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ON another page will be found an extremely interesting article on the reactions in the aluminum electric processes. This valuable contribution raises some very important and novel points in the metallurgy of aluminum. It is not, of course, to be expected that the views will be accepted without discussion, and we shall be very pleased to afford opportunity to those who differ from Mr. A. H. BUCHERER to state their opinions and experience in this paper.

THE report of the Rapid Transit Commissioners, which we published in our issue of the 30th ult., seems to be meeting with general approval. In fact, the only opposition to it, so far made known, is in a certain portion of the New York daily press, which is apparently inspired by the present elevated railway company. Of course, none interested in that enterprise could be expected to look with favor upon the new scheme. Engineers are, however, agreed that the favored railway system cannot be, practically, extended so as to afford the rapid transit which the city of New York needs. It is futile to argue that capital cannot be found to engage in the new scheme, before it has been presented, or

that the plan of a tunnel under the city is infeasible before the engineering features of the proposed line have been decided. Several plans for rapid transit by means of tunnels under the streets, which are excellent in many respects, have already been presented to the Commission. One of these is the Reno system, which was illustrated in the ENGINEERING AND MINING JOURNAL of Feb. 21st, 1891. No conclusions concerning the system to be adopted can be drawn from the report of the Commissioners, but the recommendation that the four-track, double-deck tunnel may be adopted may possibly point to the selection of the Reno system, at least for the lower portion of the city.

OUR esteemed contemporary, the *Mining Journal*, of London, makes an error in its issue of May 23, which would have been pardonable if it had not drawn upon its imagination in elaborating a sensational story out of a casual remark in some American journal. It says:

When the campaign was instituted in the United States against the Chinese, the Knights of Labor could hardly have foreseen the time when their childlike competitors would encroach upon a domain which had hitherto been regarded as the peculiar province of western civilized man. Yet that is what they have just begun to do as the result of the purchase by a wealthy Chinese company in San Francisco of the gold mines of Belmont, in the State of Colorado. This property was acquired for the respectable sum of \$1,500,000, a figure which they could well afford to give, seeing that they obtain enormous profits from the silver mines which they already possess at Sheridan and Mendota. These excellent returns are attributed to the excessively low rate of wages that is paid to the Chinese that are employed as miners, and who will be exclusively engaged in the newly acquired Belmont gold mine. It is really very difficult to know what to admire most in this philanthropic action of the Chinese company, whether it is the paternal feeling of the Chinese capitalists which prompts them to take their oppressed countrymen from the washing-tub to the washing-cradle, or whether it is the keen genius for making bargains which induces them to employ the cheapest possible labor. Evidently the enterprise is not regarded with anything approaching admiration by the Legislature of Colorado, for that body is now considering a proposal for a law to prevent foreigners from possessing mining properties in that state.

The Sheridan Mining Company, which owns the Sheridan and Mendota mines, in Marshall basin, near Telluride, Colo., is frequently referred to as a Chinese company, its headquarters being in Shanghai, China. It is not composed of citizens of the Celestial Empire, however, but of English tea merchants and others resident there. A syndicate, composed of stockholders in this company, which has, indeed, been very successful, has recently purchased the Belmont gold mine, also located near Telluride, for a price stated to be \$300,000. We can assure our esteemed contemporary that no Chinese labor is employed by the Sheridan Mining Company, and we do not expect that the new owners of the Belmont will attempt any such innovation. The limit of Chinese mining in the United States has been the working of old placer claims abandoned by other people in California and Colorado.

THE BLUESTONE QUARRYING INDUSTRY OF THE UNITED STATES.

The most recent bulletin issued by the Department of Mines and Mining of the Census Office is that upon the production of bluestone in the United States, an abstract of which we publish in another column. This report, forming one of the series upon the building-stone industry, is by Dr. WILLIAM C. DAY, to whom we owe the admirable reports upon granite and marble which have already appeared, and although this is by no means so elaborate as those, yet it has evidently been prepared in the same careful and thorough manner.

In the beginning of the investigation, for the purpose of collecting stone statistics, it was decided to include bluestone with sandstone simply as one of the varieties of the latter. The decision was afterward changed, however, partly because it was found that the producers of bluestone, in a large number of cases ignorant of the fact that the rock is properly a sandstone, strenuously objected to that name. It was deemed advisable also to make a division between the two stones on account of the great difference in the methods of quarrying and the subsequent disposal of the product. The decision seems to have been a wise one, and both reports will undoubtedly be the more valuable for the separation.

