10; to the Sound, 80c. per ton.

Birmingham

Birmingham, Dec. 15—The mines in Alabama continue to be operated on full time, with but few exceptions. The consumption is large and good prices prevail. The statement is made that a number of coke ovens in Jefferson county will be started up again soon, and that all men who desire work can obtain same even through the two weeks of the holiday season. There has been no reduction in coal quotations and the railroads are still furnishing all the cars that are wanted. The damage done at the new shaft of the Tennessee company by a local windstorm is being repaired rapidly.

Chicago

Dec. 16—The coal market is quiet, owing largely to the absence of cold weather. General business conditions are improving.

Eastern coals in general have been weak. Shipments have been larger than the trade could absorb. Hocking has been in large supply at $3.15@3.65. Smokeless also has been plentiful and has sold at $3@3.50 for run-of-mine and $4.15 for lump. Youghiogheny at $3.15 for ¾-in. gas and Pittsburg No. 8 at $2.95 have had light sales. Anthracite is selling moderately.

Illinois and Indiana coals hold about the same prices as for the last month. Lump brings $2@3; run-of-mine $1.75@2; screenings, $1.20@1.40. Brazil block is sluggish at $3.10.

Stocks of both retailers and consumers have been somewhat large, but are being steadily depleted.

Indianapolis

Dec. 17—Reports from the coal-trade centers indicate a slightly better tone, and, with the exception of a few localities, an increasing demand for coal at the mines. Cooler weather and a greater volume of currency with which to pay the miners, thus inducing them to return to the work, are the contributing causes. The coal traffic with some of the railroads continues to be heavy, especially those touching the gas-belt territory.

As a general thing prices remain firm. A slight break is made here and there in order to put off coal which is a little off grade.

Pittsburg

Dec. 17—There is but little change in the coal situation. The cut in prices last week did not induce buying and the mines are running to about 60 per cent. of capacity. There is no complaint of a scarcity of railroad cars and many cars are stored on the various branches. Coal is still quoted on a basis of $1.15@1.20 for mine-run at mine but it is believed this rate could be shaded. Slack has declined to 40c. and it is reported that there would

be no difficulty in buying at less. The rivers were navigable for over a week and the Monongahela River Consolidated Coal and Coke Company shipped fully 3,000,000 bush. to the lower markets. A number of empty coal boats and barges came up on the "rise" and were sent up to the pools. All the river mines are in full operation.

Connellsville Coke—The week opened with 19,396 ovens idle out of a total of 25,522 in both of the Connellsville coke fields. Three small independent concerns operating less than 400 ovens made a reduction of 12½ per cent. in wages on Dec. 1 and it is understood a few other independents will order a cut on Jan. 1. So far as known the large producers will not make any change in the wage schedules. Furnace coke is quoted at $2 @2.25 and foundry at $2.50@3, but these rates are purely nominal as there is but little new business being done. The *Courier* in its report for the week gives the production in both fields at 202,471, tons and the shipments aggregated 6616 cars distributed as follows: To Pittsburg, 2319 cars; to points west of Connellsville, 3696 cars; to points east of Connellsville, 601 cars.

Iron Trade Review

New York, Dec. 18—Little change is to be reported in the iron and steel markets. Some demand for foundry and basic pig has developed in the East, but it is rather of a sporadic sort, indicating special needs of a few plants. Finished material continues very quiet, so far as new business is concerned, a few orders for city work being all the business in sight.

Bids for the construction of the approaches to the new Manhattan bridge over the East river in New York were opened Dec. 12. Four bids were received, as follows: J. C. Rodgers, $2,168,304; Maryland Steel Company, $2,179,724; McClintic-Marshall Construction Company, $2,367,978; Williams Engineering and Contracting Company, $2,411,407.

Pig Iron Production—The reports of the blast furnaces on Dec. 1 show 226 coke and anthracite stacks in blast, having a total weekly capacity of 347,400 tons. This is 144,100 tons less than on Nov. 1; 180,800 tons less than the maximum reached on July 1, 1907; and is the smallest weekly capacity reported since Nov. 1, 1904. Taking the report of the American Iron and Steel Association for the first half of the year, the estimate of the *Iron Age* of the coke and anthracite make for later months and an allowance for the charcoal furnaces, the approximate production of pig iron in November was 1,856,000 tons; and for the 11 months ended Nov. 30 it was 24,525,544 tons.

Lake Iron Ore Shipments—Lake navigation closed practically Dec. 10. The ore shipments by water for the season are reported as below, in long tons:

Ports:	1906.	1907.	Changes.
Escanaba.....	5,851,095	5,761,988	D. 89,107
Marquette.....	2,791,033	3,017,427	I. 226,294
Ashland.....	3,388,111	3,437,672	I. 49,561
Two Harbors..	8,180,128	8,188,906	I. 8,778
Superior.....	6,083,057	7,440,380	I. 1,357,323
Duluth.....	11,220,218	13,445,977	I. 2,225,759
Total.....	37,513,642	41,292,350	I. 3,778,708

The figures for 1907 may require a slight revision. The total increase this year was 10.1 per cent., most of it coming from the Mesabi range. The rail shipments in 1906 were 1,008,597 tons; this year they will probably be about the same.

