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The Refractory Uses of Bauxite.

BY A. J. AUBREY.*

Bauxite is a hydrated oxide of aluminum, corresponding to the formula $Al_2O_3 \cdot (H_2O)_2$, although the proportion of water varies greatly, and the aluminum is sometimes partly replaced by iron; silica and titanium oxide occur as impurities; silica varies widely in different deposits.

There are three localities in the United States where bauxite has been found in commercial deposits; namely, in Arkansas, New Mexico and the Georgia-Alabama district. The last named district has been nearly worked out, and at present the chief sources of the ore are the Arkansas deposits.

The crude bauxite is washed at the mines to remove some of the free silica. It is next calcined at a temperature of $2,500^\circ$ F. (approximately Seger cone No. 12); during this process it gives off its "chemical water," amounting to about 30% of the raw ore, and also undergoes great shrinkage. It has been observed that the bauxite shrinks but little until after Seger cone No. 9 (approximately $2,390^\circ$ F.) is reached; from Seger cones No. 9 to No. 12, the greatest amount of the shrinkage takes place. Accordingly the lowest temperature limit at which bauxite should be calcined is $2,500^\circ$ Fahrenheit.

I made an analysis of washed and calcined bauxite from Arkansas, with the following results: Mechanical water, 0.88%; silica, 6.40%; oxide of iron, 1.43%; alumina, 87.30%; titanium oxide, 3.99%.

The calcined material can be bonded with fire clay, sodium silicate, or lime, and made into brick and tile. As little as 4% plastic fire clay can be used for a bond for hand-made brick. When bonded with lime, the bricks become quite hard a few hours after

making—so hard that they will not take the impression of the finger nail. This setting or hardening is probably due to the formation of a calcium silicate between the lime and the free silica, in analogy with the setting of silica brick when bonded with lime. After careful drying, the bricks are burned in down-draft kilns at a high temperature; when they are hard and tough, and can be subjected to rough treatment without breaking. A brick 9 in. by $2\frac{1}{2}$ in. by $4\frac{1}{2}$ in. weighs $7\frac{1}{2}$ lb., and stands a crushing test of 10,000 lb. per sq. inch.

The problem of calcining the washed granular bauxite presents itself. It can not be successfully calcined in a vertical-shaft kiln, because it will pack and clog on account of its fineness, and so obstruct the passage of the kiln gases. On the other hand, it is not feasible to calcine it in the ordinary down-draft kiln on account of the perforated floor. I believe that to calcine it on a commercial scale would require a rotary kiln, using oil, gas, or powdered coal for fuel, preferably the first. Provided the cost of fuel is low at the mines, such kilns should be installed there in order to save the cost of transportation which is now paid on the 30% of water that the crude bauxite contains.

For basic open-hearth steel furnaces, a brick high in alumina and low in silica is required. A brick of this character is obtained in the following way: A pure white variety of the pisolitic bauxite (which has already been washed at the mines and has had a portion of its free silica removed) is selected and sieved. The fine material passing through the sieve is rejected, as it contains the greater part of the silica. The "pisolites," pebbles about the size of peas, are retained as they are higher in alumina and lower in silica than the rest of the bauxite. By using, as a bond, lime free from silica, a brick can be procured which will contain as low as 6% or 8% silica.

A high silica-content has always been the chief objectionable feature of bauxite brick for basic open-hearth steel furnaces, because the silica is attacked by the basic slag. Authorities on open-hearth practice have generally declared that bauxite brick would be suitable for basic open-hearth furnaces, provided a brick could be made with less than 12% silica. Recent tests bear out this statement.

A test was made several months ago in one of the basic open-hearth furnaces of the Bethlehem Steel works in which a bauxite brick and a magnesite brick were placed side by side near the gas- and air-ports, and were submitted to the highest temperature attainable in the furnace. The magnesite brick bent and showed viscosity

after seven minutes, against fifteen minutes for the bauxite brick. Again, a magnesite brick and a bauxite brick were submerged in the slag near the doors for some time, after which they were withdrawn, and examined when cold. The magnesite brick was incorporated with slag, while the bauxite brick, when broken open, showed that the slag had not penetrated to its center, but had remained as a coating over the outside. Both bricks were quite badly affected, but the bauxite withstood the action of the corrosive slag as well as the magnesite. In more recent tests, bricks having a lower content of silica have shown up as well as the magnesite, when exposed to the action of the basic slag.

The comparison is hard to make in any case, because of the fact that either a bauxite or a magnesite brick, if left in the hearth of the furnace for any length of time and submerged in the slag, is so violently attacked that differences between the remnants taken out are not easily detected. Even a magnesite brick if thrown into a basic open-hearth furnace will be entirely eaten away after a considerable length of time, so that the only real test of bauxite will be to build a hearth (or portion of hearth) of that kind of brick, and test it, covering it with calcined bauxite and treating it in every way as the magnesite hearths are treated. Steps are now being taken to make tests of this character.

Sir Wm. Siemens found that bauxite is a superior furnace lining, and though he used an inferior bauxite containing so much as 35% oxide of iron, he claimed that it lasts five or six times as long as the "Stourbridge first brick." Siemens also says of bauxite: "It is important to observe that bauxite, when exposed to intense heat, is converted into a solid mass of emery of such extreme hardness that it can hardly be touched by steel tools and is capable of resisting mechanical, as well as the calorific and chemical, action to which it is exposed."

Bischof, in his *Die Feuerfesten Thone*, says that bauxite, when not impure on account of the admixture of foreign substances, especially of iron, which generally occurs in considerable quantities in compounds of aluminum, is extremely refractory." He also goes on to say: "The addition of varieties free from iron, or the white ones, to other refractory clays offers the only important means known of increasing their percentage of alumina, and at the same time their refractoriness." Thus it appears that bauxite has been regarded as a refractory material for a long time, but that no definite use has been made of it; also that the inferior grades

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have been more generally tested than the purer ones.

In addition to its use for open-hearth bauxite brick has shown up quite successfully in other lines. Two recent applications concern such uses; first, as a lining for rotary Portland cement kilns, and second, as a lining for lead-refining furnaces.

As a lining for a rotary portland-cement kiln it has shown unusual durability and has given excellent service. In an experiment, the hot zone (about 10 or 12 ft.) of a 60-ft. rotary kiln, fired with coal dust, was lined with a 6-in. bauxite lining; the kiln had previously been lined with 9-in. fire-brick blocks.

A block for lining rotary portland-cement kilns in the hot zone must possess the following qualities: It must be neither too hard nor too soft. If too hard, it will not allow the cement coating to stick to its surface; if too soft, it will not hold the coating, but the latter will pull off, bringing portions of the brick with it. The cement coating affords an excellent protection for the lining, and if the bricks do not hold this coating they soon burn out. The bauxite block made for this purpose has all of the aforesaid qualities. After 10 months' continuous service night and day, this 6-in. lining is still doing the work.

When one of these rotary kilns is shut down the loss of output in cement per 24 hours is equivalent to \$250. As the minimum time required for lining or patching a kiln in the hot zone is from 36 to 48 hours, the loss of output will be between \$375 and \$500. It is apparent that a superior lining will be the cheaper, in the long run. Again it must be remembered that only the hot zone need be lined with a bauxite block.

The second, and most recent, application of bauxite brick is that of lining portions of lead-refining furnaces. Pig lead (containing copper, antimony, occasionally arsenic, and other metals in small quantities) is charged into the hearth of the refining furnace, and melted by the reverberation of hot gases. The hearth of the furnace (10 by 13 ft.) is lined on the bottom by 9-in. square brick, set on end. The sides of the furnace are lined with a single course of 9-in. brick, laid with ends against the walls.

The temperature of the furnace is from 1,300° to 1,400° F. Besides the part they play in melting, the fluxes bear no relation to the destruction of the brick, as they are sufficiently refractory to withstand much higher temperatures. It is purely a case of chemical action on the brick.

During the process of refining, a scum rises to the surface of the molten lead; this scum contains most of the impurities which the refining is designed to remove. It consists largely of litharge, PbO; copper oxides, CuO and Cu₂O; antimony oxide, Sb₂ O₃; with possibly other oxides in small

amounts. Wherever the bricks are exposed to this scum, particularly around the doors (where there is a larger supply of oxygen and, accordingly, where litharge is more easily formed) and along the level of this scum, they are badly eaten away; they have to be taken out after several weeks' service, and generally have to be patched after a week. Consequently the furnace loses much time for repairs, which lowers its output considerably.

The cutting away of the brick is explained as follows: Mixed silicates are formed between the oxides of the metals in the scum, and the silicates of alumina and free silica in the brick; these silicates are easily fusible, because lead oxide, PbO, which is readily fusible, comprises the greater part of the basic element of the silicate. But there are also several other oxides in the base of the silicate, and mixed silicates are more fusible than single silicates. Hence, as fusible silicates formed between the scum and the fire-brick, the brick was rapidly decomposed and eaten away. A porous brick wore out faster than a dense brick; also the scum penetrated along the joints for several inches beyond the exposed face of the brick. This is probably due to the fact that the raw fire-clay (which was used in making the joints) is much more soluble in the scum than is the burnt clay. Accordingly, care should be taken in laying up the bricks to see that the joints are as tight as possible.

Inasmuch as the scum was composed of highly basic oxides, it was considered reasonable to substitute a basic lining for the fire-brick lining; accordingly, a lining of bauxite was put in wherever the bricks were exposed to the slag. The result was that the bauxite brick lasted from five to six times as long as the fire-brick lining.

With these uses, and its possible advent into open-hearth practice and elsewhere, bauxite brick will prove a valuable refractory material.

Magnetic Separation in Wisconsin.

There are at present 13 magnetic separation plants in operation in the Wisconsin zinc field, all of which are doing good work. With one exception all of these plants are using the Cleveland-Knowles separator. The Blake electrostatic separator was tried in the Wisconsin field, and performed satisfactory work, but the undertaking was abandoned because of failure of ore supply in the mine in connection with which the plant was erected. This plant has now been shut down and dismantled. The success of the magnetic separating plants in this field is doing very much to increase the production of zinc ore, which is now becoming an important factor in the market.

Metallic palladium may readily be deposited by the use of a solution of cyanide of palladium.

Marketing Bullion in London.*

BY ARTHUR C. CLAUDET.

Gold Bullion.—All gold is melted, and bars weighing over 1,000 oz. troy, are melted into two bars. The melting charges are 0.25d. per oz. on all ordinary gold bullion, and 0.5d. on gold dust and amalgam. The refining charges are 3d. per oz. weight after melting.

Deduction on Cyanide Gold.—If gold report is below 700 per 1,000 parts, and the gold and silver together do not equal 900, the deduction is four millièmes on gold. If gold report is 700 to 800 and the gold and silver together do not equal 900, the deduction is three millièmes. If gold report is above 800 there is no deduction.

The full gold and silver contents are paid for, less the above deductions, and one-sixteenth commission on the net output is allowed the seller. Silver is paid for at the price of fine silver.

Silver Bullion since Jan. 1, 1906, has been dealt with in millièmes (parts per 1,000), instead of, as hitherto, on the trade report. Bars are weighed to the quarter-ounce, instead of, as heretofore, to the half-ounce.

Parting silver is refined on the following terms: All gold and silver contents will be accounted for without deduction.

The refining charge on gross weight is (1) 0.375d. per oz. on silver containing no gold and up to 100 millièmes; (2) 1d. per oz. on 100 and up to 225 millièmes gold; (3) 1.5d. per oz. on 226 and up to 350 millièmes gold; and (4) 2d. per oz. on 351 and up to 500 millièmes gold.

No gold reported under 0.3 millième is paid for. No bullion under headings 3 and 4 is purchased except on "dip" assays. All bullion containing 500 millièmes of gold is treated according to the conditions under gold bullion.

Formerly the silver was reported as better or worse in half-pennyweights per pound than standard silver (925 per 1,000), and the gold in grains per pound of gross weight of the bar. The abolition of this system now brings English reports into line with foreign ones and the system is practically a decimal one, the same as is the case with gold bullion.

A model town, which will be built by the Illinois Steel Co., in connection with its new plant to be constructed near Buffington, Ind., will be named Corey, in honor of the president of the United States Steel Corporation. The town will contain model workmen's dwellings, public baths, laundries, kitchens, and other municipal enterprises, and will have a theater and a large assembly hall. The new plant will be ultimately one of the largest, if not the largest, steel works in the world.

* Abstract of communication in *Bulletin*, No. 16, Institution of Mining and Metallurgy, Jan. 11, 1906.

Tailing Disposal by Gold Dredges.

BY J. P. HUTCHINS.*

In a recent issue of the JOURNAL (Dec. 30, 1905, p. 1219), mention is made of the opposition to gold dredging in California, and a solution of the difficulty is suggested by restoring worked-out land to its original condition, that is, by leaving it

hydraulic mines, now idle, but capable of operation without damaging other interests, would be producing. It nearly always happens that legislation to correct evils goes too far, and in becoming extreme affects interests which inflict damage of negligible degree, or do no harm at all. Thus, opposition created by a few operators may result in legislation which will seriously hamper other dredgemen

of the material excavated passes 0.5 in. apertures. At present many of the dredges need sand pumps to elevate part of the fine to a point above the coarse tailing, to prevent too great shoaling of the ponds in which they float. This is costly, inasmuch as sand pumps (centrifugals, especially designed with lined runners and shells) require much power for operation (about 90% of the mass pumped

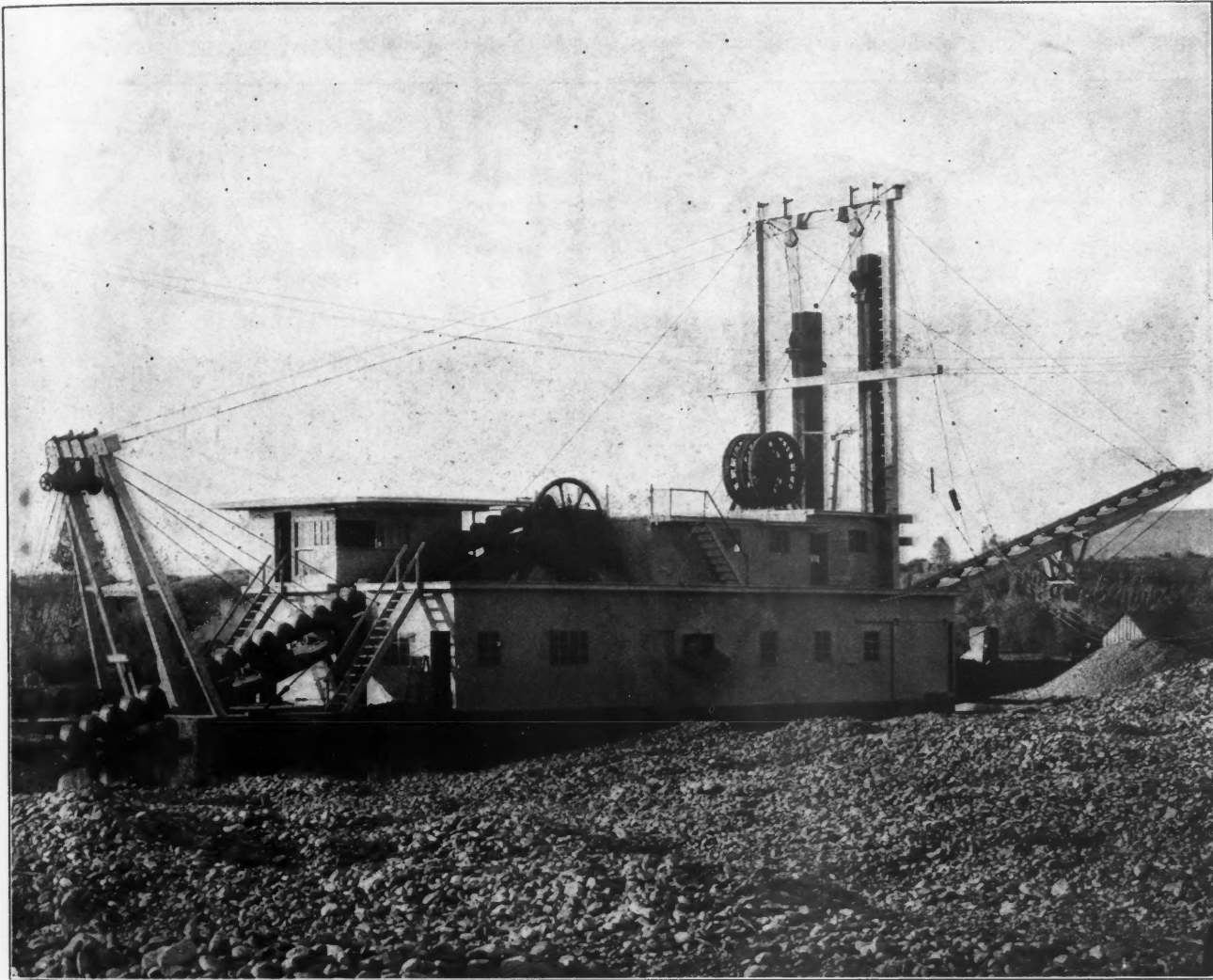


FIG. 1. TYPE OF OROVILLE DREDGE.

with the fine on top. Dredging is of magnitude and importance, and the growing opposition and agitation are such that some further consideration of the methods of tailing disposal is timely.

Possible Results of Opposition.—Opposition to dredging is a matter of immediate importance, and must not be ignored or slighted. A realization of present bad conditions, and the intelligent co-operation by dredge operators to improve them, are essential. If the hydraulic miners of California had appreciated the necessity of modified procedure, and had made sincere effort to improve conditions, instead of organizing associations "to fight for their rights," it is probable that many

who are not only doing no damage, but are actually causing benefit and are contributing largely to the general prosperity of their districts.

History of Tailing Disposal at Oroville.—The present status of the problem will be better understood if an account of the methods of tailing disposal at Oroville is hastily sketched. The first successful dredge was a type already working to good advantage in New Zealand. Its tailing method, although modified somewhat in mechanical arrangement, is still exclusively used at Oroville, and is described later in this article. From the beginning, the disposer of tailing has been a problem of great magnitude, particularly at Oroville, where there is a large percentage of fine; often more than 50%

being water, the rest solids), and the wear and tear of handling quartz sand and pebbles is great. A considerable part of the lost time is still attributable to troubles with sand pumps. Not enough sand is elevated in this way to cover all the boulders, and no attempt is made to operate sand pumps so as to leave worked-out ground in condition for agricultural use.

Disposal of tailing has never had consideration commensurate with its importance, even when seen from the dredge-man's viewpoint. Much effort has been devoted to increasing digging capacity, but the other phases of dredging auriferous alluvion (including such an important one as gold saving) have to a large degree been neglected in striving for large yardage records. The problems incident

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to leaving worked-out ground devastated and practically worthless, where in some cases beautiful orchards had existed, have until recently had no adequate consideration. Early operations were of such scale as to excite no particular comment; only the wasting of large areas has caused the opposition to dredging.

Modified Tailing Disposal.—Since the introduction of the first successful dredge, only one with a radically different tailing device has been tried at Oroville; it was of the "sluice-box" type. It has since

Steam Shovel Stripping.—This method was tried for a short time. A shovel dredge with 1.5 cu. yd. dipper, capable of excavating to a depth of about 23 ft. below the surface of the pond, was operating in gravel about 60 ft. deep. It was necessary to pump out the pond and lower the dredge to dig sufficiently deep. Thus a dangerous bank about 40 ft. above water-level, consisting largely of fine, constantly menaced the dredge; the use of an 8-in. sand pump requiring 50 h. p. for its operation was necessary. A steam shovel with

—All the dredges operating in the Oroville district (as well as many others throughout the world) use a method of disposal of tailing by which most of the material passing the screen perforation, usually 0.5 in. diameter (in fact all the material except the small proportion of necessity elevated by sand pumps to prevent shoaling of the pond) is discharged by sluices at a comparatively short distance from the dredge. All gravel of larger diameter is usually deposited in irregular conical piles, or regular wind-

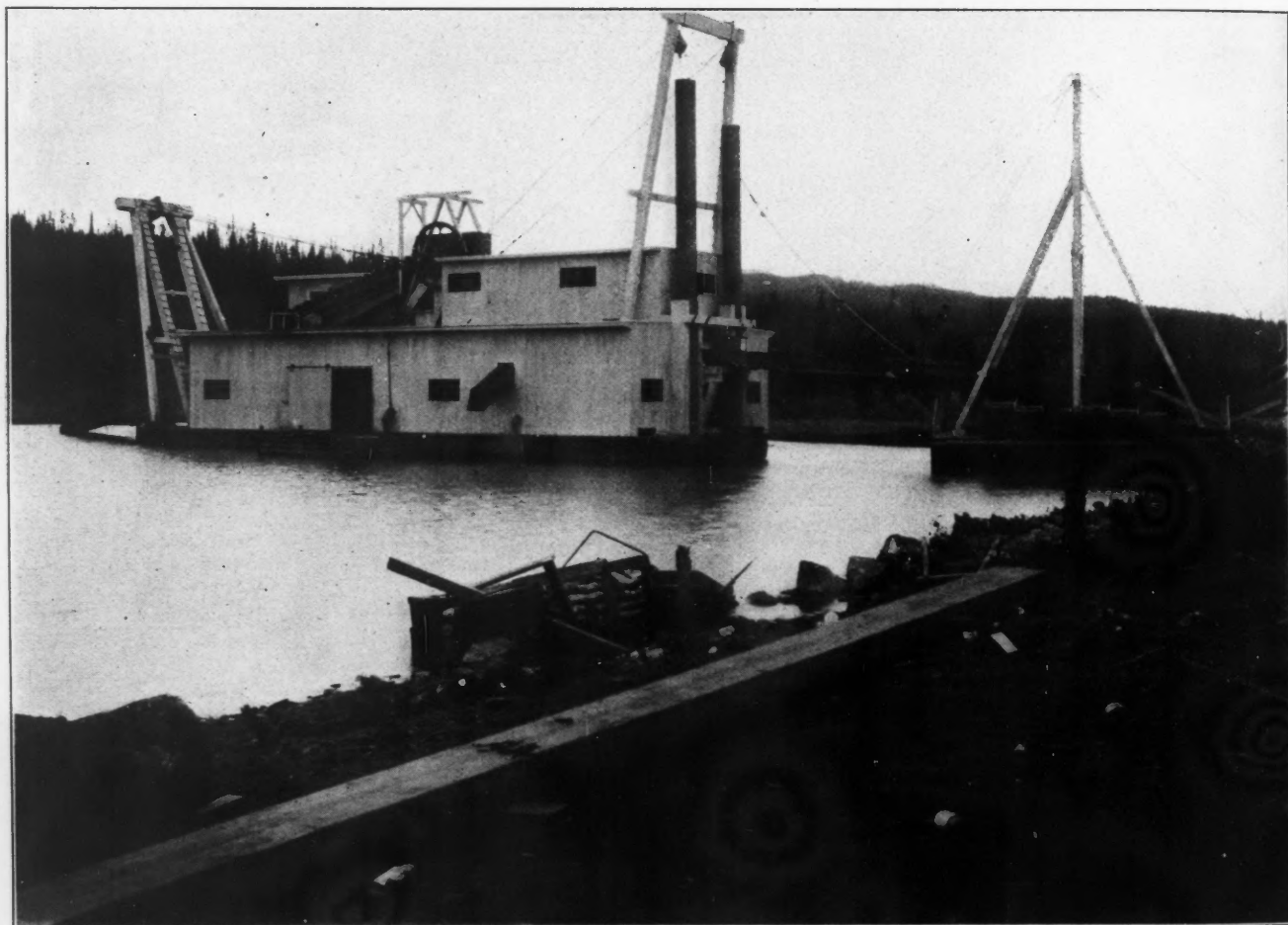


FIG. 2. WATER-SIDE ELEVATION OF DREDGE.

been remodeled, and is now like the others. As at first operated, it dumped all boulders larger than about 4 in. in diameter on the bottom of the pond; all fine was discharged by a sluice after passing through an 18-in. dredging pump. Worked-out ground was left in far better condition, and the general use of such a dredge would probably not have caused any opposition to dredging. The reason for remodeling was the heavy cost of exploitation, due to expensive operation of the dredging pump (a 150 h. p. motor drove it), and to its great wear and tear. It was also supposed that the gold-saving devices necessary for such a type of dredge were of low efficiency. The circumstance that worked-out ground was left in comparatively good condition had little or no bearing in the matter.

dipper of 1.25 cu. yd. capacity was introduced to do advance stripping. Top dirt was excavated to a depth of about 15 ft., and trammed in cars of 2 cu. yd. capacity by a steam engine and horses to the dump on top of the tailing pile behind the dredge. An elliptical car track surrounded the dredge pond. Cost of stripping was said to be about 12c. per cu. yd.; this was approximately the same as for excavating with the dredge. This high cost and the circumstance of the top dirt possessing a slight value, recoverable by the dredge, caused discontinuing the attempt to strip. Here, as in other procedure in Oroville, economy of operation almost exclusively dictated the course of action. The condition of worked-out ground had no bearing whatever in the consideration.

Method of Tailing Disposal now in Use.

rowed hills depending respectively upon the use of "head line and caving," or of the "spud and side-feeding" method, in excavating. The largest boulders, which are found nearest the bottom, are usually left on the extreme top of the tailing pile, as they come from the last digging of each cut and thus are the last to be discharged. In this way the gravel section is completely reversed. When tailing is deposited as at Oroville, expansion due to interstitial voids among boulders results in an increase of volume sometimes as great as 40 per cent.

Correction of Evils.—The general adoption of the common method is due almost entirely to its cheapness and to the supposed efficiency of the gold-saving devices which are used in conjunction with it. Its advantages are larger profits for dredg-

ing corporations; its disadvantages are serious opposition by several associations and numerous individuals. There are a number of interesting problems when seen from the several viewpoints: (1) The operating (because of mechanical difficulties of changes); (2) the legal (because of questions of damage to contiguous and adjacent interests); and (3) economic (because of the interest of the State in preventing devastation of such lands with consequent loss in revenue by lessened taxation). These aspects are all important and the future delimitation of respective rights will not be easy.

The seemingly simple solution, as suggested in numerous instances, by "restoring worked-out ground to its original condition," has numerous difficulties, and is anything but simple. If the mechanical features in remodeling all the existing dredges of the Oroville district were sim-

length to discharge top soil and stripping in conjunction with the sluice of the "sluice-box" type, as is done in New Zealand. With all the methods using water as a means of carrying gravel, there is the advantage of a general leveling of tailing, a filling to greater or less degree of interstices among boulders, and a consequent minimum expansion of tailing of only about 10%. The finest material (which is the soil proper and to which any land owes its fertility) in all phases of the wet method is carried by the water into pools or depressions, and thus there is an incomplete restoration. At best a gravelly surface with interstitial coarse sand is left. Such conditions are not conducive to agricultural or horticultural prosperity.

Sand pumps working in conjunction with sluice and stacker have been tried as a means of restoring land. It was found so expensive that the worked-out

gun. The dredge is then backed up, the auxiliary sluices closed, the main sluice opened, and the bottom gravel is excavated with the main sluice discharging coarse just ahead of where the auxiliaries last emptied fine. Thus, with alternate stripping of top and digging of bottom, the dredge advances leaving fine above coarse in the worked-out ground.

While the same objection which applies to all wet tailing methods is patent in this instance, it is superior to any of the others. Other advantages are claimed in a higher extraction of gold by preventing the mixing of overburdens (frequently containing clay and other substances which tend to cause losses) with the gold-bearing alluvion. Of course such a device only works at its best where a fortunate occurrence of fine and coarse gravel in the right relative positions is found; but it is also true that, where soil is not found on

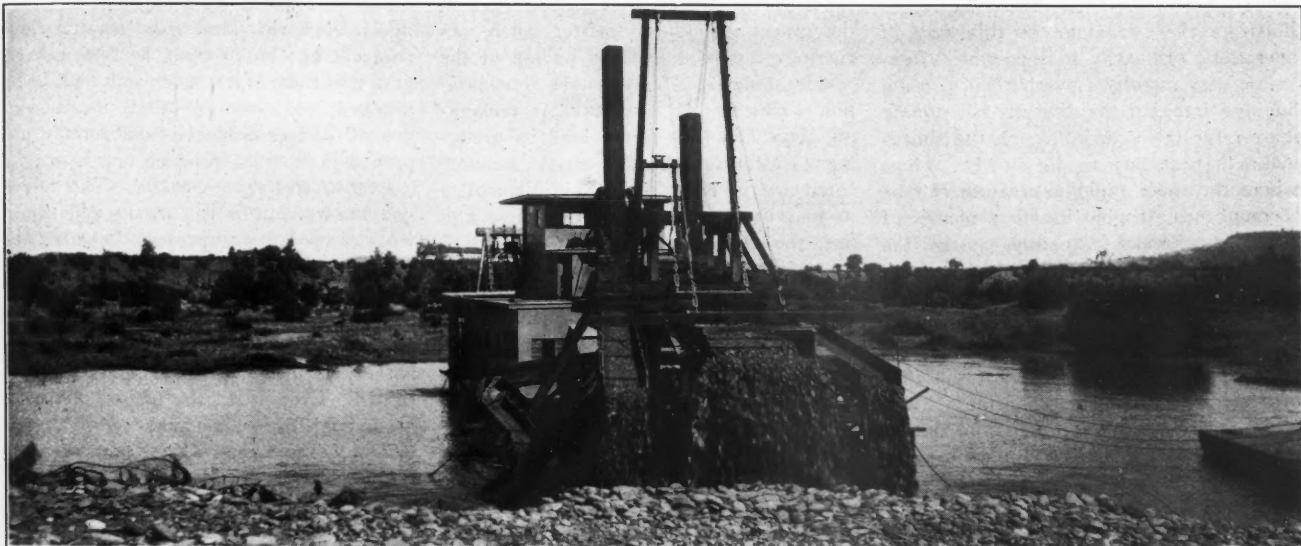


FIG. 3. DREDGE SHOWING TAILING CHUTES.

ple and cheap, it would assist considerably; but this is not the case, and numerous other considerations enter. Among the most important is that of efficiency in gold saving; this may be materially affected by changes which would make radically modified practice necessary. It will not be easy to persuade or force a different procedure upon Oroville operators, who are entirely satisfied, possibly too easily satisfied, however, with existing methods.

Wet Methods of Tailing Disposal.—Tailing methods for restoring worked-out ground can be well grouped under two comprehensive heads depending upon the use of water or of mechanical conveyors to transport material from the dredge to the dump. The wet method includes all operations in which water is used either in sluices alone, on so called "sluice-box" dredges, or in sand pumps in conjunction with sluices and conveyors as on the Oroville type, or by auxiliary sluices of greater

ground cost more per acre for restoration than it was worth originally, and that in leaving it in a rough, rocky and sandy condition the process was successful only to a slight degree.

The use of an auxiliary sluice for advance stripping, as practiced in New Zealand, is novel and interesting and gives better satisfaction than any other of the wet methods. The device is simple; it is used in conjunction with the sluice-box type. The auxiliary sluices are placed one on each side of the main sluice, and are made of greater length to permit discharging material farther astern. A simple system of gates allows turning sluicing water into either the main or auxiliary sluices. The advance stripping is carried on by the dredge digging in the fine overburden, and by moving ahead until the material from the longer auxiliary sluices is falling where the main sluice was discharging previous to the time when the advance stripping was be-

top, the dredgeman has no "restoring" to do. It is possible that where the overburden contains no substances tending to cause loss, auxiliary sluices may be eliminated by having gates in the bottom of the main sluices and allowing the coarse material to fall through them. In this way the same result could be accomplished with greater simplicity. It would be equivalent to having main and auxiliary sluices in all phases except in that of keeping overburden out of the main sluice; the prime result, sorting tailing, would be accomplished.

The mechanical problems in all tailing disposal by the wet method are well understood, and modifications to restore ground in this way would be simple. Advance stripping, because of irregularly caving banks, will not be easy in Oroville.

Dry Method.—This means of restoring ground is one in which water plays no part as an agent in transporting material from the dredge to the dump. It offers

large possibilities as a means of solving a difficult problem. There are several modifications of this method. Among them is one which I introduced at Oroville; not, however, with the object of restoring ground, but to permit starting a dredge in paddock or inland working, without using a sand pump to dispose of fine. A device was introduced to blank the screen apertures and the overburden was passed to a belt conveyor so designed and operated as to permit handling material (frequently with the consistency of a thin mud, as the dredge buckets lifted enough water to cause this condition). No water was used to assist its movement through the screen.

Stripping to a depth of 15 ft. (the whole gravel section being 30 ft.) was carried on in this way while the dredge was advanced 40 ft., the cut being 400 ft. wide; overburden was handled at a rate of about 10,000 cu. yd. per 24 hours, not continuously, however. I cite these figures to illustrate the advantage of this way of operation; ordinarily it is possible to excavate very rapidly in overburden, it being fine and free, but the difficulty of running it over the tables and through the sluices makes it necessary to dig slowly. Thus, where the most rapid excavating can be accomplished, trouble in other phases of handling alluvion frequently causes the slowest work to be done. Increased yardage would surely result by introducing a perfected device accomplishing the same result in a better way. The first arrangement had a single duty, and it did that satisfactorily. As a mechanism it was crude and imperfect, though it permitted starting an inland dredge without using a sand pump, as had always been necessary with other dredges.

The advantages of preventing contact of particles of quicksilver and amalgam with large volumes of barren material, usually adhesive, is obvious. Other advantages such as increased yardage and decreased lost time (clean-ups being possible while stripping is proceeding) need not be considered particularly. The disadvantages are several; among them are the mechanical difficulties, and a sacrifice of simplicity. They are not such as to preclude ample consideration of this method.

Restoration by this means would leave worked-out ground in better condition than can any of the others. There is no chance, as when water is used in transporting or screening material, of having the finer and richer soil particles wasted. On the other hand, poor agricultural land cannot ordinarily be improved by stripping. Still it often happens that, even in present exploitation where no attempt is made to accomplish such an end, worked-out ground is superior to virgin land in the immediate vicinity. It is interesting to note that it is possible to conduct operations so that much land will be consider-

ably improved by dredging it.

Silt Elevator.—A process now in operation in New Zealand is giving satisfaction, from the dredging aspect, in disposing of troublesome fine material. It is a "silt elevator" used in conjunction with a bucket stacker. Its design, construction and operation are simple, it being a tailing wheel (similar in operation to those used in other metallurgical processes). Fine, after passing over the tables and through the sluices, is discharged direct into the buckets on the periphery of the wheel by which it is elevated to the stacker and is discharged with the boulders and pebbles too large to pass the screen apertures. There are said to be no difficulties in operating this device. Its advantages, if it can be modified to effect the superposition of fine, are great. Its facility of adoption on the type of dredge now generally used in Oroville and elsewhere is a strong argument in its favor. The circumstance that all fine in the gravel section—no matter where occurring—can be discharged on top of the coarse stones is a very potent consideration. This feature may result in reclaiming large areas of barren land by dredging. Restoration by this means, as now conducted in New Zealand, is incomplete in that there is a mixing of coarse and fine, the uppermost part of the restored ground is that from the deepest dredging, and a large proportion of heavy boulders are left on top. When dredging in Oroville was first undertaken, a secondary elevator—a chain of buckets—was tried on the first shovel dredge, as a means of elevating fine to the main stacker. Mechanical imperfections and a large content of water raised with the fine to a steep belt stacker of unsuitable design (causing tailing to run back to its lower end) prevented successful operation. The New Zealand silt elevator effects a removal of water and will thus allow its use in conjunction with belt stackers of considerable inclination.

Method best Adapted for Use on Existing Dredges.—The last described device with a few modifications is probably the best suited, for use on the dredges now operating in California where stackers are generally employed. It would seem that there are no serious drawbacks to modifying it so as to accomplish the superposing of fine, a purpose somewhat different from that originally intended. There are several difficulties, however, and any assumption that this device will prove an easy and universal remedy for existing evils is incorrect. It is possible, however, that its operation will be cheaper than that for occasional sand pumping; that it will be less expensive than continuous sand pumping is surely true.

Manipulation as Affecting Restoration.—Exploitation as above noted has been carried on without any attention to tailing disposal except when affecting the profit

of dredging. This spirit has controlled manipulation as well as design and construction, and methods are now in vogue which will need modification, if other considerations are to be included. Thus the procedures which leave tailing in conical piles, in long windrowed hills, or in other irregular and rough heaps with pools between, must be changed, even when restoring devices are used.

Characteristics of Restored Ground.—It is not an easy matter to leave worked-out ground in good condition for agricultural or horticultural purposes. Time will be required to allow settling and agglomeration, beside the recovery of fertility. It will probably be found that, because of expansion of tailing, with consequent higher level of the surface (thus making it farther to water level), and by reason of interstitial absorption and circulation (many voids among boulders being inevitable), restored land will become dry and parched quickly. It would seem that restoring will never leave rich land as it was previous to dredging; but it must be remembered, first, that there is not much rich land being dredged; and second, that much poor ground will probably be considerably improved if modified practice is adopted.

Cost of Restoring Ground.—This is not yet known, but it is sure to add somewhat to operating expenses. Whether the sale of restored ground will pay this increased expense is problematical; in all probability it will not. In spite of the agitation and opposition to dredging, comparatively little fertile ground is being ruined. Even if all the proved dredging ground in California (much of which was bought for less than \$1 per acre previous to the advent of dredging, and was worthless for either agriculture or horticulture) be ruined, the economic benefits accruing to the State would still far outweigh the damage done. It is unquestionably true that the damage being done is much exaggerated.

Fig. 1 shows a typical Oroville dredge, with a belt-stacker and sluices for the disposal of coarse and fine tailing, respectively. A short time previous to taking the picture, this dredge was of the sluice-box type. Tailing discharged at that time is seen in the foreground; its condition is typical of that from dredges of the sluice-box type. A description of the method appears in this article, under the section "Modified Tailing Disposal." Under the outer end of the stacker are piles of coarse tailing deposited during the first few hours of operation after changing to the stacker type. After a time, these piles became regularly windrowed, and about 20 ft. higher than the tailing in the foreground. The differences in ground worked by the two methods is well shown.

Figs. 2 and 3 are views of the dredge shown in Fig. 1, as it appeared prior to remodeling from the sluice-box to the stacker type. The discharge end of the

sluice, with tailing from the same, is in the foreground; the dredge and pond in the middle ground, and the undredged area in the background. The stony condition of tailing is well demonstrated. The material in the background (most of which has been mined by Chinamen) is typical of much of the Oroville field. It is rough, uneven and useful only for grazing purposes. Such land has already been ruined by previous mining, and the relatively small rich area being despoiled by dredging is really inconsiderable.

Saw-Toothed Roof Construction.

The new erecting and machine shop of the Pittsburg & Lake Erie Railroad at McKees Rocks, Pa., has a modified form of saw-toothed roof that presents some novel methods of dealing with ordinary conditions. The steel work for this building was designed by Albert Lucius, of New York, and was fabricated and erected by the McClintic-Marshall Construction Co., Pittsburg, Pa.

The steel skeleton is enclosed by 18-in. curtain walls of brick; both steel and brickwork are carried on concrete foundations. The building is 533 ft. long and is divided transversely into three spans and longitudinally into bays of 22 ft. The erecting shop occupies the higher portion on the south side of the building (a span of 68 ft. 9 in.) and extends the full length, while the machine shop occupies the entire north side; it is approximately 100 ft. wide (in two spans) and also extends the full length.

Fig. 1. In the plane of the roof trusses is a system of longitudinal bracing which, in connection with similar vertical bracing between the columns, is designed to take the stresses arising from the load and motion of the crane. The columns which support the roof are separate from the crane columns, but both are composed of

both erecting and machine-shop sections and upon this is laid the roofing felt.

Inside drainage is used to eliminate the possibility of water backing up due to freezing of conductor pipes. The conductor pipes are 5 in. in diameter, on the erecting-shop section, and lead from the flashing boxes to the longitudinal discharge pipes, of which there is one 8 in. in diameter, carried along under each side of the roof and supported by the steel work, as shown in Fig. 1. For the machine shop, 4-in. conductors lead from the flashing boxes to 5-in. vertical discharge pipes, which are arranged alongside of alternate columns of the middle row, extending through the shop. There are 12 low points in the roof construction to provide drainage.

The saw-tooth windows are arranged to be operated in sections from the floor of the shop by hand-wheels; the mechanism for this purpose is shown in Fig. 2. This gives ample ventilation, and obviates the necessity for any further provision for that purpose.

The first natural cement made in modern times was made by John Smeaton in 1757 and used by him in the construction of the famous Eddystone lighthouse.

The Colosseum at Rome was built by Vespasian and Titus, A. D. 75 to 80; it was constructed largely of concrete walls, in which natural cement was used.

The dome of the Pantheon is of concrete supported on a frame work of brick arches; it is one of the earliest concrete structures known.