It was impossible to compile complete statistics of the bluestone industry on account of the manner in which it is conducted, no records being kept of the operations in very many quarries which are operated in a desultory way. Slightly more than 39 per cent. of the total production came from quarries of this description. The complete statistics of the other quarries may be assumed, however, to furnish a fair statement of the economic features of the industry. This bulletin will be followed by one on the production of the other varieties of sandstone.

THE MAID OF ERIN SILVER MINES, LIMITED.

The present year, not yet half over, has been distinguished by the great number of companies which have been organized in London to operate American gold and silver mines, thus marking a return of confidence in England in investments of this kind. No less than five transactions, representing an aggregate capital of £1,650,000, have been effected during the past six weeks alone. The most recent and the most important of these is the organization of the Maid of Erin Silver Mines, Limited, with a capital of £600,000, say, \$3,000,000, to take over the property of the famous Henriett and Maid Consolidated Mining Company, of Leadville, Col. Of the capital stock of the new company, £575,000 has been allotted

to the vendor, Mr. DAVID H. MOFFATT, of Denver, and these shares are now being offered in the London market.

This is an undertaking of such character and such magnitude as to call for remark. The Henriett and Maid Consolidated Mining Company was organized several years ago, under the laws of Colorado, as a consolidation of the Henriett and Maid of Erin mining companies, which owned adjoining mines. The former of these two mines had once before, in 1882, been offered in England, and a company was formed to operate it, but after a year's working its affairs were voluntarily wound up on account of differences with the vendor, to whom possession of the mine was restored.

These mines have hitherto been among the most profitable silver-lead mines in the United States. Located upon the north side of Carbonate Hill, the great ore chute which outcropped in the Catalpa, Evening and Morning Star claims extended through its territory in full strength. The ore was the typical lead carbonate for which the mines of Leadville were so famous, and although of low grade in silver, was rich in lead, and carrying an excess of iron over its silica contents, was so desirable for the lead smelters that within the past few years, when the supply of this kind of ore in other mines had been practically exhausted, the Henriett and Maid company has occupied a commanding position in the ore market. That the profits of the company were large is shown by the statements of the English accountants who examined its books. In the prospectus of the English company it is stated that for seven months in 1887 the profits amounted to \$104,519.95; in 1888, \$408,700.43; in 1889, \$384,942.28, and in 1890, \$453,787.11; a total of \$1,351,950.46, while the profits had been charged during this period with \$307,338.27 expended for improvements.

It is very apparent that the mine is now being sold on its record, although it would be thought, after the English experience with the Emma, Flagstaff, Eberhardt, Terrible and others, that English investors would have learned that this is the most unstable of "assets" upon which to purchase a mine. The Henriett and Maid will probably be able to yield a profit for some time from its present ore reserves, but it is generally understood to be far past its summit on the road to complete exhaustion, and it is not at all likely ever to return the capital of \$3,000,000 and interest on the same.

The prospectus of the new company itself is very indefinite upon this subject. The ore reserves are estimated at 40,606 tons, but nothing is said concerning the grade of this ore, but in the past the ore is believed to have run from 25 to 30 per cent. lead and from 4 to 6 ounces of silver per ton. The average proceeds from 220,000 tons of ore shipped from June 1, 1887, to Dec. 31, 1890, smelting charges deducted, were \$12.15 per ton. During the same period the dividends paid by the company amounted to slightly more than 51 per cent. of the value of the output. Estimating from these data even the present ore reserves of the company would yield a profit of little more than \$250,000. But every one knows that the good ore is always worked out of a mine that is going to be sold, and few will believe that the present reserves will yield one-twentieth of the capital of the new company. It is possible that new ore bodies may be found in these mines; but is it fair that the stockholders should pay for what "may be" instead of what is?

For the guidance of those whom it may concern, it may be stated that there are very few mines in Leadville paying dividends to-day which were opened ten years ago. Already the lead-carbonate ore of the Henriett and Maid is practically exhausted, and the principal part of its output at the present time is sulphide ore. The prospectus of the new company is silent concerning these and other very important points on which would-be investors would do well to get light before parting with their money.

NEW PUBLICATIONS.

PANTOBIBLION; an international bibliographical review of the world's scientific literature. A. Kersha, C. E., editor. Published monthly. St. Petersburg, Russia. New York, D. Appleton & Co. Subscription, 24s. (\$5.83) per annum, post free.