Baltimore

Dec. 17—Imports for the week included 1500 tons spiegeleisen, 1449 tons ferromanganese, 100 tons ferro-silicon and 228 tons silico-spiegel. Arrivals of iron ore were 9050 tons from Cuba and 4890 from Spain; 13,940 tons in all.

Exports included 6059 tons steel rails, 310 tons splice bars and 529 tons steel ties, chiefly to Panama.

Birmingham

Dec. 16—A few sales of pig iron were made in the Southern territory recently, but the aggregate business was small. The production is down to the lowest point, and as far as can be heard there will hardly be any more curtailment. The local consumption is falling off, the cast-iron pipe plants not running as full as they might. The rolling mills at Bessemer and in the city are doing fairly well.

Pittsburg Construction Company will begin the work of re-building stock bins at the Ensley furnace and steel plants of the Tennessee company, Jan. 1, bringing over 200 men from the North.

The report of the receivers of the Southern Steel Company, given to the creditors at a meeting held the past week, shows that less than 50c. on the dollar is likely to be realized by the creditors.

Chicago

Dec. 16—Conditions of the iron trade look decidedly better. Sales of pig iron are increasing and there is manifest a spirit of returning confidence. Particularly significant, in the opinion of the trade, is the increase in sales for delivery farther ahead than the next 30 days.

Prices remain firm, $15 Birmingham for Southern No. 2 ($19.35 Chicago) and $19@20 for Northern No. 2 representing most sales. There is naturally a wide range of prices under variations of tonnage and time of delivery. The foregoing represent prices on such lots as are being sold—carload lots to 1000 tons to be delivered within the next three months.

Trade in iron and steel products is still quiet but does not appear to be in danger of a slump. Coke remains dull at $5.65 for the best Connellsville.

Philadelphia

Dec. 18—The pig-iron condition has improved to the extent that inquiries are coming in, chiefly for basic. Several sales have been made, some for early delivery, but most of it for two months hence. Both foundry and forge are very dull so far as sales are concerned, but with some inquiries. Prices are nearly nominal, and buyers believe that pig iron has not yet touched bottom. Foundry interests are picking up some new business.

Steel Billets—Inquiries are coming from large consumers, but they are looking for lower prices, and then their requirements are trifling.

Bars—There is not the slightest improvement to be noted. Quotations range from 1.60 to 1.70c. The jobbing trade is taking only sufficient iron to cover actual demand.

Sheets—Considerable sheet capacity is idle, but some of our manufacturers say that large orders are practically assured.

Merchant Steel—Considerable merchant steel has been received from the mills and the agencies are well stocked up. Special inducements have been offered this week in the way of prices on small lots.

Pipes and Tubes—The consumption in this territory continues large. The shops working up tubes are doing a fair amount of business.

Plates—The inquiries for plate are coming from the smaller builders and machine shops, and there is fair activity among this class of buyers. The business is strictly retail in character.

Structural Material—The outlook is a little better than in other lines. Some work is coming from the Pacific Coast, which is helping out. The amount of bridge work placed this month is about two-thirds of the average. There are very few small orders for building purposes.

Scrap—The scrap market does not present a single feature this week that entitles it to be noticed.

Pittsburg

Dec. 17—Despite the unusually dull conditions in the trade, there is still considerable unfilled business on the books of the large companies. The big Homestead steel plant and the Clairton works of the Carnegie Steel Company are operating in full and the Edgar Thomson rail plant is on half time. The company is operating its steel plant at New Castle and yesterday started one of the idle blast furnaces at that place. The National Tube Company is running all of its plants in this district in full and they will be kept going steadily the rest of the year and into the first quarter with a few days' idleness during the holiday week. On Jan. 1 the National company will take over the sales department of the Shelby Steel Tube Company and the Western Tube Company, subsidiary concerns. This is to be done as a matter of economy. It is understood that the United States Steel Cor-

poration is planning for a saving in a number of ways, but will not reduce wages as has been repeatedly reported. Thre may be some readjustments, but no general cut on Jan. 1. There are many optimists in this district and but few steel men take a discouraging view of the future. While there is still some uncertainty regarding the business that is expected to come from the railroads, it is generally believed that the orders for steel rails for 1908 will not fall short of the tonnage filled for this year's requirements. The Republic Iron and Steel Company is still booking small orders for iron and steel bars and is running its Brown-Bonnell works in the Youngstown district almost to capacity. It also is operating its spike mill, as there have been a large number of new orders placed by the railroads for spikes. The outlook for tin-plate continues bright.