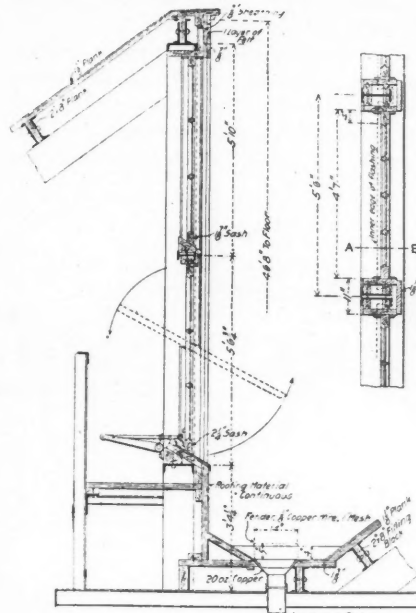


FIG. 2.

channels and plates, of box section; the crane runways are of the usual plate-girder construction, except that lateral stiffness is provided to resist the thrust of the crane when the trolley is suddenly

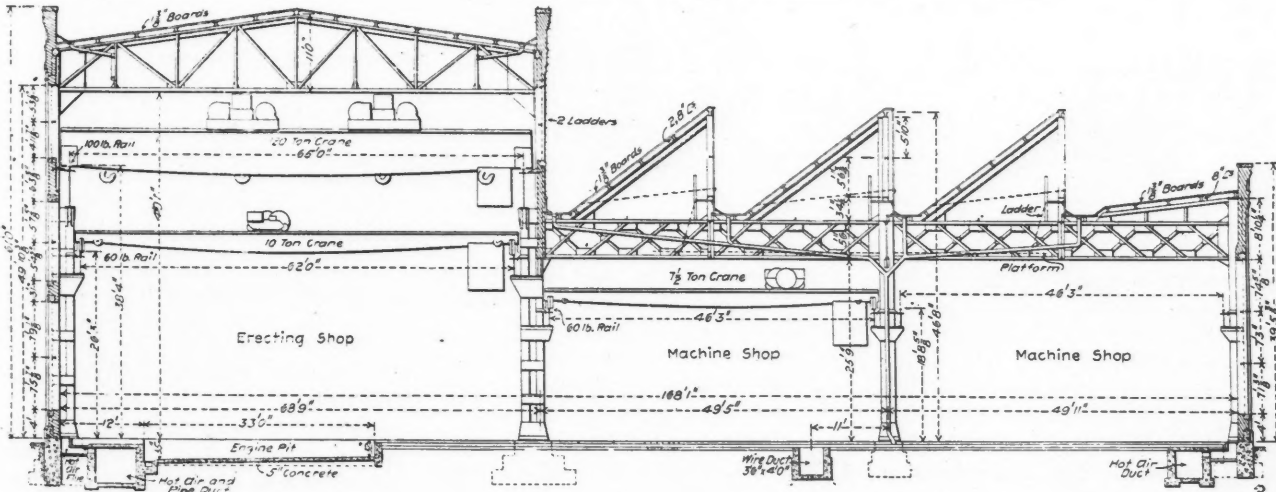


FIG. 1.

One electric crane of 120 tons capacity and one of 10 tons capacity, each traveling on a separate runway, serve the erecting shop; their respective spans are 65 ft. and 62 ft. center to center of crane rails; and the machine shop is covered by two 7½-ton cranes, one in each span. The span of these cranes is 46 ft. 3 in. All cranes run the entire length of the building.

The arrangement of the building is shown in the accompanying cross-section,

stopped. The girders for the 120-ton crane are 5 ft. deep.

Details of the roof are shown in the cross-section, Fig. 1, and also in the detail of the saw-toothed construction, Fig. 2. This is used above the machine-shop section of the building. The details of the saw-tooth construction show a cross-section through the windows at the quarter points of the machine-shop roof.

The roof itself consists of a base of 1½-in. tongued and grooved boards, upon

The manufacture of lampblack by the imperfect combustion of natural gas is extensively developed in Calhoun, Lewis, and Doddridge counties, West Virginia. It is estimated that from 30 to 40 million cubic feet per day are consumed in this most wasteful process.

Iridium melts at a much higher temperature than platinum, and attempts to produce solid metal result in the formation of a powder or incoherent mass.

The Allis-Chalmers Steam Shovel.

BY W. N. TANNER.

The use of the steam shovel in mining operations, which, until within comparatively recent times, has been mostly confined to the iron districts, is coming more and more into play wherever there are surface deposits which require stripping or where material can be readily excavated, transferred or loaded by this means. So prominent a place are steam shovels taking in large work of this character, that the attention of mining engineers through-

There is no part of a steam shovel subjected to such severe alternating strains as the A-frame, and this fact has been fully recognized by builders, and the old method of making a riveted section in the uprights has been largely abandoned, the solid bar being substituted. Following this method, both uprights are made in one continuous piece, which has produced an A-frame that is unbreakable.

The boom is made of structural steel, in plate girder form, with cast steel inner and outer ends. It is heavily built and is ribbed on the lower flange for side strains. The shape of the boom is shown

of smaller diameter rigidly attached to each side, the smaller drums having a common diameter. This makes a drum with one diameter of, say, 7 ft. and two drums of, say, 3½ ft. each. The rope passes a sufficient number of times around the larger diameter of the differential drum, the end being permanently attached. From the small diameters, two ropes lead over the head sheave to the dipper. These are fastened to the drum. Winding the rope on the hoisting drum causes the hoisting rope to run off the larger diameter of the differential drum and the two ropes attached to the dipper

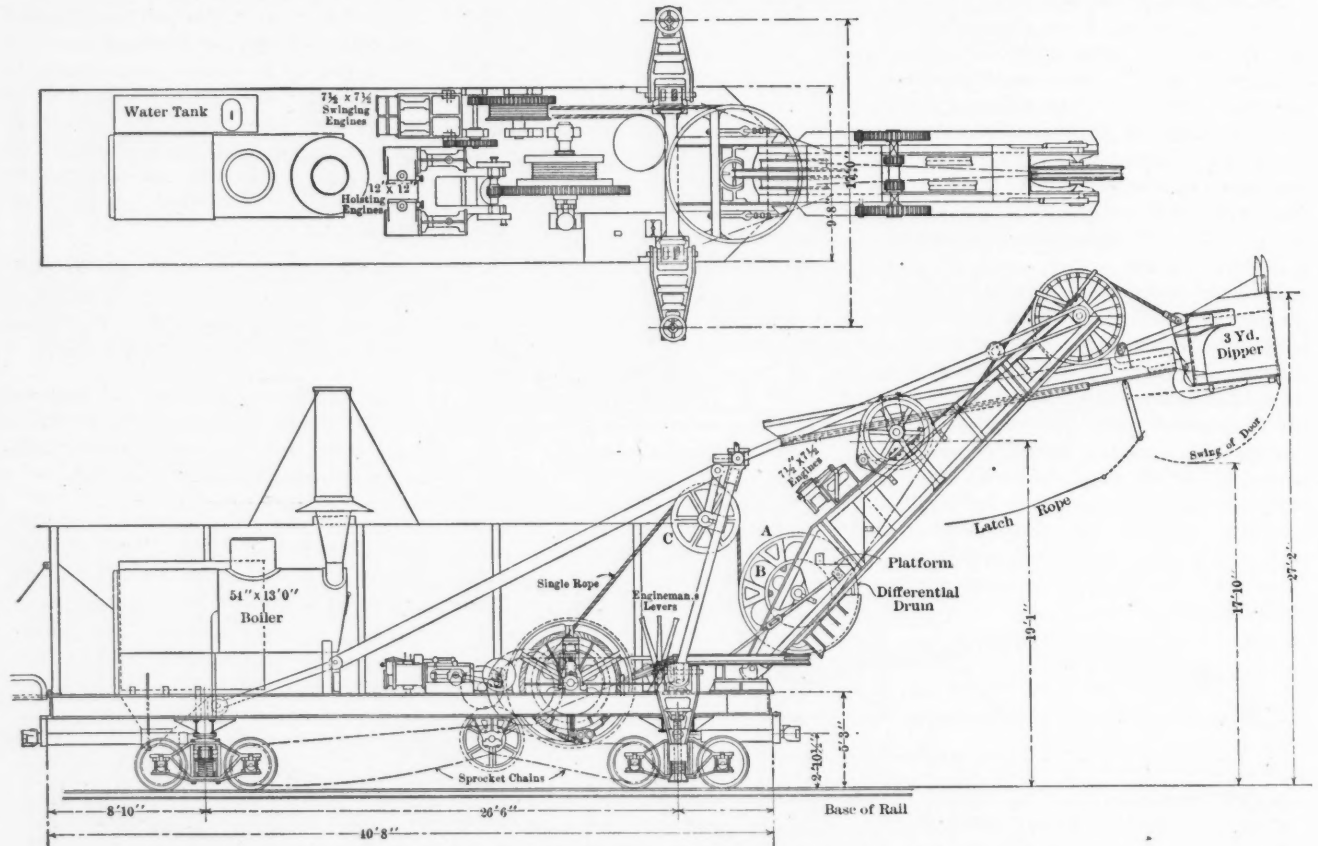


FIG. 1. AND 2. PLAN AND ELEVATION OF STEAM SHOVEL.

out the world is being directed to the most efficient and economical types of construction.

The shovel described is made by the Allis-Chalmers Co., Milwaukee, Wis. It is mounted on a substantially constructed car; every strain to which the heaviest digging can subject the car is considered and provided for. Trucks are of all steel "diamond" pattern, and draft gear with automatic couplers is provided, as approved by the Master Car-Builders Association.

The A-frame uprights, together with the jack-arms, form a support for the boom that, so far as strains are concerned, rests on the ground; the tension rods connect the jack-arms in such a manner that there is no side thrust on the latter. The A-frame is a single forging capped at the upper end with a cast steel head, where all the strains intersect at a point.

in Fig. 3; the drum shaft is built into it by a method that tends to strengthen the member.

It is self-evident that weight on the boom, or turntable, is detrimental; so it is good practice to burden this member only with what is absolutely necessary. In line with this deduction, the ropes lead in such manner that the strains produce a lifting effect at the foot of the boom. In following this course the advantage of a light load on the turn-table and the ability to swing more rapidly is obtained, as well as reduction in strains and friction.

Figs. 2 and 3 show the method of operating. The hoisting drum is geared directly to the engine. From the drum the rope runs over a sheave suspended from the A-frame to a differential drum placed on the boom. This is made up of a drum (A) of large diameter, with a drum (B)

to wind on the smaller drums. A step-up in the pull exerted is thus effected without the use of jack-shaft or gearing. The rope running from the large sheaves (C) suspended from the A-frame to the large diameter of the differential drum is centrally located over the axis of the turntable, so that the twist of the rope takes care of turning without any trouble, doing away with the necessity for guide pulleys. When digging strains are exerted, the tendency of the rope between the sheave (C) and the drum (A) on the boom is to exert an upward pull on the differential drum and the lower end of the boom, thus relieving the turn-table of weight. The load removed from the member by this form of construction and method of operating is about 15 tons when the shovel is digging, and seven tons when the shovel is empty. These figures are based on a 3-yard shovel. The construction of the drum and the method of re-

ducing weight stresses on the turn-table is similar to that used in the Allis-Chalmers dredge, which has been previously described in this journal (Nov. 25, 1905, the machine to a rigid bearing on the rails. without any rocking or tilting motion. This is shown in Fig. 4, in which the dotted lines represent the "free" po-

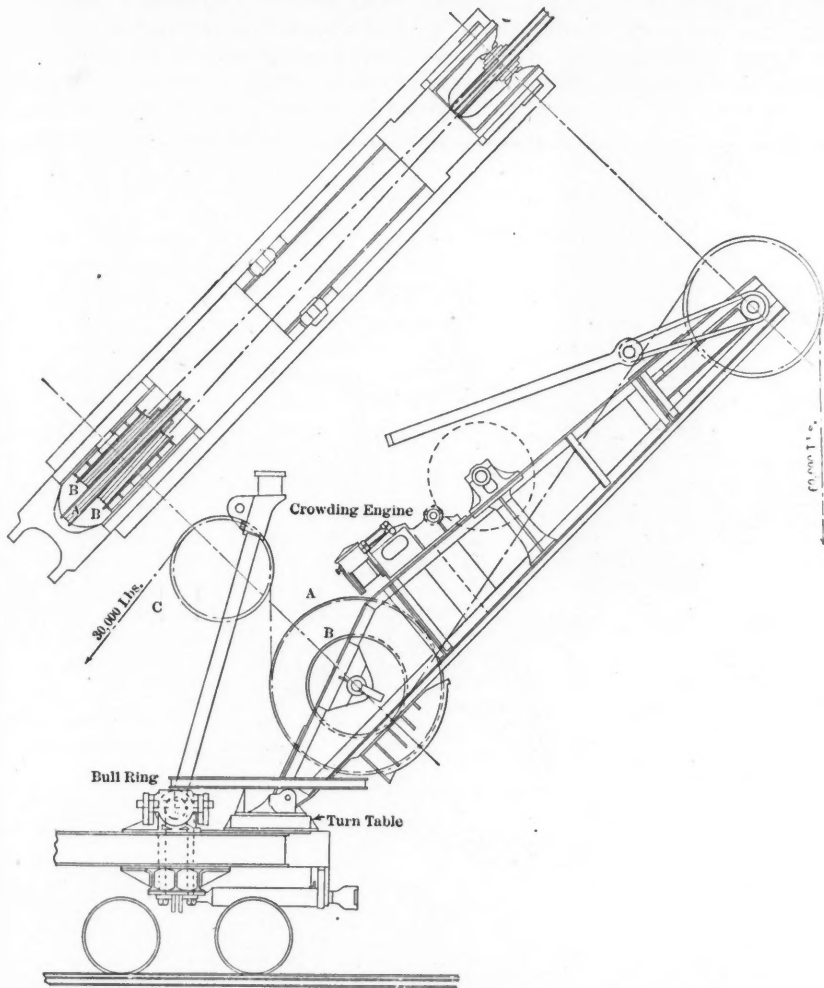


FIG. 3.

p. 974). Fig. 1 gives a clear illustration of the lifting effect on the turn-table.

The "digger" shown is a shovel of the 3-cu.-yd. size; it is fitted with a double 12x12 in. hoisting engine and a double 7½x7½ in. swinging engine; the latter operates by wire rope instead of chains. The crowding or dipper engine is also double, 7½x7½ in. and is mounted upon the boom. The illustrations show this in detail; the boom is 25 ft. long and has a normal angle of 40° with a clear lift of approximately 18 feet.

A locomotive boiler is provided and mounted back of the engines. This is adapted to carry 100 lb. pressure. The whole machine is self-propelling; the swinging engine being used for this motion; it is connected through gear wheels and sprocket chains to the inner axle of each truck.

The clutches are steam-actuated, through the engineman's levers shown; the crowding engine is operated from the platform shown on the boom. Side bearing on the tread of the truck-wheels is provided in such manner that the simple turn of a screw brings the entire front of

the bearing blocks. The blocks as shown in full lines are in the bearing or "set" position. When free, there is nothing to hinder the movement, in either

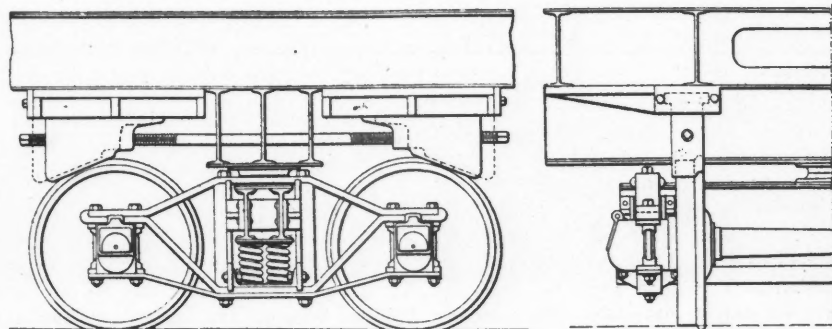


FIG. 4.

direction, of the machine, but setting them effectually locks the car in position.

The general average price of natural gas to the consumers is very close to 16c. per 1,000 cu. ft. at a pressure of 4 oz. above atmosphere. The greater portion of the domestic consumption is furnished at between 18 and 25 per 1,000 cu. ft.

Natural Gas in Indiana.

At the beginning of 1904 the general rock pressure in the older field of Indiana was close to 15 lb. per sq. in.; at the close of the year it was reduced to about 5 lb. Originally it was 350 lb., and a number of wells discharged as much as 12,000,000 cu. ft. per day. Many of the cities and towns as well as manufacturing plants have been forced to abandon natural gas as a fuel and to substitute coal, wood, or manufactured gas, or seek new locations where cheaper fuel is available. Occasionally a fair gas well is found where a limited reservoir has escaped the general depletion, but the lives of such wells are necessarily short, owing to their limited areas.

The great proportion of gas is at present secured while drilling in search of oil. There is hardly any attempt made at drilling for gas exclusively. The general practice in operating for oil is to keep the wells pumped, thus keeping the rock clear of water and getting what oil there is, with a better flow of gas than by leaving the wells to stand and drown out. The bulk of the gas produced in this field today is pumped to the point of consumption. In the majority of cases it is considered best to drill into the oil strata, getting all the gas there is, and at the same time to get what oil there is, as for the best results the well must be pumped in any event, as even a shallow gas well will ordinarily accumulate water. The pressure varies in different fields. In many cases where compressors are used the pull creates a suction on the rock.

The Geological Society of London will this year award its medals and funds as follows: The Wollaston Medal to Dr. Henry Woodward; the Murchison Medal to Charles Thomas Clough; the Lyell Medal to Prof. Frank Dawson Adams, of Montreal; the Prestwich Medal to Wil-

liam Whitaker; the Wollaston Fund to Dr. F. L. Kitchis; the Murchison Fund to Herbert Lapworth; the Lyell Fund to W. G. Fearnside, and Richard H. Solly; the Barlow-Jameson Fund to H. C. Beasley.

Palladium is not tarnished by exposure to the air and is the equal of platinum or gold in this respect.

The Colonial Coke Co's Plant.—I.

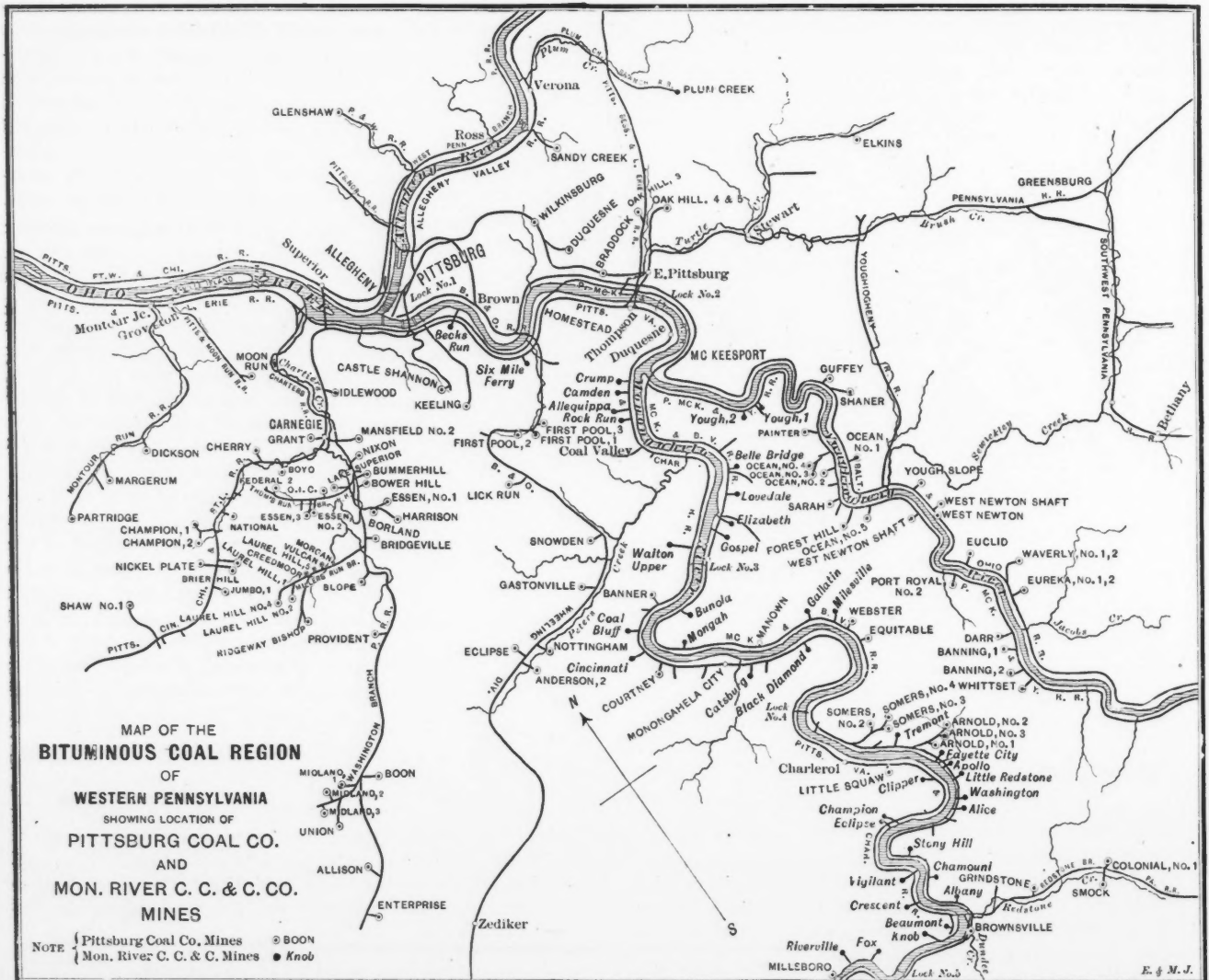
(EDITORIAL CORRESPONDENCE)

The Colonial Coke Co. (subsidiary of the Pittsburg Coal Co.) is one of the largest coke producers from the Pittsburg seam of the Pennsylvania bituminous region. Its Mine No. 1 and its prin-

the outcrop of this seam at its easternmost point, where it approaches most closely the western edge of the Connellsville basin, from which the Fayette anticlinal separates it. The next anticline to the west brings the Pittsburg seam to the surface at Brownsville, so that the Colonial mine enters the eastern margin of a syncline, eight miles across and 500

Above it lies 4 feet of calcareous shale, and then a substantial sandstone. The floor is a hard fire clay, which, although it slacks somewhat on exposure, does not creep upward. The seam is entirely free from dislocations, although an occasional "horseback" pinches it from beneath.

Surface Plant.—The mine is expected to be productive for 30 years, and there-



cipal oven plant are at Smock, Fayette county, on Redstone creek, nine miles east of the latter's outlet into the Monongahela river at Brownsville. This is the region commonly known as the Lower Connellsville district. It is reached by the Monongahela division of the Pennsylvania railroad, 62 miles south from Pittsburg. The mine ships no coal, but turns its output into coke. The company owns about 8,000 acres in this vicinity.

Geology.—The Pittsburg seam underlies a large part of southwestern Pennsylvania; its northeastern extremity is bounded roughly by the Ohio and the Monongahela rivers. From this outcrop it dips at a low angle to the southwest, gaining thickness with depth. It is diversified by a series of parallel folds, whose axes all pitch in this same direction. The Colonial No. 1 mine enters

ft. deep at its bottom, and dipping 4° at its eastern outcrop.

Coal.—The section shown in Fig. 2 is an average of numerous measurements in Colonial No. 1, and is typical of the Pittsburg seam. The breast coal is remarkably clean; there is not a visible streak of impurity in it; the lower fourth is scarcely less clean. The 0.3-ft. band of coal between the two 0.01-ft. partings is soft, and was a convenient point of attack in the days of hand under-cutting. A sample across the face of the 9-ft. seam showed the following composition: Moisture, 1.05%; volatile hydrocarbons, 31.20%; fixed carbon, 60.77%; ash, 6.98%; sulphur, 0.85%; phosphorus, 0.002%. The "draw slate" is treacherous; it will ring firmly at one moment and drop in the next. The roof coal is of inferior quality, and is not touched.

fore the equipment is carefully designed and built. Boiler and power houses are of brick, and the tipple and bins are of steel. The power plant, with four boilers, generates 450 h. p. and works at 80 lb. pressure. The boiler plant can be doubled in the space provided. Feed water is heated to 200° F. by exhaust from the hoist and the dynamo driver. Steam is carried to the hoist, 100 feet distant (under separate roof) in straight, overhead pipe, covered with asbestos and protected with sheet brass. The hoist consists of two simple, slide-valve engines working on the same shaft. Two plain cylindrical drums can be clutched to the shaft at will; one carries the hauling rope, and the other the tail rope. A dial shows the position of the trip. In the same room, a smaller engine drives a dynamo for supplying the oven-charging

trolley system with current at 250 volts.

The fan is a 16-ft. Capell, 8 feet wide, and is driven at 70 r. p. m. by a simple slide-valve engine, receiving its steam through a protected out-door pipe from the boiler house, 500 feet distant. It maintains an air pressure of 1.25 in. of water. The mine is devoid of gas. The fan ordinarily works as a suction blower, the return current from the mine dividing, passing in at the centres on opposite sides of the fan, and discharging from its periphery. Swinging doors, at the point where the current divides, may be thrown across the air current; if then the sides of the fan house be opened and the upward discharge be closed, the fan, without reversing its rotation, will reverse the direction of the air current. In cold weather this has to be done every other day, to prevent the accumulation of ice in the downcast.

The mine makes but little water; one small, electrically driven, triplex pump, working eight hours a day serves to drain the dip workings, while the rise workings drain themselves.

The tippie, shown in Fig. 3, is designed to obviate manual labor. It is supported by latticed columns (resting on masonry piers) and carries two tracks, the track for loads being down grade to the dumping end, and the track for empties be-

the design shown in Fig. 4, and weigh 1,600 lb. empty. A car holds 40 bushels when level full, or about 1.75 ton of

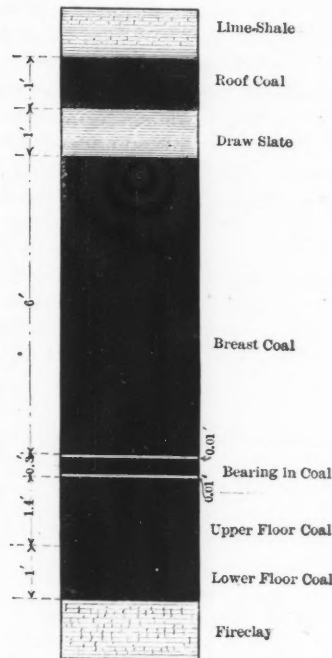


FIG. 2. SECTION OF THE PITTSBURG SEAM.

coal. Each car has a brake on each side, consisting of a trapezoidal wooden block,

Mining.—The first operators started a main slope slightly to the dip and turned one butt entry perpendicular to it. The new management has changed the alignment slightly to the rise and turns its butts strongly to the dip and to the rise, thereby making the rooms level. This has the further advantage of coinciding with the cleat of the coal, which in this mine is strongly pronounced. The rooms are driven full face on.

Triple entries, and in some butts, quadruple entries, are the rule. Crossovers for the air current are cut in the roof; their bottoms and walls are strongly built of steel beams (sometimes rails) and brick. Permanent stoppings are built of brick. No timber is used in the entries; whenever a crush threatens, the roof and walls are arched with brick, or masonry walls on the sides support the roof by steel beams. In general, all entries are 9 feet wide and 7 feet high. Owing to the treacherous behavior of the "draw slate," that is never voluntarily exposed. At least a foot of breast coal is retained in the roof, and the best miters will arch the roof to give added strength. This holds up the slate, and the narrow seam of coal above it is neglected.

The room-and-pillar method is employed exclusively. Rooms are turned to one side only, 39 feet between centers,



FIG. 3. COLONIAL COKE CO. TIPPLE.

ing down grade in the other direction. A short up-grade then brings the "empty" track up to the common level. The bottoms of the two bins are at different levels, to accommodate oven-charging larries on different terraces. Coal is dumped into these bins as it comes from the mine, without crushing or screening of any kind.

The mine wagons are of wood, after

which can be forced between the two wheels. One design bears down on the block; another one pulls it upward; in either case the force is transmitted by an arrangement of levers operated from the rear end of the car. The coupling consists of three links of 1¼-in. steel, with a clevis at each end, furnished with a 1.25-in. steel pin for insertion through the end of the draw-bar.

and 9 feet wide. At 21 feet in, they are widened to the rise, to 15 feet, leaving 24-ft. pillars. This practice, in driving narrow rooms and leaving wide pillars, is found to give the most satisfactory results.

The mining is done exclusively by hand, and since large coal is no object, the method of undercutting is discarded. Beginning with a squared-up face, the miner

cuts a tapering vertical shear 2 feet wide at the outside, and 6 feet deep, from top to bottom at the middle of the face. He bores a hole with an auger, 5 feet deep, on one side, near the rib and about midway in height. A charge of 15 lb. of black powder fired with a fuse loosens this half of his advance so as to permit easy picking. The process is repeated on the same side. When this second advance is cleared out, the remaining "tail" on the other side, 12 feet long and half the width of the face, can be brought down with one shot.

When a sufficient number of rooms have reached their extent, the pillars are drawn back by the adjacent miners, and the rooms abandoned. Room-and-pillar

suspended from the last car prevents accidents from a break in a coupling.

Entries are laid with 30-lb. rail, 42-in. gauge. The haulage rope is 1.25-in., and the tail rope 1-in. diameter. Wooden rollers, spaced unevenly, 25 to 30 feet apart, carry the ropes between the rails. For signalling, two parallel wires, spaced 6 inches apart, traverse all the haulage entries. Every runner carries a file in his pocket, and he can thus ring the electric gong in the engine house from any point in the mine by circuiting the wires.

At the high point of the tippel, the trip is stopped, the haulage and tail ropes are uncoupled and thrown down to the lower track to be attached to the

Brazing Cast Iron.

Cast iron may be brazed by the use of equal parts of burnt borax and either the black or red oxide of copper. The two should be finely powdered and well mixed; they are then mixed with water to a suitable consistency and the joint to be brazed is coated with the mixture. The joint is then heated by suitable means and ordinary brazing solder is applied in the manner that is practiced in brazing. Some burnt borax should be added with it as a flux. When the brazing solder has permeated the joint, the operation is finished and the cast iron is thoroughly united.

This is known as the Pich process, and

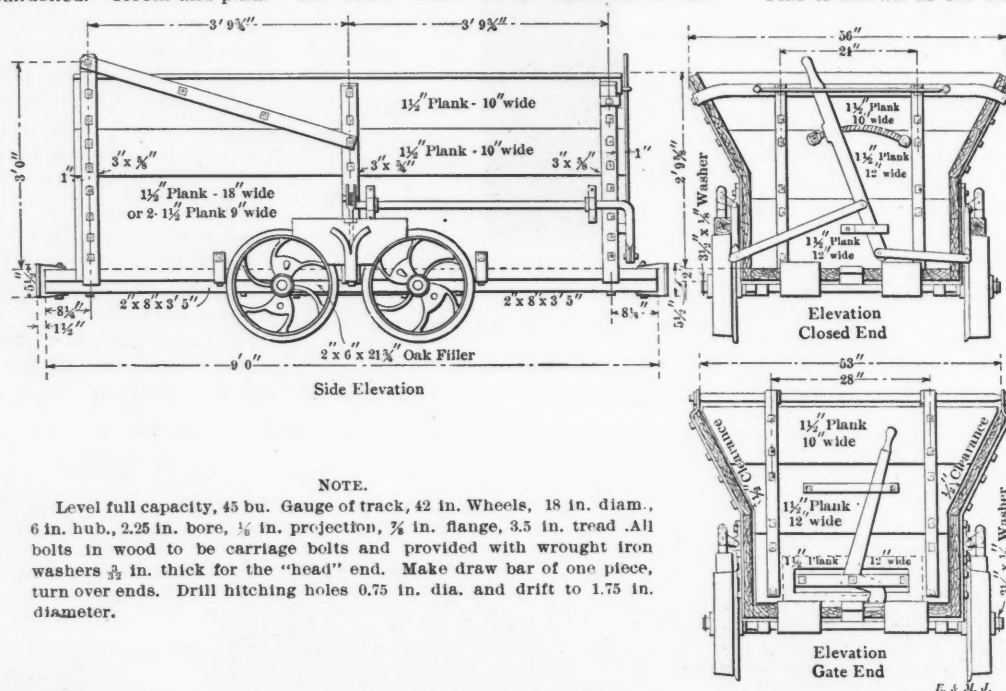


FIG. 4. COLONIAL MINE CAR.

coal is paid for at the rate of \$1.20 per 100 bu., equivalent to 48c. per wagon, or 28c. per short ton. Entry coal is paid for at the rate of \$1.30 per 100 bushel.

Transportation.—Loaded cars are drawn from the rooms by mules which are stabled underground. From the mouths of the rooms the cars drop by gravity, with brakes applied, to the main entry, in the case of rise workings, or to convenient points in the butt entries in the case of dip workings. They are made up into trips of 30 cars. The tail rope traverses only the main entry; if a returning empty trip is consigned to the dip workings, the hoisting engineer will slacken speed and remove the tension on the tail rope long enough for the runner to cast off the tail rope when the switch to the dip is reached, likewise in hauling a loaded trip from the dip, he will give the runner a chance to jump off and hook on the tail rope when the main entry is reached. When hauling from the back of the main entry, the tail rope is not disturbed during the journey. A drag

waiting empty trip, and the loads, uncoupled one by one, run by gravity to the Phillips cross-over dump. Here each emptied car is released by the pressure of the succeeding load on a loose section of rail, actuating the horned catches by which the dumping car is secured. The bump starts it down grade, past a weighted switch, to the kick-back; thence down grade on the empty track to be made up into a return trip. The main entry is now 3,000 feet back, and the round journey is made in 12 minutes, which suffices in the meantime for the dumping of the 30 loaded cars.

The second largest stone-arch bridge in the world—a railway bridge at Salcano, Austria—was recently completed. The arch has a span of 279 feet.

If a monkey-wrench is used so that the pull on the handle is in the direction in which the jaws point, it will stand twice as much strain and is not nearly as likely to slip as when the pull is the other way.

depends upon the reaction which takes place between the carbon in the cast-iron and the oxide of copper. Ordinary methods fail in brazing cast iron, on account of the presence of carbon in it, which prevents the brazing solder from adhering. The oxide of copper is reduced to metallic copper by the carbon in the surface of the iron, and carbonic acid gas is formed. This escapes; at the same time the copper adheres to the clean metallic surface thus produced and if a good job has been done, it will be found that any further fracture will occur at another point.

The history of natural gas in Kansas dates back 30 years, when the Acres Mineral well was completed at Iola, which gave a small flow of natural gas. After several wells had been drilled near this location a vigorous well was found in 1893, which flowed about 3,000,000 cu. ft. in 24 hours. In 1892 the gas began to be introduced successfully in a small way.

Centrifugal Ventilating Machines.

BY F. ERNEST BRACKETT.*

The centrifugal ventilating machine has, from time to time been the subject of numerous investigations. Perhaps every phase in the design of this interesting machine has been more or less fully covered; in fact, the student sometimes finds several conflicting theories advanced concerning the same phase of the subject. The fundamental question of the best size of fan for a given piece of work has not entirely escaped this confusion.

The practice of assuming the number of revolutions (which, with the given water

size of the fan could not be made a function of the equivalent orifice alone. If it were so made, the equation would give us the same size of fan for an infinity of different sets of volumes and water-gauges, a result which every practical engineer will recognize as absurd. Some engineers have a loose, and more or less empirical, method of correlating the size of the fan to the volume of air; it is with this method, and the scientific basis upon which it rests, that the present discussion is concerned.

Whatever method may be used for determining the size of fan, the object sought is to obtain that size which will give the

lost work to be divided into two parts: First, the power lost in revolving the wheel; second, the power lost in getting the volume of air through the fan.

The friction of the wheel may be considered proportional to its weight, and the weight in similarly proportioned fans, varies as the cube of the diameter. The power lost in revolving the wheel is equal to its frictional resistance multiplied by the number of revolutions. Or:

$$L_1 \propto D^3 n,$$

where L_1 is the power lost; D the diameter, and n the number of revolutions¹. But the number of revolutions required varies directly as the square root of the water gauge, for equal diameters; and inversely as the diameter, for equal water gauges. Or:

$$n \propto \frac{\sqrt{h}}{D},$$

where h is the water gauge.

By substitution,

$$L_1 \propto D^2 \sqrt{h}.$$

The pressure lost in getting the required amount of air through the fan varies as the square of the velocity of the air traversing the fan. In fans similarly proportioned this velocity varies directly as the volume, and inversely as the square of the diameter. Or:

$$\text{Pressure} \propto \left[\frac{V}{D^2} \right]^2 = \frac{V^2}{D^4},$$

where V is the volume of air required.

This pressure is the pressure per square foot of orifice of passage. The total pressure required to pass the air will be found by multiplying this pressure by the area of that orifice. As this orifice may be considered as varying with the square of the diameter, we may write:

$$\text{Total pressure} \propto \frac{V^2}{D^4} \times D^2 = \frac{V^2}{D^2}.$$

The work required to put the air through the fan is equal to the total pressure, multiplied by the velocity. Or;

$$L_2 \propto \frac{V^2}{D^2} \times \frac{V}{D^2} = \frac{V^3}{D^4},$$

where L_2 is the lost work.

The total lost work L , is the sum of L_1 and L_2 ; or:

$$L = A D^2 \sqrt{h} + \frac{B V^3}{D^4},$$

where A and B are constants.

In order that the fan may give maximum efficiency in a given piece of work, L must assume a minimum value. Examining the above equation for a minimum, with reference to D , we have:

$$\frac{dL}{dD} = A^1 D \sqrt{h} - \frac{B^1 V^3}{D^5} = 0.$$

Solving for D , we get:

$$D = \sqrt[6]{\frac{B^1 V^3}{A^1 \sqrt{h}}}$$

whence:

$$D = \sqrt[6]{\frac{B^1}{A^1}} \times \sqrt[12]{\frac{1}{h}} \times \sqrt[3]{V}.$$

¹[In the absence of a sign for variation in our fonts, this expression is represented by the letter alpha throughout this article. Ed.]

TABLE I.
GUBIAL FANS.

Serial No.	Source	Diameter ft.	Width ft.	Volume cu. ft. per min.	Water gauge in.	Mechanical Effic.	$\sqrt{\text{Vol.}}/\text{Diam.}$	Remarks	
1	M	24	8	57,792	1.60	.6489	10.02		
2	M	30	10	109,838	3.20	.6092		Shutter not adjusted.	
3	M	Same	fan	107,520	2.60	.6502	10.93	Shutter adjusted.	
4	M	30	10	104,290	2.95	.6524	10.76		
5	M	Same	fan	90,475	2.80	.6204			
6	M	Same	fan	114,675	3.30	.5979			
7	M	36	12	158,879	3.70	.5878	11.07		
8	M	36	12	128,540	2.80	.6464			
9	M	Same	fn	182,000	5.00	.6641	11.85		
10	M	46	15	120,454	1.37	.5847	7.54		
11	M	Same	fan	155,565	2.45	.5546			
12	M	36	12	167,778	1.10	.6960			
13	M	Same	fan	243,770	1.90	.7214	13.71		
14	M	45	15	213,165	2.95	.7078	10.26		
15	M	36	12	114,231	3.00	.6306			
16	M	Same	fan	120,725	3.00	.6464	9.65		
17	M	36	12	151,000	2.05	.7015	10.79		
18	M	40	12	303,000	3.20	.7200	13.76		
19	E	50	12	108,500	3.30	.423	6.60		
20	E	46	14.83	247,000	1.85	.529	10.80		
21	E	40	12	170,500	1.46	.479	10.30		
22	F	39.4	8.2	121,800	2.17	.543	8.90		
23	F	Same	fan	136,000	3.30	.511			
24	F	Same	fan	159,000	4.22	.522			
25	F	39.4	8.2	52,000	2.87	.399			
26	F	Same	fan	61,400	4.10	.448	6.30		
27	F	Same	fan	705,000	5.79	.427			
28	F	29.5	6.9	68,600	3.07	.520			
29	F	Same	fan	68,600	4.02	.522	8.90		
30	F	Same	fan	71,500	4.85	.471			
31	F	19.0	6.4	97,100	3.15	.598			
32	F	Same	fan	105,000	3.54	.595			
33	F	Same	fan	112,000	4.25	.608	17.50		
34	B	28.0	7.67	29,000	0.41	.3481			
35	B	Same	fan	60,000	1.58	.5606			
36	B	Same	fan	113,500	3.80	.8130	12.00		
37	B	Same	fan	150,000	0.40	.6119			
38	B	Same	fan	292,000	1.20	.5890			
39	B	Same	fan	476,000	3.00	.7080			
40	P	32.8	9.85	97,500	1.69	.410	9.50	No Shutter. Maximum Efficiency.	
Average								10.56	

TABLE II.
GUBIAL FANS.

Serial No.	Source	Diameter	Width ft.	Volume cu. ft. per min.	Water gauge in.	Mechanical Effect	$\sqrt{\text{Vol.}}/\text{Diam.}$	Remarks
31	F	19.0	6.4	97,100	3.15	.598	16.40	From Table I.
2	M	30	10	109,838	3.20	.6092	11.05	From Table I.
19	E	50	12	108,500	3.30	.423	6.60	From Table I.
				Value for C=11.05				
38	B	28	7.67	292,000	1.20	.589	19.30	From Table I.
13	M	36	12	243,770	1.90	.7214	13.71	From Table I.
20	E	46	14.83	247,000	1.85	.529	10.80	From Table I.
				Value for C=13.71				
				Average value for C=12.38.				

gauge, would determine the diameter of the fan) is hardly preferable to arbitrarily assuming the diameter at once. Some writers prefer to correlate the size of the fan to the equivalent orifice of the mine; but it does not seem that any wholly successful method of doing this has been devised. At least it would seem that the

*Mining and civil engineer, Cumberland, Md.

maximum mechanical efficiency on a definite piece of work. If the fan is too large, the passive resistance (due to its weight) reduces its efficiency; if it is too small, its high resistance to the flow of air destroys its economy. Between these extremes there must exist a happy medium.

Following this idea, let us consider the

The factor $\frac{1}{h}$ varies inversely as the water gauge. Within the limits of practice, however, the twelfth root of this factor may be considered constant. Therefore by substituting the constant $\frac{1}{C}$ for

$$\sqrt[6]{\frac{B^1}{A^1}} \times \sqrt[12]{\frac{1}{h}}$$

we get the simple formula:

$$D = \frac{1}{C} \sqrt{V}$$

efficiency of the fan, nor does it even imply a high efficiency. The efficiency of any fan varies, no doubt, with the water gauge when the volumes are constant. However, the equation does imply that the greatest possible efficiency, of a certain type of fan on a certain piece of work, is obtained when:

$$D = \frac{1}{C} \sqrt{V},$$

where C is the type constant.

TABLE III.
GUBBAL FANS.

Serial No.	Source	Diameter ft.	Width ft.	Volume cu. ft. per min.	Water gauge in.	Mechanical Effic.	$\sqrt[4]{\text{Vol.}}$ Diam.	Remarks
31	F	19.0	6.4	97,100	3.15	.598	16.40	From Table I.
36	B	28	7.67	113,500	3.80	.813	12.00	From Table I.
16	M	30	10	107,520	2.60	.6502	10.93	From Table I.
22	M	30	10	104,290	2.95	.6524	10.76	From Table I.
19	M	36	12	128,540	2.80	.6464	9.96	From Table I.
16	M	36	12	120,725	3.00	.6464	9.65	From Table I.
22	F	39.4	8.2	121,800	2.17	.543	8.90	From Table I.
19	E	50	12	108,500	3.30	.423	6.60	From Table I.

Value for C=average from No. 36 to No. 16 inclusive=10.66.

TABLE IV.
GUBBAL FANS.

Serial No.	Source.	Diameter ft.	Width ft.	Volume cu. ft. per min.	Water Gauge in.	Mechanical Effic.	$\sqrt[4]{\text{Vol.}}$ Diam.	Remarks.
13	M	36	12	243,770	1.90	.7214	13.71	From Table I.
14	M	45	15	213,165	2.95	.7078	10.26	From Table I.
17	M	36	12	151,000	2.05	.7015	10.79	From Table I.
18	M	40	12	303,000	3.20	.7200	13.76	From Table I.
36	B	28	7.67	113,500	3.80	.8130	12.00	From Table I.

Value for C=average = 12.10.

TABLE V.
CAPELL FANS.

Serial No.	Source	Diameter ft.	Width ft.	Volume cu. ft. per min.	Water gauge in.	Mechanical Effic.	$\sqrt[4]{\text{Vol.}}$ Diam.	Remarks
1	C	25		300,049	3.6	.7467		Full speed could not be run on this fan because of temporary lack of boiler pressure.
2	C	Same	fan	358,294	4.7	.7461		
3	C	Same	fan	392,957	5.4	.7479		
4	C	Same	fan	418,708	6.2	.7698	25.9	
5	C	Same	fan	409,408	6.2	.7427		
6	C	16	6	153,000	1.7	.7530		
7	C	Same	fan	240,000	4.7	.8300		
8	C	Same	fan	270,000	7.5	.8500	32.5	
9	C	16	5	254,701	7.875	.846		
10	C	Same	fan	257,491	8.187	.915	31.7	
11	C	Same	fan	223,184	8.062	.756		
12	C	Same	fan	227,180	6.062	.845		
13	C	Same	fan	216,021	6.187	.872		
14	C	Same	fan	197,925	6.250	.881		
15	C	Same	fan	168,142	5.125	.753		
16	C	Same	fan	145,899	4.375	.719		
17	C	Same	fan	153,816	4.500	.782		
18	C	Same	fan	153,062	4.000	.775		
19	C	Same	fan	146,276	3.625	.806		
20	F	12.3	6.56	72,000	3.39	.606		
21	F	Same	fan	89,100	4.34	.650	24.3	
22	F	Same	fan	99,500	6.10	.647		
23	F	8.21	5.90	27,500	1.06	.701		
24	F	Same	fan	36,800	1.89	.739		
25	F	Same	fan	40,600	2.52	.656	23.3	
26	F	11.8	5.25	40,600	2.33	.492		
27	F	Same	fan	46,000	2.84	.508	18.1	
28	F	Same	fan	48,000	3.11	.447		
29	C	18.0	8.0	257,960	1.95	.760		
30	C	Same	fan	314,689	3.50	.786		
31	C	Same	fan	367,730	4.60	.766		
32	C	Same	fan	462,266	7.08	.792	37.8	

Here C is a constant depending upon the type of the fan. It may be called the "type constant."

The fulfilment of this equation does not necessarily involve the highest possible

Such an equation (derived as it is from more or less doubtful, though logical, assumptions) would be of little value if it were not verified by experiment. Strictly speaking, the verification of the formula

given above could only be accomplished by substituting fans of exactly similar construction, but of different diameters on the same piece of work. The diameter giving the greatest mechanical efficiency could then be used to find C by the equation:

$$C = \frac{\sqrt{V}}{D}$$

If a number of different works were experimented with in this way and the formula given above were correct, then the values of C, as found from different works, would be the same. Such a proceeding is, of course, nearly impractical, and we are therefore thrown upon other resources to test the truth of our formula.

With this end in view, the accompanying tables of data on several different types of fans have been collected. A number of disturbing factors necessarily enter into their use in establishing the type constant:

In the first place the efficiencies given, in many cases, are known to include the friction of the engine and driving mechanism. In every case the efficiencies are believed to include this.

In the second place, the Prussian Commission corrected its water gauges for the velocity of the air at the point of observation. This procedure is, no doubt, technically correct. It involves a deduction from the observed water gauge on an exhaust fan, and an addition to the observed

water gauge of a blower equivalent to $\frac{v^2}{2g}$ reduced to water gauge. The effect of this is to reduce the apparent efficiency of an exhaust fan, and to increase the apparent efficiency of a blower. In many other cases, this correction is known not to have been made; and, because it is not customary, it is believed all other experiments show the results from observed water gauges. The Prussian Commission however, tested its fans under a number of different mine resistances; then by means of curves they computed the maximum point of efficiency obtainable from the fan. As will more fully appear, this is a valuable piece of information for our present purpose. Some of its work has therefore been included.

Third, some of the fans may have been blowers. As previously explained, the comparison of these with exhaust fans by means of observed water gauges would result in an error. However, there is only one known blower in the entire set of tables. It is believed that all others are exhaust fans.

Fourth, fans of the same type differ in their proportions and construction, and, for our purpose, are therefore more or less incomparable.

It is of course impossible to take entire cognizance of all these disturbing factors; still, for want of something better, we must be satisfied with the data at hand.

In the accompanying tables credit is due to certain sources of information. The let-

ters in the tables correspond with those given below².

Table I is a collection of tests on Guibal fans. Table II shows two sets of three fans, each selected from Table I for comparison. The work to be performed is approximately equal for each set. The efficiencies show that fans 31 and 38 are

too small for the work, and that 19 and 20 are too large. The fans numbered 2 and 13, having intermediate diameters and showing greater efficiencies than either the larger or smaller fans of their sets, may be taken as giving the approximate value of C. Averaging we get C = 12.38

work, we can average all fans over 70% efficiency. Table IV shows the result of this selection. The value of C by average, is 12.10.

Item. No. 40 of Table I represents the maximum efficiency which can possibly be obtained from the fan. The efficiency given, although low, is not comparable with the other efficiencies of the table because the Prussian commission corrected the water gauges as previously explained. Now a fan at its maximum efficiency will probably be more economical than any other size fan of its type on that particular work. The value of $\sqrt[4]{V} \div \text{Diam.}$ may therefore be taken as the value of C. Let us consider experiment No. 36 as a fan also at its maximum efficiency. Averaging No. 36 and 40, we get C = 10.75.

The general average from Table I may be taken as representing average practise.

Giving each of these values equal weight in a final average we have:

- (A) By comparing fans on nearly equal works..... C = 12.38
 - (B) By comparing fans on related works..... C = 10.66
 - (C) By averaging fans of high efficiency..... C = 12.10
 - (D) By averaging fans at maximum efficiency..... C = 10.75
 - (E) Average practise..... C = 10.56
- Average..... C = 11.3

The remaining tables relate to other types of fans; they are, of course, subject to the same methods of study. Unfortunately the amount of material at hand is not sufficient for the complete application of these methods, and the values of C derived from them by inspection cannot be considered as having the same weight as the value given for Guibal fans.

Table V gives a number of experiments on Capell fans. Judging from the efficiencies, experiments 8 and 10 may be averaged for the value of C. The result is C = 32.1.

Table VI, of the Schiele fans, affords scant material for a conclusion. We would give preference to experiment 4, because this represents maximum efficiency, and because experiment 2 shows a slight decrease in efficiency below experiment 1. For the Schiele, then, C = 34.2.

Table VII shows experiments on the Ser fan. The best efficiency makes C = 42.7.

The Rateau fans, given in Table VIII, show a curious contradiction. A comparison between experiments 4 and 8 favors the value of C as 33.3, which the high efficiency of experiment 4 confirms. But a comparison between No. 1 and 10 directly contradicts this result. The discrepancy is explained by the fact that No. 1 was on a blower, No. 10 being on an exhaust fan. For this reason experiments No. 1, 2 and 3 are not comparable with the remainder of the table. We should therefore put C = 33.3 for Rateau fans.

Table IX gives data on several fans of the open running or Waddle type. The scarcity of experiments and the low

TABLE VI.
SCHIELE FANS.

Serial No.	Source	Diameter ft.	Width ft.	Volume cu. ft. per min.	Water gauge in.	Mechanical Effic.	$\sqrt[4]{\text{Vol.}} \div \text{Diam.}$	Remarks
1	E	9.5	1.67	106,400	2.03	.493	34.4	
2	E	17.0	2.08	157,000	1.91	.461	33.0	
3	P	4.25	0.52	43,000	1.20	.219	48.7	
4	P	5.08	0.66	30,200	2.02	.447	34.2	Greatest of 4 Exper. Maximum Efficiency.

TABLE VII.
SER FANS.

Serial No.	Source	Diameter ft.	Width ft.	Volume cu. ft. per min.	Water gauge in.	Mechanical Effic.	$\sqrt[4]{\text{Vol.}} \div \text{Diam.}$	Remarks
1	F	4.6	0.79	18,400	1.46	.401		
2	F	Same	fan	21,900	1.85	.384		
3	F	Same	fan	26,500	2.25	.430	35.4	
4	F	5.25	0.91	41,600	1.93	.503		
5	F	Same	fan	50,600	2.67	.574	42.7	
6	F	Same	fan	54,000	3.06	.562		
7	F	6.56	1.81	76,100	1.62	.429		
8	F	Same	fan	87,600	2.36	.438		
9	F	Same	fan	101,500	2.67	.481	48.5	
10	F	8.21	1.48	52,900	0.95	.457		
11	F	Same	fan	65,400	1.38	.505	31.1	
12	F	Same	fan	83,600	2.08	.479		

TABLE VIII.
RATEAU FANS.

Serial No.	Source	Diameter ft.	Width ft.	Volume cu. ft. per min.	Water gauge in.	Mechanical Effic.	$\sqrt[4]{\text{Vol.}} \div \text{Diam.}$	Remarks
1	F	6.56	.525	49,000	1.22	.481	33.8	Blower Fan.
2	F	Same	fan	52,600	1.81	.457		
3	F	Same	fan	58,100	1.89	.483		Doubtful Experiment.
4	F	6.56	.525	48,000	2.64	.839	33.3	
5	F	Same	fan	50,100	3.19	.818		
6	F	Same	fan	56,600	3.74	.826		
7	F	9.20	.755	38,700	1.77	.350		
8	F	Same	fan	46,800	2.83	.417		
9	F	Same	fan	59,500	4.30	.470	26.6	
10	F	9.20	.737	54,000	1.30	.687		
11	F	Same	fan	68,400	2.05	.692		
12	F	Same	fan	75,500	2.67	.775	29.9	

TABLE IX.
MISCELLANEOUS FANS.

Serial No.	Source	Diameter ft.	Width ft.	Volume cu. ft. per min.	Water gauge in.	Mechanical Effic.	$\sqrt[4]{\text{Vol.}} \div \text{Diam.}$	Remarks
1	E	45.0	1.45	163,300	3.08	.528	8.96	Waddle Fan.
2	E	Same	fan	153,500	2.80	.505		
3	P	5.25	.985	18,900	1.29	.252	26.1	Winter Fan.*
4	P	9.85	1.15	31,000	1.53	.277	17.9	Moritz Fan.*
5	P	9.85	1.15	39,000	2.40	.360	20.0	Moritz Fan.*

*3, 4 and 5 represent condition at maximum efficiency.

²M. D. P. Mason, Mining and Civil Engineer, Newcastle-on-Tyne, England, 1876.

E. "Rapport de la commission des ventilateurs mécaniques nommée," 1878. Soc. des Ingen. du Nord de l'Angleterre. Traduit par M. D. Murgue. Bull. de la Soc. de L'Indust. Min.

F. "Les Ventilateurs de Mines," by H. Mativa, E. Desvachez, I. Isaac, N. Evrard. Communicated, 1892 par M. E. Desvachez, to Assoc. des Ingen. sortis de l'Ecole de Liège. Rev. Univ. des Mines et de la Métall.

P. "Commission Prussienne du Grisolw, 'Rapport' by M. Althaus, 1886. Traduit par MM. D. Murgue et P. Brun. Bull. Soc. de L'Indust. Min.

B. J. T. Beard, ENGINEERING AND MINING JOURNAL, August 5, 1905.

C. William Clifford, American manufacturer of Capell fans, Jeannette, Pa., 1905

Table III shows all the fans in Table I whose volumes lie between 90,000 and 130,000, and whose water gauges lie between 2 in. and 4 in. The same "dropping off" is observable in the efficiency for both large and small fans. As the value of C approximately lies between No. 36 and 16, inclusive, we can average $\sqrt[4]{\text{Vol.}} \div \text{Diam.}$, between these points for the value of C. The result is C = 10.66.

Upon the assumption that all fans of high efficiency are well suited to their

efficiency given for the Waddle fan are not sufficient to form any opinion as to the value of C. The remaining fans represent maximum efficiencies and are therefore worthy of consideration. For the Winter fan, we would put C = 26.1; for the Moritz fan, C = 19.0.

We have then for our several fans the following equations for size:

Guibal, $D = \frac{1}{11.3} \sqrt{V}$

Capell, $D = \frac{1}{32.1} \sqrt{V}$

Schiele, $D = \frac{1}{34.2} \sqrt{V}$

Ser, $D = \frac{1}{42.7} \sqrt{V}$

Rateau, $D = \frac{1}{33.3} \sqrt{V}$

Winter, $D = \frac{1}{26.1} \sqrt{V}$

Moritz, $D = \frac{1}{19.0} \sqrt{V}$

Here V is the volume of air delivered in cu. ft. per min.; and D is the diameter of the wheel in feet, giving the best obtainable efficiency.

It would seem from this work given herewith, especially on Guibal fans, that the truth of the formula is well supported, if not entirely established, by practice.

The values of the type constants clearly illustrate the two recognized systems of centrifugal ventilation. The first system (of which the Guibal is almost the only exponent) contemplates a large wheel working at a low velocity. In the second system, a much smaller wheel driven at a much higher velocity is used.

Judging from the high efficiencies of some of the smaller wheels, it would seem that the obtainable economy of centrifugal fans had been a little increased by the reduction in size. Some of this apparent increase is, no doubt, due to calculations made on apparent water-gauges, the high velocity of the air causing a greater error of observation. Also the more economical arrangement of parts (and perhaps better engines) may be showing their effect on efficiency. We think it would be fair to conclude that the smaller type of fans could be built to give at least as great an economy as the larger ones. The objection to the high speed of the smaller type, as being more liable to break down, must bear some weight in favor of the larger size, especially when high water-gauges are required for fiery mines. However, the objection to high speed on that account is certainly not so great as it was fifty years ago; and as the smaller installations are usually cheaper, we think that the future will find these smaller types more and more in favor.

If the existence of a base metal alloyed with platinum is suspected, immerse the article in question first in boiling hydrochloric acid for a few minutes, then, after thorough rinsing with clean water, immerse in boiling nitric acid free from chlorine. Action indicates impurity.

Petroleum Production in California.

C. T. Deane, secretary of the California Petroleum Miners' Association, reports the statistics of crude oil in California in 1905, as follows:

District.	Total Production.	Field Stocks Dec. 31, 1904.	Shipments.	Field Stocks Dec. 31, 1905.	Wells Producing.	Wells Drilling.	New Derricks.
Kern River.....	14,000,000	10,500,000	9,500,000	15,000,000	680	6	5
Santa Maria and Lompoc.....	5,300,000	200,000	4,190,000	1,310,000	73	42	1
Los Angeles and Salt Lake.....	3,000,000	128,000	2,778,000	350,000	300	20	12
Coalinga.....	8,869,000	74,000	8,946,000	30,000	243	26	9
Fullerton and Brea Canyon.....	1,750,000	77,760	1,727,760	100,000	150	3	2
Puente and Whittier.....	960,000	138,200	938,200	160,000	94	8	6
Newhall.....	150,000	4,000	104,000	50,000	52	1	1
Ventura.....	350,000	60,000	350,000	60,000	246	2	2
Summerland.....	75,000	10,400	85,400	.....	120	1	1
Sunset.....	400,000	250,000	300,000	350,000	38	3	4
Midway.....	70,000	5,000	.....	75,000	21	3	3
McKittrick.....	720,000	120,000	720,000	120,000	90	2	1
Sargents.....	20,000	9,800	29,800	.....	5	2	0
Arroyo Grande.....	5,000	.....	.....	5,000	1	3	4
Halfmoon Bay.....	2,000	1,000	.....	3,000	3	1	1
Total.....	35,671,000	11,578,160	29,636,160	17,613,000	2116	123	52

NOTE—Field stocks include oil in receiving tanks awaiting shipment.

The production during the last four years has been as follows:

District.	1902.	1903.	1904.	1905.
Coalinga.....	500,750	2,138,058	5,114,000	8,869,000
Santa Maria and Lompoc.....	116,500	208,890	670,500	5,300,000
Kern River.....	8,872,115	16,342,100	17,500,000	14,000,000
Los Angeles.....	1,047,300	793,765	1,200,000	3,000,000
Sunset.....	144,200	353,100	400,000	400,000
Midway.....	50,000	29,200	910	5,000
McKittrick.....	639,500	1,353,500	1,875,925	720,000
Newhall and Ventura.....	626,540	683,500	663,100	500,000
Fullerton and Brea Canyon.....	1,195,015	1,427,700	147,500	1,750,000
Whittier and Puente.....	687,030	878,015	748,000	960,000
Summerland.....	94,550	131,000	120,000	75,000
Sargents.....	.....	.....	35,090	20,000
Halfmoon Bay.....	.....	.....	1,000	2,000
Arroyo Grande.....	.....	.....	.....	5,000
Total.....	13,973,500	24,337,828	28,476,025	35,671,000

Capping a Hoisting Rope.

A good way to cap a hoisting rope is said to be as follows: First, examine the rope and see that every necessary wire is present; then slip on three bands or hoops made of iron of varying sizes, the smallest going on first and the largest last. Then lap round the rope, at a distance of 9 or 12 in. from the end, some copper or galvanized wire; untwist the rope, and cut every alternate strand a little shorter than the rest so that, by doubling them back, we create the formation of a cone. Over this a tight wrapping with copper wire is necessary, which gives a cone-shape to the end of the winding-rope, largest at the end, and uniform all the way up. Upon this the cap is placed, which is first made hot and carefully shaped by the smith, so that it exactly fits the rope. The cap in shape is in the form of a loop with two long ears; when placed in position on the rope end, it is hammered down tightly onto the prepared cone. Finally, the hoops are driven down tightly into position, and should be equidistant from each other.

Natural gas in connection with a mantle of a rare earth (thoria, etc.) has produced the cheapest and best illuminant. Where natural gas can be had at 25c. per 1,000 cu. ft. and 50-candlepower can be obtained from the consumption of 2½ cu. ft. per hour with a mantle, the cost per candlepower per hour is but 0.00125 of 1 cent.

Tests of Brass Furnaces.

The tests reported herein are noted by George Perrott, foreman for the Canadian General Electric Company, at Petersborough, Ont., in *American Machinist* [Dec. 14, 1905, p. 810.] The furnaces tested were the Charlier and the Schwartz.

The oil used was measured with a meter, and the tests on the different furnaces were run on separate days in order that the same meter might be used on each. The metal was weighed into the furnace and was weighed out while hot, before being poured into the molds, so that no opportunity was afforded for any being lost.

Below is a tabulated report of the comparative performances of the two furnaces:

	Charlier.	Schwartz.
Total time of tests.....	9 hr. 37 m.	16 hr. 2 m.
Total number of heat.....	9	7
Av. length of each heat.....	1 hr. 4 m.	2 hr. 17 m.
Av. time metal was under blast.....	51 m.	2 hr. 9 m.
Av. weight of metal charged per hr.....	670.5 lbs.	323.7 lbs.
Av. weight of metal delivered per hr. by furnace	649.4 lbs.	293.0 lbs.
Oil consumed per 100 lb. of metal delivered.....	2.29 gals.	2.68 gals.
Av. shrinkage in all kinds of metal.....	3.13%	9.48%
Av. shrinkage in chips.....	4.9%	14.7%
*Av. shrinkage in soft brass	5.5%	5.9%
Av. shrinkage in special mixtures.....	1.7%	3.6%

*Note.—33% spelter used.

Unless fitted with a by-pass, it is best to place globe or angle valves so that pressure will be underneath the disc when closed.

THE ENGINEERING AND MINING JOURNAL

Contents.

Editorials:	
Hill Iron Ore Properties.....	233
Lake Ore Carriers	233
Fine Crushing in Ore Dressing.....	233
Rand Geology	233
Chinese Labor	234
The Steel Corporation	234
The Western Coal Mines.....	234
The Joplin District	234
Spelter Production in 1905.....	235
The Refractory Uses of Bauxite,	
<i>A. J. Aubrey</i>	217
Magnetic Separation in Wisconsin....	218
Marketing Bullion in London,	
<i>A. C. Claudet</i>	218
*Tailing Disposal by Gold Dredges,	
<i>J. P. Hutchins</i>	219
*Saw-Toothed Roof Construction.....	223
*The Allis-Chalmers Steam Shovel,	
<i>W. N. Tanner</i>	224
Natural Gas in Indiana.....	225
*The Colonial Coke Co.'s Plant.—I.	
<i>Editorial Correspondence</i>	226
Brazing Cast Iron	228
Centrifugal Ventilating Machines,	
<i>F. E. Bruckett</i>	229
Petroleum Production in California....	232
Capping a Hoisting Rope	232
Tests of Brass Furnaces	232
Oil Refining in Kansas	239
Scandinavian Mining Industry.....	241
International Geological Congress.....	241
Weight of Rubber Belting,	
<i>Robt. Anstee</i>	241
Metallies	236
Colliery Notes	237
Correspondence and Discussion:	
Spanish Mines as a Field for Invest-	
ment	<i>N. P.</i> 237
*A Dredge Bucket Joint.....	<i>A. M. H.</i> 238
Ferrocyanide Titration of Zinc,	
<i>E. M. Johnson</i>	238
Sulphur in Roasting,	
<i>Wm. E. Greenawalt</i>	238
Sand Launderers.....	<i>Grant D. Miller</i> 239
New Publications	239
Professional Papers	240
Abstracts of Official Reports:	
Le Rol No. 2, Ltd.....	240
Mount Lyell Mining & Railroad Com-	
pany, Ltd	240
Patents	241
Personal	243
Obituary	243
Societies and Technical Schools.....	244
Trade Catalogues	244
Construction News	244
Special Correspondence:	
San Francisco	244
Salt Lake City	245
Denver	245
Leadville	245
Butte	246
Duluth	246
Calumet, Mich.	247
Indianapolis	247
Platteville, Wis.	248
Joplin, Mo	248
Scranton	249
Toronto	249
Victoria, B. C.	250
Mexico	250
London	251
Paris	251
General Mining News	252
Foreign Mining News	255
Markets	255

*Illustrated.

Hill Iron Ore Properties.

A positive denial is given to the report that negotiations were in progress for the transfer of the so-called Hill iron ore properties, on the northern side of the Mesabi range, to the United States Steel Corporation. Such a transfer would have effected an important change; but it is announced that the Great Northern Railroad Company has no intention of parting with the properties. These holdings are of various value, but they constitute, as a whole, a large and important ore reserve, and the best policy is probably to hold these for the future.

Lake Ore Carriers.

The growth in size of Lake ore carriers is illustrated in a striking way by the records kept at the ore-docks of the Duluth, Missabe & Northern Railroad at Duluth. In 1895 the average cargo of all the vessels loaded there was 1,800 tons, and in 1896 was 2,202. By 1900 it had increased to 3,783 tons. The figures continued to grow, and in 1904 the average was 5,272 tons. With the number of new 10,000-ton boats there was a further rapid advance, and in the season of 1905 the average cargo was 6,101 tons, or much more than three times that of ten years ago. Nearly the limit of size for the present depths of channels on the Lakes has been reached; but the average size of cargoes will continue to increase, as the older and smaller vessels are gradually eliminated from the trade.

Fine-Crushing in Ore Dressing.

The disseminated copper ore of Bingham Cañon, Utah, which is now the subject of so much interest, is a porphyry in which chalcopryite is very finely interspersed. Fine-crushing is necessary to liberate the mineral; it appears to be requisite to crush the ore to pass a 30-mesh screen. This is uncommon in straight ore dressing, although not extraordinary. It was the first step in the solution of the treatment of some of the mixed sulphide ore, like that of Leadville, and is extensively practiced in that connection. The scale on which such fine crushing is to be done in these new Utah mills is, however, much beyond anything of similar character, and the selection of the machinery is a matter for careful consideration.

Rolls, ball-mills, Huntington mills and edge-runners are used for this purpose, but it is rather late in the day for the advocacy of stamps, which we believe have been seriously suggested in connection with one of the projected mills. Stamps are very inefficient granulators, because of their small screening surface and the inability of the ore to escape from the motor until reduced to excessive fineness. Their use in concentration mills has, therefore, been generally abandoned. Rolls on the other hand are thoroughly efficient granulators and can be used in wet crushing down to about 20-mesh with very good results, and with fair results down to 40-mesh, if there be not much talcose or clayey matter in the ore.

Rand Geology.

In the paper read by Dr. McClelland Henderson before the Geological Society of South Africa on Dec. 18, 1905, some significant new facts were advanced in support of the long-suggested identity of the Main and Nigel Reefs of the Rand. It is now confidently believed that the Nigel district has been linked, without a break or flaw in the chain of evidence, with the most easterly outcrops of the Modderfontein line, before they are obscured by the more recent deposits. For this conclusion the chief credit is due to the geologists whose influence has prompted financiers to sink large sums of money in the bore-hole exploration of virgin fields.

Commenting on Dr. Henderson's paper, Dr. Hatch said that the facts furnished by the Daggafontein bore-hole No. 6 were an important addition to the proof of the theory that the Nigel was identical with the Main Reef. The section of the beds cut in this bore-hole corresponds in every particular with the normal section of the Upper Witwatersrand formation from the Kimberley series to the Main Reef, as developed in the East Rand.

When, some time ago, the bottom bed of the Kimberley series, resting on the Kimberley slates, was found in Daggafontein bore-hole No. 3 to contain as much as an ounce of gold to the ton, many jumped to the conclusion that this must be the Main Reef, in spite of the plain evidence of the geological section.

Fortunately, the Daggafontein company placed sufficient reliance on its scientific advisers to bore in No. 6 bore-

hole to a depth of about 1,200 ft. below this Kimberley Reef, and it has been rewarded by striking the Main Reef, carrying good ore, at a depth of 3,692 feet. This result, combined with the excellent results obtained from samples of the reef recently cut in Geduld No. 2 shaft, should inspire confidence in the future of the Van Ryn-Nigel syncline as a gold-producing district.

Chinese Labor.

The reported statement of Mr. Stevens that Chinese labor must be relied upon for the construction of the Panama Canal brings home to us the problem which worried the mining interests of the Transvaal and found its solution in a resort to the teeming population of China. We referred to this contingency in some recent remarks concerning the action of the Liberal Government of Great Britain in forbidding the further importation of coolies into South Africa. It is to be expected that the subject will become one of political discussion here as it has been during the recent campaign in Great Britain. There will be the difference that in one case the question is one of private benefit primarily, although the welfare of a country depends upon the prosperity of the mining industry concerned; while in the other case the question is directly a national matter.

The determination of the American people to push through the Panama Canal is now so strongly fixed that previous convictions as to many things are likely to be ignored if necessary to provide the ways and means to complete the canal, convictions as to tariff questions as well as to labor. We may not be willing to admit Chinese labor to the United States, but we may readily reconcile ourselves to its introduction in Panama if we need it. An amusing feature of the campaign in Great Britain was the absurd argument made to the trades unions that if the Chinese should be kept out of the Transvaal there would be more opportunities for the British laboring man, which apparently has not been without effect. Such chaff will hardly catch the American with respect to Panama. There has not been manifest any great inclination to go there except in the higher salaried positions, which unfortunately must be recognized as limited in number.

The Steel Corporation.

The United States Steel Corporation report for the last quarter of 1905 gives us approximately complete figures for the best year the Corporation has had since its organization, with one exception. That was the boom year, 1902. In 1905 the first part of the year was comparatively quiet, and it was not until the second quarter was well advanced that the rising wave of prosperity began to be clearly visible. In our issue for Jan. 16, the net earnings for the fourth quarter were estimated at \$35,500,000. This was slightly above the actual result, the figures now given out being \$35,278,688, which brings the total for the year up to \$119,850,282. This was slightly below 1902, but it exceeded the total for 1904 by no less than \$46,673,759, or 63.8%; a gain which closely reflects the comparative conditions of the iron and steel trades.

The Corporation has taken advantage of its heavy earnings for the year to make large appropriations for repairs and improvements to its existing plants; for additions to plant in the form of new mills and furnaces; and for additions to its reserves of iron ore. All these measures are wise, since they are needed to maintain its leadership and control of the trade in the future. By cutting down or omitting entirely these appropriations, it would have been possible to pay some dividend on the common stock; but the question, apparently, was not raised by the managers, and returns on the common shares seem still remote. It must be remembered, however, that the very bulk and weight of the vast property makes constant improvement an imperative policy. To stand still is the first step toward decay and future disintegration.

The Western Coal Mines.

The convention of the United Mine Workers at Indianapolis ended last week, and this week the joint meeting of the miners and operators is in session, to formulate a new agreement to take the place of the present one, which will expire on April 1. This joint convention is still in its earlier stages, so that it is impossible to predict the outcome with any degree of certainty. The news which comes to us is, as is usually the case at such meetings, more or less colored by

the individual opinions of the observers, and is to be accepted with some degree of caution for that reason. On the whole, it may be said that the general tone of the conference is conciliatory rather than hostile, and an amicable settlement may be expected.

The demands of the miners of the Central West are, briefly, an increase of 12½% in the mining rate; a fixed differential of 7% between pick and machine mining, and a general run-of-mine basis. On the wage question, the operators propose a reduction, no definite amount being stated as yet; on the other points they have made no formal declaration. As we have heretofore said, the wage demands have been put on a high basis, to give room for a compromise. No reduction from the present rate is probable, and it is likely that the miners will be satisfied with the restoration of the 5½% reduction made in 1904. Anything beyond that is hardly possible in the present condition of the western coal trade, but such a settlement is possible and indeed probable.

Much discussion will undoubtedly arise over the general run-of-mine basis. The present agreement provides for a screened-coal basis in Pennsylvania and Ohio, and the operators there will find it hard to go back to the run-of-mine system which caused so much trouble in Illinois. The differential between pick and machine mining will also cause discussion, as it is so small as to discourage the use of machines.

At present, fortunately, the indications are for a final agreement; and it is to be hoped that the disaster of a general strike will be averted.

The Joplin District.

The Joplin district has just enjoyed a year of remarkable prosperity, the price for both lead and zinc ore having averaged remarkably high, wherefore although the output of each was less than in 1904, the proceeds of each were greater—very much greater in the case of zinc ore. The quantity of zinc was 11,385 tons less than in 1904, but its market value was 1,893,000 more. It is to be feared that there will be a further falling off in the output of zinc ore this year, even if the price continues high, for the reason that the new openings of ore are not compensating for the exhaustion of the

older mines. A large part of the Joplin output at the present time is derived from the "sheet ground." Some excellent mines are being worked in this "sheet ground," and at least one that is remarkable, but on the whole this class of ore deposit is rather lean and the cost of mineral obtained from it is high.

The profits of the Joplin miners have not by any means increased in direct proportion with the selling price of their ore, the cost of production having increased materially. In this connection an important feature has been the labor agitation, incited by the upholding of the constitutionality of the State eight-hour day law, introducing troubles from which the district had previously been remarkably free. There has not yet been any success in the unionization of the district, but efforts toward that end are still being made, and the poison has been introduced, which manifests itself in discontent and decreased efficiency.

This is particularly unfortunate at a time when attention needs to be directed toward reducing the cost of production, and will offset the savings which may be made through the introduction of cheaper power by electric transmission and the natural-gas pipe line. Forty dollars for ore used to look big in Joplin, but it does not seem so interesting now. In standing out for high prices the Joplin miner is not making exorbitant demands, as would be quickly manifest if the market for ore should be very much depressed. A satisfactory condition of the present situation in the business is the elimination of the old discontent with the smelters' bargaining for ore. The Joplin ore is now bought on a small margin, and from the smelters' standpoint it is a luxury which cannot be freely enjoyed. Its excellence is such that there will always be active competition for it and the miners can feel that they are receiving their full share of its value.

Spelter Production in 1905.

According to the statistics of Henry R. Merton & Co., Ltd., which have just been published (with very commendable promptness) the production of spelter in Europe and America in 1905 was 647,585 long tons, against 615,290 in 1904 and 562,325 in 1903. This represents practically the total spelter production of the world, the only omissions being the out-

puts of Sweden and Norway, Saxony and Australia, which in the aggregate are comparatively insignificant. The total zinc production of the world is, however, about 7.5 per cent larger than the spelter production, because of the important output of zinc oxide in the United States, which is produced directly from ore. The statistics of Messrs. Merton in detail are as follows:

Country.	1905.	1904.	1903.
Belgium.....	143,165	137,780	129,000
Rhine district.....	66,185	64,360	61,315
Holland.....	13,550	12,895	11,515
Great Britain.....	50,125	45,490	43,415
France and Spain.....	49,575	48,310	41,780
Silesia.....	127,895	123,695	116,835
Austria and Italy.....	9,210	9,100	9,025
Poland.....	7,520	10,440	9,745
United States.....	180,360	163,220	139,695
Total	647,585	615,290	562,325

The production reported for the United States corresponds to 202,000 short tons, which is just one per cent more than we reported in our issue of Jan. 6, our figure being 199,964 short tons—certainly a satisfactory agreement between statistics collected independently and with such great promptness in both cases. This great spelter production in the United States puts this country very near to the leading position, which it is likely to take within three or four years. The aggregate output of Silesia and the Rhenish districts in 1905 was 194,080 long tons, and this is practically equivalent to the output of Germany entire, the produce of the works at Freiberg, Saxony (which are not included) being only a few hundred tons. As a producer of zinc the United States has been in the lead for several years, because of its large production of zinc oxide. In 1905, this amounted to 65,403 short tons, equivalent to 52,322 short tons (46,716 long tons) of zinc. The total production of zinc in the United States in 1905 was, therefore, considerably upward of 250,000 short tons.

The Merton statistics of spelter are presented now in more valuable form than formerly, inasmuch as the outputs of Belgium, Holland and the Rhine, which used to be lumped together, are reported separately. The production credited to "France and Spain" is mostly due to the former, there being only one smelter in Spain. Similarly, there is only one smelter in Italy, and its output being very small, the figures credited to "Austria and Italy" are due chiefly to the former.

Every country showed an increase in 1905 except Poland. The falling off in Poland was probably due to the internal disturbances in Russia; we know of no other reason. The largest proportional

increase was made by the United States, which gained 10.5 per cent. Great Britain was, however, only a trifle behind, its gain having been 10.2 per cent. The progress in spelter production in Great Britain during the last few years has been particularly noteworthy. In 1901, its output was only 30,055 long tons, or six per cent of the world's output; in 1905 it was nearly eight per cent of the world's total. The minor position occupied by the British smelters previous to 1901, and even at the present time, was and is due to their own backwardness. Great Britain has much greater resources of zinc ore than some of the Continental countries which are important in the smelting business—Holland, for example, which has no ore at all; and Belgium, which has only a little left of its once grand resources. These countries are dependent upon foreign mines for their ore supply. Great Britain with its abundant supply of fuel, admirable seaport locations, and important ocean traffic is in an equally good position, save for some disadvantage with respect to wages for labor.

We may confidently expect that before long Great Britain will acquire a much more important position in the zinc smelting industry. There is now on foot a movement to utilize more extensively the vast zinc resources of Broken Hill, where there is literally "in sight" and developed a greater tonnage of zinc ore than few, if any, other districts can show. Three strong companies, owning those vast resources of ore, are making plans to undertake the smelting of it, and we understand that in this connection the establishment of smelteries in Great Britain is projected. Developments on this line will be awaited with interest. In the meanwhile increased attention is being devoted to zinc mining in Great Britain, and there was in 1905 more activity in that direction than for a long time.

It is worthy of remark that the great increase in the world's production of spelter since 1901 has been on a strongly rising market, the average price at London having been £17 os. 6d. in 1901; £18 11s. in 1902; £20 17s. 5d. in 1903; £22 9s. 7d. in 1904; and £25 4s. 8d. in 1905. This shows the great demand for the metal in the consuming industries, and indicates sound basic conditions from the producer's standpoint, which cannot fail to be satisfactory.

Metallics.

A cubic yard of coursed rubble requires, in order to allow for waste, about 1.2 cu. yd. of stone and 0.2 cu. yd. of mortar.

Aluminum-bronze is very difficult to cast in large sections. The great shrinkage, the excessive amount of dross, and the cost all prevent the more extensive use of this alloy.

Natural gas is the source of fuel or power when exploded in the gas engines used in drilling and pumping the thousands of gas and oil wells, and in operating the pumping plants which collect the petroleum and force it through pipe lines to markets.

The holes that are drilled for plunger elevators of high lift are perhaps the most perfect example of straight drilling known. A clearance of $1\frac{1}{2}$ inch around the casing is usually sufficient to allow for irregularities in the most difficult installations.

Some of the worst accidents in mining are due to men drilling into the sockets of holes they have themselves blasted, examined and judged perfectly safe. These accidents do not happen to learners, but to old miners, grown careless by long immunity.

It is imperative for good and safe work that a finished hole should be big enough at the very bottom to receive the cartridge intended for it without the exertion of undue pressure to force it home. In most cases the explosive will be most effective if concentrated as near the bottom of the hole as possible.

A diamond drill hole put down 1,000 ft. through amygdaloidal trap, sandstone, quartzite and conglomerate by the Black Bay Mining Company on the east side of Black Bay, Lake Superior, in 1904, cost \$1.03 per ft., the cost of diamonds being 28c. per ft.; other operating costs, 67c. per ft., and contractor's profit 8c. per ft.

The mortar-mixer who has had long experience on various classes of work is able to give points to the engineer. The extra wages paid to such a man will be more than over-balanced by the saving he is able to effect in material. It is like everything else; one must be familiar with the properties of the material to be used before its intelligent use is practicable.

The town of Fredonia, Chautauqua county, New York, used natural gas as far back as 1821 from natural flows and shallow wells, and has the honor of first making use of it as a source of light and heat. During 1904, by deeper drilling, seven very fair natural-gas wells were found near Silver Creek, in this County.

One of the oddities of our nomenclature is that the combination of metals

known as german silver contains no silver in its composition and is of Chinese and not of German origin. It was first introduced into Europe by the Germans, and for some time it was not generally known that they had simply borrowed it from the Chinese.

In the operation of a rock drill, power is of prime importance; 80 lb. air pressure is about right. It is false economy to equip a man thoroughly in other respects for rock drilling and then handicap him with a low air pressure. Theoretically, it is of interest to know that a machine will run at 40 lb. pressure, but there is no machine made which will pay when run under such conditions.

A high-altitude air compressor is designed to compress the lighter air in high altitudes to the same gauge pressure that another machine produces when working at sea level. At any appreciable altitude above sea level a larger number of compressions are required to produce the same sea-level gauge pressure. This is arranged by increasing the area of the air cylinder in the high-altitude compressor, and the valves are set so as to effect an earlier cut-off.

A Ferraris ball-mill, at Monteponi, Sardinia, crushed in 541 days, 5,000 metric tons of dolomite, mineralized with galena, blende and calamine, the crushing being at the rate of 1,000 kg. per hour. The material was delivered to the mill in sizes from 50 mm. upward, and was crushed to pass a 5 mm. screen. The consumption of balls was 0.074 kg., and of lining plates 0.048 kg., showing a total consumption of 0.122 kg., or 0.268 lb. of steel per 1,000 kg. of ore crushed.