Pig Iron—The meeting of foundry pig-iron producers held recently in Cleveland for the purpose of devising plans to prevent a slump in prices, and to insist on a restriction of production, evidently did not have the desired effect. It is understood that several furnaces, after having completed contracts on hand, have continued to operate and that pig iron is accumulating. A report today that full 30,000 tons of foundry pig iron is on the yards at Valley furnaces is not credited, but it is admitted that stocks are larger than desired to carry out plans to maintain a stable market. It is reported that some sales of No. 2 foundry were made as low as $17 a ton at the furnace. One sale of prompt No. 2 iron is noted at $17.50. Furnaces are still holding bessemer iron at $19, Valley furnaces, but it is known that fully $1 less could be done. There is no demand, however, and prices are purely nominal. Gray forge is quoted at $17.25 and basic at $17, Valley furnaces. The United States Steel Corporation is operating 57 of its 95 furnaces, one furnace at New Castle having been blown in yesterday.

Steel—There is absolutety nothing doing in billets. Independent finishing mills refuse to pay $28, the price at which makers are holding both bessemer and open-hearth billets. Plates are still quoted at 1.70c. and merchant steel bars at 1.60c.

Metal Market

Gold and Silver Exports and Imports

NEW YORK, Dec. 18.

At all United States Ports in Nov. and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Nov. 1907..	$ 615,169	$63,463,036	Imp. $62,847,867
" 1906..	1,963,757	8,935,274	" 6,971,517
Year 1907..	54,211,240	98,837,722	" 44,626,482
" 1906..	44,828,263	147,962,143	" 103,133,880
Silver:			
Nov. 1907..	4,187,378	3,350,076	Exp. 837,702
" 1906..	4,561,830	3,351,981	" 1,209,849
Year 1907..	57,212,168	41,437,995	" 15,774,173
" 1906..	53,552,186	40,228,572	" 13,323,614

For the week ending Dec. 14: Exports of gold at New York were $2800; Imports, $9,470,075. Exports of silver were $369,755; Imports, $238,673.

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

	Gold.	Silver.	Total.
Ass'd New York	.....	.....	$177,165,300
England	$170,818,415	.....	170,818,415
France	538,482,580	$185,113,885	723,596,465
Germany	133,440,000	37,000,000	170,440,000
Spain	78,175,000	128,240,000	206,415,000
Netherlands	38,233,000	24,842,500	63,075,500
Belgium	18,060,000	9,030,000	27,090,000
Italy	192,930,000	23,595,000	216,525,000
Russia	613,265,000	25,895,000	639,160,000
Aust.-Hungary	228,600,000	58,200,000	286,800,000
Sweden	20,340,000	.....	20,340,000

The New York banks do not separate gold and silver. The foreign statements are from the *Commercial and Financial Chronicle* of New York.

The movement of gold and silver in France for the 10 months ended Oct. 31 was as follows:

Gold:	1906.	1907.
Imports	Fr. 400,050,000	Fr. 436,359,000
Exports	113,085,000	94,004,000
Excess, imports.	Fr. 286,965,000	Fr. 342,355,000
Silver:		
Imports	134,278,000	151,781,000
Exports	125,606,000	161,609,000
Excess	I. Fr. 8,672,000	E. Fr. 9,828,000

Imports of copper and nickel coins were 105,000 fr. in 1906, and 86,000 fr. in 1907. Exports were 164,000 fr. in 1906, and 643,000 fr. this year.

Silver Market

SILVER AND STERLING EXCHANGE.

Dec.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Dec.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
12	4.8525	55⅛	25¾	16	4.8575	54⅛	25⅛
13	4.8520	54⅞	25½	17	4.8600	53½	24¾
14	4.8550	53¾	25	18	4.8590	52⅛	24 5/16

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

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

	1906.	1907.	Changes.
India	£ 14,412,796	£ 10,289,254	D. £ 4,123,542
China	430,700	331,750	D. 98,950
Straits	1,750	691,150	I. 689,400
Total	£ 14,845,246	£ 11,312,154	D. £ 3,533,092

Receipts for the week were £2000 from Chile, £23,000 from the West Indies and £294,000 from New York; £319,000 in all. Exports were £100,350, all to India.

Indian exchange has been weak and only a small amount of Council bills was taken in London, at 15.91d. per rupee. Buying of silver for India has been light.

The director of the Mint last week bought 300,000 oz. silver at 55.5c., to be delivered in equal lots at Denver, New Orleans and Philadelphia. This week 200,000 oz. more were bought at 54.725c., delivered at New Orleans and Denver.