There is a valuable discussion in the Western Australian Report on mine ventilation as to the vexed question of what constitutes adequate ventilation. The result arrived at is, that the quantity of air required does not depend so much on the number of workers, as on the condition of the individual parts of the mine, *i. e.*, one place may require 100 cu. ft. per minute, another 200 and another 400, to make it decent for working in. This is what the British regulations require, *viz.*, "a fit state for working."

From Chicago comes an indictment against the pneumatic tools that are used in constructing steel-frame buildings. It is declared that a number of people have had their eyes seriously injured by small particles of steel which are detached by these tools and sent floating through the atmosphere. These are said to have been found imbedded in the eyes of patients who had no suspicion of the cause of the trouble, and they are reported to have seriously injured the eyesight of a number of horses as well.

The head being constant, the velocity of

the water at the delivery nozzle of an impulse wheel is constant, and the horse power varies directly with the water supply. By changing the dimensions of the wheel carrying the buckets, the rotative speed is changed, while the speed of the water remains constant at all times. With constant field strength on an alternating current generator driven in this manner the voltage will be directly proportional to the rotative speed and, as the cycles are also proportional to the rotative speed, it will be seen that the volts and cycles vary in a fixed ratio to each other.

For coarse screening, say down to 0.25 in. openings, cylindrical trommels with perforated steel plate give the best service. From this size down to 0.1 in. openings cylindrical trommels with wire cloth are preferable. (0.1 in. corresponds to about 5 mesh, No. 13 wire). For finer meshes the hexagonal form of trommel is to be preferred. The proper peripheral speed of hexagonal fine-screens is about 180 ft. per min. The angle of the slope should not exceed 10° from the horizontal. Large screening surface means greater output and less repairs, owing to the thinner streams passing through and less weight on the fine wire cloth of the screens.

It is sometimes advised to use 60 lb. air pressure for rock drills with a view to reducing the coal bill, the argument being that the men will drill only four holes at best, that 60 lb. pressure will suffice to put in four holes in a shift, and that it is therefore wasteful to burn the extra coal required to keep a higher pressure. If the assumption of four holes were correct, this might be sound policy, but it is only partly correct. Most men on development regularly do more than four holes per shift, with good air, and now and again in every mine some stopers will exceed that number. The adoption of a low pressure standard would effectively prevent the most willing men from doing more than four holes, reducing good and bad to the dead level of mediocrity.

In comparative tests of the crushing strength of brick the method of bedding the specimens is very important. Some years ago when the fever for cement brick was in the air a number of Philadelphians were invited by the Atlantic City Cement Brick Co. to inspect its plant, and were showed some remarkable results in tests of the crushing strength of the brick as compared with common hard clay brick. Investigation revealed that the reason for the apparent superiority of the cement brick was the fact that they had an approximately true bed while the clay brick had a rough bed, and the crushing test of the latter was really more of a transverse test. When the clay bricks were given a true surface their resistance was very much increased and was much higher than that of the cement brick.

Colliery Notes.

Faults in coal seams are liable to cause trouble from a broken roof, or water or gas inflows. They should always be approached with caution.

The top man and the bottom man should always be on duty, and sufficient lights maintained at the top and bottom landings of all collieries when the men are being hoisted and lowered.

At least five minutes should be allowed to elapse before any one is allowed to return to a missed shot, unless the firing is done by electricity, and then only when the wires have been disconnected from the exploding device.

The back airways afford the best means of carrying water drains. When this plan is adopted the hauling roads can be kept perfectly dry without any special expense for ditching headings. An additional advantage is that the ventilating currents are not contaminated by stagnant water and damp earth.

The mine foreman or his agent should make it a rule to be at his post at the mine when the men are lowered in the morning for work; he should keep a record of the number of men lowered either for day or night shifts, and he or his agent should remain at night until all the men employed during the day have been hoisted out.

Mine fires are chiefly caused by gas or coal-dust explosions, spontaneous combustion of coal or pyrite, accidental ignition of timber or debris, and blown-out shots or electric currents. The chief preventive measures are good ventilation, proper drainage, avoidance of accumulations of debris and coal dust, and careful attention to all electrical wires.

The panel system of working coal seams is often better than the ordinary room-and-pillar system when much gas is given off, as it affords the means of ventilating each section of the mine, and the ventilating currents are most easily controlled. Consequently in the event of any explosion happening in one panel, there is less liability of it spreading to the other panels.

The common method of closing breakthroughs with lumber and by building slate and bone coal walls and filling in with fine coal is extremely uneconomical, and is often a source of danger through leaks and permitting the spread of mine fires. All permanent stoppings between intake and return airways in the main entries should be made of stone masonry, or brick laid in lime or cement.

In timbering rooms the posts should be set as systematically as possible, in rows parallel to the face and at regular distances apart. Every post should have a good tight-fitting cap-piece of suitable thickness. Timbering should be kept well advanced with the work, and whenever

possible iron bars should be driven into the working face to prevent falls of roof while undercutting is in progress.

A separate map should be made of the surface whenever objects are so numerous as to obscure the details of the mine workings if drawn upon the same sheet with them; in such case the surface map should be drawn on transparent cloth or paper, so that it can be laid upon the map of the underground workings, thus indicating the local relation of lines and objects on the surface to the excavations of the mine.

When two or more coal seams occur in a mine it is an open question as to which should be worked first. Sometimes the best plan is to work the best seam first, but care has to be taken to see that this will not increase the cost of the next workings. At other times it is found best to work systematically in descending order. When seams are over 150 ft. apart it is often immaterial which one is first worked out.

In Poland, and in some German coal-fields, the old workings in collieries are filled with sand which is sent down from the surface in pipes. The sand is flushed through the pipes by about one part of water to three of sand. The sand is distributed in the various rooms by means of branch pipes which are drawn back as the filling proceeds. This method of filling enables a larger percentage of good coal to be extracted than would otherwise be possible, as only a few pillars are left unworked.

The loss of coal in mine workings depends upon many circumstances; the depth of seam from the surface, the kind and quality of the country rock, the value of surface rights, proximity of different coal seams in the same mine, and system of working being important factors. In the Staffordshire coal-field, in England, the average loss is as follows: For pillars and boundaries, 14%; loss in extraction 5 to 7%, loss through faults 7%; the total loss being about 26%. An output of 1,350 tons per foot of solid coal worked per acre is obtained from a good seam.

Experiments with safety explosives for use in coal mines show that they do not depend upon chemical composition for their effectiveness only, but also upon the methods employed in their manufacture. Explosives of similar composition made by different firms will explode with results differing in a considerable degree. Moisture will also play an important part in reducing the effectiveness of a safety explosive. In an experiment in which sulphate of soda, which crystallizes with 10 molecules of water, was substituted in a powder that usually contained sulphate of magnesia crystallizing with seven molecules of water, the limit charge was more than doubled.

Correspondence and Discussion.

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

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL. Letters should be addressed to the Editor. We do not hold ourselves responsible for the opinions expressed by correspondents.

Spanish Mines as a Field for Investment.

Sir—It has often astonished me that all mining enterprises in Spain and Portugal have been monopolized by English, French and German capital, and that rarely has any American money found its way to these countries, which are by no means small ore producers. I saw sometime ago (I think in the JOURNAL) that Spanish rails had found their way to Mexico. The reason for such a curious event was said to be the cheap labor in mines and metallurgical industries at the place of manufacture. Whether this is the reason or not, I shall not discuss; but I shall only mention that few countries can show such intelligent and hard-working laborers, suffering long hours, with comparatively small remuneration. The average day-pay for intelligent miners is 2.75 pesetas (\$0.41); for ordinary assistants and truck runners, 2 pesetas (\$0.30); for boys, 1.25 to 1.50 pesetas (\$0.19 to \$0.23). Underground laborers furnish oil for their own lamps. Surface laborers receive about 0.25 pesetas (\$0.04) less than underground men; foremen, five and four pesetas (\$0.75 and \$0.60); first class mechanics, 200 pesetas per month (\$30); engine drivers, carpenters and masons, three pesetas (\$0.45) per day. The average working hours during the year, with philanthropic companies, are 10 hrs.; others in the summer make the time up to 14 hours per day.

I have said before that the Spanish laborer is intelligent. I think that few nations are so quick to find out the best and quickest way to tackle work. With the exception of a small part of northern Spain, the Spanish capitalist will not invest in mining enterprises. It is true that some of the Bilbao capitalists, after finding their mines in that district completely exhausted, have invested capital in southern Spain, but all the larger and more important mining affairs in Spain are in the hands of English, French and German capital.

Spain and Portugal are full of good mining enterprises of the most varied kind; from iron-ore down to the rare minerals. Why should no American capital be employed in these countries? There are variety and abundance of ores, and abundance of intelligent and cheap labor; Spanish and Portuguese mining laws give every facility; expropriation of land through these laws is favorable to the miner; the railways, although not

complete, are of high efficiency; and the nation will do anything possible to favor any enterprise tending to give work to the poorer classes, and thus help to avoid the emigration lately initiated.

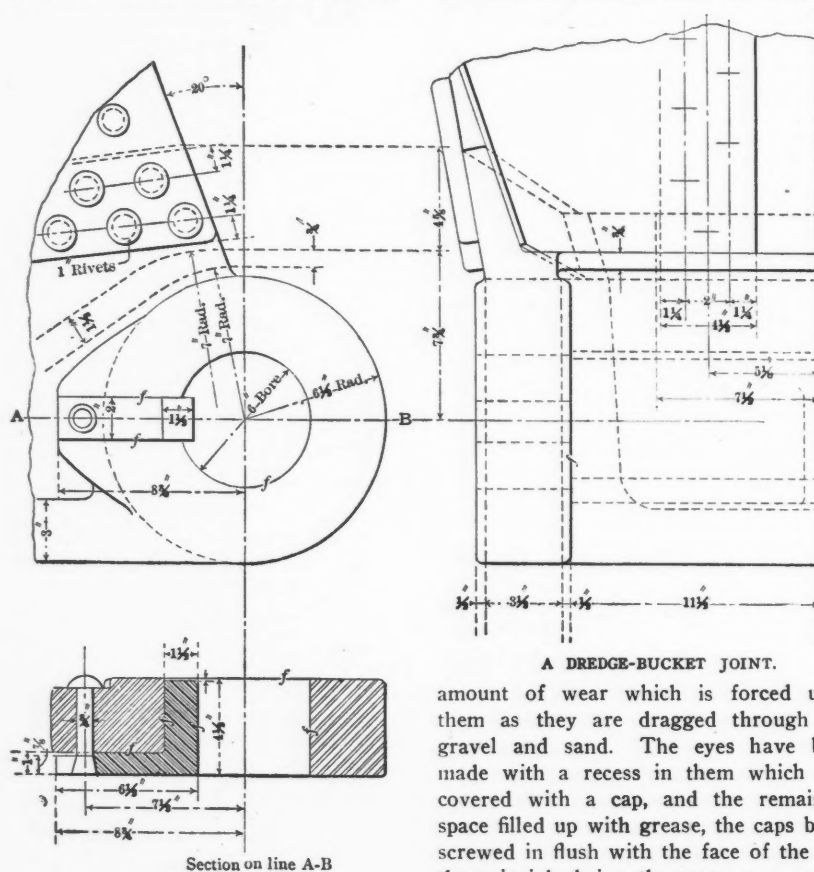
No American capitalist need fear being less heartily welcomed than one from any other nationality. The loss of the Spanish colonies has never been regretted by the working classes, because to them the colonies never were anything but a cemetery. Any capitalist, entering Spain with the view of establishing any kind of business, would be received as a god-send, and would be given every facility.

N. P.

Valencia de Alcantara, Spain, Dec. 23, 1905.

A Dredge-Bucket Joint.

Sir—the accompanying drawing shows in detail the construction of the front eye of a cast-steel bucket bottom for a 9 cu. ft. continuous bucket gold dredge, which design, after a year's continuous service, has



A DREDGE-BUCKET JOINT.

amount of wear which is forced upon them as they are dragged through the gravel and sand. The eyes have been made with a recess in them which was covered with a cap, and the remaining space filled up with grease, the caps being screwed in flush with the face of the eye, the principle being the same as a grease cup, but our experience was that the caps were smashed in or so mutilated that we could not remove them within the short period of two or three days.

The rear eye of this bucket extends from face to face, about 23 in. and it has a half bushing made of manganese steel which is made so that it can be very easily removed from the eye when necessary.

A. M. H.

Denver, Colo., Jan. 6, 1906.

Ferrocyanide Titration of Zinc.

Sir—I am glad Mr. Robinson has brought up the question of the blank (the JOURNAL, Dec. 16, 1905, p. 1126) in relation to my article (the JOURNAL, Oct. 28, 1905, p. 780). As he proves, our results are approximately right; or *vice versa*, that 0.35 c. c. is the correct figure to deduct for the blank, a point I had observed with some satisfaction. However, I fail to see why a table, based upon the varying amounts of zinc or the blank deduction, would not be convenient; especially so in the determination of copper where the KCN method is used, as it is necessary to standardize the solution with a corresponding amount of copper contained in the ore, there being no means of determining the blank in this case.

Mr. Robinson also affords me the opportunity of bringing up the question of counterbalancing errors. In a number of the zinc ores, especially the sulphides, the lead and insolubles are lost; while the zinc and iron vary inversely. A few determinations that I have made indicate that the iron precipitate retains zinc, and affects the results approximately to the same degree as the variations due to the blank.

In a laboratory when 25 to 35 determinations of zinc have to be made every day, in connection with other work, it is impossible to adopt some special method (as Mr. Waring's); or to re-precipitate (as is often the case with the Low method). Therefore, if the relations indicated above should be proved correct, when the re-precipitation is neglected, the blank should not be deducted. This will give somewhat nearer results for a commercial method, at least. Incidentally, I would call attention to two errors in his results: 14.97 should read 14.93; and 0.01009 should read 0.01015.

E. M. JOHNSON.

Cañon City, Colo., Dec. 22, 1905.

Sulphur in Roasting.

Sir—In my recent article on "Sulphur and Roasting" in the JOURNAL (Dec. 23, 1905, p. 1165), a typographical error appeared in the first sentence of the last paragraph. It should read that "air is not conducive to the formation of sulphates."

To illustrate: Zinc concentrate containing 33% sulphur, was roasted under the ordinary conditions of air and temperature. Sulphur analysis of samples taken every hour, showed the highest sulphate to be 1.17%. Another lot of the same ore was roasted under precisely the same conditions, except that a large amount of air was supplied to the roasting ore. The highest sulphate in this test was only 0.66%.

In another case a sample was taken from the bed of ore below the rabbles, in a large mechanical furnace, to determine

proven to be very satisfactory.

These buckets form an endless chain, which passes over two tumblers, the upper one of which is driven by a 150 h. p. induction motor. The dredge has about ninety buckets in the chain, each one weighing a little over a ton. The buckets dig up the gravel and carry it up to a hopper, from whence it goes on to the shaking screens. The bucket lips are made of the best quality of manganese steel, and from experience this is found

the condition of the sulphur, when the ore is subjected to prolonged heat with insufficient air. The sulphur analysis showed 2.75% sulphur, almost all of which was soluble. Since the average of all the ore entering the furnace was about 2.75%, it would indicate that practically all of the sulphur was converted into sulphate.

WILLIAM E. GREENAWALT.

154 Cedar St., Denver, Colo., Jan. 4, 1906.

Sand Launderers.

Sir—The article in a recent issue of the JOURNAL (Dec. 16, 1905, p. 1119) on "Sand Launderers" by Thomas J. Read is of considerable interest, especially when one calls to mind the unlimited variety used in mills.

In one case, a launder was required to have the minimum grade and to use the least quantity of water. The sand to be conveyed was from a stamp-mill, and would all pass through the ordinary 20-mesh laboratory sieve. After many practical tests with various patterns, the best results were obtained with a launder of pine wood, having the following inside dimensions; 8 in. width at the top, 4 in. at the bottom, and 10 in. deep. The smooth bottom also gave greater efficiency.

Several launders, constructed on the same ratios, have since been used to carry (from Frenier wheels) sands passing 20- to 40-mesh sieves, and have given entire satisfaction.

GRANT D. MILLER.

Minas La Noria, Sombrerete, Zacatecas, Mexico, Jan. 16, 1906.

Oil Refining in Kansas.

The independent oil refiners of Kansas have mailed to James R. Garfield, commissioner of corporations of the Department of Commerce and Labor, an appeal for justice against the alleged conspiracy between the Standard Oil Co. and the railroads to shut Kansas oil out of the market. The refiners who signed the appeal were Clifford Thorne, A. F. Robertson, F. S. Bennett, C. D. Webster, J. M. Cameron, H. Kessman, D. O. McGee and C. E. Martin. These men own eight refineries now in operation, besides two in course of erection at Atchison and Kansas City, Kan. They are said to have invested more than \$1,000,000 in refineries, tank cars, storage tanks, wagons and barrels. They claim that by reason of a conspiracy between the Standard Oil Co. and the railroad systems of the Southwest, they are limited to Kansas for a market for their refined oil; that to all points outside of Kansas the freight rates on all the products of crude petroleum have been maintained at unreasonably high figures in order to confine the business of the independent refiners to Kansas.

New Publications.

Electric Wiring, Diagrams and Switchboards. By Newton Harrison. Pp. 272; illustrated. 5x7½ in.; cloth, \$1.50. New York, 1906: The Norman W. Henley Publishing Company.

Contents.—The beginning of wiring. Calculating the size of wire. A simple electric light circuit calculated. Estimating the main, feeders and branches. Using the bridge for testing. The insulation resistance. Wiring for motors. Wiring with cleats, moulding and conduit. Laying out a conduit system. Power required for lamps. Lighting of a room. Switchboards and their purpose. Switchboards designed for shunt and compound wound dynamos. Panel switchboards, street railway switchboards, lightning arresters. The ground detector. Locating grounds. Alternating current circuits. The power factor in circuits. Calculation of sizes of wire for single, two and three-phase circuits.

The scope of this work is well indicated by its table of contents. It is a thoroughly practical treatise covering the subject of electric wiring in all its branches, including explanations and diagrams which are thoroughly explicit and greatly simplify the subject. Practical every-day problems in wiring are presented and the methods of obtaining intelligent results are clearly shown. Only arithmetic is used.

Russel W. Davenport. Pp. 79; illustrated with a portrait (frontispiece); 6x9 in.; cloth, \$3. New York and London, 1906: G. P. Putnam's Sons.

Russell W. Davenport was the foremost oarsman of his day, and is known as the "father of rowing at Yale." After his graduation from Yale he studied in Europe, and upon his return to America became chemist at the Midvale Steel Works. This was in 1874. In 1882 he became superintendent of the works, which he left in 1888 to go to Bethlehem as assistant to John Fritz. He became general superintendent of the Bethlehem Works in 1899, and in 1902 became the general manager of Cramp's ship-building works, a position which he held at the time of his death (in 1904). As a metallurgist, Davenport rendered conspicuous service. He produced the forgings for the first six-inch, all-steel, built-up gun made in the United States. His skill found concrete expression in the offensive and defensive equipment of the vessels of the United States Navy that fought in the Spanish War; and in the last year of his life he began the reorganization of the shipyard in which many if not most of those vessels were constructed.

The present biographical sketch, of which the author's name is not announced, is based on communications received from his family, friends and associates in college and in business. It has

evidently been prepared in a perfunctory way, which is to be regretted, because Davenport had an interesting and highly useful career, and the material ought to have fallen into better hands. The story of his life, however, is of so much interest, especially in this industrial age, that it is well worth reading, in spite of the unsympathetic telling of it; but the reader will put down the book with regrets for what might have been made of it.

Standard Reduction Factors for Gases. By Helon Brooks MacFarland. Pp. 54. 6x9 in., cloth, \$1.50. New York, 1906: John Wiley & Sons. London: Chapman & Hall, Limited.

Contents.—Factor for standard conditions of 30 in. of mercury and 62° F. Factor for standard conditions of 30 in. of mercury and 32° F. Factor for standard conditions of 30 in. of mercury and 0° C. Factor for standard conditions of 760 mm. of mercury and 0° C. Tension of water-vapor in inches of mercury, degrees Fahrenheit. Tension of water-vapor in inches of mercury, degrees centigrade. Tension of water-vapor in millimeters of mercury, degrees centigrade. Weight in grains of moisture in 1 cu. ft. of saturated air, degrees Fahrenheit. Weight in grains of moisture in 1 cu. ft. of saturated air, degrees centigrade. Pressure in inches of water and corresponding barometric reading in millimeters and inches of mercury.

Practical Cement Testing. By W. Purves Taylor. Pp. 320; illustrated. 6x9 in.; cloth, \$3. New York, 1906: The Myron C. Clark Publishing Co.

Contents.—Classification and Statistics. Composition and constitution. Manufacture. Inspection and sampling. The testing of cement. Specific gravity. Fineness. Time of setting. Tensile strength. Soundness. Chemical analysis. Special tests. Approximate tests. Practical operation. Other varieties of cement. Specifications.

This volume has been designed primarily for the use of the student, the novice, and the practical operator in conducting actual routine tests of cement to determine its suitability for purposes of construction. The general scope of the book covers a description of the properties of cement, the objects of the various tests, the methods of conducting them, the common influences and errors that are most likely to affect the determinations, and the practical interpretation of the results which are finally obtained. No attempt has been made to consider the practical use of cement and concrete except in so far as the conditions of actual work regulate the use of the various tests, while the data given are also applicable more to the conduct of tests than to the final use of the material. In other words, the scope of the book is intended to cover only the methods and the application of the tests of cement commonly employed

in routine work, and not to consider theoretical properties, investigations of a research character, or the use of cement.

The Drumlins of Southeastern Wisconsin. By Wm. C. Alden. Bulletin No. 273, U. S. Geological Survey. Pp. 46+III; illustrated. 6 by 9 in.; paper. Washington, D. C., 1905; U. S. Geological Survey.

Mining Operations in South Australia during 1905. By T. Duffield. Pp. 20; illustrated. 6 by 10 in.; paper. Adelaide, 1905; C. E. Bristow.

Report on the Peat Resources of Iowa. By T. E. Savage. Bulletin No. 2, Iowa Geological Survey. Pp. 40; illustrated. 6 by 9 in.; paper. Des Moines, Iowa, 1905; Iowa Geological Survey.

Crown Lands of South Australia. By T. Duffield. Pp. 16; illustrated. 5 by 8 in.; paper. Adelaide, 1905; C. E. Bristow.

New Zealand Official Year Book, 1905. Pp. 771; illustrated. 5 by 8 in.; paper. Wellington, N. Z., 1905; John Mackay.

Western Australia Statistical Register for 1904. Part XII. Pp. 25. 8 by 13 in.; paper. Perth, W. A., 1905; A. Curtis.

Report on Geological Explorations in West and Northwest of South Australia. By H. Y. L. Brown. Pp. 17; illustrated. 8 by 12 in., paper. Adelaide, 1905; C. E. Bristow.

Professional Papers.

Electrolytic Solutions, Commercial Value of Hypochlorite. W. P. Digby. *Eng. Review* (London), Jan., 1906, pp. 35-39; illustrated.

Metallurgical Progress. Percy Longmuir. *Eng. Review* (London), Jan., 1906, pp. 56-61; illustrated.

Lead as Iodate, Volumetric determination of. L. Moser. *Chem. Zeit.*, Jan. 6, 1906, p. 9.

Coal Mines, Fuel economy at. C. E. Watts. *Proc. Eng. Soc. W. Pa.* Jan., 1906, pp. 487-507; illustrated.

Wire Rope, G. W. Westgarth. *Jour. Brit. Soc. Min. Students.* April, 1905, pp. 72-82; illustrated.

Shaft Cleaning, Proving a seam of ironstone by. A. W. Grazebrook. *Jour. Brit. Soc. Min. Students.* April, 1905, pp. 83-89; illustrated.

Arsenic Solutions, the Electrolysis of. B. Neumann. *Chem. Zeit.*, Jan. 17, 1906, pp. 33-35.

Metalliferous Veins, The problem of. Jas. Furman Kemp. *Econ. Geol.* Dec.-Jan., 1905-06, pp. 207-232.

Wisconsin Zinc and Lead Deposits, Structural relations. U. S. Grant. *Econ. Geol.* Dec.-Jan., 1905-06, pp. 233-242; illustrated.

Quicksilver Deposits, Terlingua. H. W. Turner. *Econ. Geol.* Dec.-Jan., 1905-06, Pp. 265-281; illustrated.

Engineers' Instruments, Repairing. E. M. Douglas. *Eng. News.* Jan. 25, 1906, pp. 89-90.

Abstracts of Official Reports.

Le Roi No. 2. Ltd.

This property, (which is owned in London, Eng.) is at Rossland, B. C. It consists of No. 1 mine (not operated during the year), the Josie mine, and a mill. The report covers the year ending Sept. 30, 1905.

Ore and concentrate are smelted at the Greenwood and Trail smelters, the company having closed a contract with the latter during the year. The two smelters treated 9,013 and 3,224 tons of ore, respectively; the total charge for freight and treatment was \$8.70 per ton. This was \$1.06 higher than for the previous year, due to the increased value of the ore.

Development during the year comprised 2,685 ft. of drift and cross-cut; 279 ft. raises and winzes, and 3,121 ft. of diamond-drill holes, costing \$2.70 per ft. There were also stations cut amounting to 645 cu. yards.

During the year, the Company has acquired eight properties in the vicinity of its own claims, two in the Rossland district adjacent to the velvet mine, and five in the Ymir district.

Concentration for the year was entirely by water, and resulted in a decided improvement over the previous year. The output was 425 tons of concentrate, averaging 2.54 oz. gold, 2.22 oz. silver, and 2.61 copper; the smelter receipts for the same being \$22,408.

The total ore produced was 34,208 tons which, after hand-sorting, was divided into 12,237 tons shipping ore, 10,678 tons second-class ore, and 11,293 tons waste. The total cost of ore, including diamond drilling, amounted to \$4,222 per ton; this with an additional charge of \$3.38 for depreciation and equipment, brings the final cost to \$7.60 per ton (calculated on a basis of 19,789 tons actually taken from the mine during the year).

The decrease in output of the mine for the year was due to the restriction of work during the latter half in order to push exploration.

The ore shipped, amounting to 12,237 tons, carried 14,493 oz. gold (1.184 oz. per ton); 28,369 oz. silver (2.318 oz. per ton); and 885,992 lb. copper (72.4 lb. per ton or 3.62%). The value of this ore was \$35.78 per ton, as contrasted with \$24.80 for the previous year.

Mount Lyell Mining & Railroad Company, Ltd.

The report of this Tasmania company covers the six months ending Sept. 30, 1905. During these months, the company's mines produced 212,158 tons of ore, an increase of 6,284 tons over the preceding period. Of this amount, 208,282 tons (assaying 2.37% copper, 1.84 oz silver and .058 oz. gold) was treated with

22,237 tons of purchased ore, metal-bearing flux, metallurgical residues, etc., resulting in 12,843 tons of matte (assaying 40.16% copper, 32.85 oz. silver and 1.139 oz. gold). This was blown to blister copper, amounting to 4,306 tons, and containing 4,253 tons refined copper, 365,440 oz. silver, and 12,425 oz. gold; which showed an increase over the previous half-year of 303 tons copper, 1,189 oz. silver, and 560 oz. gold. The cost of producing blister-copper was 13s. 3.14d., against 13s. 0.39d. for the six months ending March 31, 1905, on account of the increase cost of mining in the North Mount Lyell mine.

In this mine, which is of more recent development, considerable diamond drilling has been done, and much light has been thrown upon the position and extent of orebodies in the lower levels.

The holes were drilled at each level, from the 1st to the 7th inclusive, with varying results; the most satisfactory being at the 700-ft. level where an orebody of considerable size was located.

Underground exploration in all of the Company's mines consisted of the following: Driving and cross-cutting 1,629 ft.; sinking and raising 557 ft.; diamond drilling 1,887 ft.; total, 4,073 ft.

Of this total, 3,745 ft. was in the ground of the North Mount Lyell mine.

Electric power is being substituted wherever possible. At the last named mine there is an electrically driven hoisting engine; and at the power plant there are two 400-k.w. steam-turbine generator sets giving perfect satisfaction. On the average, four blast-furnaces have been running continually during the period covered by the report, and have treated a larger tonnage than that of the preceding six months.

Besides their mining operations, the Company conducts a coke plant at Port Kembla, N. S. W. (which furnishes the entire coke supply for smelters and power plant), manufactures superphosphates and sulphuric acid at its chemical works, and operates railways, all of which enterprises are on a paying basis.

The financial statement is given in detail, and may be condensed as follows:

From blister-copper,	£396,380
Revenue from railways,	14,493
Total receipts,	£410,873
Working expenses,	£186,954
Office and all other expenses, ..	35,342
Total expenses,	£222,296
Net earnings for six months, ...	£188,578
Balance, March 31, 1905,	231,762
Total balance, Sept. 30, 1905,	£420,340

A dividend of £75,000 was declared, representing 1s. 3d. per share, and making a total disbursement of £225,000 paid in dividends.

Extensive water rights and 858 acres of mineral lands have been acquired, either by lease or under option, among which

are tin fields in the Blue Tier district on the East coast.

Scandinavian Iron Industry.

Attempts are to be made to develop the iron and steel industries of Norway and Sweden. Large deposits of iron ore have been found in Norway. So far the principal part of the iron ore has been exported, especially in the form of briquettes. In Sweden, on the other hand, where the export of iron ore in former years was encouraged to the fullest extent, and where large sacrifices were made to increase the business, the people have recently begun to see the danger of thus depriving the country of such an important resource for its development.

In Sweden the people have commenced to realize, with the increasing demand for iron and steel, that the mines are not so inexhaustible as has been thought. The greatest difficulty in creating a larger iron industry in the Scandinavian countries is the want of coal, and to import coal for this purpose does not pay. As, however, in Norway and Sweden there are many waterfalls, from which electricity may be produced, and a great deal of peat for the production of generator gas, these may prove substitutes for coal. To carry this idea into practical effect, it is proposed to erect experimenting stations, the expense to be covered by a small duty on the exported ore.

International Geological Congress.

The announcement is made of the tenth session of this Congress, to be held in Mexico City, Sept. 6, 1906. The program contemplates the consideration of the following questions; (1), The climatic conditions of geological epochs; (2), relations between tectonic structure and eruptive masses; (3), genesis of ore deposits; (4), classification and nomenclature of rocks. These subjects are to be discussed, respectively, by many prominent specialists, both from America and abroad.

The program also plans several excursions to the more noted mines and smelters in the Republic of Mexico. The subscription for membership is \$4, U. S. currency; the special book recording the excursions will be furnished for \$2 U. S. money. The general secretary of the local committee is Mr. Ezequiel Ordóñez, 5a del Cipres, No. 2728, Mexico, D. F.

In April, 1904, a record-breaking well was drilled on the Johnson farm, 5½ miles southwest of Independence, Kan., which gaged 37,000,000 cu. ft. per day. Near Dearing, toward the close of 1904, a well producing 33,000,000 cu. ft. was struck. The rock pressure was about 650 lb. per sq. in.

Weight of Rubber Belting.

BY ROBERT ANSTEE.

The average weight of a good four-ply rubber belt, 7 in. wide, is about 16 oz. per linear foot. A very light 7-in., four-ply belt may weigh as little as 12 oz. per linear foot; a very heavy belt of the same dimensions may weigh as much as 20 oz. The weight of rubber belting varies to some extent with the quality of the raw material and the time of the year when manufactured, and it is consequently impossible to give exact figures. Some inferior rubber belts weigh more than first-class products because of the use of adulterated rubber, the adulterations employed being as a general thing heavier than the rubber itself.

The nature of these adulterants is a secret of the trade. It is well known, however, that zinc oxide, barytes, litharge, chalk, gypsum, talc, magnesia, asphaltum and lampblack are used for this purpose. Experts in the manufacture of goods are able to identify adulterated rubber by its appearance and physical characteristics. The extent to which adulteration has been practiced may be determined from the comparative weight of the ash of various samples after incineration.

The best rubber belting is made with 32-oz. duck. A 7-in., four-ply belt made of 32-oz. duck weighs about 20 oz. per linear foot; a 7-in., four-ply belt weighing 16 oz. per linear foot is made from 28 to 30-oz. duck; a belt of the same dimensions weighing only 12 oz. per linear foot would have only 26-oz. duck.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

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

Week Ended Jan. 23, 1906.

- 810,428. TUNNEL-SHIELD. Charles L. Parmelee, Orange, N. J., and Edward G. Williams, Washington, D. C. Filed Jan. 3, 1905.
- 810,439. MINE-HARNESS. Joseph P. Stratton and Robert S. Stratton, Sullivan, Ind. Filed Nov. 30, 1904.
- 810,445. HOISTING APPARATUS. Charles W. Tribken, Brooklyn, N. Y., assignor to Lidgerwood Manufacturing Company, New York, N. Y. Filed Sept. 30, 1902.
- 810,454. PROCESS OF MAKING STANNIC CHLORIDE. Charles E. Acker, Niagara Falls, N. Y., assignor to Acker Process Company, a Corporation of New Jersey. Filed June 8, 1903.
- 810,455. PROCESS OF MAKING STANNOUS CHLORIDE.—Charles E. Acker, Niagara Falls, N. Y., assignor to Acker Process Company, a Corporation of New Jersey. Filed June 8, 1903.
- 810,456. PROCESS OF MAKING CHLORINE COMPOUNDS OF TIN. Charles E. Acker, Niagara Falls, N. Y., assignor to Acker Process Company, a Corporation of New Jersey. Filed Dec. 30, 1903.
- 810,513. MINER'S DRILL. Henry Todd, Marshfield, Ohio. Filed Mar. 23, 1905.
- 810,531. PROCESS OF HARDENING STEEL.

Robert A. Hadfield, Sheffield, England. Filed Feb. 18, 1903.

- 810,572. PROCESS OF TREATING ORES. Joseph Savelsberg, Pappenburg, Germany. Filed May 15, 1905.
- 810,639. ROCK-DRILL. Arthur H. Gibson, Easton, Pa., assignor to The Ingersoll-Sergeant Drill Company, New York, N. Y., a Corporation of West Virginia. Filed June 9, 1905.
- 810,654. INGOT-CASTING MACHINE. John Illingworth, Newark, N. J. Filed June 17, 1905.
- 810,778. SPRAGGING DEVICE FOR COAL AND PIT CARS. John Levak, Lemont Furnace, Pa. Filed Oct. 5, 1905.
- 810,830. PAN-AND-ROLLER MILL FOR CRUSHING AND GRINDING.—Johannes C. Wegerif, Battlesbridge, Eng., assignor to the Benfrew Crusher Company Limited, London, England. Filed May 12, 1905.
- 810,841. MAGNETIC SEPARATOR. Henry F. Campbell, Melrose, Mass., assignor to National Magnetic Mineral Separating Company, Boston, Mass., a Corporation of Maine. Filed July 29, 1902.
- 810,851. APPARATUS FOR REMOVING SUPERFLUOUS METALLIC COATING FROM SHEET METAL. Olin S. Fellows and Archibald E. Hopkins, Middletown, N. Y. Filed April 28, 1905.
- 810,864. APPARATUS FOR CHILLING CINDER OR SLAG. Frank K. Hoover and Arthur J. Mason, Chicago, Ill. Filed Aug. 31, 1903.
- 810,865. METHOD OF CHILLING CINDER OR SLAG. Frank K. Hoover and Arthur J. Mason, Chicago, Ill. Filed Aug. 31, 1903.
- 810,883. REVERSING-VALVE FOR HOISTING-ENGINES. James L. Pilling, Port Huron, Mich., assignor to Pilling Air Engine Company, Detroit, Mich., a Corporation. Filed Feb. 19, 1903.
- 810,889. PROCESS OF ELECTROLYTICALLY PREPARING METALS OR ALLOYS FOR LITHOGRAPHING PURPOSES. Otto C. Strecker, Darmstadt, Germany. Original application filed Apr. 19, 1900.

GREAT BRITAIN.

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

Week Ended Jan. 13, 1906.

- 28,664 of 1904. RAIL JOINT.—J. Bentley, Stafford. Improved method of joining rails in mines.
- 2,337 of 1905. RECOVERY OF ALUMINUM. A. E. de Souza, Rio de Janeiro, Brazil. For extracting aluminum from clay, the inventor uses the ordinary plaster clay which consists of a mixture of silicate of aluminum with gelatinous hydrates of aluminum and silicon. This clay is digested with sulphuric or other acid, by means of which sulphate or other salt of alumina is formed. After decanting and so getting rid of silicon compounds, the solution is treated with an alkali, thus forming pure hydrate of alumina.
- 5,975 of 1905. HOT BLAST STOVE. J. Evans and D. Lewis, Dowlais, Wales. Improved construction of hot blast stoves with the object of making them more easily cleaned, and so preventing the corrosion of the floor plates.
- 9,443 of 1905. PHOSPHATE.—A. Clemm, Mannheim, Germany. The inventor produces a phosphate soluble in citric acid, by treating phosphates with hydrochloric acid and electrolysing the solution. Chlorine comes off from the anode and hydrogen from the cathode, and the phosphate soluble in citric is precipitated.
- 10,794 of 1905. ELECTRIC SIGNAL.—L. B. Woodworth, Johannesburg. Improved form of magneto electric signalling machine that can only be operated by a special key, for use at various levels in a mine for signalling to the surface.
- 16,232 of 1905. BRIQUETTING IRON ORE.—U. Wedge, Ardmore, Pennsylvania. For agglomerating fine iron ores, mixing with clay and heating to the melting point of iron oxide.
- 16,233 of 1905. BRIQUETTING IRON ORE.—U. Wedge, Ardmore, Pennsylvania. For agglomerating fine iron ores, mixing with portland cement and heating to the melting point of the portland cement.
- 16,234 of 1905. BRIQUETTING IRON ORE.—U. Wedge, Ardmore, Pennsylvania. For agglomerating fine iron ores; mixing with sulphate of iron and heating to a temperature at which the sulphur is driven off.

Personal.

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

D. J. Haff, of Kansas City, Mo., was in Cananea, Mexico, recently.

Woolsey McA. Johnson, of New York, has returned from a professional trip to Mexico.

Arthur Thacher, of St. Louis, has gone to the Indian Territory for New York parties.

Willis J. Hullings, manager of the Inde Reduction Co., Chihuahua, Mexico, was in Parral recently.

H. A. Wheeler is examining the Cyclone mine in Central Missouri for Pittsburg parties.

Francis A. Thomson has returned to Goldfield, Nev., from a trip to Colorado and British Columbia.

Frederick J. M. Rhodes, of the Rhodes Consolidated Mines Co., of Mexico, is visiting in New York.

P. A. Babb, consulting mining engineer and geologist, has removed his office to Gante No. 8, City of Mexico.

C. J. Asure, a mining man of Bisbee, Arizona, interested in that district and in Sonora, is in Duluth, Minnesota.

P. H. Bertschy will succeed John T. Milliken as superintendent of the Imperial mill at Deadwood, South Dakota.

Irving J. Sturgis, of Gay & Sturgis, Boston, has been in the Michigan copper district on business the last few days.

J. M. Callow, constructing and mechanical engineer, of Salt Lake City, expects to leave shortly on a European trip.

G. A. Koenig, professor of the chair of chemistry at the Michigan College of Mines, is in the West on mining business.

W. B. Milliken returned to Denver a few days ago from a professional trip to California extending over several weeks.

H. S. Clark, general manager of the Lanyon Zinc Co. has been in Utah looking over zinc ore conditions in that State.

Louis A. Wright, late of San Antonio, Texas, is now in New York, and has established an office as mining engineer at No. 42 Broadway.

J. S. Douglass, general manager Moctezuma Copper Co., Nacozari, Sonora, Mexico, has returned there from a trip to New York on business.

James Douglas and Walter Douglas were visitors at Cananea, Sonora, Mexico, recently on a visit of inspection to the Sierra De Cobre mines.

Arthur S. Dwight, general manager Greene Consolidated Copper Co. at Cananea, Mexico, has returned there after a brief trip east on business.

A. C. Pratt is making a tour through the Canadian West in the interests of

the Canadian Tin-plate and Stamped Steel Co., of Morrisburg, Ontario.

U. A. Fritsch, manager of Volcano Mining and Development Co. at Lampasas, Sonora, Mexico, has returned from El Paso, Texas, to the mine.

A. Chester Beatty stopped in St. Louis last week on his way west. His visit was to look over the Guggenheim interests in southeast Missouri.

James Wilcox, superintendent of the Mass Consolidated Mining Co., at Mass City, Mich., has been in Boston the past week, attending a meeting of the directors.

John T. Milliken, of the Imperial mill at Deadwood, S. D., has been appointed superintendent of the Telluride plant at Colorado Springs, which is being remodeled.

F. R. Carpenter is at present in Mexico examining copper properties, and will go to Lower California upon similar work, returning to Denver by way of Los Angeles.

H. F. Fay, president of the Allouez, Centennial and other Lake Superior copper mines, has returned to his home in Boston, after inspecting the properties in Michigan.

L. W. Powell, of Duluth, Minn., the newly elected third vice-president of the Calumet & Arizona Mining Co., and allied Bonanza Circle mines, assumed charge at Bisbee, Ariz., Feb. 1.

F. R. Burnham, formerly of the British army and on Gen. Roberts staff in South Africa is interested in mining in the State of Sonora, Mexico, and is located at Nacozari for the present.

C. W. Leimer has resigned his position with the Montana Zinc Co., at Walkerville, Mont., and returned to Denver, Col. He will leave shortly for San Francisco, and will go thence to Mexico.

R. S. Botsford recently returned to London from Sarawak, Borneo. After a short stay, he left England for Ashantee, West Africa, to take charge of the cyanide plant of the Sansu mine.

W. T. Frazier, superintendent of the Alder Creek Gold Mining Co., at Flat Iron, S. Dak., has resigned, and is now in California, where he will practice as mining and metallurgical engineer.

Ralph Baggaley of Pittsburg, who resigned as manager of the Pittsburg & Montana Copper Co. in Butte, Mont., a few weeks ago, is in Butte on business. He will spend several days in that city.

David Levat, of Paris arrived in New York last week. He is on his way to Arizona to examine some gold mines and to Wyoming to examine a petroleum property. He expects to return to New York late in February.

William Wearne, who was in immediate charge of the operations of the Superior Copper Co., south of Houghton, Mich., has resigned to take charge of ex-

ploratory work for the Lake Copper Co. at Belt, Michigan.

James Chynoweth, superintendent of the Centennial, Allouez and other Lake Superior copper mines, has gone to California. He expects to remain in the West two months before returning to his home at Calumet, Michigan.

Paul A. Von Aueberg, who has for some years represented Heyl & Patterson of Pittsburg in connection with steel contracts, has been appointed manager of construction for the Dominion Coal Co. at Sydney, Cape Breton.

Edwin T. Perkins has resigned his position as mining engineer of the Granby Mining and Smelting Co., at Granby, Mo., to become assistant superintendent of the plant of the St. Louis Smelting and Refining Co., at Collinsville, Illinois.

E. J. Wilson, who has been superintendent for the Arizona Smelting Co., at Humboldt, near Prescott, Ari., having completed the construction of that plant, has resigned his position and will return to his home at Spokane, Washington.

W. L. Libbey, for 12 years past president and general manager of the Brookfield Mining Co., in Queens county, Nova Scotia, has resigned and returned to his home in Boston. After a few weeks rest he will go to Chihuahua, Mexico, and take charge of his mining interests there.

W. C. Agnew, general manager of the Mahoning Ore & Steel Co., of Duluth, has been appointed by the judges of the circuit court of that district one of the commissioners who are to have complete charge of the location and construction of a fine county building for St. Louis county.

F. Wüst has joined Dr. Borchers in the editorial management of *Metallurgic*, the scope of which is now to be extended to cover all the metals, instead of the limitation to the non-ferrous metals as heretofore. Dr. Wüst, who is the professor of metallurgy of iron and steel in the technical high school at Aachen. will edit the new department of *Metallurgic*.

Robert E. Swain, professor of chemistry in the Stamford University, California, spent a few days in Butte, Mont., recently, having gone there to give expert testimony in the suit brought by Fred J. Bliss against the Washoe and Anaconda copper companies to enjoin the companies from operating their plant to the alleged detriment of farmers in the surrounding valley.

Obituary.

William Hutchison, a pioneer iron and coke manufacturer of Pittsburg, died at his home in that city Jan. 18. He was born in Ireland in 1826, coming to Pittsburg 20 years later. He built the Keystone Iron Works and was for many years a member of the firm of Hutchison,

Glass & Co., iron manufacturers. In later life, however, he devoted his attention to the coke business.

Societies and Technical Schools.

International Congress of Applied Chemistry.—The sixth meeting of this Congress will assemble at Rome, Italy, on April 16, next. Special rates are offered by the steamship companies, and also by the Italian railways. There are about 60 members in America. Prof. H. W. Wiley of Washington, D. C., is chairman of the American committee.

Canadian Mining Institute.—The Toronto Branch of the Canadian Mining Institute was organized Jan. 17, with the following officers: Eugene Coste, chairman; B. A. C. Craig, vice-chairman; George Nickle, treasurer; S. Dillon Mills, secretary; Dr. A. P. Coleman and Prof. Willet G. Miller, councillors. The local branch is being formed with the object of co-operating with other branches throughout the Province in the organization of a provincial association to represent the mining interests in connection with the proposed mining legislation now under consideration.

Trade Catalogues.

Publications have been received during the past week from the following firms:

Abner Doble Co., San Francisco, Cal., Bulletin No. 7. Doble tangential water-wheels; pp. 100, paper, 6 by 9 in. 1906.

Chicago House Wrecking Co., 35th and Iron Sts., Chicago, Ill. Catalogue No. 143, Louisiana Purchase Exposition; pp. 422, paper, 6 by 9 in. 1906.

Lidgerwood Mfg. Co., 96 Liberty St., New York. Hoisting engines, boilers, cableways and machinery; pp. 168, paper, 9 by 12 in. 1904.

Industrials.

The Weber Steel-Concrete Chimney Co. has removed to new and more commodious offices in the Marquette Building, Dearborn street, Chicago.

The Denver Engineering Works Co., of Denver, Colo., has opened an office in the Dooley block, Salt Lake City, Utah, with S. G. Bignell in charge as manager of the district.

Ivanhoe furnace, at Wytheville, Va., with 500 acres of iron ore land, has been sold by the New River Mineral Co. to Robert A. Carter, of Pittsburg. The furnace is to be rebuilt and started up.

The Blake Mining and Milling Co., of Denver, has just shipped a plant of its electrical separating machinery to Manchester, England, and is very busy filling orders, having received one for 14 of its

machines from a prominent mining company, within the past few days.

The Abner Doble Co. of San Francisco, has opened up a branch office in Los Angeles, in the Pacific Electric Building. The new branch will have for its field Southern California, Arizona and New Mexico, with parts of Nevada and Mexico. Mr L. Cummins will have charge of the office.

The Quinn Furnace Co. has been incorporated at Gadsden, Ala. with \$200,000 capital stock, to operate a blast furnace there. A. H. Quinn of Anniston, Ala. is president; P. P. Williams of Mobile, Ala., vice-president, and W. F. Johnston, Jr., of Anniston, Ala., secretary-treasurer; main offices, Gadsden.

The Electric Cable Co. of Bridgeport, Conn. which succeeds the Magnet Wire Co. and the Peerless Electric Co. both of New York. The company is erecting a factory in Bridgeport where it will manufacture magnet wire, field and armature coils and voltax, a new non-rubber insulation. The officers of the Company are: President, Edwin W. Moore; vice-president, Frederick H. Cowles; treasurer, J. Nelson Shreve; secretary, H. S. Williston.

Construction Notes.

Platteville, Wisconsin.—The Krog-Webster Mining Co., will put in a mining and milling plant at British Hollow. The company's address is at Platteville.

Idaho Springs, Colorado.—The stockholders are to vote upon arrangements for extending work on the Golden Cloud mine, and buying new machinery. L. Tobias, Idaho Springs, is manager.

Cardinal, Colorado.—The management of the Boulder county mine at Cardinal, in Boulder county, Colo., is going to erect a 50-stamp mill during the coming spring to handle the ores from that property.

Butte, Montana.—The Butte & London Copper Co. will equip its property with new machinery, including a hoisting engine, compressor and pumps. W. E. Reynolds is secretary of the company, his address being 46 East Broadway, Butte, Montana.

Gold Butte, Nevada.—The Nevada Gold Butte Mines Co., which is developing a gold property at Gold Butte, Lincoln county, Nevada, will be in the market for a stamp mill soon. E. V. Higgins, David Keith block, Salt Lake City, Utah, is secretary of the company.

Silver Star, Montana.—The Copper Chief Mining Co., the property of which is near Silver Star, Madison county, Mont., is arranging to place heavier machinery on its claims, five in all. F. M. Longshore is secretary of the company. His address is 49 East Broadway, Butte, Montana.

Cobalt, Ontario.—Timmins, Dunlap & McMartin, a leading firm of Cobalt mine operators have let the contract for the construction of a smelter in which they will treat their own ores as well as those of other mines. The Provincial government will be asked to give a grant in aid of the enterprise.

Pinal County, Arizona.—The Lake Superior & Arizona Mining Co., which is developing a copper-gold-silver property on Pine creek, has under consideration the installation of either a cyanide plant or a 100-ton smelter. A. C. Sieboth is superintendent and the mine office is at Florence, Ariz. The home office is at Calumet, Mich., A. E. Peterman, secretary.

Keweenaw County, Michigan.—The Mohawk Mining Co., which has a stamp mill on Traverse Bay, plans to change its stamp-heads from the simple to the compound type. The fourth head, just installed, is a steeple compound stamp, but the other three heads, which have been in use for some time, will be remodeled. Address, Mohawk, Keweenaw Co., Michigan.

Fall River, Colorado.—Henry I. Seeman, Equitable Building, Denver, Colo., is making plans for the erection of a large milling plant to be erected up Fall river, Clear Creek county, Colo., for the Continental Mines, Power and Reduction Co.; the mill to be erected at the mouth of the tunnel of this company. Also for the installation of a power plant and drills for the running of this tunnel toward James Peak.

Florence, Wisconsin.—The Florence Mining Co. will install a double hoist at its No. 7 shaft, replacing the old machinery now in use, and will also install a Gates No. 9 gyratory crusher. The hoists will have 10-ft. drums and will be manufactured by the Lake Shore Engine Works, at Marquette, Mich. The Florence Co. will also install a new surface tram system and will replace the wooden head-frame at its No. 7 shaft. Address, Florence, Wisconsin.

Port Arthur, Ontario.—Satisfactory progress is being made with the blast furnaces of the Atikokan Iron Co. and the ore and coal docks in connection therewith. The concrete foundations for the blast furnaces having been completed contracts for the building and plant have been let. The Canada Foundry Co., Toronto, has taken the contract for the furnaces and a large proportion of the machinery amounting to about \$200,000. They will furnish four 225-h. p. Canada water-tube boilers with steam plant and pumping machinery, etc. The boilers will be installed about March and the furnaces completed in June. The Canada Bridge Co. has a \$100,000 contract for structural steel. Several contracts go to American firms for machinery which could not be furnished in Canada.

Special Correspondence.**San Francisco.** Jan. 24.

The recent storms of rain and snow have set men at work prospecting in all directions, as there is an abundance of water clear up to the mountain tops. A hole can be dug almost anywhere in the mining regions with water handy to pan out gravel or pounded-up quartz. In the older camps men and boys are searching around old dumps and in the ravines and gulches, looking for nuggets which have been washed out by the unusual rush of water. Others again are searching the hillsides and mountains in hope of finding croppings of veins uncovered by the same means. All the mines of the State are again running full blast and the miners are happy for the first time in several months.

In Brown Valley, one of the old time mining camps of Yuba county, now in a state of decadence, John Stevens and E. L. Whittier, while prospecting within a thousand feet of the town, found rich float quartz which, followed up, led them to promising croppings. The find is called the Mountain View, and is parallel to the old Pennsylvania-Dannenbroge, at one time a famous producer, but dips to the west into the mountain, instead of to the east as does the other named. The new claim is on the mountain side which rims the valley, and is outside the zone formerly worked. The rich placers of the trough of the valley, long since worked out, no doubt derived their gold from these ledges.

At Camptonville, another old mining camp of Yuba county, a strike of some importance has been made. In sinking a well in one of the lots in the residence district a promising quartz ledge has been found. At Campbell gulch, not far away, some of the old ledges are now being worked with good prospects of success, so that Camptonville may become again a mining camp.

An important decision affecting oil lands has been handed down by Judge Wellborn of the United States Circuit Court in Los Angeles, in the litigation between the Argentine Oil Co. and the Section Twenty-five Oil Co. It is in favor of the latter and affects the title to a valuable section of land in the Midway oil district of Kern county. Nearly all the people interested in the Twenty-five Co. are residents of Bakersfield and the land is estimated to be worth \$500,000. Judge Wellborn holds that the plaintiff company had practically abandoned the oil-bearing properties, and, from evidence adduced by non-interested parties, was shown to have admitted its disbelief that minerals existed there. The greater part of the work of improvement, according to the opinion, has been done by the defendants, and therefore they should be permitted to enjoy the fruits of their labors.

The Kern County Land Co. and all the allied canal companies have filed a suit against the Associated Oil Co. and every oil company operating in the Kern river field, and judgment is asked to compel the defendant companies to take such measures as will protect the river from accumulated and waste oil. The plaintiff asks for a restraining order to prevent the oil companies from accumulating oil in sump-holes until the hearing on the issue raised. The suit is the outgrowth of a long controversy between the canal and the oil companies. The waste oil, the canal companies allege, is allowed to accumulate in reservoirs or sump-holes, and from there it is said freshets carry it to the river, and thence it is taken to the cultivated lands through the canals to the great injury of the crops and the land. From time to time the canal companies have issued warnings to the oil companies to be more careful with their waste and to protect their reservoirs. The complaint sets forth that the canal companies are entitled to the use of the water in the river; that by reason of the position of the lands in the oilfields, waste oil must find its way into the river in the event of heavy rains, as will the oil in reservoirs insufficiently protected. It is alleged that "petroleum is a substance deleterious and noxious to animal and vegetable life when mixed with the waters of the river, and renders the water unfit for domestic stock and agricultural purposes."

A representative of the Mammoth Copper Co., of Kennett, Shasta county, has been visiting Goldfield, Tonopah and neighboring districts in Nevada making contracts for delivery of ore to the smelter of his company, which has decided to do custom work on a large scale. A special shipping rate is offered, somewhat lower than that prevailing.

The Southern Pacific Co. has closed a contract with the Guggenheim interests, by which it is to ship its ores from Nevada and Mexico over the Southern Pacific lines to Port Costa, Cal., where they will be loaded on vessels and taken by sea to the refinery at Tacoma, Washington. For this purpose the company is to rebuild its coal-bunkers in the Port Costa yards. Orders were received last week to rush the work to completion as fast as possible. The Tacoma plant has been handling Alaska ores almost exclusively, but under the present plans it will use ores from the Pacific States and even from Mexico. The Selby smelter is not large enough to handle all the ore, and to avoid the heavy freight charges due to the long haul to Tacoma, the Trust has resorted to the plan of shipping by both rail and water.

Up in Amador county, on the Mother Lode, the installation of the big electric pump to control the water in the South Eureka and Central Eureka mines, is be-

ing watched with interest, as the work to be done makes the longest lift of any pumping apparatus in that section. It is designed to raise water from a depth of 2,030 ft. on the incline, or a vertical depth of 1,800 ft. It is being installed under a guarantee that it will be satisfactory in every way. At the Oneida mine near Jackson, they have a lift of 1,300 ft., and no trouble is experienced. The South Eureka pump is designed to handle an average of 100,000 gallons of water per day. The Central Eureka is bearing the greater part of the burden of this installation, as the two mines are connected by drifts, for ventilation and other purposes, and too much water in the South Eureka would mean the flooding of the lower levels of the Central Eureka.

The great power plant to be erected by the Western Pacific Co. in Plumas and Butte counties, is expected to develop 180,000 h. p. Oroville, with its 30 or more dredges running by electricity, will have an abundance of power at command. The Valley Counties Power Co. in its four plants generates 40,000 h. p. The Ore Light and Power Co. will generate 5,000 h. p.; the plant at French Creek when completed, 20,000 h. p.; the projected plant by Thos. Barbour of the Risdon Iron Works, 14,000 h. p., which would make a grand total of 259,000 h. p. This great amount of electric energy available for use will be greatly to the advantage of the mining industry.

The "Lose the Yuba" movement received new impetus as a result of the high water last week. The Yuba & Feather Improvement Association feels encouraged to renew its work. This project is the removal of the Yuba river from its present channel for a distance of 15 or more miles, giving it a new channel across country finally emptying into the basin at the mouth of Bear river, where that stream forms its confluence with the Feather river. The point at which the new channel would commence would be near the new dam built by the Government near Daguerre Point, and the course would be southeast from there to a point two or three miles above the mouth of the Bear river. The topography of the country is such that the project is feasible, and once the river was turned into the new channel it would stay there, the fall being much greater than in the old channel, the latter being filled to a depth of from 30 to 100 ft. with tailings from the hydraulic mines. The plan would leave some fifteen miles of sand and gravel in the present channel of the Yuba, and it would stay there instead of working its way continuously into the Feather river, thence into the bay.

The Dempsey copper properties near Smartsville, Yuba county, have been purchased presumably by the American Smelting and Refining Co., which will, it is reported, erect a smelter on the line

of the California Midland Railway, soon to be built from Grass Valley and Auburn to Marysville. The amount involved is probably \$250,000, or more. The properties have been thoroughly expeted during the past several months and the ore deposits have proved extensive and rich in copper. Several other copper properties in the same vicinity are expected to change hands shortly. All the copper mining heretofore has been on a very limited scale.

Salt Lake City Jan. 25.

Information has come from Pioche, Nevada, to the effect that railroad engineers are in the field, locating a branch of the San Pedro, Los Angeles & Salt Lake from Caliente to Pioche. The impression prevails that the road will not stop at Pioche, but that it will be pushed on to the copper camp of Ely in White Pine county.

Before the end of January the management of the Newhouse Mines and Smelters Co. expects to be treating 700 tons of ore daily from the Cactus mine in Beaver county, and this will be increased to 1,000 tons.

A confirmation of the report that the Daly-West Mining Co. has been quietly seeking to get control of the Ontario and Daly mines at Park City, has been obtained from J. E. Bamberger, president of the first named corporation. Negotiations have been pending for some time, but nothing has been accomplished as yet.

George A. Baird of Sharon, Pa., executor of the estate of the late P. L. Kimberly, has been elected president of the Annie Laurie mine in the Gold mountain district, to succeed L. C. Huck, deceased. The late Mr. Kimberly was extensively interested in the Annie Laurie.

Active development is shortly to be inaugurated at the Last Chance mine in Bingham, Utah. The property is under bond to the Nevada-Utah Mines and Smelting Co., which has undertaken an extensive mining campaign in Pioche.

A Duluth syndicate, represented by Allen McDonnell, closed up a deal in Salt Lake recently for the purchase of the Potosi lead mine and zinc property at Good Springs, Nevada.

It is said parties extensively interested in the Calumet & Arizona, and other mines in Arizona, have become identified with the Buckhorn mine at Ophir, Utah, which is being operated by the Buckhorn Ore Co., under a lease and bond. R. M. Atwood an engineer of Butte, Montana, has been made general manager.

The stockholders of the Tintic Mining and Development Co., which owns the Yampa mine in Bingham, have authorized the capital stock increased from 600,000 shares to 700,000 shares of the par value of \$5 each. The proceeds from the

sale of the increased stock is to be used in paying off the present indebtedness and to provide working capital.

The supreme court of Utah has rendered a decision in favor of the defendant in the case of the Red Wing Mining Co. vs. William D. Clays. The complaint alleged trespass and taking of ore from the Columbia and Silver Hill lode mining claims in Bingham.

The officers of the Butler Liberal Mining Co. for the ensuing year are: J. J. Corum, president; C. N. Strevell, vice-president; F. M. Orem, secretary and treasurer; W. C. Orem, general manager. All are Salt Lake residents.

A controlling interest in the Paymaster Copper mine near St. George, Utah, has passed to Samuel Newhouse, and others. Samuel L. Adams will continue manager, retaining a one-third interest. The property adjoins that of the Utah & Eastern Copper Co.

Recent developments made in the Consolidated Mercur mine at Mercur have been of a character that will add years more of activity for that property. An upraise from the level below has opened into a 13 ft. body of oxidized ore on the floor of the Lizzie stope, which has yielded handsomely in the past. The ore is as good as that taken out of the Lizzie stope, which averaged about \$5 to the ton. Assays running as high as \$8 to the ton have been obtained. In raise 80 an old caved stope has been re-opened. The ore has been encountered again and a cross-cut is being run to the foot-wall, when an upraise will be run on the dip of the vein. There is a large tonnage available here. A cross-cut from the Electric tunnel to the Magazine vein is being run to determine if pay-ore exists below the Magazine stope. The face now shows values of \$2.50 a ton and the management is encouraged over the outlook. The Consolidated Mercur is in better condition now than it has been for a number of years. The mill is handling about 900 tons per day.

The announcement has been made of the formation of the Cumberland-Ely Mining Co., which is to operate in the camp of Ely, Nevada. George Gunn of Salt Lake, who for a number of years was the field representative of the American Smelting and Refining Co., is the promoter of the enterprise. The ground acquired covers a large area adjoining the domains of the Nevada Consolidated.

Denver. Jan. 26,

For the first month of the new year the dividend record of the Cripple Creek district will be a splendid one and the total will reach nearly \$360,000, which does not include the profits of lessees and of close corporations. The Portland Gold Mining Co. leads the list with

a dividend of 8c. per share, aggregating \$240,000.

The shipments of Mesabi range iron ore to the Minnequa plant of the Colorado Fuel and Iron Co. at Pueblo, have not been sufficiently profitable to continue them on account of the freight rates, and the company expects to use the product of its own ore properties after this.

The new line from Mystic, S. D., to Rapid City has just been completed by the Burlington system and on Feb. 1, the same will be opened for traffic, when Denver will have direct connection with Rapid City.

Until a couple of days ago there was considerable doubt about the route which the Denver, Northwestern & Pacific road would follow from Kremmling west. It has been finally determined that it will pass through Toponas, Yampa, Steamboat Springs, and Craig, thence by Lay and Maybelle to the Green river.

The Southern Pacific Railroad Co. has just closed a deal for the Porter Fuel Co.'s extensive coal properties, located a few miles from Durango, in the southern part of the State. This deal involves about 20,000 acres of coal land and the consideration is said to be about \$750,000. This means that the Southern Pacific will connect Durango with its system, surveying parties have been in the intervening territory for some time past.

Snowslides have interfered greatly with mining and milling operations, especially in the San Juan country, during the past week and a number of lives have been sacrificed, while a large amount of property has been destroyed. On the road between Durango and Silverton there are about six miles of Rio Grande track covered by slides of great depth, which carried an enormous amount of timber with them. Silverton has been virtually separated from the outside world for several days.

Leadville. Jan. 26.

Leadville men are again becoming interested in the mines at Red Cliff and so far are meeting with success. The Iron Mask group of claims at Gilman, have been secured by the Pittsburg Gold-Zinc Co., with Jas. W. Newell, of Leadville as vice-president and manager. The territory has large bodies of oxidized iron and zinc sulphides which are being extensively worked, the shipments of zinc being in the neighborhood of 3,000 tons per month, and that of iron is 50 tons daily. The zinc sulphide averages from 45 to 47% per zinc, with only 1½% of silica; it is shipped to the Colorado Zinc Works at Denver. The iron orebody overlies the zinc sulphides and in several places where it has been opened it is 85 ft. thick. It is estimated by engineers who have thoroughly examined the property that there are available for shipment 2,000,000 tons of ore.

The western slope of Carbonate hill is once more the center of attraction to many lessees, and during the month considerable ore has been shipped from the section. The old Enterprise shaft, west of the Castleview, has been put into commission, and a drift is being run from the Castleview shaft to make the necessary connections for air; 70 ft. remains to be cut before the connection will be made. From the drift several upraises were carried which opened a large body of manganese ore, carrying in addition to the manganese 4 oz. silver per ton. The ore is being shipped to the local smelter, but arrangements are pending to turn the whole output to the steel works at Pueblo. When the connection is made the Enterprise will be in a position to ship 75 tons daily. From the Castleview 125 tons daily are going out, consisting of iron and lead carbonates. The Yankee Doodle is also shipping a good grade of lead carbonate. In this section of Carbonate hill when a body of ore is caught it runs high in silver and lead values, and is generally caught within reasonable distance of the surface, so that there is little water to bother.

The work of installing heavier pumps at the Mammoth, Big Evans gulch, is nearing completion and in a day or two mining will be resumed and the shaft sunk below the second ore-shoot. A station will then be cut at the bottom of the shaft for the accommodation of compound pumps, and then drifting on the ore channel will be started. The opening of ore in the Mammoth has interested the owners of the property in the district and when spring arrives several new shafts will be sunk. The Mammoth company has a lease on the Pawnolas group to the west, and this territory will be opened during the coming spring.

A great deal of interest is being manifested in the work that is being carried on at the Nil Desperandum, Rock hill, especially in the south drift. This drift has been driven from the shaft in the neighborhood of 700 ft., and nearly all of the way it has been in mineralized water with frequent pockets of rich ore. During the week the drift entered contact and talc heavily stained with mineral, and if the ore channel is not caught within the next 50 ft., upraising will be commenced, as it will then be evident that the orebodies are above. The character of ore found in the pockets is similar to the main orebody of the Reindeer.

The M. N. Fraction, Breece hill, is being operated from the Yak tunnel and the lessees have already opened a mass of gold-copper sulphides which are being got into shape for shipping. The depth that this ore was struck was in the neighborhood of 1,000 ft. from the surface.

The Hayden shaft, of the Small Hopes Co., is being operated from the 425-ft. level and considerable good ore has been

shipped. Development work shows that there is a bright prospect of opening a large ore channel in the territory.

The body of manganese ore that was opened last week in the Home Extension ground has been found 60 ft. below, in the Cloud City territory. The percentage of manganese is high, and when both of the orebodies are developed the mine will be in a position to ship 75 tons daily.

The great dumps of zinc of the A. Y. & Minnie, considered at one time as waste, are now being treated by the Yak mill at a profit; the whole dump will be worked over.

Frank and Osterhaus are sinking a shaft on their claim, Big English gulch, following a vein of ore that carries close to an ounce of gold per ton. The shaft is down 300 ft. and in the next 200 ft. it is expected that the values in the three-foot vein will become shipping ore.

Butte. Jan. 26.

The Columbus-Butte Co., composed of Columbus, O., and Butte men, which began work on a group of four claims west of the Lexington mine last September, has struck a vein of rich gold and silver ore at a depth of 358 ft. in the Jennie Dell claim, one of the group. The strike is one of the most important of this class of ore that has ever been made in this section. The vein is about 10 ft. wide, having increased from 5 ft. at the point of intersection, and carries ore that assays high in gold and silver. It is not all so rich, but is all commercial, running high in both metals and from 1/2 to 1% copper. The company has extracted about 20 tons of copper ore since it began operations, showing that the possibilities for running into a permanent body of this class of ore are not remote. The vein traversing the property is supposed to be the one that passes through the Lexington, a United Copper mine, which lies east of the Columbus-Butte ground. The company succeeded to the interests of the Jennie Dell Co. and began work with a view of striking copper. It will sink deeper. Manager Ed. Higgins says the copper ore found in the property is identical with that in the Lexington, and is satisfied he has the Lexington vein.

Butte has another company known as the Butte & London Copper. It is organized under the laws of Arizona and will develop the Greendale placer, which adjoins the property of the Pittsburg & Montana Copper on the north, the extent of the area being 2,000 by 3,000 ft. Although called placer, the ground is supposed to contain the extension of the vein of the Jessie and other North Butte Co. veins. Theodore Brantley, chief justice of the Supreme Court of Montana, is president. The amount of the capitalization is \$5,000,000 in 1,000,000 shares.

Dr. Herman B. Eisenberg, of London, who spent several days in Butte recently, represents the London end of the enterprise. He has taken 100,000 shares of the stock to London to be sold there. The company intends to sink a shaft from 1,200 to 1,500 ft. deep in the center of its ground and then crosscut north and south.

Amalgamated is driving its cross-cut rapidly from the 2,400-ft. station of the Anaconda south, but will not strike the vein until some time in March. It is drifting on the vein at the 2,200. The company is actively engaged in developing the J. I. C., a promising claim in the vicinity of the East Butte Copper property, and is also getting well down with the shaft on the Greenleaf, at the east side of the flat. The company reports an output of between 16,000,000 and 17,000,000 lb. of copper for December. It is shipping to the Washoe plant, 7,800 tons of ore per day, 7,500 of which are from its own mines and the remainder is bought from small operators. Great Falls is getting 112,000 tons a month from Boston & Montana mines.

North Butte, which succeeded to the interests of the Berlin Co. recently, has stopped sinking on the Berlin and pulled the pumps. It intends to explore the ground from the lower levels of the Jessie, which is close to the Berlin. The shaft on the Berlin had reached a depth of about 400 ft. The group comprises five claims, and North Butte has made payments on it.

Duluth. Jan. 26.

The Mesabi Iron Co. was organized in the 60's to explore and develop iron ore properties on what has since been regarded as the valueless portions of the range, all of its land lying east of the west line of R 12, and in townships 60-12 and 60-11. There were about 9,000 acres, and the ore formation was very strong and persistent. In places along this part of the Mesabi range ore shows on the surface in great glaciated plane faces, and the banded chert is everywhere present. But work done there up to this time has not shown any ore of importance. The region was affected by a vast gabbro extrusion, of Keweenawan time, and before acid solutions had done their work in separating the silica and iron of the ore-bearing formation as they did further west, where there was none of the gabbro influence, and where the separation resulted in the laying down of the enormous merchantable orebodies of the Mesabi. The chert and iron have not, so far as has been proved yet, been separated on that part of the range, and still lie in strata, often of rich ore and lean jasper and taconite. The exploration there has been by a number of interests, for isolated locations and small sections of the formation, but so great is the district that it is difficult to say that it has been proved, for it lies

along some 10 miles of the range. G. A. St. Clair, of Duluth, who has been of late quite successful in some work near Biwabik and elsewhere, has now taken options on the holdings of this company and is already at work exploring. In its possible effect on the future of the district this work is important, possibly the most so that is under way at this time.

The total amount of ore shipped by the Wisconsin & Michigan road from the lake Superior region to date by its novel car-ferry proposition, has been 20,169 gross tons. All of this was moved the past season from No. 5 shaft of the Aragon mine at Norway, and went to the port of Peshtigo, where it was run onto car-ferries especially built for carrying loaded freight cars, moved by lake to South Chicago, transferred to the tracks of the Belt road and taken to the furnaces of the Joliet works of the Illinois Steel Co. The car-ferry proposition has not yet worked out, as a revenue-producing scheme, but it is supposed that the company will increase its business the present year and that it will handle a portion of the product of several large mines, both at Norway and Crystal Falls. The road is to be extended to Iron Mountain as soon as possible; indeed its tracks would be moving forward now but for the unfortunate collapse of the J. R. Walsh enterprises some weeks ago.

Longyear & Hodge are drilling the lands of the Buffalo & Susquehanna Co., north of the Armenia mine, at Crystal Falls, and will put down several holes. There is a great deal of activity in exploration and development in that territory. At the Kimball the process of unwatering the old shaft is under way, and miners may get underground in two weeks. This property will be explored and developed as fast as ore is shown. Ore is being put into stock at the Fairbanks exploration there, and this little mine will make a good showing for the year. A new machinery plant has been ordered for the Dunn and is expected on the ground in a month.

Total shipments of the Cleveland Cliffs Iron Co. for the past year amounted to 2,014,735 tons, against 1,233,333 for the previous season. This does not include, either year, the shipment of the Queen group at Negaunee in which the company has a quarter interest, but it does include all of the Negaunee shipments, of which the Lackawanna Steel Co. owns half.

The Rand Drill Co. has sold a complete mine plant, including drills, compressors and rock crushers, to the Atikokan Iron Co., of Port Arthur, which expects to have the works in operation next summer. The plant will give the company capacity for mining and crushing about 1,000 tons per day, of which a large share will be for sale on the Canadian market to bessemer-iron producers. The mine will have no hoisting plant, as for a long time its ore will be won through tunnels.

Negotiations are in progress for the sale of the Crosby holdings on the new Deerwood range, west of Duluth, to the Zenith Furnace Co., of that city, through its Zenon Iron Co. If closed, the new company will explore the lands for merchantable ore on as vigorous a scale as has been pursued by Mr. Crosby and associates. Some merchantable non-bessemer ore has been found on these lands, but the tonnage is small in comparison with that of lean ore, not good enough to ship.

In the shaft that is being sunk on section 30-63-11, Vermillion range, ore was cut at the depth indicated by drill-work, and the shaft is now in it. The character of this ore is that customary for the district. The shaft will soon go out of this lens, but at about 300 ft. a drift will be started to cut it again, and the development of the property may then be said to have commenced.

Calumet, Mich. Jan. 27.

There is very little change in the situation at the Tamarack mine, where half of the mine has been idle two weeks because of the fire underground in No. 2 shaft. After every possible effort had been made to rescue the three men cut off by the flames underground, the company sealed the mouths of No. 1, 2 and 5 shafts. It is hoped to smother the flames. No effort to investigate the condition of the underground workings has been made since the shafts were sealed. Additional forces have been put to work in No. 3 and 4 shafts of the North Tamarack branch and an increased output is coming from that branch of the property, which is not connected with the remainder of the mine by any openings underground.

Diamond drill exploration work on the Belt mine in Ontonagon county was started this week by the Lake Copper Co. which has acquired title to the property. The Knowlton and other lodes will be explored. An old shaft on the Knowlton will be unwatered and extended. Boilers and other equipment have been installed at the shaft. R. C. Pryor of Houghton, Mich., is president of the Lake Copper Co. and will manage the work.

There are a large number of diamond drills engaged in exploration work in the Lake Superior copper district this winter. The Calumet & Hecla Mining Co. has a number on its extensive mineral land holdings in Keweenaw county. The Keweenaw Copper Co. has had one drill working in that section all winter and is preparing to start several more. The Osceola Consolidated Mining Co. has been using a drill at its North Kearsarge branch, conducting explorations from one of the drifts on the lower levels. At the Rhode Island another diamond drill is located. It is rigged up on surface and the Kearsarge amygdaloid bed is sought.

President H. F. Fay, of the Allouez, who has just finished an inspection of the workings and returned to Boston, said

before leaving: "No. 2 shaft is down 40 ft. in the sand, and is progressing satisfactorily. No. 1 shaft is approaching the sixth level and should reach that depth Feb. 1. The sixth will be the uppermost level at which connections with No. 2 shaft can be effected. The distance between the two shafts is 2,000 ft., and as this is also the depth, it will be necessary to sink in order to reach the same level in No. 2 shaft, we have figured out that the two operations will reach a common point almost simultaneously."

No. 2 shaft of the Centennial, opened to the twenty-sixth level, is gradually being enlarged throughout its course to the full size of two compartments and the skip-roads are being installed as rapidly as the openings permit. The shaft is opened to its permanent size below the thirteenth level and also at several points beneath. It will be holed through to the twenty-seventh level in a short time.

Indianapolis. Jan. 27.

The coal operators and the miners of the two big organized competitive bituminous coalfields of the country—the Central competitive field, composed of western Pennsylvania, Ohio, Indiana and Illinois and the Southwestern district, composed of Missouri, Arkansas, Texas, Indian Territory and Kansas—got down to work in their two joint conferences this morning. The refusal to admit the Southwestern district to the Central competitive district occasioned the two conferences; the Central joint conference, with 990 mines and operators seated, was held in Tomlinson hall, while 170 miners and 25 operators met in Masonic Temple as representatives of the Southwestern district.

Out of all the confusion and threats of a prolonged strike there have come bright prospects for peace in the bituminous districts. The indications are that before another week passes the miners and operators will reach an agreement and be ready to sign a contract. Though the demand for a run-of-mine basis, and a 7% differential between pick and machine mining, and other demands may take up some time, the fight in the big conference has already practically settled down to the one demand of the miners for an increase in wages. The real fight will come, not on the demand for a 12½% advance on present wages, the formal demand of the miners, but on the restoration of the wages to the 1903 scale—the one in effect previous to the 5.55% reduction accepted by the miners two years ago.

The indications are that the operators would court a cessation of the mining industry of the country for 60 days because of low prices and mild weather, but it is understood that they have set the standard of wages to be paid at the present existing scale, and it is generally

believed that the miners will in due time agree to sign the present wage scale with a few minor conditions changed. This is the real battle ground, the operators insisting on its re-enactment and the miners insisting on an increase no matter how slight. What will be the result no one can tell, but it is safe to predict that the miners will not go away from the joint conference with a contract providing for another reduction in wages, and it is equally safe to say they will not secure any material increase. The feeling between the operators and miners is unusually good and each side endeavors to outdo the other in gracious compliments. The feeling, however, in the miners' convention, and particularly among the officers and leaders, was not good, and at times it was thought there would be a rupture, or division of the union. A faction at one time threatened to secede but wiser council prevailed.

The people of Southern Indiana owe a debt of gratitude to John R. Walsh, and if it were in their power to place him on his feet again financially, they would do so. Mr. Walsh has done more, directly and indirectly, to increase the value of the coal-fields of Indiana than any other man. When it was reported that he had failed, the people at once regarded it as a distinct disaster to the coal interests of Indiana. Mr. Walsh and his railroad has been largely responsible for the rapid growth and development of the Indiana coal-fields and stone quarries, nearly half of the mines of the field being located on the main line and its branches. This railroad and the money spent liberally by Mr. Walsh are responsible for the growth of Linton, Vicksburg, Midland, Tower-Hill, Jasonville, Coalmount and other places which have grown from villages of a few hundred souls to fair-sized cities. Mr. Walsh organized the Southern Indiana Coal Co. which now controls seven of the largest mines in the Linton district.

As to what effect the Walsh failure will have in southern Indiana, no one can at present predict.

The Chicago, Indianapolis & Evansville Railroad, now building, is calculated to foster coal land development. It is stated that men connected with this enterprise have purchased 60,000 acres of coal land in southern Indiana.

The Chicago, Illinois & Eastern Railroad Co. has leased 22,000 acres of coal land in Pike county and is now employing a number of crews who are making diamond drill tests near Petersburg.

Austin, Texas. Jan. 26.

Judge Brooks, of Austin, in his decision given on the Kennedy taxation law has decided:

1. That the tax is constitutional.
2. That under section 9, a wholesale dealer includes all who sell oil.

3. That section 11, levying a gross receipt tax on lessees and owners of tank cars is void for lack of uniformity.

4. That the producer and pipe-line tax section are valid.

5. That the penalties prescribed for failure to make reports are not collectable.

6. That the taxes imposed must be calculated from April 17, 1905, instead of April 1, 1905, as names in the act.

The oil companies have given notice of appeal.

Platteville, Wis. Jan. 29.

At the Mineral Point Zinc Co.'s plant, some interesting experiments are being made, which are expected to result in an increased saving of the zinc, which has formerly been lost as flue dust. An analysis of the flue-dust from several of the different separator plants in operation in the district has shown it to be comparatively free from iron.

The Galena type roaster recently installed at the Tripoli mine, near Mineral Point, is a great improvement over the one formerly in use there. It is not generally known, but several attempts have been made to install an electro-static plant, from which some good test results were obtained, but they were not commercially satisfactory. Several different types of roasters and separators have been tried, but nearly all operators have gone back to the original process with its different modern improvements.

Since the vein of lead and zinc ore was struck at the Gillilan mine, between Platteville and Potosi camps, shares that had been selling at \$100 (there being only 40 shares in all) jumped up to \$1,000. The Gillilan is situated on property that at one time produced great quantities of lead and dry-bone above the water level. The present strike is much below the old workings. The finding of ore at the greater depth means much for the district.

Some work is contemplated at the Krog-Webster mine, at British Hollow camp. Mr. Krog, the president, states that it is the intention to begin the installation of necessary machinery for the economic handling of the ores. The mine is situated on very high ground. It is the intention to place the mill and power plant down in the creek bottom; electric transmission of power will be a feature of the operations. The Krog-Webster Co. owns the mining right on 102 acres of the property, the balance, 86 acres being a lease on a royalty basis. The total depth is 143 ft., with at 90 ft. and 140 ft.

The Sally Waters management has concluded to change from gasoline to steam and electric power, at the mine, near the New Diggings camp. It is also the intention to double the present concentrat-

ing plant. During the time the present mill has been in operation it has averaged over one ton of concentrates per hour.

A compressor and pumping plant is being installed at the Snowball mine, in the Dodgeville camp. Considerable lead has been shipped out of Dodgeville in years past.

The Blue Mounds Co. is a new one, recently organized and in a flourishing condition.

For over two years the owners of the Rowley Mining Co. have been carrying on active development work, at their mine in Buncombe camp. Their efforts have finally been rewarded, it is reported; by a big strike of zinc and lead ore. As a last resort a prospect drift was run into the hill and the vein was found. It is supposed to be a continuation of the Kennedy range.

Joplin, Mo. Jan. 27.

Activity in this district was never more marked than at the present time. Never was there as many concentrating mills in course of construction and contracts for new ones being let. One Joplin contractor has four contracts signed up and reports a dozen companies that will soon let contracts for new mills. This vast amount of work is the result of high ore prices during the past year, which bid fair to extend throughout this year.

The largest mining deal of the new year was closed yesterday when the Empire Zinc Co.'s 20-acre tract in the west edge of Joplin, and known as the Smelter reserve, was taken over by a company capitalized at \$1,400,000. This five years ago was offered for \$20,000 with no takers, since which time it has become a valuable producing property. The new company is composed of E. Z. Wallower, of Harrisburg, Pa.; I. Ward Frey, of Springfield, Ohio; A. H. Rogers, Captain E. O. Bartlett, Captain Dan Dwyer and D. M. Sayers of Joplin. The new company will be known as the Paomo Mining Co., the name being a combination of the abbreviations of the three States represented by the residences of the purchasing parties. Three producing mines are located on this tract, the Sexton, Alice H. and Power & Co.

The Concord Zinc and Lead Co., of Joplin, has filed articles of association with a capital of \$100,000. The stock is divided into 1,000 shares, par value of \$100 each, all paid up for a term of 50 years, and held by G. B. Carstarphen, L. E. Craig, Chas. W. Bibb, and Fred L. Williams.