Other Metals

Dec.	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.
12	13 @13¼	12⅞ @13⅛	58¾	28¼	3.65 @3.75	4.25 @4.30	4.10 @4.15
13	13 @13¼	12⅞ @13⅛	59¼	28	3.50 @3.60	4.20 @4.25	4.05 @4.10
14	12⅞ @13⅛	12¾ @13	.....	27¾	3.50 @3.60	4.15 @4 20	4.00 @4.05
16	12⅞ @13⅛	12¾ @13	59½	26½	3.40 @3.50	4.15 @4.17½	4.00 @4.02½
17	12⅞ @13⅜	12¾ @12⅞	58½	25⅝	3.35 @3.45	4.15 @4.17½	4.00 @4.02½
18	12⅞ @13⅛	12¾ @12⅞	58	26	3.35 @3 45	4.15 @4.17½	4.00 @4.02½

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electroytic copper are for cakes, ingots or wirebars, and represent the bulk of the transactions made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary western brands; special brands command a premium.

Copper—The transactions of the past week have been small. Since Monday there have been several small sales to domestic consumers, who evidently have been tempted by the recession in price. It is an encouraging feature that any should show interest in the market, their prolonged absence having been a depressing factor. There have been numerous overtures for transactions for delivery in February and later, but producers are disinclined to undertake business so far ahead, preferring to keep their copper and take their chances later on, rather than to sell now, hold the copper and wait for the money. This may be construed, perhaps, as a hopeful feeling as to an improvement in business after the end of the year. At the close Lake is quoted 12⅞@13⅛; electrolytic in ingots, cakes and wirebars, 12¾@12⅞. The average for casting copper is 12½@12¾c.

The market for standard warrants in London has been irregular. On Thursday and Friday of last week it was somewhat firmer, advancing to £60 10s., but on Tuesday of this week it reacted to £57 10s., and closes today at £58 for spot, £59 10s. for three months.

Statistics for the first half of the current month show an increase in the visible supplies of 2000 tons.

Refined and manufactured sorts we quote: English tough, £56; best selected, £64; strong sheets, £67.

Copper Sheets and Wire—The base price of sheets is 20c.; wire, 16¼@16½c. per pound.

Tin—The market has suffered a further decline, due to the fact that an East Indian speculative pool is being dissolved. Quotations in London moved between £127 15s. for spot, £129 for three months, and £115 10s. for spot, £117 5s. for three months, and the close is somewhat firmer at £117 for spot, £119 5s. for three months.

Domestic consumers are naturally led to expect a further decline, and for this reason are holding off. The business which is done comprises small lots, and for immediate delivery only. As the spot stocks are still well concentrated, premiums are obtained for such. The market at the close is quoted about 26c. per lb.

Lead—Demand continues very poor, and in consequence of pressure to sell the accumulated stocks, prices have declined, and at the close we quote 3.35@3.45c., New York.

The London market had a sharp decline early in the week to £13, from which it has reacted somewhat, closing today at £13 17s. 6d. for Spanish lead, £14 for English lead.

The St. Joseph Lead Company and the Doe Run Lead Company, on Dec. 13, sent orders to the mines and smelting works to reduce the output by 50 per cent.

Spelter—Conditions remain unchanged. Consumption has decreased considerably, and manufacturers remain out of the market. Stocks have accumulated in the hands of smelters and prices have declined. At the close we quote 4@4.02½c. St. Louis, 4.15@4.17½c. New York.

The foreign market for spelter, which closed last week at £20 10s. has been weak and closes at £20 2s. 6d. for good ordinaries, £20 7s. 6d. for specials.

The smelter of the New Jersey Zinc Company, at South Bethlehem, Penn., has been closed down.

The Bartlesville Zinc Company, at Bartlesville, Okla., fired up its first two blocks during the first week in December.

The works of the Mineral Point Zinc Company, at Mineral Point, Wis., and those of the Ozark Smelting and Mining Company, at Coffeyville, Kan., manufacturers of zinc oxide, have been closed down.

The American Zinc, Lead and Smelting Company has closed down its mines in the Joplin district, and has reduced the output of its smelteries at Caney and Deering, Kan., to one-third.

It is reported that the works of the Mineral Point Zinc Company, at Depue, Ill., and of the Prime Western Spelter Company, at East Iola, Kan., have been closed down.

Antimony—The market continues dull and listless with no buyers and little or no pressure to sell. Quotations are, 9½@10c. for Cookson's; 8¾@9c. for Hallett's; 8@8¼c. for ordinary brands.

Platinum—There are no changes in the market and business continues dull. Quotations are as follows: Hard metal, $28.50; ordinary, $26; scrap, $17@18 per troy ounce.

Nickel—For large lots, New York, the chief producer quotes 45@50c. per lb. according to size and terms of order. For small quantities, 50@65c., same delivery.

Quicksilver—New York quotations are $45 per flask for lots of 100 flasks or over, and $46 for smaller orders. San Francisco quotations are $44.50@45.50 for domestic orders; for export nominal, at about $1.50 lower. The London price is £8 5s. per flask, with £8 3s. 9d. quoted from second hands.

Missouri Ore Market

Joplin, Mo., Dec. 14—The highest price paid for zinc was $36 per ton, the base price ranging from $34 down to $28 per ton of 60 per cent. zinc, and averaging, all grades, $31.04. The highest offering for lead ore at the end of the week was $36 per ton, ranging down to $34 for the best grades, and averaging, all grades, $36.88 per ton.

Zinc ore was in stronger demand during the week, and there was a larger quantity sold on a $36 base and less on a $28 base than the previous week, advancing the average $1.08 per ton. At the end of last week 19 additional mills were closed down, reducing the production 650 tons per week. Buyers purchasing ore from the mills closed down found their supply greatly reduced and it became necessary for them to advance prices on other bins to get their quota for shipment.

Following are the shipments of zinc and lead from the various camps of the district for the week ending Dec. 14:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville.	2,410,750	687,250	$ 51,286
Joplin	1,984,420	100,850	33,616
Duenweg	765,150	118,550	14,435
Galena	588,480	50,420	10,054
Alba-Neck City	512,430	.....	8,711
Oronogo	398,960	62,310	8,041
Aurora	457,060	.....	7,084
Prosperity	390,880	28,180	6,775
Granby	550,000	30,000	5,000
Carthage	142,140	10,620	2,602
Spurgeon	148,020	.....	1,916
Cave Springs	111,710	.....	1,787
Zincite	101,000	.....	1,616
Badger	83,530	.....	1,420
Carl Junction	57,880	.....	984
Sarcoxie	51,330	.....	821
Wentworth	42 040	.....	672
Peoria	26,290	9,810	430
Totals	8,822,070	1,097,990	$157,250
50 weeks	559,768,270	82,386,620	$15,179,864

Zinc value, the week, $137,002; 50 weeks, $12,313,547
Lead value, the week, 20,248; 50 weeks, $2,866,317

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

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January	47.38	45.84	January	75.20	83.53
February	47.37	47.11	February	72.83	84.58
March	42.68	48.66	March	73.73	82.75
April	44.63	48.24	April	75.13	79.76
May	40.51	45.98	May	78.40	79.56
June	43.83	44.82	June	80.96	73.66
July	43.25	45.79	July	74.31	58.18
August	43.56	43.22	August	75.36	59.54
September.	42.58	40.11	September.	79.64	53.52
October	41.55	39.83	October	79.84	51.40
November	44.13	35.19	November	81.98	43.40
December	43.68	.....	December	81.89	.....
Year	43.24	.....	Year	77.40	.....

Wisconsin Ore Market

Platteville, Wis., Dec. 14—Buyers continued to pay $33 for 60 per cent. zinc ore during the past week, in spite of the further decline in the spelter market. Matthieson & Hegeler, the Illinois Zinc and the Grasselli Chemical companies are now the only buyers left in the field. The Mineral Point Zinc Company, hitherto the largest bidder for low-grade blende and the exclusive buyer of carbonate ores, has closed down its oxide plant at Mineral Point, and is entirely out of the market for the present. Its acid works are as yet in operation, but the big ore surplus on hand is sufficient to supply the crude material for months ahead.

Lead ore, 80 per cent., sold during the week at $19 per thousand.

Shipments for the week ended Dec. 14 were as follows:

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville	412,970	.....	.....
Hazel Green	160,000	.....	.....
Livingston	140,000	.....	.....
Highland	118,000	.....	.....
Benton	83,000	.....	.....
Cuba City	82,000	.....	.....
Mineral Point	70,000	.....	.....
Linden	30,750	.....	.....
Total	1,096,720	.....	.....
Year to Dec. 14	96,144,307	4,888,730	462,360

Galena, Harker and Rewey made no shipments during the week.

Chemicals

New York, Dec. 18—The local situation remains unchanged and the market continues dull. The only feature of note is the weakness of white arsenic, which is now at the low price for the year, quotations being 5¾c. per lb.

New York, Dec. 18—Copper sulphate quotations are unchanged at $5.50 for carloads and $5.75 for smaller lots.

Phosphates—Shipments of phosphate rock through the port of Savannah in November are reported by J. M. Lang & Co. as follows: Germany, 9056 tons; Holland, 4609; Austria, 1040; total, 14,705 long tons.

Mining Stocks

New York, Dec. 18—Notwithstanding further gold imports and a somewhat easier feeling in the money market, stocks have failed to advance; in fact, they show a slight recession and a weaker tone.

Mining stocks have been dull and weak. The curb market shows generally lower prices on rather light dealings. The heaviest trading of the week was in Nevada Consolidated, which closed at $7½ per share.

Boston

Dec. 17—Continued weakness has put the copper-share market in the dumps. Utah Consolidated cut its dividend in half by declaring 50c. for the quarter. The

stock made its low at $27, off $4, from which it recovered to $28.50. Mohawk has broken $6.50 to $42., on an expected reduction in the dividend to $1 against the last payment of $5.

Amalgamated made its low at $42.37½ today, being off $4.25 from a week ago. Copper Range is off $1.25 to $52.25 and North Butte $1.25 to $36.75. Calumet & Hecla touched $599, off $11 and Calumet & United States Smelting lost $2.75, to $32.75. It is understood that Boston Consolidated stockholders took but 10 per cent. of the bond issue, convertible into stock at £3, although it was underwritten in this country and London.