The Postal Lead and Zinc Co., of Joplin, filed articles of incorporation today with a capital stock of \$50,000, divided into shares of \$100 each, all paid in. The shareholders are: C. S. Hinchman, C. R. Hinchman, A. S. Elliott, W. C. Arrison, all of Philadelphia, Pa.; A. H. Waite, C. E. Hart, A. F. Donnan, all of Joplin.

The Red Jacket Mining Co., of Webb City, has filed articles of association with a capital stock of \$75,000, divided into 3,000 shares of \$25 each, one half paid up, for a term of 50 years. The stock is held by S. A. Allison, J. M. Hirons, Ephie Cohen and Morris Harris.

The Amalgamated Zinc and Lead Co., of Joplin, has filed articles of association with a capital stock of \$100,000, divided into shares of \$100 each, all paid up for a term of 50 years. The stock is held by W. E. Wisby, G. B. Carstarphen, Charles W. Bibb and E. Wisby.

Scranton. Jan. 30.

Considerable interest has been displayed in the anthracite region in connection with the open rupture at the Indianapolis convention of the Mine Workers between President Mitchell and the Vice president, T. E. Lewis. According to some of the delegates who have returned, the feeling was intense, although mostly under the surface. Lewis being a Welshman, has a number of friends in this section, where the Welsh miners are very numerous, but he is not so generally and widely known as Mitchell. He had been regarded as Mitchell's successor in the event of a change being made in the office, but it is the opinion of even his own friends that his chances are now considerably reduced. The trouble, it is said, is old, and was accentuated in the Ohio convention recently, when the two forces supported different men for State president.

All the 44 collieries of the Philadelphia & Reading Co. were idle for two days last week, owing to the scarcity of cars. The demand for coal, it is said, is still very satisfactory. Some difficulty has also been experienced in securing sufficient men to handle the coal trains.

The Cain Brothers Coal Co. has been chartered in Pottsville, with a capital of \$30,000, and will operate the Buck Run colliery.

The Philadelphia & Reading Co. is placing fire extinguishers in prominent places in its mines and breakers.

Remarkable work has been accomplished since last March on the coal strippings of the St. Clair Coal Co., and some valuable veins have been uncovered and worked. Two mammoth steam shovels and four locomotives are at work night and day. Since March 300,000 cu. yd. have been excavated, and parts of veins uncovered show a thickness from 50 to 60 feet.

Kinsley & Wescott, of Scranton, have been awarded the contract for the breaker which is built in connection with the new colliery at Pine Knot.

The Buck Run Coal Co. is installing electrical power for its breaker as well as for lighting the plant.

The Delaware & Hudson Co. is building a washery in connection with the new breaker at Olyphant.

John Donaldson, who formerly held large coal interests at Shamokin and Tamaqua, died in Atlantic City, aged 70 years.

The Drake Drilling Co., of Hazleton, is sinking in North Scranton, one of the largest bore-holes ever undertaken in the anthracite region. It will be 20 in. in diameter and 600 ft. deep, and will be used for a pipe-line to pump water from a slope.

It is announced that the new breaker for the Mary D. Coal Co. at Tuscarora, to replace that recently destroyed by fire, will be completed within four months.

Toronto. Jan. 26.

Dr. Eugene Haanel, Dominion superintendent of mines, is making an inspection of the experimental plant installed at Sault Ste. Marie for testing the electric smelting process as applied in magnetite iron ores in bulk. The experiments so far conducted under the supervision of Dr. Heroult, the French expert, have been made with a small furnace but it is proposed to treat large bodies of ore in a furnace of special design, in order to obtain more conclusive results. The experiments already made have demonstrated that nickel pig can be produced by treating nickeliferous pyrrhotite by electricity. Apart from the main object of the experiments—the smelting of iron ore—this discovery is regarded as of great importance to the Sudbury nickel industry.

The Ontario Bureau of Mines has received samples of steel produced directly from iron ores by an electric furnace from J. W. Evans, mining engineer, of Deseronto, Ont., who has for some time been conducting laboratory experiments in electrical smelting. The samples consist of steel produced from the titaniferous iron ore of the Horton mine in 15 minutes, and from the sulphurous iron ore of the Coe Hill mine in 20 minutes and appear to be of good quality. These are both refractory ores and should the results obtained be borne out by trials on a larger scale, it will render commercially valuable large deposits of these ores in Hastings county hitherto regarded as economically useless.

The weather in the Cobalt mining area has been very mild, with but little snow, and operations at several of the mines have been continued all the season without intermission. W. G. Trethewey states that in the working of the New Ontario, or, as it is more generally known, the Trethewey, the largely accepted theory that the silver values would decrease with depth has been disproved. Samples recently taken at a depth of 65 ft. show a higher percentage of silver than those taken from the surface at the same point. Sanitary conditions in the camp are very unsatisfactory and the water impure, so that an outbreak of disease is anticipated with the advent of spring unless strict precautions are taken to avert it.

As a result of numerous representations made to the Ontario government by miners and prospectors as to the illegal methods by which extensive claims in the Cobalt mining area have been secured by the Timiskaming & Hudson Bay Mining Co., Ltd., Attorney-General Foy has announced that the whole question will be brought before the courts. Writs are being issued against the company in regard to locations said to have been wrongfully acquired. Under its charter the company was authorized to locate 640 acres of land for mining development. It is alleged that in addition to this generous grant the men who formed the company each took up all the claims possible in their individual names, and then made declarations of trust, handing them over to the company, in violation of the mining laws. Other illegal acts in connection with obtaining claims are alleged. The company now controls an immense area in and surrounding the Cobalt district. A large number of Cobalt prospectors and miners are in Toronto in connection with the matter.

The report that the United States Steel Corporation intends to establish a branch in Ontario, which, though frequently denied, is again repeated in a circumstantial way is generally discredited here.

The output of the Nova Scotia Steel and Coal Co. for 1905 amounted to 560,000 tons of coal, 120,000 tons of coke, 58,000 tons of pig iron and 22,000 tons of steel. The Dominion Iron and Steel Co., of Sydney, N. S., had a record year with a total production of 162,000 tons pig iron, 173,500 tons open-hearth steel, and 47,000 tons rolled forms. The production of coke was 242,150 tons. They consumed over 500,000 tons of coal, 380,184 tons iron ore, and 267,237 tons of limestone and dolomite. During December the company's rod-mill turned out 6,700 tons of wire-rods. The company has heavy orders for steel rails on hand for this year.

Col. Ray, of Port Arthur, and Folger Bros., Kingston, owners of the Tip Top copper mine, 80 miles west of Port Arthur, have disposed of the ore on the dump to an American syndicate for \$38,000 and given them an option on the property for \$150,000.

Prof. W. G. Miller, Provincial Geologist, has warned the public to beware of investing in mining companies which are trying to take advantage of the Cobalt excitement to sell worthless shares. The best properties, he says, are already taken up and those who own them are not, as a rule, peddling stock.

New companies organized here: Terrill Cobalt Mining Co., Ltd., Sault Ste. Marie; capital, \$100,000; provisional directors: Wm. E. Gimby, G. U. Woodbrick, David I. Millar, H. H. Taylor, W. B. Moorehouse, Alex. McIntyre, Fred. Rogers, A. G. Terrill and Robt. H. Schultz.

Dymond Development Co., Ltd., Ottawa; capital, \$250,000; provisional directors: Chas. W. F. Gorrell, Adam T. Shillington, B. J. Arnold, Wayland L. Arnold and Ralph G. Arnold.

Victoria, B. C. Jan. 24.

Nelson.—The Canadian Metal Co., which a short time ago acquired the smelter at Pilot Bay, Kootenay Lake, last week started a lead stack, described as a new furnace, the invention of M. Blanchard, of Seattle, Washington. It is the first of its kind to be used in Canada. A series of experiments has been carried out, chiefly with lead ores from the Canadian Metal Co.'s Blue Bell mine, Kootenay Lake, with results declared to be very satisfactory.

Rossland.—Ore shipments from Rossland mines last week were as follows: Centre Star-War Eagle, 4,080 tons; Le Roi, 2,040 tons; Le Roi No. 2, 570 tons; Jumbo, 300 tons; total, 6,990 tons. Total of shipments for the year is given as 19,210 tons.

Letters patent have been issued for the incorporation of the Canadian Consolidated Mines, with an authorized capital of \$5,500,000, to acquire the properties of the St. Eugene Consolidated Mining Co., the Centre Star Mining Co., the Canadian Smelting Works, and the Rossland Power Co. The St. Eugene Co. owns the St. Eugene lead-silver mine at Moyie, East Kootenay, which last year produced nearly 40,000,000 lb. of lead and 1,000,000 oz. silver. The Centre Star Co. owns the Centre Star and War Eagle mines at Rossland. The Canadian Smelting Works own the smelter at Trail, near Rossland, with both lead and copper stacks in operation and an electrolytic lead refinery of a capacity of 50 tons of metallic lead daily, with additions being made to bring its capacity up to 60 tons daily. The Rossland Power Co. erected at Trail in 1904, large concentrating works for the purpose of concentrating Centre Star and War Eagle ores of too low a grade to bear ordinary smelting charges, but these works are awaiting the addition of more machinery.

Boundary.—A press dispatch from Phoenix gives the ore shipments from Boundary mines for last week as having totaled 25,971 tons, as follows: Granby Co.'s mines, 16,708 tons; British Columbia Copper Co.'s mines, 3,787 tons; Dominion Copper Co.'s mines, 4,926 tons; Oro Denoro, 510; Providence, 40 tons; total, 25,971 tons. The total production for the year to date is 58,172 tons.

A published table shows that twelve high-grade properties situated in the neighborhood of Greenwood shipped during 1905, a total of 2,745 tons of silver-gold ore, which ranged in value from \$50 to \$100 per ton.

Coast.—The manager of the Western Fuel Co. is quoted as authority for the statement that at the company's Depart-

ure Bay mines, near Nanaimo, Vancouver Island, the actual coal in sight is sufficient to permit of an output of 1,000 tons per day for at least 18 years. A slope recently entered the upper seam of coal in these mines and made accessible 5½ ft. of coal of excellent quality. Two seams of coal, the upper known as the Douglas seam and the lower as the Newcastle, occur here and have for many years been worked at Nanaimo and seaward from Protection island. The development of the Northfield or Departure Bay mines has been in active progress, except during the period of last year's strike of the miners, for two or three years. No. 3 and 4 mines were opened at Northfield Point, Departure Bay, where a shaft was sunk 60 ft. and from the bottom of it a haulage slope was driven in the Newcastle seam under the channel to meet levels driven from Newcastle island towards Northfield Point. A counter slope was driven from the surface at Departure Bay in the same seam, for a return air-way. At first the Douglas (or upper) seam was too near the bottom of Departure Bay to allow of its being mined, but at some distance a connection was made from the Newcastle seam by a drift to the rise. As the Douglas seam had faulted, this drift did not encounter it where expected but it was located by boring and last week it was entered and, as above indicated, found to be a workable seam of coal of excellent quality. In connection with the opening up of the Departure Bay mines extensive hoisting and screening works have been erected and substantial wharves and storage bunkers constructed.

The first shipment of copper matte from the Alaska Smelting Co.'s smelter at Hadley, Prince of Wales Island, southeast Alaska, mentioned last week as expected to shortly reach Crofton, has been received by the Britannia Smelting Co. It consisted of 490 tons of matte, which has been sampled and is being bessemerized. Paul Johnson, manager of the Alaska Smelting Co.'s works, was at Crofton while the sampling was in progress.

Boundary.—Advices from Phoenix state that about 3,300 tons of ore are being shipped daily from the mines of that camp, between 2,700 and 2,800 tons from the Granby Co.'s mines and the remainder from those of the Dominion Copper Co. With the blowing in, Jan. 11, of the second furnace at the Dominion Copper Co.'s smelter, at Boundary Falls, every blast furnace in the district was in simultaneous operation. The total smelting capacity of the three district smelters, with all furnaces running, is rather more than 4,000 tons of ore per day, in the following proportions: Granby Co.'s smelter at Grand Forks, with eight furnaces, 2,800 tons; B. C. Copper Co.'s smelter at Greenwood, with two furnaces, 600 to 700 tons per day, and Dominion Copper Co.'s

smelter at Boundary Falls, also 600 to 700 tons per day.

All three smelters are now working their employees on 8-hour shifts instead of as formerly, when most of the men had to work 12 hours. An understanding has been arrived at relative to wages to be paid under the new conditions. This desirable change has removed what has long been regarded as likely to lead to difficulties with the men.

Mexico. Jan. 24.

Perhaps no camp in Mexico has more new work actually started or contemplated than in Guanajuato today, where a great deal of American, Canadian and English capital is being introduced, with very little noise. The showing already made by some of the new and enlarged companies, such as the Guanajuato Reduction and Mines Co. and the Guanajuato Consolidated Mining and Milling Co., have been largely the cause of this interest and influx of capital. The former company has its new plant well under way and in the meantime is opening up the old properties which it has acquired, while the Guanajuato Consolidated has its 90 stamps, amalgamation and cyanide mills in full working order and is keeping the development work well ahead at its Sirena mine. In addition to these there are under construction mills of 120 stamps for the Peregrinas, 100 stamps for La Luz, and 80 stamps for Valenciana. And now it is rumored that a consolidation of a number of the small old properties that are still working will be effected this month, involving something like \$3,000,000, Mexican. The 200 years accumulations of old tailings in the Guanajuato river is still being presented to various capitalists in the hopes of finding the right people, and E. B. Kimball, a hydraulic mining engineer of California, is at present making examinations and tests on the river bed for interested parties. And the Dwight Furness Co. has had consolidated its several railroad concessions, for the construction of a road from Guanajuato to Marfil, and thence to both Irapuato, on the Mexican Central, and to Salamanca, on the Mexican National, giving the people of Guanajuato not only a line right into town, which they have not at present, but also the outlet by both Central and National. The concession gives freedom from duty and materials for five years from Oct. 24, 1903, requires that at least six kilometers (3¾ miles) be built each year, and all completed by Dec. 31, 1910. Of the line to Salamanca, there is now built and running the 30 kilometers of road from Marfil to San Geronimo. M. C. Kimball is said to be stirring up considerable interest by claiming to have found large bodies of anthracite coal near the railroad in the State of Guanajuato, but is keeping it to himself until he can obtain the

ground and necessary capital. It is to be hoped he is not after a body of obsidian, of which there is considerable in the country.

Parral, Chihuahua, is considerably aroused over the statement that the deal has actually been consummated for the sale of the holdings of the Hidalgo Mining Co., of James I. and P. J. Long with Pittsburgh associates, including the mines and the Parral & Durango Railroad, to the Anglo-French Industrial Syndicate for \$5,000,000 gold. It is said that one of the first acts of the new company will be to extend the railroad to Guanacevi, in the State of Durango, which is a branch badly needed. Also the work on the public wagon road from the terminus of the Parral & Durango Railroad to the mining camp of Guadalupe y Calvo is to be started next month, the completion of which will work a great benefit to a large mining section. In the city of Chihuahua, the work on the new smelting plant of 500 tons, to be erected there by the American Smelting and Refining Co., has been begun by the demolition of an old plant that stood on the site, under directions of T. S. Austin, the general superintendent of the company.

London. Jan. 20.

Now that zinc and lead are so much in demand, and also owing to the prominence given to zinc by the exploitation of the dumps at Broken Hill, a good deal of attention is being paid, especially in the South African market, to the properties belonging to the Rhodesia Broken Hill Development Co. A few years ago the discoveries of zinc and lead ores in Rhodesia were used for the purpose of booming that country, but until recently very little has been heard as to the actual values of the deposits. R. J. Frecheville paid a protracted visit to the district during the latter part of last year and his report is of considerable interest. The deposits are in northeastern Rhodesia, 350 miles from the Victoria Falls. It is expected that the railway from Victoria Falls will be completed as far as the properties by the middle of the current year, so that the mines will then be in direct communication with Beira. Mr. Frecheville reports that the deposits occur as rough, hilly outcrops in the middle of more or less swampy plains, partly covered with timber and partly with rank grass. They are the remnants of anticlinal folds, which have been vastly broken up, so that the dip and strike of the strata are uncertain. The beds consist of limestone, sandstones and shales; and the ores occur at or near the contact between these various beds. The deposits seem to have been formed by replacement. Also, the mineralizing waters must have contained a great deal of soluble silicic acid, for silicate of zinc is the predominant mineral. At one of the outcrops

sufficient exploratory work has been done to expose over 100,000 tons of ore averaging 24% zinc and 21% lead. Manganese oxides are present, owing to the leaching of the limestone, and there are also oxides and carbonates of iron, the presence of the latter indicating that pyrite will be found in depth. At another of the developments, the ore is mostly silicate, running 25% of zinc and only 3% of lead. At all these deposits, water is found very near the surface, so the amount of oxidized ores is comparatively small, and so far nothing has been done below the water level. Mr. Frecheville estimates that at these two workings there is proved and probable ore amounting to over 250,000 tons. The method of treating the ores is very uncertain, for zinc ores cannot be treated locally, nor can the ores be concentrated by water or by hand in order to make a lead ore that can be smelted on the spot. Mr. Frecheville's report is the reverse of encouraging, but the supporters of Rhodesia and the Rhodesian market are optimists, and know no such word as "fail."

The Dolores Limited is an English company that was floated two years ago by the Venture Corporation to acquire practically the whole of the shares in the American company called the Dolores Mines Co., incorporated under the laws of the State of Maine. The mines are situated on the Guerrero district, Chihuahua, and are 120 miles from the railway at Minaca, communication being over a rough trail. The former owners opened up the mine in primitive fashion, but did enough to prove the existence of large bodies of gold and silver ores of high grade. When the American company came into possession, hoisting plant and water supply had to be provided, and the best way of treating the ore had to be studied. The system finally adopted, on the recommendation of Mr. Godfrey Doveton, is as follows: The coarsely broken ore is passed over a picking belt, where the richer ore is picked out. This ore is first coarsely stamped and then ground in Bryan mills. The pulp so produced is amalgamated in ordinary pans. The remainder of the ore, not picked from the belt, is stamped and ground in Bryan mills, mixed with the tailings from the treatment of the richer ore, and the mixture slimed in tube mills and cyanided. During the summer months of last year, that is from May to September, 2,000 tons of picked ore were amalgamated, yielding \$122,000, or at the rate of over \$60 a ton, the values being divided about equally between gold and silver. It is estimated that the tailings contain quite \$30 per ton. The plant for crushing and amalgamating the lower grade ore and for sliming and cyaniding the tailings is not yet complete, but it is expected to be in working order during the coming summer. It will be seen from these notes that the company has a promising pros-

pect before it, in spite of the obvious physical difficulties connected with transportation. The shares in the English company are underwritten, but they have not yet come on the public market. Their appearance will be delayed until there is a divisible profit.

Paris. Jan. 10.

At a recent meeting of owners and concession-holders of coal-bearing lands in the Lorraine district, it was decided to commence boring operations on a considerable scale at Abaucourt, which is the place where most favorable results were obtained from experimental borings. A bed of excellent coal with veins of 9 ft. thickness has been reported from this district and at the meeting \$2,000,000 was immediately subscribed for the commencement of operations. Much satisfaction is felt on all sides that success is attending the efforts of the promoters of this coal district which will in large part render the French consumer independent of Belgian coal.

Not a great deal is known here of the deliberations which took place in Paris in December last between representatives of the American and German steel trusts. It is believed, however, that the way was prepared for large American orders to be placed in Germany in view of the inability of American firms to meet the deliveries demanded. It is also thought that a close trust will result from the understanding arrived at in Paris.

There is now commencing an agitation for the abolition or reduction of the heavy taxes on petroleum and petroleum products entering France. At present the State tax is about \$2 per hectoliter and the octroi or Paris city dues are \$6 per hectoliter; the hectoliter is about 30 U. S. gallons. The result is of course reactive in respect to the industrial development of certain industries, especially the automobile industry, which makes little headway in respect to the manufacture and sale of industrial vehicles. The tax if removed would lead to an immediate increase in the consumption of petroleum and its products. The absence of petroleum-operated public omnibuses in Paris is largely due to the heavy duty on the combustible, which costs \$12 per 30 gallons.

Several large copper contracts are being renewed, and they all show an increase in price of from 20 to 30 per cent. Stocks are very low and firms are loth to purchase at the ruling prices. It is not thought that the present high price will continue for long, although from present indications it is uncertain whether the near future will bring an increase or decrease. At all events those who can do so are holding on as long as possible and abstaining from placing considerable orders in the hope of a speedy fall in prices.

General Mining News.

Southwestern Interstate Coal Operators' Association.—A meeting of this association was held at the Coates House, Kansas City, Mo., on Jan. 22, to consider the Joint Interstate Convention with the United Mine Workers of America which convened at Indianapolis, Ind. Jan. 25. This association embraces districts 14, 21 and 25 of the United Mine Workers of America, which include Kansas, Missouri, Arkansas, Indian Territory and Texas. On account of the market conditions existing in these fields for the past year or more, brought about partly by competition with oil and the inferior quality of coal produced, it was decided to demand a return to the lump coal system of paying the miners.

It was also decided to stand for the entire abolition of the check-off system, and the payment of fines by the miners and for a blanket reduction of 15% on present scale prices. Also, on account of the extravagant and reckless use of powder under the present mine-run system of paying the miners and the consequent increased danger to life and the operators for violations of the agreement.

Also for the formation of a board of arbitration for the settlement of disputes which fail of adjustment by the officers of the two organizations.

A scale committee of four from each district, together with the president, vice-president-at-large, and vice-president from each district were authorized to attend the Indianapolis convention as delegates, for the association.

CALIFORNIA.

Two mining counties of the State, Nevada and Siskiyou, are beginning to advertise their resources as widely as possible, and among other ways, to people passing on the trans-continental trains, who usually go to terminals without stopping in the interior counties, or trying to learn anything about them. The Nevada County Promotion Committee appointed a committee to take steps to procure a site for the erection of a quartz monument at Colfax, and also to obtain the required ore for this purpose. It is believed that such a monument, properly constructed, will be such an object of interest to tourists that it will lead to wide advertising of the county and its resources. Colfax is on the line of the Central Pacific, at the junction with the narrow gauge road running to Grass Valley and Nevada City. The Siskiyou County Chamber of Commerce will put up a number of signs along the line of the Southern Pacific. The signs are to be substantially built and artistically painted. The two principal overland trains in passing through Siskiyou County give passengers 10 hours. On the Siskiyou

side of a line of posts a sign is to be erected calling the attention of the traveling public to Siskiyou's various resources, and a similar sign will be placed at Dunsmuir, where the trains stop some time. Big, attractive signs are to be placed at Cantara, Mott, Sisson, Upton, Igera, Weed, Edgewood, Gazelle, Montague, Ager, Klamath River and Hornbrook, telling in plain letters of Siskiyou's industries and great possibilities.

CALAVERAS COUNTY.

James Hemerick while digging a well found a deposit or channel of gravel carrying coarse gold right in the town of Wallace. Other lot owners have started digging and nearly all have struck the same channel.

Esperanza.—This mine (formerly the Old Boston) at Mokelumne Hill is about to be reopened by W. B. Murdock of San Francisco. It will first be unwatered and then the 30-stamp mill will be put in commission for prospecting purposes. The vein is a large one of low grade ore, and a big mill is eventually to be put up.

Garabaldi.—Two Huntington mills are being installed at this mine near Greenwood.

SISKIYOU COUNTY.

Ethelynn Mining Co.—This company, at Horse Creek, Oak Bar district, has finished its new ditch, but now has to build a 1,500-ft. flume to carry off tailings. A large force of men is employed.

King Solomon Mines.—W. H. Young states that these mines, near Cecilville, will shortly be equipped with a large milling plant and other machinery, as soon as the road is built from Black Bear, a distance of eight miles.

Blue Gravel.—This mine in Greenhorn district, near Yreka, has been tied up some time by lien litigation, but the lease has been purchased and liens satisfied by W. T. Cope of Grant's Pass, Oregon, who will install pumps and a hoisting plant. It is a drift mine with a 116-ft. shaft.

Pine Tree Grove.—This mine (also known as the Peach Orchard) is about to be operated by the hydraulic elevator system by Los Angeles men, using water from McKinney Creek.

Salmon Mountain.—In this section extensive prospecting is now going on, the men being encouraged by recent strikes in the vicinity of Highland, Advance, Harris Bros., and other claims on Russian and Taylor creeks and China Gulch.

SIERRA COUNTY.

Telegraph Drift Mine.—The electric power plant at this mine has been put in operation and the work of development will be commenced on a much larger scale than heretofore.

TRINITY COUNTY.

Paulsen Group.—First payment has been made on the bond on this group of

hydraulic mines near Douglas City. The group is 1,000 acres in extent, including the Dutton's Creek mine, the Union Hill and the Last Chance. The first belonged equally to Mrs. Susan Lorenz, of Redding, and P. M. Paulsen, of Weaverville; the second to Mason & Thayer, of Douglas City, the third to P. M. Paulsen. Water to work the mine will be taken out of Grass Valley creek. The conduit for carrying it across the cañyon will be an inverted siphon of 600 ft. depression. The ground has long been known to be valuable, but the first cost of equipping it for hydraulicking has been too much for the present owners to undertake.

YUBA COUNTY.

In digging a well at Camptonville, in some residence property, the workmen discovered a fine looking ledge showing free gold.

COLORADO.

BOULDER COUNTY.

Ward Rose.—Harry Seaton and associates of Denver have leased this property in the Ward district, and the top plants and buildings are being over hauled. Smelting ores are to be shipped direct to smelters, but milling ores will be piled up awaiting the developing of the cyanide plants which are in process of erection.

Wall Street Gold Extraction Co.—In Boston, Jan. 25, the United States Circuit Court appointed H. A. Packard receiver of this company, on suit of Tobias Libby, whose claim is for advances made to the company.

CLEAR CREEK COUNTY.

Mattie.—A strike is reported on this property on Chicago creek, Moonan & Co. having opened in the fifth level a streak of high grade ore, of which a test lot gave high values.

Nabob.—In the upper tunnel workings, at a distance of 1,100 ft. in, a streak of high grade silver ore has been uncovered, with a heavy percentage of lead. Property is situated on Columbia mountain, up Silver Creek near Georgetown. C. A. Benkleman and associates of Denver are interested.

Silver Leaf.—An electric line is being built from the Burleigh tunnel to this tunnel, and a Temple electric drill is to be installed for the speedier development of a group of 18 claims near Silver Plume. Ben. J. Martelon of Idaho Springs is manager.

GILPIN COUNTY.

Sleepy Hollow.—This property is being re-opened by J. F. Hopkins of Denver and Black Hawk, with Denver capital interested, and in cleaning out the seventh level east, some free gold ore has been found in a crevice of free milling ores.

which is 10 ft. wide. The main shaft, now 800 ft. is to be sunk to 1,000 feet.

Prompt Pay Gold Mines Co.—This company has purchased from Senator H. M. Teller, the westerly 794.65 ft. of the Jefferson lode in Russell district, for a consideration of \$8,000. Heavy developments are being outlined for the entire group. E. W. Williams, Central City, Colo. is manager.

Old Town Mining Co.—A big strike is reported from the 1400 level with between 2 and 3 ft. of smelting ores, and from 3 to 5 ft. of concentrating ore. G. K. Kimball, Jr. of Idaho Springs is manager.

Poso Mining Co.—Denver people operating this group in Nevada gulch are getting ready to install a pump, and sink the shaft deeper. This property is the only zinc producer in the county. A. M. Rucker, Bald Mountain, Colo. is manager.

SAN MIGUEL COUNTY.

Sawpit District.—This district on the San Miguel river, 16 miles below Telluride, is witnessing the construction of three quartz mills, two of five stamps each and one of 10 stamps, for the treatment of low-grade ores on the dumps and standing in the mines of that section. A. M. Ballard, of Sawpit, is the owner of one of the plants, and Reveller, Pomeroy & Weeks of the same place, of another. They are the first mills to be erected in the camp, and it is believed will result in the revival of operations on mines which have been idle for a number of years. The only mineral shipped from the mines was that carrying sufficiently high values to yield a profit after the expense of a long haul to smelters and charges for treatment. It is estimated that there are 500,000 tons of low grade material on the dumps which can be concentrated and shipped at a profit, while there are thousands of tons in the mines which have never been broken down and taken out. The ore is a lead carbonate carrying gold, silver and lead.

Silver Tip Group.—E. L. Davis, of Telluride, has gone East to stock a company for the operation of this property, located near the town of Ophir, 16 miles from Telluride. The group is owned by Dan Martin, of Ophir, who recently leased and bonded it to Mr. Davis for an agreed consideration of \$75,000. A 2-ft. streak of the vein runs high in gold and silver. If a company is organized, the property will be extensively developed and if the disclosures warrant them, a mill and tramway will be constructed.

Yellow Aster Group.—Frank Maumey, of Telluride, has recently leased and bonded this property to Telluride parties the consideration in the event of a sale being \$7,500. The property takes in 900 ft. of the Silver Tip vein and it is on this extension that the lessees are directing their energies.

GEORGIA.

WHITFIELD COUNTY.

Cohutta Tale Co.—This company has been reorganized with M. H. Williams president, and J. M. Sanders, manager. The manufacturing plant is to be moved from Dalton to the neighborhood of the mine at Chatsworth.

IDAHO.

BOISE COUNTY.

On the property owned by Frank W. Parker at Quartzburg, a 5-ft. Huntington mill, with steam power, has been added to the plant. The new equipment is the latest design manufactured by the Allis-Chalmers Co. Milwaukee.

IDAHO COUNTY.

Butterfly.—This mine, near Oro Grande, has passed into the possession of parties from Duluth, Minn., who have started development work.

Crooked River Mining Co.—This company is making several improvements at the Hogan mine, and at the adjoining mill.

INDIAN TERRITORY.

CHOCTAW NATION.

Western Coal and Mining Co.—This company will sink another shaft on its lease adjoining the east corporate limit of Lehigh. This shaft when completed, will have all modern improvements and employ from 300 to 500 men.

The company has been compelled to turn down orders of coal monthly on account of output, although it has shafts in this section.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

Atlantic.—Owing to a fall of ground in B shaft, 40 men employed in that opening were laid off while repairs were made. Some new sets of timber were put in, and as production was stopped for 4 days, the output of the mine will be slightly less than normal this month. Drifting northward from No. 5 shaft of the Baltic on the sixth level has reached a point where cross-cutting to intercept the lode will be started. This drift is in Atlantic ground for a distance of 450 ft., and is being extended to facilitate the work of opening the Baltic amygdaloid bed on section 16.

Franklin.—There remains 600 ft. for the fourth level crosscut to penetrate before reaching the Kearsarge amygdaloid bed. It is being pushed with all possible speed, but 6 months will be necessary to complete the work.

Superior.—Preparations are under way for the installation of heavier hoisting machinery. Sinking in the shaft has at-

tained a depth of 50 ft. below the second level, or 220 ft. from the surface. Since work was started a small engine and kibble have been used for hoisting, but stringers are now being laid for a skip-road. Drifting was discontinued when sinking started, as the hoisting arrangements are not adequate for both.

ONTONAGON COUNTY—COPPER.

Adventure.—The plat at the 200-ft. level of No. 4 shaft has been completed. The lode is now being cross-cut at that depth. An assessment of \$1 per share will provide \$100,000, or ample funds for the development and equipment of the new shaft.

Mass.—Production suffered in January owing to delayed operations at A shaft, where a fire necessitated the suspension of work a few days. Sinking in the exploratory shaft on the Minnesota group of lodes has reached a depth of 150 ft. The formation is undisturbed at that point, and a crosscut is being driven to intercept the lodes which are yielding good results at the Michigan mine, adjoining.

Victoria.—Work has started on cutting out two stopes in No. 2 shaft. One is at the eighth level, and the other at the sixteenth level, both at a point 1,200 ft. west from the shaft. Work on the intake shafts of the hydraulic compressor plant is nearly completed. Various other portions of the power-plant and stamp-mill are rapidly nearing completion, and it is expected production will start in March.

MISSOURI.

New Prospecting.—The strong lead market is attracting renewed interest in the lead belt and several new prospecting parties are preparing to enter the field that are backed by New York, Chicago and Lake Superior capital. Good lands are being rapidly taken up and the coming season promises to be the most active ever known in southeast Missouri.

FRANKLIN COUNTY.

Bellew.—The owners of this mine are going to re-build the shaft-house and mill recently destroyed by fire. The Bellew has been the largest producer in Franklin county in recent times.

Cyclone.—This mine, which is controlled by British parties, has been closed down, preparatory to a reorganization of the company.

Union Smelter.—The lead smelter which was erected at Union five years ago by St. Clair parties, has been permanently closed down and dismantled. It was started on too small a scale and with inadequate capital, while the location was ill advised.

Virginia.—This old mine, which is located on a fissure vein, and has been the largest producer in central Missouri, has been freed from litigation, and is being re-opened by St. Louis interests.

ST. FRANCOIS COUNTY.

Doe Run Lead Co.—This company, which is controlled by the same interests as the St. Joe Lead Co., has declared a stock dividend of 75%, and the last dividend of 1/2% per month was also paid on the new stock. This last dividend distributes all its treasury stock, as 50% was declared last June, so that the authorized capital of \$4,000,000 is now all issued, on which it is paying 6% per annum.

St. Joseph Lead Co.—A special meeting will be held at the office in New York, Jan. 31, to vote on the question of increasing the stock from \$6,000,000 to \$20,000,000, to consist of 2,000,000 shares of \$10 each, par value. A part of the new stock, it is said, will be issued as a dividend of 100% on the present stock.

MONTANA.

FERGUS COUNTY.

Kendall Mining Co.—This company reports improved conditions at the mine. The ore is now running about \$5 per ton and the extraction by cyanide is about 86%. The company has resumed dividend payments.

SILVER BOW COUNTY.

Butte Copper Exploration Co.—This company has been organized, with a capitalization of \$500,000 in 100,000 shares. E. A. Nichols, of Butte, is president, Alfred F. Leopold, Chicago, vice-president, N. Bruce McKelvie, Boston, secretary and treasurer. The directors are the officers and Spencer R. Hill, Thomas S. Dee and Frank E. James of Boston, and Warren Nichols of Chicago. The company has bought six of the O. Clark group of eight copper claims east of the city, and will sink a shaft of 1,500 ft. The ground is partially developed.

TETON COUNTY.

Great Northern Oil Co.—This company has taken over a tract of oil lands and will start sinking oil wells. The headquarters are in Spokane, Wash. The officers are A. M. Dewey, president; M. L. Bevis, vice-president; G. P. Mulcahy, secretary; T. H. Thompson, manager.

NEVADA.

ESMERALDA COUNTY.

Death Valley Salt Co.—This company has taken up a number of claims in Death Valley, and proposes to work them for salt. The incorporators are: W. A. Kelly, J. B. Osborne, Mance, Nev.; B. Smith, Eureka, Nev.; O. J. Smith, Reno, Nev.; W. Gregg, San Francisco.

WHITE PINE COUNTY.

Nevada Consolidated Copper Co.—It is announced that this company will make its initial plant of sufficient capacity to treat 2,500 tons of ore daily, instead of 1,000 tons as originally planned.

NORTH CAROLINA.

CATAWBA COUNTY.

Catawba Gold Mine.—Last week's run at this mine produced 53 oz. of gold. The expenses are not over \$30 per day, and this rate of production has been going on for the past 18 months. It is an example of proper management as evidenced by the fact that the property never did pay until under the present superintendence of Andrew Jackson Overton, formerly of Colorado, who advised and installed the present methods for the treatment of the entire mass. It is a belt of auriferous, decomposed schist over 100 ft. in width; the material is mined with pick and shovel at the rate of 400 tons per day, and put through washing machines with the result that the mine is paying regular weekly dividends on ore that does not average over 60c. per ton. This property has been worked at for years without paying results; but now it is classed as one of the regular dividend payers.

ROWAN COUNTY.

Union Copper Mine.—This mine, at Gold Hill, continues to ship one or two carloads of good copper-gold ore per day to the smelter.

OREGON.

POLK COUNTY.

Pilot Knob Gold Mining Co.—At the annual meeting in Monmouth recently, President and Manager Hoffman presented his report. It was decided to increase the capital stock to \$350,000, and supplemented articles of incorporation were filed. The stock was increased for the purpose of procuring money for additional development. It is proposed to put a permanent tunnel through the Pilot Knob property this year.

PENNSYLVANIA.

BITUMINOUS COAL.

Sterling Coal and Coke Co.—This company has been organized in Pittsburg, with \$500,000 capital stock. The new company owns 500 acres of coking coal land near Fayette City. The officers are: President, W. C. Magee; vice-president, George Whyet; secretary and treasurer, T. W. Seamans. The new company is controlled by the Pickands-Magee Coke Co., of Pittsburg.

SOUTH DAKOTA.

CUSTER COUNTY.

Saginaw.—The work of installing the new machinery for the electric plant is under way. This will be the first mine in the Southern Hills to have electric power and also electric lighting throughout its mills and the works.

Lillian Bell.—A meeting of the directors of this company was held recently and it

was decided to extend the work immediately. Some eastern capitalists have bought an interest in this property and money is now at hand to prosecute developments. The property lies just outside of Custer.

LAWRENCE COUNTY.

Horseshoe.—At the meeting of the board of directors of this company held in Pittsburg two weeks ago, the plans for re-organization were approved and the legal procedure is being gone through with as rapidly as possible. From the insurance on the mill that was burned last May the company has ample funds with which to remodel the Pluma plant. This will be put into condition for use by June or July and will be a 300-ton cyanide plant employing the Chilean mill for grinding. The company is now shipping from 65 to 75 tons of smelting ore a day to Omaha. Most of this ore comes from the Ben Hur. A new system of ventilation has been installed.

Golden Reward.—This company is preparing to run a long tunnel to connect with the Ruby shaft. It is to be used for the purpose of draining the water which runs from the stopes into the shaft heretofore.

Homestake.—About 50 men were laid off this week on account of so much extra rock being on hand. About 250 air-drills are in use and some 30 of these are out of use at present. The underground bins and stopes are all full of rock ready for milling and until the supply is reduced the men will not be reinstated. Two ledges of gold bearing rock have been encountered on McGovern Hill in Deadwood while excavating for the slime plant. Many nuggets have also been picked up by the workmen. These gold prospects are quite unexpected. This land lies some 50 ft. above the creek and the ledges are well defined.

Big Four.—The work of unwatering this property is progressing. A strike of free gold-bearing rock was made yesterday and the find promises to be of considerable size.

Gilt-Edge Maid.—Some additional tanks are being placed in position at the mill of this property for the purpose of obtaining a higher extraction and also of increasing the capacity of the plant.

Cumberland.—The ledge in this property, formerly known as the J. R. mine, has at last been struck, some 600 ft. from the old workings. It shows rich ore from which many specimens have been taken.

PENNINGTON COUNTY.

Cuyahoga.—This company is engaged in sinking a new shaft and also in increasing the depth of the first one. Good ore has been found both in the old shaft and in the new.

UTAH.

JUAB COUNTY.

Tintic Shipments.—The output of ore during the past week amounted to 182 car loads, the shippers being: Ridge & Valley 5; Scranton, 2; Centennial Eureka, 58; Dragon Iron, 18; Beck Tunnel, 6; Brooklyn, 1; Swausea, 8; Eagle & Blue Bell, 8; Eureka Hill, 2; Yankee, 2; Black Jack, 5; Caris, 4; Grand Central, 4; Lower Mammoth, 12; Victoria, 5.

Star Consolidated.—Physical conditions at this property are improving rapidly. The mine is under-going systematic development and the 450 and 600 levels are showing up well. Some shipping is being done from the 450 level.

SALT LAKE COUNTY.

City Rocks.—Arrangements have been concluded with the management of the Continental Alta mine to use the tramway belonging to the latter for the movement of ore to market.

Foreign Mining News.

MEXICO.

SONORA.

Greene Consolidated Copper Co.—At a meeting of the executive committee of this company held in New York Jan. 25 it was voted to call a meeting of stockholders for Feb. 10, to vote upon an increase in the capital stock from 864,000 shares, par \$10, to 1,000,000 shares, par \$10. The 136,000 new shares of stock are to be issued to stockholders pro rata at \$25 per share, one-half to be paid upon subscription, the remaining half within 60 days.

A circular from President W. C. Greene, Jan. 25, gives the company's production of copper bullion for the five months ending Dec. 31, 1905, as 26,593,931 lb. (contrasting with 64,211,895 lb. for the entire year ending July 31, 1905), containing 195,890 oz. of silver and 1,867 oz. of gold. He further says in part: "Sales of copper made a total, inclusive of gold and silver, of \$4,274,284. During this period of five months ending Dec. 31, 1905, dividends No. 13, 14 and 15, of \$345,600 each, aggregating \$1,036,800, were paid, in addition to which there was expended for new construction \$401,832, while the amount of bills and accounts payable was reduced \$187,596, and the balance due us as equity on copper sold increased \$498,091. Our copper production is sold up to about Jan. 12, 1906. The first reverberatory furnace should be ready to blow in about March 20. It is intended to immediately follow with a second furnace of the same capacity of 300 tons per day for treating fines, flue dust and concentrates.

"The final decision in favor of the Greene Copper Company in what was known as the Hallenborg suits by the Supreme Court of the United States, which

was in our favor, has ended a long and expensive litigation, and development work will be now pushed upon the Cobre Grandé more rapidly than in the past.