The curb has been active and at generally better prices.

STOCK QUOTATIONS

NEW YORK Dec. 17	
Name of Comp.	Clg
Alaska Mine	....
Am.Nev.M.&P.Co.	....
Amalgamated	43¾
Anaconda	27
Balaklala	2½
British Col. Cop.	4
Buffalo Cobalt	....
Butte & London	....
Butte Coalition	13½
Butte Cop. & Zinc	....
Cobalt Contact	....
Colonial Silver	1
Cum. Ely Mining	5¼
Davis Daly	4
Dominion Cop.	1¾
El Rayo	1⅝
Foster Cobalt	.63
Furnace Creek	.19
Giroux Mine	2⅞
Gold Hill	¾
Granby, New	....
Greene Gold	¾
Greene G. & S	½
Greenw'r & D.Val.	.75
Guanajuato	2¼
Guggen. Exp.	135
Hanapah	.35
McKinley Dar.	1⅛
Micmac	3
Mines Co. of Am.	1½
Mitchell Mining	1/16
Mont.Sho. C.(New)	3¾
Nev. Utah M. & S.	2½
Newhouse M. & S.	5½
Nipissing Mines	6
Old Hundred	1
Silver Queen	⅝
Stewart	9/16
Tennessee Cop'r.	....
Union Copper	⅞
Utah Apex	2⅝
West Columbus	.11

N. Y. INDUSTRIAL	
Am. Agri. Chem	....
Am. Smelt. & Ref.	68½
Am. Sm. & Ref., pf.	....
Bethlehem Steel	....
Colo. Fuel & Iron	18¼
Federal M.& S., pf.	60¾
Inter. Salt	10
National Lead	37¼
National Lead, pf.	....
Pittsburg Coal	....
Republic I. & S	15¾
Republic I.& S.,pf.	68
Sloss-Sheffield	....
Standard Oil	450
Tenn. C. & I	....
U. S. Red. & Ref.	6
U. S. Steel	25⅜
U. S. Steel, pf	86¼
Va. Car. Chem	....
Va. I. Coal & Coke	....

ST. LOUIS Dec. 14		
N. of Com.	High.	Low.
Adams	.30	.20
Am. Nettie	.03	.02
Center Cr'k	2.00	1.50
Cent. C. & C.	63.00	60.00
C.C. & C. pd.	75.00	70.00
Cent. Oil	100.00	90.00
Columbia	3.00	2.00
Con. Coal	25.00	23.00
Doe Run	120.00	110.00
Gra. Bimet.	.25	.20
St. Joe	13.00	12.00

BOSTON Dec. 17	
Name of Comp.	Clg.
Adventure	2½
Allouez	24¾
Am. Zinc	....
Arcadian	3¾
Atlantic	9
Bingham	4⅛
Boston Con.	10⅛
Calumet & Ariz.	94
Calumet & Hecla	....
Centennial	24
Con. Mercur	.28
Copper Range	52½
Daly-West	8⅞
Franklin	7¼
Greene—Can	6
Isle Royal	16½
La Salle	9⅞
Mass	2½
Michigan	....
Mohawk	42½
Mont.C.&C.(new)	1¼
Nevada	7⅜
North Butte	37¼
Old Colony	....
Old Dominion	26½
Osceola	80
Parrot	9½
Phoenix	.50
Quincy	75⅛
Rhode Island	....
Santa Fe	....
Shannon	9¾
Tamarack	62
Trinity	13¼
United Cop., com.	7½
U. S. Oil	....
U. S. Smg. & Ref.	33
U.S.Sm.& Re.,pd.	35
Utah Copper	28¼
Victoria	4½
Washington	....
Winona	4
Wolverine	110
Wyandotte	....

*Ex. Div. †Ex. Rights.

BOSTON CURB	
Ahmeek	....
Ariz. Com	....
Black Mt.	4⅛
East Butte	....
Hancock Con.	....
Keweenaw	....
Majestic	1 1/16
Raven	.87
Shawmut	.42
Superior	....
Superior & Pitts.	8½
Troy Man	....

LONDON Dec. 18	
Name of Com.	Clg.
Dolores	£1 0s, 0d
Stratton's Ind.	0 3 3
Camp Bird	0 13 6
Esperanza	1 10 0
Tomboy	1 10 0
El Oro	1 1 3
Oroville	0 14 0
Somera	. . .
Utah Apex	0 10 11
Ariz.Cop.,pfd.	. . .
Ariz.Cop.,def.	. . .

Cabled through Wm. P. Bonbright & Co., N.Y.

NEVADA STOCKS. Dec. 18.
Furnished by Weir Bros. & Co., New York.

Name of Comp.	Clg.	Name of Comp.	Clg.
TONOPAH STOCKS		Golden Sceptre	...
Belmont	.90	Homestake King	.65
Extension	1.37½	Montgomery Mt.	.05
Golden Anchor	.03	Mont. Shoshone C.	4.00
Jim Butler	.40	Original Bullfrog	.03
MacNamara	.18	Tramp Cons	.18½
Midway	.54	MANHAT'N STOCKS	
Montana	1.72	Manhattan Cons.	.23
North Star	.10	Manhat'n Dexter	.09
Tonopah & Cal.	...	Jumping Jack	.06
Tono'h Mine of N.	5.75	Stray Dog	.09
West End Con	.34	Indian Camp	.06
GOLDFI'D STOCKS		GREENW'R STOCKS	
Adams	.05	Furnace Creek	...
Atlanta	.25	Greenwater & D.V.	...
Blue Bell	.07	Green'r Cop. M.& S.	...
Blue Bull	.17	United Greenwa'r	...
Booth	.15	MISCELLANEOUS	
Columbia Mt	.15	Golden Boulder	.10
Comb. Frac	.75	Hayseed	.30
Cracker Jack	.07	Lee Gold Grotto	.10
Dia'dfield B. B. C.	.17	Nevada Hills	3.12½
Goldfield Belmont	.12	Nevada Smelting	1.12½
Goldfield Con	4.37½	Pittsburgh S. Pk.	1.15
Goldfield Daisy	.95	Round Mt. Sphinx	.29
Goldfield Mining	...		
Great Bend	.26		
Jumbo Extension	.55		
Jumbo Mining	...		
Katherine	.06		
Kendall	.10		
Laguna	...		
Lone Star	.09		
Lou Dillon	.02		
May Queen	.05		
Mohawk	...		
Oro	.09		
Red Hill	.30		
Red Top	...		
Roanoke	.09		
Sandstorm	.20		
Silver Pick	.25		
St. Ives	.40		
Triangle	.08		
BULLFROG STOCKS			
Amethyst	...		
Bullfrog Daisy	...		
Bullfrog Mining	.04		
Bullfrog Nat. B.	.09		
Gibraltar	.11		
Gold Bar	.38		

COLO. SPRINGS Dec. 14	
Name of Comp.	Clg.
Acacia	6¼
Black Bell	....
C. C. Con	3¼
Dante	5
Doctor Jack Pot	....
Elkton	47
El Paso	29¾
Findlay	39
Gold Dollar	5½
Gold Sovereign	4¼
Isabella	24½
Index	....
Jennie Sample	....
Jerry Johnson	6
Mary McKinney	....
Pharmacist	2⅝
Portland	1.00
Un. Gold Mines	4¾
Vindicator	76½
Work	16¾

New Dividends

Company.	Payable.	Rate.	Amt.
Am. Cement	Jan. 23	$0.30	$60,000
Am. Sm'g & Ref. Co., com.	Jan. 15	2.00	1,000,000
Am. Sm'g & Ref. Co., pfd.	Jan. 2	1.75	875,000
Buffalo Mines, Ltd	Jan. 1	0.03	27,000
Calumet & Arizona	Dec. 23	1.50	300,000
Calumet & Hecla	Dec. 24	10.00	1,000,000
Cent. C. & C., com	Jan. 15	1.50	76,875
Cent. C. & C., pfd	Jan. 15	1.25	23,438
Copper Range Con	Jan. 1	1.00	383,781
Daly-West	Dec. 15	0.30	54,000
Dominion Coal	Jan. 1	1.00	150,000
Empire Steel, pfd	Jan. 1	3.00	75,000
Gen. Chemical, pfd	Jan. 2	1.50	150,000
Guggenheim Expl.	Jan. 2	2.50	262,500
Kerr Lake	Jan. 31	0.15	90,000
Maryland Coal	Jan. 15	4.00	75,400
McKinley Darragh	Jan. 15	0.04	80,000
Monon Con. C. & C., pfd.	Jan. 25	3.50	350,000
Montezuma M. & S.	Jan. 10	0.04	40,000
N. Y. & Hond. Rosario	Dec. 21	0.10	15,000
North Star	Dec. 21	0.40	100,000
Republic Iron & Steel, pfd.	Dec. 21	1.75	357,296
Sloss. Sheff., pfd	Jan. 2	1.75	117,250
Texas & Pacific Coal	Dec. 31	1.50	30,000
Va. Car. Chem., pfd	Jan. 15	2.00	360,000