"During the past few months our development has shown a large increase in the amount of sulphur contents of our ores and has accentuated the need for roasters and additional reverberatory capacity. The proposed increase stock issue would enable the company to at once install two batteries of four each of McDougal roasters; a second reverberatory furnace; to duplicate the present pipe line from the Sonora river to the plant; to install electric haulage, steam shovels and other appliances."

Coal Trade Review.

NEW YORK, Jan. 31.

ANTHRACITE.

The unexampled duration of the unusually warm weather naturally exerts a depressing influence on the hard-coal trade. The mines, however, continue their activity, and stores are being accumulated there, and at tidewater points, in readiness for any disruption of present labor conditions. A feeling of security is becoming prevalent, owing to the conciliatory spirit on both sides shown at the recent conference.

The steam sizes are not moving off quickly, much coal going into storage. Domestic sizes are less active but prices remain firm at \$4.75 for broken and \$5 for domestic sizes. Steam sizes: \$3 for pea; \$2.25@2.50 or buckwheat; \$1.45@1.50 for rice and \$1.30@1.35 for barley f. o. b. New York harbor shipping points.

BITUMINOUS.

The warm weather has at last influenced even the soft-coal trade and business is on the verge of stagnation. Contract coal receives almost the exclusive attention of shippers, though consumers are becoming less urgent about the delivery of additional supplies. Trade in the open market is exceedingly dull; in New York, supplies of spot coal have accumulated, under the influence of unimpeded transportation, and prices have fallen to \$2.40@2.60 f. o. b. harbor shipping points for the ordinary grades.

Demand in the all-rail trade continues vigorous and occasionally the prevailing high prices are reduced. The far East is absorbing its customary tonnage in spite of the weather, and the Sound is recovering from the congestion that has delayed unloading at terminal points for several weeks.

Car supply at the mines is equal to all requirements, and vessels in the coastwise trade are in abundant supply.

The House of Representatives on Jan. 29 passed a resolution calling for a report from the Interstate Commerce Commission on relations supposed to exist be-

tween the Pennsylvania Railroad on the one hand, the Norfolk & Western, the Chesapeake & Ohio, the Baltimore & Ohio, and other roads, on the other. Coal rates are said to be the special point on which investigation is asked.

COAL TRAFFIC NOTES.

The total coal and coke traffic originating on all lines of the Pennsylvania Railroad east of Pittsburg and Erie for the year to Jan. 20, was as follows, in short tons:

	1905.	1906.	Changes.
Anthracite.....	224,067	285,951	I. 61,884
Bituminous.....	1,499,667	2,040,021	I. 540,354
Coke.....	581,469	723,673	I. 142,204
Total.....	2,305,203	3,049,645	I. 744,442

The increase is large, over the exceedingly heavy tonnage of last year.

Birmingham. Jan. 29.

The coal production in Alabama is held down by the railroad car shortage. The railroads are doing everything in their power to relieve the situation, but there is not only a shortage of cars but also of locomotive power. The demand for coal in this section is healthy, and the prospects are bright for several months to come. The coal companies not employing union labor are bringing in more labor every week to place at the work, and the collieries are beginning to fill up right along. More than 3,000 coal miners are out on strike yet in this district.

State Mine Inspector J. M. Gray announces that his official report will hardly be ready for a fortnight as yet, and that he has fears that the output is not going to be as favorable as he had anticipated.

The coke market in this State shows no improvement. The demand is strong and prices are firm.

Chicago Jan. 29.

With the month of January ending in unbroken mildness, there is little hope in the coal trade of a prosperous season. On every side are heard the usual declarations that something must be done to prevent over-supplying the market with western coals, but as in previous times of distress, nobody can suggest an effective remedy. The business of the last half of January has been uniformly light, in both bituminous and anthracite.

Illinois and Indiana coals, in consequence of the conditions, are depressed. Run-of-mine is off 10@20c. from the prices of two weeks ago, and domestic sizes show as much as 40c. cut on some grades, the demand for domestic being very slight. Screenings are also down, and in some cases have sold for less than \$1. The need of keeping coal moving to escape demurrage charges is a factor.

Eastern bituminous coals find the same trouble—too light consumption. Hocking is somewhat less freely shipped, but is in

such supply as to keep the price down below \$3.25. Smokeless also is being held back, it is said, but is still weak, at about \$3.30. A little Youghiogeny is being sold at about \$8.

The anthracite market is very weak, and free coal is prominent, much of it 20@40c. below the established prices. A sudden cold wave, whether prolonged or not, would result in large orders for both anthracite and bituminous, as retailers are generally in short supply.

Cleveland. Jan. 30.

One of the operators of this territory returned from the Indianapolis meeting today and made the statement that he expects the mine workers and the operators to get together this week on a scale, as President Mitchell does not want to shoulder the responsibility of calling out both anthracite and bituminous coal miners at the same time. The open weather has made for a weaker market. The best grades of run-of-mine steam coal are now being sold here on a basis of 90c. at the mines, with the statement general that some coal has been unloaded at a lower price than that. The slack market has also grown exceptionally weak, regardless of the shortening of the supply. Pennsylvania slack is now selling at 50c. at the mines, and Ohio slack is selling at 80c. at the mines, the difference being largely that of freight rates to the point of consumption.

The domestic coal situation has been hit hard by the recent open weather and four or five mines in the Massillon district have been closed for a week. This is an unknown situation in January heretofore. Prices have been somewhat strengthened in all grades by an artificial shortening of the supply, due to closing of the mines.

Pittsburg. Jan. 30.

Coal.—Despite the fact that the wage question is unsettled and a general suspension on April 1 is possible, operators continue to take contracts at low prices. The general rate this week seems to be on a basis of \$1 a ton for mine-run coal at the mine, although in a few instances 90c. is the price. The joint conference of miners and operators, parties to the interstate agreement, has been in session at Indianapolis since last Thursday and indications point to a failure to agree, unless the miners make concessions and accept the present mining rate for another year. The rivers were navigable for a couple of days last week and nearly 3,000,000 bu. coal went to the lower markets. The mines are fairly active and there are plenty of railroad cars.

Connellsville Coke.—There was another slump in the price of furnace coke and sales for prompt shipment were made at \$2.35 a ton. Prices for foundry coke are well maintained and quotations this week are \$3.25@3.50 a ton. The production

for the week is given at 283,930 tons, a decrease of 1,470 tons compared with the previous week. The shipments aggregated 12,217 cars, distributed as follows: To Pittsburg and river points, 4,418 cars; to points west of Pittsburg, 6,522 cars; to points east of Everson, 1,277 cars. This was a decrease of 197 cars. The combined shipments from the Connellsville and Masontown fields for the week amounted to 356,095 tons.

San Francisco. Jan. 25.

J. W. Harrison's circular of this date says: "Since our last there have been four arrivals of Australian coal, total 13,074 tons. There are on the engaged list to carry coal from Newcastle, N. S. W., 24 vessels with a carrying capacity of about 70,000 tons; four of these vessels are steamers, one of which is now fully due. Last month the total deliveries of Australian coal here amounted to 13,074 tons; for the same period the year previous, the total deliveries of Colonial coal only amounted to 5,865 tons. The British Columbia shipments for last month footed up 35,852 tons against 17,579 tons in December, 1904. The quantity of coal here now in yard is exceptionally small, and we will have barely sufficient to carry us through our winter demands unless British Columbia shipments are materially increased. No change of value has been established, although the restricted amount of coal fuel here on hand would justify a material advance in prices; besides we are just passing through an exceedingly sharp snap of cold weather, which necessitates an increased demand for coal for house uses. The consumption of fuel oil for the past year is over 5,000,000 barrels in excess of the previous year, and has been a source of great astonishment to large fuel consumers on the Coast; it demonstrates very clearly, that if we had not oil to rely upon, we would be in a sad plight in California for fuel for manufacturing purposes."

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

Foreign Coal Trade.

Jan. 31.

The Westphalian Coal Syndicate in Germany has announced the allotments for 1906 to the different companies composing the combination. The estimated total requirements to supply consumers

for the year are 76,275,831 tons of coal, 12,258,200 tons of coke and 2,829,500 tons of briquets. This production is apportioned among 86 companies, some of the larger allotments of coal being: Gelsenkirchen, 7,698,000 tons; Harpener, 7,240,000; Hibernia, 5,416,500; Rheinpreussen, 3,000,000; Nordstern, 2,740,000 tons. No other company has over 2,000,000 tons.

Iron Trade Review.

NEW YORK, Jan. 31.

While the markets generally continue strong and active, there is a shade of hesitation apparent. Some people do not hesitate to say that the corner has been turned, and that lessening demand and lower prices are in sight. This is going altogether too far, however, and there is nothing more, really, than the temporary reaction which may naturally be expected in all boom periods. The present feeling is due, in small part, to the state of the stock markets; but in much greater degree to an apprehension that the abnormally mild winter may injure the crops. The present unsettled condition of coal-mining labor has also some effect.

So far as new construction is concerned, however, there is no hesitation apparent. New building, manufacturing and railroad projects are abundant. The demand for rails and new equipment for the railroads is unabated; and the pressure to obtain structural steel of all kinds is great. The hesitation referred to may be a fore-runner, but at present it can hardly be considered a condition of the market.

United States Steel Corporation.—The preliminary statement shows that the net earnings for the fourth quarter of 1905 were \$35,278,688, the largest amount for any quarter yet reported, except for the second quarter of 1902, when the total was \$37,662,058. This gives for the full year 1905 a total of \$119,850,282, against \$73,176,523 in 1904; \$109,171,152 in 1903; and \$133,308,673 in 1902. The net earnings by months were: October, \$12,400,306; November, \$11,827,215; December, \$11,051,167. The disposition of earnings for the last quarter was as follows:

Net earnings for quarter.....	\$35,278,688
Sinking funds, subsidiary co's.....	\$ 435,056
Depreciation and reserve.....	5,185,187
Interest, U. S. Steel bonds.....	5,743,628
Sinking fund " ".....	1,198,435
Total charges.....	\$12,567,206
Balance.....	\$22,721,482

Appropriations from this surplus were: Dividend, 1 3/4% on preferred stock, \$6,304,919; purchases of property, improvements and additions to plant, \$9,000,000; total \$15,304,919, leaving a balance of \$7,416,563 to be added to the surplus. This now amounts to \$78,700,000. The unfilled orders on the books Dec. 31 reached a total of 7,605,086 tons, the largest quantity ever reported.

Birmingham. Jan. 29.

Alabama pig-iron manufacturers are making every effort possible to move out iron as much as possible before March 1, when the advance in freight rates goes into effect. The railroads are giving all assistance in this active movement, and as a consequence the iron yards in this section are beginning to look bare. The demand has been steady, and quite a lot of iron has already been sold for delivery during the second quarter of the year. The production in Alabama is holding up well. Three furnaces are to be blown in shortly. There has been some delay, but it is now given out that before the end of another fortnight there will be at least two more furnaces in blast, and another month later there will be a third furnace going.

The sales made during the week were mostly in small lots, though there were two or three orders of some size.

Inquiry at a number of offices in this city does not reveal any definite information that there have been concessions made in the prices of iron. Special inquiry was made about 50c. reduction in iron quotations, but there is no admission of such a change.

No. 1 foundry iron is quoted at \$15; No. 2 foundry at \$14.50.

The cast-iron pipe trade continues very active, and there is an inquiry for the product which promises to develop into trade which will keep the concerns busy for many months to come. The United States Cast Iron Pipe and Foundry Co. one day last week started 30 carloads of pipe for various sections of the country, California points getting a large quantity.

Chicago. Jan. 29.

The market for pig iron and iron products has been quiet in the last week, but there are no signs of weakness. Sales of pig iron have not been so brisk during January in Chicago as in eastern centers, a fact that some students of the market say is explainable by the heavy sales of last autumn, in which Chicago consumers of iron covered their needs generally up to the end of the second quarter, whereas eastern buying now is for the same period. There is probably still a good deal of iron to be sold for all local requirements up to the end of the second quarter, however, and much of the present business is filling orders for small lots that will meet requirements of the first quarter. Contracts for second and in some cases third quarter delivery are being made, though not, as a rule, for large lots, and inquiries are increasing.

Prices are holding up well, No. 2 being quoted at \$14.50 Birmingham for Southern (\$18.15 Chicago), and \$19.50 for Northern. Lake Superior charcoal brings \$20 and is in demand. It is reported that on the most desirable contracts these prices have been somewhat shaded, but

they represent the general condition of the market.

Railroad supplies continue fairly active. Structural material is somewhat quiet, but everything indicates a heavy business as soon as the spring building season is open. Bessemer billets are in good demand at \$28 per ton.

Cleveland. Jan. 30.

Iron Ore—The reports are that the Steel Corporation is negotiating for the control of two fleets on the lakes, which will increase the carrying capacity of its ships to 20,000,000 tons a year. This is supposed to account for the fact that the Corporation reduced the allotments to the various merchant fleets. The lake shippers are said to be planning to increase their boat capacity to absorb the profits from carriage wherever possible. No new sales have been reported, but the prices are unchanged at \$4.25 for bessemer Old Range, base quality f. o. b. Lake Erie docks, with other prices on the same basis.

Pig Iron—Buying for the time is easier due in the main to the fact that consumers expect a further reduction in foundry prices as an outgrowth of the recent reduction of 50c. a ton. This is being fed, in a measure, by the fact that Cleveland furnaces are splitting the differential they enjoy over the Valley furnaces with the consumers. Buying for second quarter has been lighter and buying for third quarter has not started yet. Basic, bessemer and malleable are about steady. All materials are selling now on the basis of \$17.50 in the Valleys. This price can be shaded on No. 2 foundry.

Finished Material—On heavy plates some consumers are paying a premium of \$2 on boiler plates and \$4 on tank plates, getting their material for quick shipment from the eastern mills. The demand for structural as an outgrowth of the open weather, has been such that the supply of jobbers is being constantly drawn upon. In bars the market is easier and mills are hunting for business, being in position to make deliveries in 30 days. The price is steady at 1.50c. Pittsburg for bessemer and open-hearth. The mills are filled with lower-priced sheets, and the amount for sale at present prices is not large. Billets are easier at \$25@26 Pittsburg for bessemer, with the supply temporarily heavy.

New York. Jan. 31.

The chief interest has been in structural material, some large local contracts being under negotiation, notwithstanding threatened labor troubles in the building trades.

Pig Iron—Business has been less active. While prices are unchanged, there is rather a weaker tendency.

Prices for Northern iron are unchanged. For large lots we quote; No. 1X, \$19@19.50; No. 2X, \$18.50@18.75; No. 2

plain, \$17.75@18.25; gray forge, \$17@17.25. Virginia foundry is held at \$18.60@19.10 for No. 1, and \$18.10@18.60 for No. 2. Basic is \$18.75 for Alabama, and 25c. less for Northern. For Southern iron, on dock, quotations are: No. 1, foundry, \$18.75; No. 2, \$18.25; No. 3, \$17.50; No. 4, \$17; No. 1 soft, \$18.75; No. 2 soft, \$18.25; gray forge, \$16.50. There has been some talk of a reduction of 25 or 50c. on Southern, but it is not confirmed so far.

Business in warrants has been dull, with an easier tendency.

Cast-Iron Pipe—Prices are steady, the present basis being \$29.75 per net ton for 6-in. pipe in carload lots at tidewater points.

Bars—Business is quieter, but prices are firm. Mills are asking 1.895@1.945 for common bars and 1.95@2c. for refined bars in large lots at tidewater. Steel bars are 1.745@1.795c., same delivery. Store trade is fair at 2.25@2.50c., delivered.

Plates—Steel plates are in steady demand. Tank plates are nominally 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745@1.845c.; according to width. Jobbers ask advances on small lots.

Structural Material—Orders continue to come forward for bridge and building work. Prices are nominally unchanged. Beams under 15-in. are 1.845c. for large lots; over 15-in. 1.895c.; angles and channels, 1.845c., tidewater delivery. These are the pool prices, but buyers have to pay premiums on most new work.

Steel Rails—No change in standard sections. Light rails are in steady demand, prices ranging from \$26 for 35 lb., up to \$33 for 12 lb. rails. One large order for trolley rails has been placed, and two or three more are pending.

Old Material—Demand is not pressing, and scrap dealers are willing to listen to reason. No. 1 railroad wrought can now be had in car lots at \$21@22; No. 1 yard wrought at \$19.50@20.50; machinery cast, \$14@14.50; heavy steel melting scrap, \$16.50@17.50. These prices are on cars, Jersey City, or other terminal delivery.

Philadelphia. Jan. 31.

Pig Iron—There are some indications that high-water mark has been reached in certain kinds of pig iron, especially forge and foundry, and there have been a few contracts placed this week, not in this market, however, which go to bear out the theory that slightly lower prices may prevail in the near future. The movement is too young to say much about it, but the possibility of having turned the corner is arousing deep interest in the market, and future business will be guided by the conclusions arrived at. Importations of both pig iron and special ores at this port are to be noted and considerable material is now under contract for delivery. The business of the past few

days has been of moderate proportions in forge and foundry, but at the same time there are negotiations pending for large quantities. Large transactions have been closed in basic and bessemer and on this side of the market there are no indications of any falling off in demand. Buyers of all kinds of iron are still anxious to make themselves safe, and there will be some big business to report just as soon as the present situation can be cleared up. Quotations for No. 1X foundry are \$19.50; No. 2X, \$18.75; No. 2 plain, \$18.25; No. 2 southern, \$19; gray forge, \$17.50; basic, \$18; bessemer, \$19.50 and malleable iron \$19.

Steel Billets.—Steel billets are in active demand, and heavy sales have been quietly made at prices very close to \$30.

Muck Bars.—Business is being done in muck bars in a moderate way at prices ranging from \$29 to \$30.

Bars.—The bar market is moving along quietly. Prices remain unchanged and there is no probability of any advance, while the possibility of weakening prices is not to be thought of.

Pipes and Tubes.—A good deal of business is being done in all kinds of pipe, one indication of which is the purchase of raw material. The tube capacity continues well sold up but the mills are gradually catching up.

Sheets.—The sheet market is active in all lines and the retail sales for the past few days make a very respectable showing at the stores.

Merchant Steel.—The same activity continues in all the smaller plants engaged in the production of work which involves merchant steel of all kinds. Consumers are obtaining shipment of material with more promptness than heretofore.

Plates.—All of our middle and eastern Pennsylvania mills have been doing a good business in tank and marine plates and in all kinds of plate. The situation is highly satisfactory from every point of view. There is a demand for boiler plate, in fact, this part of the business is picking up in view of the heavy requirements to be provided for during the spring. Tank is quoted at 1.78½ in small lots; flange, 1.88½; fire-box steel 2.08½.

Structural Material.—Enormous requirements are coming in sight for structural material. A Camden shipyard will want 3,000 tons; inquiries are in hand from New York for terminal requirements and there are a number of small orders that will likely be placed this week for building work.

Steel Rails.—The steel-rail market is exceptionally active, large orders having been booked during the past week for Pennsylvania roads, Atlantic Coast lines and Western lines.

Scrap.—Some weakness has unexpectedly developed in the scrap market owing chiefly to the disappearance of a num-

ber of large consumers who are unwilling to pay fancy prices. Low phosphorus scrap is offered at \$24; No. 1 steel scrap at \$17. Railroad scrap, \$21.50; machinery scrap, \$16 per ton.

Pittsburg. Jan. 30.

Sales of bessemer pig iron during the week aggregate almost 40,000 tons, most of it for second quarter delivery at \$17.75, Valley furnace. The Jones & Laughlin Steel Co., was one of the buyers, taking from 5,000 to 10,000 tons and the Lake Superior Corporation took 5,000 tons. One lot of 5,000 tons was sold at \$17.75 and the purchaser subsequently sold to a western mill at \$18. Several small lots were sold and in one and two instances the price was \$17.50, Valley furnace, for first quarter delivery. There are a number of inquiries for bessemer iron and two large deals, besides the probable purchase of 50,000 tons by the United States Steel Corporation, are still pending. Large furnace interests here declare that all the first-quarter bessemer has been sold and there is not enough available iron for the second quarter to fill a big order. A decided shortage of bessemer is predicted, and as the foundry iron market is weak it was planned to put some of the furnaces on bessemer iron. This cannot be done, it is said, as the supply of bessemer ore available is only sufficient for the furnaces now running on bessemer iron. There are several conflicting reports regarding the pig-iron situation. One is that the top of the market has been reached and that there will be a gradual decline in pig-iron prices until the opening of the fourth quarter, when higher prices for all grades will prevail. A leading producer declared positively today that there will be no weakening in bessemer, and instead of lower prices all the unsold iron for the first half will be held at a higher figure. It is admitted that foundry iron will decline still further but gray forge is firm. According to one report in connection with the probable purchase of bessemer by the Steel Corporation the deal for 50,000 tons for second quarter was not closed with the Bessemer Pig Iron Association because the iron is held at \$18, Valley. Most of the outside iron bought is for the Carnegie Steel Co., and its requirements are fully covered for the first quarter. All of its blast furnaces are now running, the three idle ones having just been put in operation, and the production is in excess of previous records. It is possible that the Carnegie Co. may be able to get through the first half without going into the open market for additional metal. The company is rapidly completing the re-building of one of the furnaces in the Isabella group and work on the two new furnaces for the Carrie group has been begun. These two, however, will not be ready to put in blast for nearly a year, when their product will be needed for the

new steel mills being built. While the famine in ferro-manganese continues the situation is easier and a small lot of 80% was offered this week at \$165 a ton. For February and March shipment it is believed from \$130 to \$140 a ton can be done. Contracts are now being made for delivery after July 1 at \$90 a ton. Some 60% metal has been taken in emergencies for which \$135 a ton was paid.

Conditions in finished steel lines continue favorable with a big improvement in wire, sheets and pipe. The National Tube Co. has booked an order for 60 miles of 18-in. pipe and the Spang-Chalfant Co. for 25 miles from the Ohio Fuel Co., to be used in extending its lines from the West Virginia and eastern Ohio natural-gas fields to Cincinnati. The National company also booked an order for 50 miles of 8-in. pipe from Union Oil Co., of San Francisco, to be used in laying a line of pipe across the isthmus of Panama. Several smaller contracts have been placed lately and all the mills of the leading interest are in full operation. The report that prices of merchant pipe are to be advanced on Feb. 1 was denied today by a representative of the big company. A weakness has developed in iron bars and the Republic Iron and Steel Co. has withdrawn its quotation of 2c. Common iron bars are now selling at 1.85c. Pittsburg. The market for wire and wire products continues very active and all the mills in this district are operating to capacity and have orders that will keep them running steadily for several months. The recent advance in prices did not check the buying movement that started at the opening of the year. The structural trade is phenomenal and new business is being booked almost daily. The most recent large contracts are for two skyscrapers in this city, one the Union Trust Co. building and the other the Commonwealth Trust Co. building. These contracts were placed with the Jones & Laughlin Steel Co. and the material will be fabricated by the Fort Pitt Bridge Co. Some good orders for plates have been placed and the plate mills will be kept busy throughout the year. Several additional steel rail orders have been booked, the total aggregating fully 100,000 tons. The Pennsylvania Co. has placed an order for 50,000 tons, of which 10,000 tons will be furnished by the Carnegie Steel Co., 20,000 tons by the Pennsylvania Steel Co., 12,000 tons by the Cambria Steel Co. and 8,000 tons by the Lackawanna Steel Co. An advance of \$2 a ton has been ordered on steel bars and \$4 a ton on structural material for the Pacific coast. The new price for bars is 1.35c. and structural 1.60c. The freight is 75c. a hundred pounds.

Pig Iron.—Sales of bessemer pig iron for the week amount to nearly 40,000 tons at prices ranging from \$17.50 to \$18, Valley furnaces. For foundry iron it is re-

ported that \$17.25, Valley, has been shaded, and that there is a disposition on the part of furnacemen to sell as far ahead as possible. Forge is quoted at \$17.35, Pittsburg.

Steel—Mills are still behind in deliveries and bessemer and open-hearth billets are quoted nominally at \$26.50 and sheet-bars at \$27@27.50. Steel bars remain at 1.50c. and plates at 1.60c.

Sheets—Specifications on old contracts are heavy and a large tonnage of new business is being placed at the recently established prices. Black sheets are quoted at 2.40c. and galvanized at 3.45c. for No. 28 gauge.

Ferro-Manganese—It is difficult to quote prices as sales are reported at different figures. For delivery after July 1 ferro is quoted at \$90 a ton.

London. Jan. 16.

The Board of Trade returns for December and the full year, which have just been published, value the British exports of iron and steel, and of machinery, for the year as below:

	1904.	1905.	Changes.
Iron and steel	£ 28,065,671	£ 31,827,842	I. £ 3,761,171
Machinery	21,065,191	23,267,621	I. 2,202,430
New ships	4,455,151	5,429,291	I. 974,141
Total	£ 53,587,013	£ 60,524,755	I. £ 6,937,742

Exports of mining machinery, included above, were valued at £873,914 in 1904, and £832,824 in 1905; a decrease of £51,090. The larger items in 1905 were £279,208 to South Africa, £97,615 to Australia and New Zealand, and £45,657 to India.

The chief items of the iron and steel im-exports were as follows, in long tons:

	1904.	1905.	Changes.
Pig iron	810,934	931,991	I. 171,957
Wrought iron	170,505	183,406	I. 12,901
Sheets	385,408	407,021	I. 21,613
Plates	152,937	204,503	I. 52,166
Rails	525,371	546,644	I. 21,273
Steel ingots, etc.	122,830	151,809	I. 28,979
Tin plates	359,634	354,931	D. 4,683
All other kinds	735,723	891,290	I. 155,567

The total increase in quantities in 1905 was 458,673 tons, or 14.1%. Exports of tin-plates to the United States were 71,862 tons in 1904, and 63,052 tons in 1905; a decrease of 8,810. Exports of pig iron to the United States increased from 56,027 tons in 1904 to 172,789 tons in 1905; a gain of 116,662 tons.

Imports of iron and steel and their manufactures into Great Britain for the year were valued as follows:

	1904.	1905.	Changes.
Iron and Steel	£ 8,216,772	£ 8,588,571	I. £ 371,799
Machinery	4,312,440	4,539,639	I. 227,249
Total	£ 12,529,212	£ 13,128,210	I. £ 599,048

The chief items of the Iron and steel im-ports were, in long tons:

	1904.	1905.	Changes.
Pig iron	133,734	129,039	D. 4,695
Wrought iron	104,243	105,960	I. 1,718
Steel ingots, etc.	512,708	603,949	I. 81,243
Structural steel	122,954	123,001	I. 47
All other kinds	308,350	393,930	I. 85,630

The total increase in quantities in 1905 was 63,943 tons, or 4.9%. The gain was chiefly in semi-finished material.

Imports of iron ore in 1905 were: Manganiferous, 285,583; other, 7,065,151; total, 7,350,734 tons, an increase of 1,249,978 tons over 1904. Of the total last year 5,764,443 tons were from Spain.

The Scottish Ironmasters' Association reports the production of pig iron in Scotland for the full year as follows, in long tons:

	1904.	1905.	Changes.
Stocks, Jan. 1	128,058	155,414	I. 27,356
Production	1,339,740	1,378,391	I. 38,651
Total	1,467,798	1,533,805	I. 66,007
Consumption	1,021,329	1,131,315	I. 109,986
Shipments	291,055	310,555	I. 19,500
Total	1,312,384	1,441,870	I. 129,486
Stocks, Dec. 31	155,414	91,935	D. 63,479

There were 91 furnaces in blast at the close of 1905, the average for the year having been 86.77. Of the consumption in 1905 240,933 tons were used in foundries, and 890,382 tons in steel works. Of the shipments 136,767 tons were exported, and 173,788 tons were sent to England.

Cartagena, Spain. Jan. 8.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that shipments for the week were two cargoes, 7,150 tons manganiferous ore, one cargo 2,300 tons Colorado ore and one cargo, 3,200 tons dry ore to Great Britain; one cargo, 2,250 tons manganiferous ore to France; one cargo, 2,700 tons dry ore, to Rotterdam; one cargo, 2,700 tons dry ore, to Philadelphia.

The last week of the year was a heavy one as regards tonnage, and the port is full of steamers waiting turn to load. The export of iron ore during the year from the port of Cartagena was 530,929 tons as against 406,270 tons, an increase of 124,659 tons. This refers to the port of Cartagena; while the adjacent port of Porman also shows a considerable increase. The past year, during its first nine months, was an uneventful one as regards prices of iron and manganiferous ore, but during the last quarter a large increase in demand was noticed which produced a sudden change in the market, and from that date prices have been tending steadily upward until at the time of writing, quotations for iron and manganiferous ores can be considered as only nominal, the output of all the mines being engaged for months ahead. Freights continue easier, and for this reason boats are very plentiful.

Quotations for iron ores show little change. Ordinary 50% ore is 7s. 8d. @ 8s.; special low phosphorus, 8s. 2d. @ 8s. 6d.; specular ore, 58% iron, 11s.; S. P. Campanil, 9s. 6d. per ton. All prices are f. o. b. shipping port. Manganiferous ores, same terms, range from 10s. 8d. for 35% iron and 12% manganese, up to 17s. 6d.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton f. o. b. Cartagena.

Heavy Chemicals and Minerals.

NEW YORK, Jan. 31.

Niter.—W. Montgomery & Co. of London, report that the world's consumption of Chile saltpeter for the last year was 1,559,000 tons; against 1,447,000 tons in 1904. If the 112,000 tons increase, 79,000 tons is credited to Europe, and 45,000 tons to the United States. On Dec. 31, 1905, the stock in European ports was 183,000 tons, against 162,000 last year; while the quantity afloat was 482,000 tons, against 551,000 tons at the end of Dec., 1904. Then the visible supply was 665,000 tons at the end of 1905, as compared with 672,000 tons for 1904. The consumption in the United States for 1905 was 320,000 tons; as compared with 275,000 tons in 1904, and 265,000 in 1903.

Imports of general chemicals to the United States for 1904 and 1905 were as follows, in pounds:

	1904.	1905.
Am. sulph.	33,333,767	30,576,558
Alum. sulph.	1,465,710	2,395,070
Cobalt ox.	66,064	33,334
Plumbago	13,438	19,637
Pot. chloride	161,563,135	202,366,601
Pot. sulph.	47,592,131	54,377,670
Salt Cake	1,031	1,382
Soda ash	19,770,923	18,024,316
Soda, bicarb.	237,868	346,653
Soda, caustic	1,752,598	1,272,298
Soda, sal.	3,710,097	2,963,904

Heavy chemicals show little material change, though, in general, there is a tendency for the markets to become stronger. Prices are given in the following table:

PRICES.

Acids.		
Boric, crystals	per lb.	.10
powdered	"	.104
Carbonic, liquid gas	"	.124
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Nitric acid, 36°, 100 lb.	"	\$4.75
38°, 100 lb.	"	5.25
40°, 100 lb.	"	5.50
42°, 100 lb.	"	5.75
Oxalic acid, com'l, 100 lb.	"	\$5.00@5.25
Sulphuric acid, 50°, bulk, ton	"	13.50@14.50
60°, 100 lb. in carboys	"	1.00
60°, bulk, ton	"	18.00@20.00
66°, 100 lb. in carboys	"	1.25
66°, bulk, ton	"	21.00@23.02
Blue Stone (Copper Sulphate), car-load lots, per 100 lb.	"	5.90@ 6.05
Nitrate of Soda, 100 lb.	"	2.22
Sulphate of Ammonia, per 100 lb.	"	3.10@ 3.15
Sulphur.		
Louisiana to New York, Boston or Portland	ton	\$22.124
To Philadelphia or Baltimore	"	22.624
Pyrite.		
Domestic, furnace size	Unit	11c.
Fines	"	10c.
Imported, lump, At. ports	"	10@11c.
" fines	"	9½@10c.
" furnace size	"	11½@12c.
Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.		

Phosphates.	F. o. b.	C. I. F. Gt. Britain or Europe
*Fla., hard rock	\$7.75@8.00	\$10.90@12.10
land pebble	4.00@4.25	7.95@ 8.65
†Tenn., 78@80%	4.60@4.65	
78%	4.00@4.25	
75%	3.65@3.75	
68@72%	3.25@3.50	
†So. Car. land rock	4.00@4.25	
river rock	3.75@4.00	
*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.		

British Chemical Trade.—The total value of chemicals, dyes and drugs exported from Great Britain for the full year was: £13,647,449 in 1904, and £14,535,125 in 1905; an increase of £887,676. The exports of

heavy chemicals for the year were as follows, in cwt., of 112 lb.

	1904.	1905.	Changes.
Copper sulphite.....	1,405,100	1,117,860	D. 287,240
Sulphuric acid.....	117,321	85,752	D. 31,569
Mur. ammonia.....	80,880	99,269	I. 18,389
Bleach.....	777,997	937,267	I. 159,270
Soda ash.....	1,348,128	1,491,625	I. 143,497
Bicarb. soda.....	345,809	426,890	I. 81,081
Caustic soda.....	1,370,793	1,513,598	I. 142,805
Soda crystals.....	211,039	200,103	D. 10,936
Soda sulphat.....	894,744	742,332	D. 152,412

Exports of coal products—not including dyes, were as follows, for the full year, in cwt.:

	1904.	1905.	Changes.
Aniline and coal tar oils.....	456,313	901,416	I. 445,103
Carbolic acid.....	135,811	135,767	D. 44
Naphthaline, c.c.....	101,836	99,917	D. 1,919
Others.....	9,369,837	9,157,869	D. 211,968

Exports of superphosphates and other chemical fertilizers were 436,938 long tons in 1904, and 561,204 tons in 1905; an increase of 124,266 tons.

Imports of chemicals into Great Britain for the year were as follows, in cwt. of 112 lb.:

	1904.	1905.	Changes.
Borax and borates.....	352,899	254,608	D. 98,291
Potash nitrate.....	229,671	182,052	D. 47,619
Soda compounds.....	315,722	355,704	I. 39,982
Bleach.....	240,198	235,396	D. 4,802

The imports of fertilizing chemicals, of sulphur and of iron and copper pyrites, valued chiefly for their sulphur contents for the year, were as follows, in long tons:

	1904.	1905.	Changes.
Phosphates.....	419,270	421,026	I. 1,756
Nitrate of soda.....	120,526	104,436	D. 16,090
Sulphur.....	19,428	20,016	I. 588
Pyrites.....	742,837	698,846	D. 43,991

Estimating sulphur contents of pyrites on the usual basis, the total imports of sulphur in 1905 amounted to 299,554 long tons:

Metal Market.

New York, Jan. 31.

Gold and Silver Exports and Imports.

At all United States Ports in Dec. and Year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Dec. 1905..	\$2,668,532	\$3,982,040	Imp. \$1,313,508
" 1904..	13,502,827	3,336,184	Exp. 10,166,643
Year 1905..	46,794,467	50,246,564	Imp. 3,452,097
" 1904..	121,211,827	84,803,234	Exp. 36,408,593
Silver:			
Dec. 1905..	8,196,149	4,646,789	Exp. 3,549,360
" 1904..	4,114,661	2,252,955	" 1,861,706
Year 1905..	57,513,102	35,892,196	" 21,620,906
" 1904..	50,135,245	26,087,042	" 24,048,203

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

Gold and Silver Exports and Imports, N. Y.

For the week ending January 27, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week....	\$500,000	\$ 46,853	\$1,217,522	\$ 33,237
1906.....	1,036,000	165,779	7,602,604	156,809
1905.....	12,561,460	135,736	2,642,058	72,905
1904.....	473,634	1,150,084	4,318,063	68,404

Exports of gold for the week were to Argentina; of silver chiefly to London. Imports, both gold and silver, were from the West Indies and Mexico.

The statement of the New York banks

—including all the banks represented in the clearing house—for the week ending Jan. 27, gives the following totals, comparison being made with the corresponding week of 1904.

	1905.	1906.
Loans and discounts..	\$1,115,643,200	\$1,041,113,300
Deposits.....	1,189,828,600	1,047,112,609
Circulation.....	42,882,200	52,267,400
Specie.....	231,525,200	193,006,400
Legal tenders.....	92,911,500	84,601,600
Total Reserve.....	\$324,436,700	\$277,608,000
Legal requirements.....	297,457,150	261,778,150
Surplus.....	\$26,979,550	\$ 15,829,150

Changes for the week this year were increases of \$15,517,800 in loans, \$3,038,100 in specie, \$463,000 in legal tenders and \$17,743,300 in deposits; decreases of \$416,000 in circulation and \$934,725 in surplus reserve.

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

	Gold.	Silver.	Total.
New York.....	.....	.....	\$193,006,400
England.....	\$162,205,750	.....	162,205,750
France.....	570,783,480	\$211,530,605	782,314,085
Germany.....	183,485,000	61,165,000	244,650,000
Spain.....	75,205,000	115,355,000	190,560,000
Netherlands.....	33,029,500	30,433,500	63,463,000
Belgium.....	16,226,665	8,113,335	24,340,000
Italy.....	139,290,000	17,662,500	156,952,500
Russia.....	518,050,000	18,145,000	536,195,000
Austria.....	226,045,000	61,470,000	287,515,000

The returns of the Associated Banks of New York are of date Jan. 27, and the others Jan. 26. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows, for the year to Jan. 18:

	1905.	1906.	Changes.
India.....	£ 354,500	£ 1,227,200	I. £ 872,700
China.....	.....	.....	.....
Straits.....	2,800	.....	D. 2,800
Total.....	£ 357,300	£ 1,227,200	I. £ 869,900

Receipts for the week were £223,000 bars from New York, and £304,000 Mexican dollars from Mexico; £527,000 in all. Exports were £200,000 bars and £280,000 Mexican dollars; £480,000, all to India.

Indian exchange has been easier, but all the Council bills are offered in London were taken at an average of 16.06d. per rupee. Shipments of silver to India have been large, both on government and private account.

The movement of gold and silver in Great Britain for the full year is reported as follows:

	1904.	1905.
Imports.....	£ 33,876,588	£ 38,567,895
Exports.....	33,039,138	30,829,842
Excess imports.....	£ 837,450	£ 7,738,053
Silver.		
Exports.....	£ 13,263,694	£ 14,561,677
Imports.....	11,687,339	12,992,014
Excess exports.....	£ 1,576,355	£ 1,569,663

There was an increase of £6,900,603 in the net imports of gold. Of the silver imported in 1905 a total of £9,784,828, or 75.3% came from the United States.

The movement of gold and silver in France for the 11 months ending Nov. 30 was as follows:

	1904.	1905.
Gold.		
Imports.....	Fr. 614,716,000	Fr. 741,867,000
Exports.....	117,919,000	129,118,000
Excess imports.....	Fr. 496,797,000	Fr. 612,749,000
Silver.		
Exports.....	105,565,000	94,174,000
Imports.....	91,219,000	90,053,000
Excess exports.....	Fr. 14,346,000	Fr. 4,121,000

There was an increase of 115,952,000 fr. in the net imports of gold and a decrease of 10,225 fr. in the net exports of silver. Imports of copper and nickel coins were 158,000 fr. in 1904, and 110,000 fr. in 1905; exports were 420,000 fr. in 1904, and 292,000 fr. in 1905.

The coinage of the British Mint for the year 1905 was as follows:

	British.	Colonial.	Total.
Gold pieces.....	8,934,396	.....	8,934,396
Silver.....	9,680,556	39,974,502	49,655,058
Bronze.....	31,985,408	4,932,764	36,918,172
Nickel.....	.....	304,208	304,208
Total.....	50,600,360	45,211,474	95,811,834

The face value of the gold coins was £16,500,000; silver, £510,491; bronze and nickel, £100,325. The old coins withdrawn from circulation and melted down were £2,700,000 in gold and £451,884 in silver. As compared with 1904, there was an increase of 674,397, or 0.7%, in the number of pieces struck.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars.....	\$0.50½	\$0.51½
Peruvian soles and Chilean.....	0.46	0.47½
Victoria sovereigns.....	4.85½	4.87½
Twenty francs.....	3.86	3.88
Spanish 25 pesetas.....	4.78	4.80

SILVER AND STERLING EXCHANGE.

Jan.	Sterling Exchange.	Silver.		Jan.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
25	4.8710	65½	30½	29	4.8725	65½	30½
26	4.87½	65½	30½	30	4.8720	65½	30½
27	4.87½	65½	30½	31	4.8720	65½	30½

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

Other Metals.

Daily Prices of Metals in New York.

January	Copper.			Tin.	Lead.	Spelter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.			New York, Cts. per lb.	St. Louis, Cts. per lb.
18	17½	17½	.....	36½	5.60	6½	6½
25	@18½	@18½	78½	36½	5.60	@6½	6½
26	@18½	@18½	78½	36½	5.60	@6½	6½
27	18	17½	.....	36½	5.60	6.25	6½
28	@18½	@18½	.....	36½	5.60	6.15	6.0
29	18	17½	.....	36½	5.60	6.10	5.95
30	@18½	@18½	78½	36½	5.60	@6.15	@6.00
31	18	17½	.....	36½	5.60	6.10	5.95
	@18½	@18½	78½	36½	5.60	@6.15	@6.00

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations in spelter are for ordinary western brands; special brands command a premium.