Assessments

Company.	Delinq.	Sale.	Amt.
Crown Point, Nev.	Nov. 26	Dec. 19	$0.10
Del Monte, Cal.	Nov. 20	Dec. 11	10.00
Emerald, Utah	Dec. 14	Jan. 11	0.01
Etna-King, Cal.	Dec. 14	Jan. 6	0.03
Hale & Norcross, N.	Dec. 6	Dec. 23	0.10
New Stockton, Utah	Dec. 23	Jan. 20	0.02½
Pacific Tin M. Al'ka	Nov. 30	Dec. 20	0.02
Pittsburg C., Utah.	Dec. 2	Dec. 23	0.01
Posey Canyon, Utah	Dec. 6	Dec. 23	0.01
Progressive, Utah	Dec. 16	Jan. 6	0.01
Provident Oil Mg., Ca.	Dec. 7	Dec. 27	0.01½
Rescue, Nev	Dec. 10	Jan. 3	0.02
Savage, Nev.	Jan. 8	Jan. 30	0.10
Scottish Chief, Utah	Dec. 9	Dec. 28	0.01
Sierra Nevada, Nev.	Dec. 30	Jan. 20	0.10
Silver Queen, Utah.	Dec. 7	Dec. 24	0.01½
Surprise, Ida	Dec. 11	Jan. 6	0.01½
Ultimo, Cal.	Dec. 2	Dec. 23	0.05
Wabash, Utah	Nov. 30	Dec. 23	0.03
West End, Utah.	Nov. 3	Dec. 31	0.01½
Yellow Jacket, Nev.	Dec. 18	Jan. 23	0.25

Monthly Average Prices of Metals

AVERAGE PRICE OF SILVER

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	65.288	68.673	30.113	31.769
February	66.108	68.835	30.464	31.852
March	64.597	67.519	29.854	31.325
April	64.765	65.462	29.984	30.253
May	66.976	65.981	30.968	30.471
June	65.394	67.090	30.185	30.893
July	65.105	68.144	30.113	31.366
August	65.949	68.745	30.529	31.637
September	67.927	67.792	31.483	31.313
October	69.523	62.435	32.148	28.863
November	70.813	58.677	32.671	27.154
December	69.050	.....	32.003	.....
Year	66.791	.....	30.868	.....

New York, cents per fine ounce; London, pence per standard ounce.

AVERAGE PRICES OF COPPER

	New York.				London.	
	Electrolytic		Lake.			
	1906.	1907.	1906.	1907.	1906.	1907.
January	18.310	24.404	18.419	24.825	78.869	106.739
February	17.869	24.869	18.116	25.236	78.147	107.356
March	18.361	25.065	18.641	25.560	81.111	106.594
April	18.375	24.224	18.688	25.260	84.793	98.625
May	18.475	24.048	18.724	25.072	84.867	102.375
June	18.442	22.665	18.719	24.140	83.994	97.272
July	18.190	21.130	18.585	21.923	81.167	95.016
August	18.380	18.356	18.706	19.255	83.864	79.679
September	19.033	15.565	19.328	16.047	87.831	68.375
October	21.203	13.169	21.722	13.551	97.269	60.717
November	21.833	13.391	22.398	13.870	100.270	61.226
December	22.885	.....	23.350	.....	105.226	.....
Year	19.278	.....	19.616	.....	87.282	.....

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

AVERAGE PRICE OF TIN AT NEW YORK

Month.	1906.	1907.	Month.	1906.	1907.
January	36.390	41.548	July	37.275	41.091
February	36.403	42.102	August	40.606	37.667
March	36.662	41.313	September	40.516	36.689
April	38.900	40.938	October	42.852	32.620
May	43.313	43.149	November	42.906	30.833
June	39.260	42.120	December	42.750	.....
			Av. year	39.819	.....

Prices are in cents per pound.

AVERAGE PRICE OF LEAD

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	5.600	6.000	16.850	19.828
February	5.464	6.000	16.031	19.531
March	5.350	6.000	15.922	19.703
April	5.404	6.000	15.959	19.975
May	5.685	6.000	16.725	19.688
June	5.750	5.760	16.813	20.188
July	5.750	5.288	16.525	20.350
August	5.750	5.250	17.109	19.063
September	5.750	4.813	18.266	19.775
October	5.750	4.750	19.350	18.531
November	5.750	4.376	19.281	17.281
December	5.900	.....	19.609	.....
Year	5.657	.....	17.370	.....

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

AVERAGE PRICE OF SPELTER

MONTH.	New York.		St. Louis.		London.	
	1906.	1907.	1906.	1907.	1906.	1907.
January	6.487	6.732	6.337	6.582	28.225	27.125
February	6.075	6.814	5.924	6.664	25.844	25.938
March	6.209	6.837	6.056	6.687	24.563	26.094
April	6.087	6.685	5.931	6.535	25.781	25.900
May	5.997	6.441	5.846	6.291	27.000	25.563
June	6.096	6.419	5.948	6.269	27.728	25.469
July	6.006	6.072	5.856	5.922	26.800	23.850
August	6.027	5.701	5.878	5.551	26.938	21.969
September	6.216	5.236	6.056	5.086	27.563	21.050
October	6.222	5.430	6.070	5.280	28.075	21.781
November	6.375	4.925	6.225	4.775	27.781	21.438
December	6.593	.....	6.443	.....	27.938	.....
Year	6.198	.....	6.048	.....	27.020	.....

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