Copper.—The market has been stagnant and very little business has been done. Consumers are holding back, being evidently discouraged to a certain extent by the lower prices established, while certain producers who are getting some copper available are not willing to run any risks and are desirous of disposing of their metal. On the other hand certain large interests are holding out for higher prices. The situation is peculiar. No demand has been forthcoming from Europe. The market during the week may be called nominal at 18c. @ 18¼ for lake; 17½c. @ 18½ for electrolytic in cakes, wirebars or ingots, and 17½c. @ 17¾ for casting copper. The standard market in London throughout the past week has held very firm, especially for spot copper, of which there seems to be quite a scarcity. The fluctuations amounted to hardly more than 5s. and the closing quotations are cabled at £78 10s. for spot, £77 for three months.

Refined and manufactured sorts we quote: English tough, £83 @ £84; best selected, £84 @ £85; strong sheets, £90.

Exports of copper from New York for the week were 2,759 long tons. Our special correspondent gives the exports from Baltimore for the week at 450 long tons of fine copper.

Tin.—Although the demand last week diminished somewhat, during the week under review it has again set in on a remarkable scale. Spot supplies are very limited and readily command a premium over the London parity. Shipments to this country are not on a very extensive scale, and as it is reported that the production in the Straits will not show an increase during this year, a continuously firm market is to be expected. At the close we quote 36¾ @ 36⅞, depending upon deliveries.

Toward the end of last week the London market was somewhat depressed by efforts over there to lower prices on account of the impending Banka sale. At the beginning of this week, however, the market became very much firmer again, and closes at £166 for spot, £165 5s. for three months.

Lead.—Quite a pressure to sell was noticeable during the past week, without, however, attracting buyers who were conspicuous by their absence. There is no change to be reported in the official quotations.

A similar state of affairs exists in London, where prices are rather weakish, and close at £16 5s. for Spanish lead, £16 7s. 6d. for England lead.

St. Louis Lead Market.—The John Wahl Commission Co. reports on Jan. 27 as follows: Receipts amounted to 27,165 pigs this week, against 34,685 pigs last week. Shipments 26,790 pigs this week, against 26,880 pigs last week. Decidedly lower; tending downward; in limited demand. Sales in 100-ton lots at from \$5.75 early in the week to \$5.60 later, although yesterday \$5.65 was bid. Today light sales were reported at \$5.65. But general market dull at \$5.55.

The company telegraphs us on Jan. 31 as follows: Lead is weak and lower, with latest sales on basis of 5.55c., East St. Louis.

Spanish Lead Market.—Messrs. Barington & Holt write from Cartagena, Spain, under date of Jan. 13, that silver has been 14.75 reales per ounce. Exchange, 31.43 pesetas to 1. Pig lead has been 92.25 reales per quintal; equal, on current exchange, to £16 14s. 3d. per long ton, f. o. b. Cartagena. Exports were 100 tons desilverized to Marseilles, and 497 tons argentiferous lead to London.

Spelter.—Some of the larger western smelters who are trying to find a market for their accumulated stocks, are still slaughtering prices, without, however, having much success in attaining the end in view. Buyers naturally, are not anxious to take hold when they see the market declining rapidly from day to day. The close is very weak at 6.10 @ 6.15 New York, 5.95 @ 6c. St. Louis.

The London market, which showed a little more resistance the end of last week, has also become very much weaker and closes at £27 2s. 6d.

St. Louis Spelter Market.—The John Wahl Commission Co. on Jan 27 reports as follows: Receipts compare 51,070 slabs this week, with 59,110 slabs last week; shipments 69,650 slabs this week, against 80,240 slabs last week. Declined largely from \$6.35 on Monday to \$6.25 on Thursday, and \$6.10 @ 15 yesterday. The market was in a depressed and, at times, in a demoralized condition. Few sales reported today; prices still declining, and in a demoralized condition. No bid over \$6 today.

The company telegraphs us on Jan. 31, as follows: Spelter is demoralized and unsettled. The latest sales are on a basis of 6c., East St. Louis.

Spanish Zinc Ore Market.—Messrs. Barington & Holt report from Cartagena, Spain, under date of Jan. 13, that prices are nominally unchanged at 95 fr. for blende, 35% zinc, and 72 fr. for calamine, 30% zinc. There has been no change in the market. Shipments were 6,450 tons blende to Antwerp, and 38 tons calamine to London.

Zinc Sheets.—The price of zinc sheets is now \$8 per 100 lb. (less discount of 8%). f. o. b. cars Lasalle and Peru, in 600-lb. casks, for gauges No. 9 and 22,

both inclusive, widths from 32 to 60 in. both inclusive, and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c per 100 lb. The fluctuations in the base price for sheet zinc since January 1, 1905, have been as follows: December 30, 1904, \$7.25; January 7, 1905, \$7.50; May 12, \$7.25; June 1, \$7; July 29, \$7.25; August 10, \$7.50; December 1, \$7.75; January 6, 1906, \$8.

Antimony.—No change is to be reported in the market or in the quotations.

Nickel.—Quotations for large lots, New York, or other parallel delivery, are 40 @ 47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Platinum.—Prices of this metal are unsettled, owing to short supplies, and the present unfortunate conditions in Russia making shipments from that country uncertain. Today prices are as high as \$25 per ounce, but changes are likely to continue.

Quicksilver.—The metal is a little firmer and New York prices have advanced. They are now \$41 per flask of 75 lb. for lots of 100 flasks or over, and \$42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to \$43.50 @ \$44 per flask. San Francisco prices are firm at \$39.50 for domestic orders and \$38 for export. The London price has been advanced 2s. 6d. to £7 7s. 6d. per flask, and jobbers ask £7 10s. for moderate lots.

Manganese Alloys.—Prices for these alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 50 kg. delivered in Bremen, and are as follows, per 100 kilograms:

	Marks.
Manganese copper, No. 1, 30% Mn.....	275
No. 2, 28% Mn.....	180
No. 3, 20 to 25%, with 2 to 4% iron.....	165
Manganese tin, No. 1, 55% Mn., no iron.....	480
No. 2, 56% Mn., some iron.....	280
Manganese nickel, No. 1, free from iron.....	450
No. 2, traces of iron.....	270

Minor Metals.—For minor metals and their alloys, wholesale prices are f. o. b. works:

	Per lb.
Aluminum.	
No. 1, 90% ingots.....	33 @ 37c.
No. 2, 99% ingots.....	31 @ 34c.
Rolled sheets.....	4c. up.
Aluminum-bronze.....	20 @ 23c.
Nickel-alum.....	33 @ 39c.
Bismuth.....	\$2.10
Cadmium, f. o. b. Hamburg.....	77c.
Chromium, pure (N. Y.).....	80c.
Copper, red oxide.....	50c.
Ferro-Molybdenum (50%).....	95c.
Ferro-Titanium (20 @ 25% N. Y.).....	75c.
Ferro-Chrom. (75%).....	12½c.
Ferro-Tungsten (37%).....	29c.
Magnesium, pure (N. Y.).....	\$1.60
Manganese (98 @ 99% N. Y.).....	75c.
Manganese Cu. (30 @ 70% N. Y.).....	40c.
Molybdenum (98 @ 99% N. Y.).....	\$1.75
Tantallic acid (N. Y.) (oz.).....	40c.
Phosphorus, foreign.....	45c.
Phosphorus, American.....	70c.
Tungsten (best), pound lots.....	90c.

Variations in price are chiefly due to size and conditions of order and deliveries.

Missouri Ore Market.

JOPLIN, Jan. 27.

The highest price paid for zinc this week was \$53 per ton, the mines outputting the higher grades being kept from operation by the blizzard. No change was reported in the assay basis price, which ranged from \$50 down to \$45 per ton of 60% zinc. The average price of the week for all grades of zinc ore was \$47.08.

Lead opened the week at \$76, declining to \$75 at the close, and averaged \$75.72 per ton. The Galena and Granby smelters are light purchasers, but the Picher Lead Co., of Joplin, is taking all ore offered at the declining prices.

The storm that set in last Sunday proved a blizzard that kept many of the mines from operating. Nearly every mill in the district was down on Monday, but were in operation most of the week. The hand-jig plants were out of commission all of the week.

Following are the shipments of zinc and lead from the various camps of the district for the week, and the totals for the month, ending today:

	Zinc, lb.	Lead, lb.	Value.
Cartersville-Webb City..	3,720,700	988,550	\$126,150
Joplin.....	1,771,250	166,080	50,620
Galena-Empire.....	568,020	155,060	18,500
Aurora.....	490,510	55,910	11,910
Neck City.....	346,330	31,650	9,830
Duenweg.....	200,430	78,210	7,730
Badger.....	278,570	.....	6,960
Alba.....	173,110	3,570	4,450
Granby.....	220,000	20,000	3,960
Carthage.....	129,720	.....	3,240
Spurgeon.....	143,210	11,570	3,190
Zincite.....	83,550	.....	2,000
Prosperity.....	49,810	21,890	1,930
Springfield.....	64,580	.....	1,540
Reeds.....	47,230	.....	1,130
Totals.....	8,287,020	1,532,490	\$253,140

Last week..... 11,687,540 1,600,800 \$331,680
 Year ago..... 8,328,450 872,230 245,680
 Zinc value, this week, \$195,125; the month, \$951,995.
 Lead value, this week, 58,015; the month, 211,250.

The week's shipment is a decrease of 3,400,520 lb. of zinc and 68,310 lb. of lead, and the value is \$78,540 less than last week. January, compared with the first month of last year, however, shows a gain for this year of 10,708,540 lb. of zinc, 2,880,320 lb. of lead, and in value \$272,815.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
January....	33.33	52.00	January....	55.55	61.50
February....	33.63	52.77	February....	56.37	57.62
March.....	35.40	47.40	March.....	57.20	57.20
April.....	35.75	42.88	April.....	58.00	58.00
May.....	34.87	43.31	May.....	57.77	58.27
June.....	31.93	40.75	June.....	56.60	57.80
July.....	33.37	43.00	July.....	53.00	58.00
August.....	37.55	48.83	August.....	53.00	58.00
September..	40.18	46.75	September..	53.50	63.50
October....	43.65	47.60	October....	53.50	63.83
November..	43.95	49.55	November..	54.70	68.67
December..	46.38	49.00	December..	55.55	76.25

Wisconsin Ore Market.

PLATTEVILLE, Jan. 27.

The extremely mild weather has enabled the different mines to be in opera-

tion continuously. The output was greater than last week, but not nearly all loaded. There was considerable competition among the different buyers this week, for the high-grade ore that is being put out by the roasters. The last 500 tons of zinc ore bought by one buyer in particular averaged over 61% especially from a district that has always been known as a producer of low-grade ore.

The Hazel Green and Kennedy ores commanded top price. The former brought \$54, being a higher price than any ore of the same grade bought in the Joplin district as far as reported. This being due to the fine quality, the lime usually carried by the cleaned ore being reduced far below the minimum as a result of the roasting process, which thus serves a two-fold purpose, viz.: extracting iron and lime.

The different camps of the Platteville district report ore loaded as follows, in pounds:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville.....	421,000	.....	.....
Buncombe-Hazel Green..	395,400	.....	.....
Mineral Point.....	235,400	.....	.....
Shullsburg.....	154,000	.....	81,140
Highland.....	120,000	.....	.....
Linden.....	103,700	.....	.....
Livingston.....	60,000	.....	.....
Cuba City.....	60,000	.....	.....
Harker.....	45,000	.....	.....
Montfort.....	.....	.....	112,340
Total.....	1,594,500	.....	193,480

Lead ore is extremely scarce and none is reported as being sold.

Mining Stocks.

New York. Jan. 31.

The stock market has been generally uncertain, and a lower range of values has prevailed. Some of the parties who have been persistent bulls for some time are now operating on the bear side; and this largely accounts for declines, in the present condition of affairs.

The industrials felt the general tone of the market. American Smelting and Refining closes about \$164 for the common, and \$126½ for the preferred. United States Steel sold at \$42½ for the common, and \$109¾ for the preferred, while Tennessee Coal, Iron and Railroad sold down to \$155. Virginia-Carolina Chemical was off to \$49.

On the outside market the copper stocks received less attention, and were generally lower. Boston Copper closed at \$29; Utah at \$33½; Nevada Consolidated, \$12¼; United Copper, \$60½ for the common, and \$95 for the preferred. On the exchange, Amalgamated Copper sold down to \$110, while Anaconda remained strong.

On the Consolidated Exchange Alice showed several sales at \$4@4.50; Iron Silver at \$4.75; Horn Silver at \$1.95. Mollie Gibson, which has not been heard from some time, sold at 10c. Ontario recorded a sale at \$3.05. There were a number of sales of the Tonopahs, which

are attracting much attention. Business in the Comstocks has been small.

Boston. Jan. 30.

There has been a smaller volume of business in mining shares in this market this week, although activity has been witnessed in certain specialties. The Utah stocks have led in point of business. Bingham Consolidated has been particularly active and it seems as if the heavy trading of late at around \$34, has been explained. In all probability this property will go into Coram's new company as a part of the second unit, notwithstanding many rumors to the contrary. From a low price of \$33 last week, it rose to \$39.87½ today, which is its best price for a long time. In addition to the stock held by the Kimberly estate, which has been marketed, the holdings of J. A. Coram have also been taken over. Montana Coal & Coke also benefited, rising to \$6.12½. This company will also form a part of the new combination.

Amalgamated shows a net loss of \$1.37½ for the week at \$109, although it went as low as \$107.50 in the general selling movement today. Franklin had a bulge to \$19.62½ on renewed reports that the lower levels were proving exceedingly rich, yet it fell back to \$17.50 today. Boston Consolidated has been listless around \$28@29 per share, while Greer Consolidated is off \$3.25 to \$25.87½ on the increase of capital stock. Utah stiffened \$1.50 to \$67, but is off to \$63.50 tonight and United Copper, which rose \$3.50 to \$69, on varied rumors, is back to \$65. North Butte has continued buoyant and in face of a declining market today advanced to \$86.25. United States Smelting and Refining stocks have been fairly firm, although the common is off \$1.50 for the week to \$59 and the preferred \$2 to \$44.50. Over 98% of United States Mining stock has been deposited for exchange, the time being up today.

Allouez closed off \$2.75 net for the week at \$41; Centennial \$1.75 at \$28; Isle Royale \$3.50 at \$24; while Michigan settled \$2, to \$14.50 on expectation that another assessment is likely to be called to build a mill. Mohawk is off \$1 to \$58; Old Dominion \$2.75 to \$37.25; Osceola \$4 to \$100 and Trinity \$1 to \$9. Changes on the curb are unimportant.

Colorado Springs. Jan. 26.

The feature of the week was the advance of El Paso from 67½ to 81c. on a reported strike in the 1,000 level. Tuesday was the biggest day on the local mining exchange for nearly a year, and a total of 114,250 shares of stock changed hands at a valuation of over \$50,000. There have been no special features other than the advance of El Paso.

Portland has shown more weakness than any of the largest stocks, declining from \$1.90 to \$1.75 on Thursday, but re-

covering to \$1.85 on today's market. Elkton is selling on today's market for 46, Isabella for 24 $\frac{1}{4}$, Vindicator for 85c. Gold Sovereign is selling for 10@9 $\frac{3}{4}$, having shaded off from 10 $\frac{1}{8}$ c. Findley has made a slight advance, selling for 89, while Golden Cycle sold yesterday for 75c. It is reported that the Golden Cycle has decided to spend \$400,000 in remodeling the Telluride mill into a cyanide plant, which will have a capacity of 400 tons daily.

San Francisco. Jan. 18.

Dealing in the Comstocks was rather quiet, a brief spurt early in the week being followed by general dullness: Ophir holds about \$6; Consolidated California & Virginia, \$1.25; Hale & Norcross, 95c.; Sierra Nevada, 38c. per share.

The Tonopahs were active, with many fluctuations, closing strong. Several stocks made advances. The low-priced shares were especially in demand. Tonopah Belmont sold up to \$3; Jumbo, \$1.45; Tonopah Midway, \$1.80@1.85; Sandstorm, \$1.30; Ohio, 40@45. The list of these stocks is lengthening out.

Assessments.

Company.	Delinq.	Sale.	Amt.
Alpha Con.....	Jan. 31	Feb. 21	\$0.05
Apollo Con.....	Feb. 19		0.10
Belcher.....	Feb. 14	Mar. 7	0.10
Best & Belcher.....	Feb. 9	Feb. 28	0.10
Caledonia.....	Feb. 16	Mar. 9	0.10
Con. Cal & Virginia.....	Feb. 13	Mar. 6	0.25
Con. Imperial.....	Feb. 14	Mar. 13	0.01
Exchequer.....	Feb. 14	Mar. 7	0.05
Fair View, Cal.....	Feb. 12		0.10
Justice.....	Feb. 27		0.05
Lady Washington.....	Jan. 20	Feb. 10	0.05
Mexican.....	Feb. 7	Feb. 28	0.15
Mt. Pleasant Con.....	Jan. 29	Feb. 12	0.03
Providence, Utah.....	Feb. 5	Mar. 12	0.00 $\frac{1}{2}$
Potosi.....	Feb. 5	Feb. 27	0.10
St. John Quartz.....	Jan. 27		0.05 $\frac{1}{2}$
Sierra Nevada.....	Jan. 22	Feb. 12	0.10
Union Con.....	Jan. 25	Feb. 15	0.10
Vespasian-Hoogley.....	Feb. 12	Feb. 28	0.012

Dividends.

Company.	Payable.	Rate.	Amt.
Amalgamated Copper.....	Feb. 26	\$1.50	\$2,296,319
Consolidation Coal.....	Feb. 1	6.00	615,000
Fairmont Coal.....	Feb. 1	2.00	240,000
General Asphalt, pfd.....	Mch. 1	2.00	262,800
Jerry Johnson.....	Jan. 15	0.01	25,000
Portland Gold.....		0.08	240,000

*Monthly. \$Bi-monthly. †Quarterly. ‡Semi-Annually.

St. Louis.

	High.	Low.
Adams.....	\$.40	\$.25
American Nettle.....	.15	.12
Center Creek.....	2.60	2.40
Central Coal & Coke.....	62.00	61.00
" " pfd.....	80.00	79.00
Central Oil.....	60.00	55.00
Columbia.....	1.00	.25
Con. Coal.....	30.00	20.00
Doe Run.....	128.00	120.00
Granite Bimetallic.....	.35	.20
St. Joe.....	30.00	27.00

LONDON. (By Cable.*) Jan. 31.

	£	s.	d.
Dolores.....	2	2	6
Stratton's Independence.....	0	8	6
Camp Bird.....	1	10	7 $\frac{1}{2}$
Esperanza.....	4	12	6
Tomboy.....	1	8	9
El Oro.....	1	7	6
Oroville.....	0	19	6
Arizona Copper.....	3	3	9
Arizona Copper, pfd.....	3	3	9

*Furnished by C. Schumacher & Co., New York.

STOCK QUOTATIONS.

NEW YORK.		Week Jan. 31.		
Name of Company.	High	Low	Sales	
Amalgamated.....	113	106 $\frac{1}{2}$	109	840,220
Anacosta.....	283	262	269	330,100
Boston Copper.....	31	27 $\frac{1}{2}$	27 $\frac{1}{2}$	27,400
British Col. Copper.....	9 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	5,650
Federal.....	190	175	175	1,700
National Pf.....	111 $\frac{1}{2}$	105 $\frac{1}{2}$	106	16,430
Greene Copper.....	29	26 $\frac{1}{2}$	25 $\frac{1}{2}$	23,550
Greene Gold.....	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	9,300
Mitchell.....	14 $\frac{1}{2}$	12	13	16,700
Ontario.....				
Tennessee Copper.....	49	44 $\frac{1}{2}$	45 $\frac{1}{2}$	6,075
Union Copper.....	2	1 $\frac{1}{2}$	1 $\frac{1}{2}$	5,100
United Copper.....	69 $\frac{1}{2}$	62 $\frac{1}{2}$	65 $\frac{1}{2}$	112,600
United Copper, Pref.....	98 $\frac{1}{2}$	95	95	50
Utah Apex.....	8 $\frac{1}{2}$	7 $\frac{1}{2}$	7 $\frac{1}{2}$	8,700
Utah Copper.....	37 $\frac{1}{2}$	31 $\frac{1}{2}$	32 $\frac{1}{2}$	4,110

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.....	173	161 $\frac{1}{2}$	164 $\frac{1}{2}$	205,400
Am. Smelting & Ref., Pf.....	129 $\frac{1}{2}$	125 $\frac{1}{2}$	125 $\frac{1}{2}$	6,950
Col. Fuel & Iron.....	83 $\frac{1}{2}$	65	68	272,250
National Lead.....	92 $\frac{1}{2}$	80	82	46,450
Pittsburg Coal.....	17	16 $\frac{1}{2}$	16 $\frac{1}{2}$	2,500
Pittsburg Coal, pf.....				
Republic I. & S.....	37	32	32 $\frac{1}{2}$	21,300
Republic I. & S., Pf.....	108	104 $\frac{1}{2}$	104 $\frac{1}{2}$	5,700
Tenn. C. & I.....	159	147	155 $\frac{1}{2}$	9,700
U. S. Red. & Ref.....	31 $\frac{1}{2}$	30 $\frac{1}{2}$	31	1,100
U. S. Red. & Ref., Pf.....	69	68	68 $\frac{1}{2}$	810
U. S. Steel.....	45 $\frac{1}{2}$	42	43	534,250
U. S. Steel, Pf.....	115	109 $\frac{1}{2}$	110	212,210
Standard Oil.....	700	690 $\frac{1}{2}$	692	692,974
Bthlehem Steel.....	34	32	32	2,475

BOSTON.

Allouez.....	44 $\frac{1}{2}$	41	41	2,920
*Amalgamated.....	112 $\frac{1}{2}$	107 $\frac{1}{2}$	109	69,428
Atlantic.....	26	25	25	2,120
Bingham.....	397 $\frac{1}{2}$	33	38 $\frac{1}{2}$	32,600
Boston Consolidated.....	30 $\frac{1}{2}$	27 $\frac{1}{2}$	27 $\frac{1}{2}$	14,702
Calumet & Hecla.....	710	700	700	62
Centennial.....	29 $\frac{1}{2}$	28	28	1,205
Mercur.....	65	65	65	1,450
Copper Range.....	85	80 $\frac{1}{2}$	81 $\frac{1}{2}$	15,744
Daly-West.....	17	16 $\frac{1}{2}$	16 $\frac{1}{2}$	879
Franklin.....	19 $\frac{1}{2}$	17	17 $\frac{1}{2}$	1,672
Granby.....	10 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{2}$	4,282
Green Con. Copper.....	29 $\frac{1}{2}$	25	26	20,500
Isle Royale.....	27 $\frac{1}{2}$	24	24 $\frac{1}{2}$	4,020
†Mass.....	11 $\frac{1}{2}$	10 $\frac{1}{2}$	10 $\frac{1}{2}$	940
Michigan.....	16 $\frac{1}{2}$	14 $\frac{1}{2}$	14 $\frac{1}{2}$	2,465
Mohawk.....	60	57	58	764
North Butte.....	88	85	86 $\frac{1}{2}$	8,990
Old Dominion.....	40	37	37 $\frac{1}{2}$	3,005
Osceola.....	103 $\frac{1}{2}$	100	100 $\frac{1}{2}$	1,858
Parrot.....	43	40	49	4,650
Quincy.....	111	109	109	552
Rhode Island.....	7 $\frac{1}{2}$	7	7	2,125
Shannon.....	6 $\frac{1}{2}$	6 $\frac{1}{2}$	6 $\frac{1}{2}$	1,810
Tamarack.....	109	107	108	160
Tecumseh.....	14 $\frac{1}{2}$	13 $\frac{1}{2}$	13 $\frac{1}{2}$	1,425
*United Copper, com.....	69	63	65 $\frac{1}{2}$	17,660
U. S. Mining.....				
Utah.....	67	63 $\frac{1}{2}$	64	18,842
Wolverine.....	134 $\frac{1}{2}$	131	131	248

PHILADELPHIA.

Cambria Steel.....	37 $\frac{1}{2}$	35 $\frac{1}{2}$	35 $\frac{1}{2}$	81,818
Philadelphia Oo.....	53 $\frac{1}{2}$	51 $\frac{1}{2}$	51 $\frac{1}{2}$	6,936
Tonopah.....	19 $\frac{1}{2}$	19	19	2,012

PITTSBURG.

Crucible Steel.....	17 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	6,971
Crucible Steel, Pref.....	80 $\frac{1}{2}$	78 $\frac{1}{2}$	78 $\frac{1}{2}$	4,425
Tonopah Ext.....	7.95	7.40	7.40	8,225

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton.....	45	46	45	46
El Paso.....	79 $\frac{1}{2}$	86 $\frac{1}{2}$	79 $\frac{1}{2}$	86 $\frac{1}{2}$
Isabella.....	25 $\frac{1}{2}$	25 $\frac{1}{2}$	24 $\frac{1}{2}$	24 $\frac{1}{2}$
Portland.....	175	190	175	190
Vindicator.....	82	89	70	89

SAN FRANCISCO.

Best & Belcher.....	1.15	1.15	1.10	1.15
Bullion.....	.21	.21	.20	.21
Caledonia.....	.43	.44	.43	.43
Confidence.....	.75	.75	.70	.72
Con. Cal. & Va.....	1.25	1.25	1.25	1.25
Gould & Curry.....	.17	.17	.17	.17
Hale & Norcross.....	.90	1.00	.88	1.00
Mexican.....	1.20	1.20	1.20	1.20
Occidental Con.....	.92	.92	.91	.91
Ophir.....	5.87 $\frac{1}{2}$	6.12 $\frac{1}{2}$	5.87 $\frac{1}{2}$	6.00
Savage.....	.44	.50	.42	.50

* Ex-dividend. Assessment Paid.

† 1st Installment Paid. § 2d Installment Paid.

Monthly Average Prices of Metals.

Month.	SILVER.			
	New York.		London.	
	1905.	1906.	1905.	1906.
January.....	60.690	65.269	27.930	30.113
February.....	61.023		28.047	
March.....	58.046		26.794	
April.....	56.600		26.108	
May.....	57.832		26.664	
June.....	58.428		26.910	
July.....	58.915		27.163	
August.....	60.259		27.822	
September.....	61.695		28.528	
October.....	62.034		28.637	
November.....	63.849		29.493	
December.....	64.850		29.977	
Year.....	60.352		27.839	

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

Month.	NEW YORK.				LONDON.	
	Electrolytic.		Lake.		1905.	1906.
	1905.	1906.	1905.	1906.		
Jan.....	15.008	18.310	15.128	18.413	68.262	78.896
Feb.....	15.011		15.136		67.963	
March.....	15.125		15.250		68.174	
April.....	14.920		15.045		67.017	
May.....	14.627		14.820		64.875	
June.....	14.673		14.813		65.881	
July.....	14.888		15.005		66.887	
Aug.....	15.664		15.725		69.830	
Sept.....	15.965		15.978		69.667	
Oct.....	16.279		16.332		71.406	
Nov.....	16.599		16.758		74.727	
Dec.....	18.328		18.398		78.993	
Year.....	15.590		15.699		69.465	

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.....	29.325	36.390	July.....	31.760	
Feb.....	29.262		August.....	32.866	
March.....	29.523		Sept.....	32.095	
April.....	30.525		Oct.....	32.481	
May.....	30.049		Nov.....	33.443	
June.....	30.329		Dec.....	35.855	
			Av. year.....	31.358	

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.....	4.552	5.600	July.....	4.524	
Feb.....	4.450		August.....	4.665	
March.....	4.470		Sept.....	4.850	
April.....	4.500		Oct.....	4.850	
May.....	4.500		Nov.....	5.200	
June.....	4.500		Dec.....	5.422	
			Av. year.....	4.707	

Prices are in cents per pound. The London average for January, 1906, was £ 16.850 per long ton.

SPELTER.

Month	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.....	6.190	6.487	6.032	6.337	25.062	28.225
Feb.....	6.139		5.989		24.594	
Mar.....	6.007		5.917		23.825	
April.....	5.817		5.667		23.513	
May.....	5.434		5.284		23.594	
June.....	5.190		5.040		23.875	
July.....	5.398		5.247		23.	

Metal and Mining Companies—U. S.

Name of Company and Location.	Shares.			Dividends.		
	Authorized Capital	Issued.	Par Val. \$	Total to Date.	Latest.	
					Date.	Amt.
Alaska Mexican, g. Al'ka	\$1,000,000	180,000	5	\$1,293,381	Jan. 1906	\$.30
Alaska Treadwell, g. Al'ka	5,000,000	200,000	25	9,260,000	Jan. 1906	1.00
Amalgamated, c. Mont.	155,000,000	1,530,879	100	35,041,448	Feb. 1906	1.50
Am. Sm. & Ref. com. U. S.	50,000,000	500,000	100	6,125,000	Jan. 1906	1.75
Am. Sm. & Ref. pf. A. U. S.	50,000,000	500,000	100	20,266,553	Jan. 1906	1.75
Am. Smelters, pf. A. U. S.	17,000,000	170,000	100	510,000	Dec. 1905	1.50
Am. Smelters, pf. B. U. S.	30,000,000	300,000	100	750,000	Dec. 1905	1.25
Anaconda, c. Mont.	30,000,000	1,200,000	25	26,850,000	Oct. 1905	1.25
Annie Laurie, g. Utah	5,000,000	25,000	100	465,061	July 1905	.50
Arizona, c. Ariz.	3,775,000	.....	.....	6,186,826	Apr. 1905	.50
Atlantic, c. Mich.	2,500,000	100,000	25	990,000	Feb. 1905	.02
B. & H., l. z. Mo.	400,000	400,000	1	40,000	Dec. 1905	.01
Boston & Montana, Mont.	3,750,000	150,000	25	44,825,000	Jan. 1906	12.00
Bunker Hill & Sull. Ida.	3,000,000	300,000	10	5,886,000	Jan. 1906	.60
Butte & Boston, c. Mont.	2,500,000	200,000	25	1,800,000	Feb. 1904	1.00
Calumet & Arizona c. Ariz.	2,500,000	200,000	10	3,400,000	Dec. 1905	2.80
Calumet & Hecla, c. Mich.	2,500,000	10,000	25	92,350,000	Dec. 1905	15.00
Camp Bird, g. Colo.	5,500,000	820,000	5	2,050,104	May 1905	.18
Center Creek, l. z. Mo.	1,000,000	10,000	10	170,000	Oct. 1904	.10
Central Eureka, g. Cal.	4,000,000	400,000	10	643,159	July 1905	.07
Century, g. s. l. Utah	150,000	150,000	1	30,000	July 1904	.02
C. K. & N., g. Colo.	1,500,000	1,431,900	1	229,104	Dec. 1904	.01
Con. Mercur, g. Utah	5,000,000	1,000,000	5	1,055,000	Dec. 1905	.02
Continental, z. Mo.	550,000	22,000	25	121,000	July 1905	.50
Copper Range, Mich.	2,500,000	100,000	25	150,000	Oct. 1905	1.50
Copper Range Con. Mich.	38,500,000	383,781	100	1,487,124	Dec. 1905	1.00
Creede United, g. Colo.	1,625,000	1,625,000	1	173,428	July 1905	.02
Cripple Creek Con g. Colo.	2,000,000	2,000,000	1	180,000	Mar. 1905	.00
Daly West, g. s. l. Utah	3,600,000	180,000	20	4,889,000	Sept. 1905	.60
De Lamar, g. s. l. Ida.	400,000	67,180	5	2,926,370	May 1905	.72
Dillon, g. Colo.	1,250,000	1,250,000	1	21,875	July 1905	.01
Doe Run, l. Mo.	1,500,000	15,000	100	752,072	Apr. 1905	1.50
Elkton Con., g. Colo.	3,000,000	2,500,000	1	1,491,961	May 1905	.00
El Paso, g. Colo.	2,500,000	2,450,000	1	999,370	Nov. 1905	.01
Fed. Sm., com. Idaho	10,000,000	60,000	100	728,750	Dec. 1905	2.50
Federal Sm., pf. Idaho	20,000,000	120,000	100	1,601,250	Dec. 1905	1.75
Findley, g. Colo.	1,250,000	1,250,000	1	50,000	May 1905	.01
Gemini-Keystone, Utah	500,000	5,000	100	1,300,000	Aug. 1905	10.00
Gold King Con. Colo.	5,750,370	5,750,370	1	1,407,504	May 1905	.01
Gold Sovereign, Colo.	2,000,000	2,000,000	1	10,000	Jan. 1905	.00
Grand Central, g. Utah	250,000	250,000	1	1,045,750	Jan. 1906	.05
Hecla, s. l. Idaho	250,000	100,000	25	550,000	Jan. 1906	.50
Homestake, g. S. D.	21,840,000	218,400	100	14,224,150	Jan. 1906	.50
Horn Silver, g. s. c. r. Utah	10,000,000	400,000	25	5,482,000	Dec. 1905	.05
Inter'l Nickel, l. pt. N. Y.	12,000,000	912,646	100	133,689	Feb. 1906	1.50
Iron Silver, Colo.	10,000,000	500,000	20	3,500,000	Jan. 1906	.20
Jamison, g. Cal.	3,900,000	390,000	10	213,800	Jan. 1906	.03
Jerry Johnson, Cal.	2,500,000	2,500,000	1	50,000	Jan. 1906	.01
Kendall, g. Mont.	2,500,000	500,000	5	780,000	July 1905	.05
Liberty Bell, g. Cal.	700,000	130,349	1	169,441	Oct. 1904	.15
Lightner, g. Cal.	125,000	102,255	1	295,694	Aug. 1905	.05
Lucky Budge, z. Mo.	40,000	400	100	46,800	Apr. 1905	12.00
Lyon, z. l. Mo.	50,000	4,585	10	2,117	Jan. 1905	.20
Mammoth, g. s. l. Utah	10,000,000	400,000	25	1,980,000	Nov. 1904	.05
Mary McKinney, g. Colo.	1,000,000	1,000,000	1	567,000	Oct. 1904	.03
Mines Co. of Am. U. S.	2,000,000	2,000,000	1	1,065,000	Aug. 1905	.01
Mott. Ore Purch. Mont.	2,500,000	81,000	25	4,104,000	May 1905	4.00
Monument, g. Colo.	300,000	300,000	1	27,124	Apr. 1905	.01
Nat'l Lead, pf. U. S.	15,000,000	149,040	100	14,607,600	Dec. 1905	1.75
Nevada Keystone, g. Nevada	1,000,000	638,877	1	61,790	Feb. 1904	.03
New Century, z. Mo.	150,000	150,000	1	21,000	July 1905	.02
New Idria, q. Cal.	500,000	100,000	5	800,000	Jan. 1906	.20
New Jersey, z. U. S.	10,000,000	100,000	100	8,100,000	Aug. 1905	3.00
North Butte, Mont.	.....	.....	.....	400,000	Sept. 1905	.50
North Star, g. Cal.	2,500,000	250,000	10	1,056,356	Dec. 1905	.50
Northern Light, g. s. Utah	2,000,000	400,000	5	20,000	Feb. 1904	.05
Old Dominion Cop. Ariz.	7,500,000	288,000	25	144,000	Dec. 1905	.50
Old Gold, Colo.	2,101,150	2,101,150	1	10,506	Mar. 1904	.05
Ophir, g. s. Nevada	302,400	100,800	3	1,797,400	July 1904	.25
Osceloa, c. Mich.	2,500,000	96,150	25	5,221,200	Jan. 1906	4.00
Parrot, c. s. Mont.	2,300,000	229,850	10	6,347,950	Sept. 1905	.50
Peacock Valley, l. z. Cal.	25,000	2,500	10	47,500	May 1905	.....
Pennsylvania, g. Colo.	5,150,000	51,500	100	284,925	July 1905	.10
Penn-Wyoming, Wyo.	10,000,000	100,000	1	50,000	July 1905	.01
Platteville, l. z. Wis.	20,000	500	40	89,500	Oct. 1905	10.00
Portland, g. Colo.	3,000,000	3,000,000	1	6,697,080	Jan. 1906	.08
Quicksilver, pf. Cal.	4,500,000	43,000	100	1,931,411	May 1905	.50
Quip, g. Wash.	1,500,000	1,500,000	1	15,000	Apr. 1904	.01
Quincy, c. Mich.	2,500,000	100,000	25	15,720,000	Feb. 1906	5.00
Red Bird, g. s. c. l. Mont.	1,500,000	300,000	5	72,000	Dec. 1904	.01
Rob Roy, z. Mo.	15,000	15,000	1	8,700	Jan. 1906	.03
Rocco Homest'k. l. s. Nevada	300,000	300,000	1	112,000	Dec. 1905	.02
Sacramento, g. Utah	5,000,000	1,000,000	5	213,000	Aug. 1904	.01
Salvador, g. s. l. Utah	200,000	200,000	1	6,500	Aug. 1904	.01
St. Joseph, l. Mo.	6,000,000	375,000	10	4,059,500	Dec. 1904	.15
Silver Hill, g. s. Nevada	180,000	180,000	1	64,800	Nov. 1905	.05
Silver King, g. s. l. Utah	3,000,000	150,000	20	9,350,000	Jan. 1906	.66
South Swansea, g. s. Utah	300,000	300,000	1	170,500	Apr. 1904	.01
Spearsfish, g. S. D.	1,500,000	1,500,000	1	165,500	Jan. 1905	.01
Standard Con., g. s. Cal.	2,000,000	178,394	1	4,160,331	Sept. 1903	.10
Straton's Independent Colo.	5,500,000	1,000,007	10	4,505,865	May 1905	.12
Tamarack, c. Mich.	1,500,000	60,000	5	9,000,000	Jan. 1906	3.00
Tennessee, c. Tenn.	5,000,000	175,000	25	437,500	Jan. 1904	1.25
Tomboy, g. s. Colo.	1,500,000	300,000	25	1,316,000	Dec. 1904	.24
Tonopah of Nev. Nevada	1,000,000	1,000,000	5	1,000,000	Jan. 1906	.25
Tonopah Ext'n'sion Nevada	1,000,000	1,000,000	1	.....	Oct. 1905	.10
Tonopah Midway, Nevada	1,000,000	1,000,000	1	50,000	Dec. 1905	.05
Uncle Sam, Utah	200,000	200,000	1	80,000	Jan. 1906	.01
United Cop., Com. Mont.	45,000,000	450,000	100	450,000	July 1905	1.00
United, c. pf. Mont.	5,000,000	50,000	100	1,050,000	Nov. 1905	3.00
United, z. l. com. Mo.	5,000,000	92,400	5	27,450	Oct. 1903	.05
United, z. l. pf. Mo.	1,000,000	19,556	25	197,084	July 1905	.50
United, (Cripple Ck) Mo.	5,000,000	4,009,100	1	280,071	Apr. 1905	.00
United Verde, c. Ariz.	3,000,000	300,000	10	17,085,322	Dec. 1904	.75
United States, g. s. c. Utah	21,500,000	480,000	25	780,000	July 1905	.75
Utah, g. Colo.	1,000,000	100,000	10	225,000	June 1904	.01
Utah Con., c. Utah	1,500,000	300,000	5	4,388,000	Jan. 1906	2.50
Victoria, Utah	250,000	250,000	1	25,000	Jan. 1906	.03
Vindicator Con., g. Colo.	1,500,000	1,100,000	1	1,401,000	Jan. 1906	.03
Wolverine, c. Mich.	1,500,000	80,000	25	2,790,000	Oct. 1905	6.00
Work, g. Colo.	1,500,000	1,500,000	1	15,000	May 1905	.00
Yankee Con., Utah	500,000	500,000	1	100,000	Aug. 1905	.05
Yellow Aster, f. Cal.	1,000,000	100,000	10	538,789	Feb. 1904	.15

Coal, Iron and Other Industrials—United States.

Name of Company and Location.	Authorized Capital	Shares.		Dividends.		
		Issued.	Par Val. \$	Total to Date.	Latest.	
					Date.	Amt.
Ala. Con., C. & I., pf. Ala.	\$2,500,000	\$24,638	100	\$905,265	May 1905	\$1.75
Allis-Chalmers, pf. U. S.	25,000,000	200,000	100	3,213,750	Feb. 1904	1.75
Amer. Ag. Chem., pf. U. S.	20,000,000	181,350	100	6,286,790	Apr. 1905	3.00
American Cement, Pa.	2,000,000	200,000	10	888,000	Jan. 1906	.30
American Coal, Md.	1,500,000	50,000	25	1,682,500	Sept. 1905	1.25
Associated Oil, Cal.	21,000,000	21,000,000	1	630,000	Aug. 1905	.01
Bethlehem Steel, pf. Pa.	.....	150,000	100	525,000	Feb. 1906	1.75
Bon Air C. & I., pf. Tenn.	2,500,000	18,803	100	249,757	Oct. 1904	1.50
Cambria Steel, Pa.	50,000,000	900,000	50	10,500,000	Jan. 1906	.75
Caribou Oil, Cal.	100,000	80,000	1	56,000	July 1905	.07
Central C. & C., com. Mo.	5,125,000	51,250	100	1,166,250	Oct. 1905	1.50
Central C. & C., pf. Mo.	1,875,000	18,750	100	984,370	Oct. 1905	1.25
Central Oil, W. Va.	1,500,000	60,000	25	182,500	May 1904	.25
Claremont Oil, Cal.	500,000	450,000	1	58,500	June 1905	.01
Col. & Hock, C. & I., Ohio	7,000,000	69,244	100	173,086	Feb. 1905	.25
Consolidated Coal, Ill.	5,000,000	50,000	100	350,000	July 1904	1.00
Consolidation Coal, Md.	10,250,000	102,500				