The purpose of this new periodical is to help literary men concerned with the applied sciences generally, and particularly those devoted to any technical studies of any specialty, to be promptly, exactly and completely informed of the current scientific literature. To attain this purpose it is proposed to include in *Pantobiblion* a classified list of all the scientific and technical books published in all the principal languages in all the countries of the civilized world, arranged in systematic manner; a series of critical articles on all the most important publications, fully informing the reader of the contents of the reviewed book, written in the same language as the work under notice; and a review of the current periodical literature of the world, showing the contents of all the chief scientific magazines.

The first number of *Pantobiblion* is a volume of 287 pages, containing 1,200 titles of new publications, 80 critical articles, and an index of contents of 270 periodicals. Publications in all of the principal languages of the civilized world are represented, namely, English, French, German, Italian, Spanish, Portuguese, Dutch, Swedish, Danish, Hungarian, Rumanian, Russian, Bohemian and Polish. The typographical work in the volume is excellent and the matter is well arranged. Its polyglot contents give it an international character, and it will undoubtedly be equally useful to scientific men of all countries. It is to be hoped that the new publication will receive the necessary support.

SURVEYING AND LEVELING INSTRUMENTS. Theoretically and practically described, for construction, qualities, selection, preservation, adjustment, and uses; with other apparatus and appliances used by civil engineers and surveyors. By William Ford Stanley, optician, manufacturer of surveying instruments, author of a treatise on drawing instruments, properties, and motions of fluids, etc. E. & F. N. Spon, London and New York, publishers. 12mo, pp. 552. Illustrated. Price, \$3.

It might be supposed that the author of this work, a manufacturer of engineering instruments himself, would have been unable to write upon the subjects of which he treats in an unprejudiced manner. Such, however, is by no means the case. It is true that the instruments made by Mr. Stanley have been freely described, but we are unable to see any disposition on his part to glorify his own wares in this book at the expense of those of other makers. The aim of the author has been to describe the construction of the surveying instruments in use, with details of their adjustment, so that professional men, who must generally have limited experience of the qualities of workmanship, should be supplied with as many simple tests as possible for assuring themselves of their quality. The matter is therefore carried into detail for at least one instrument of each class, and in each case a typical instrument has been selected. Carried out on this plan, the work is quite as valuable to those using American or Continental instruments as to those using English, although the last are principally described, as was hardly to be expected otherwise. The only suggestion of an advertisement in the book appears in the price list, which forms a kind of appendix to the volume, but this defaces it in no way, and may indeed be considered a rather valuable addition, giving as it does the prices of many of the instruments which are described in the preceding pages.

The contents of the book are divided into 16 chapters, which comprise a historical sketch and general classification of the subject; the telescope; the magnetic compass; levels; leveling staves; division of the circle and methods employed in taking angles; theodolites; mining survey instruments; instruments to measure subtense or tangential angles to ascertain distances; instruments of reflection; altitude-measuring instruments of a portable kind; graphic surveying instruments; instruments for measuring land and civil works directly; stations of observation; measurements of altitude by differences of atmosphere; and miscellaneous appliances.

The entire series of subjects is treated in such a fashion as would be expected of a practical instrument maker of the high standing and long experience of Mr. Stanley. Not only does he describe the various instruments and their adjustments in a detailed and exact manner, but he adds much information regarding their use, and makes many hints in that connection which will certainly be of much value to the great body of engineers. The entire book is thoroughly well done, and is surely an important contribution to technical literature.

The typographical work in the volume is excellent, and it is generously illustrated by a series of well-executed cuts. We can only criticise its binding, which is more suitable for a summer novel than a work of this character.

BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and that of book buyers, give the retail price?—These notices do not supersede review in another page of the Journal.]

Electricity, the Science of the Nineteenth Century. A sketch for general readers. By E. M. Caillard, author of "The Invisible Powers of Nature." Illustrated, 310 pages. Published by D. Appleton & Co., New York, 1891.

Geological Survey of New Jersey. Annual Report of the State Geologist for the year 1890. Illustrated, 505 pages. Trenton, 1891.

Preliminary Handbook of the Department of Geology in the U. S. National Museum. By George P. Merrill, Curator of the Department of Geology. 50 pages. Washington, 1891.

Protection or Free Trade? By Henry George & Co. 216 pages. Published by Henry George, New York, 1891. \$0.25.

Tables for the Determination of Minerals by Physical Properties Ascertainable with the Aid of a Few Field Instruments. Based on the system of Prof. Dr. Albin Weisbach. By Persifor Frazer, Professor of Chemistry, Franklin Institute, etc., etc. Third edition, entirely rewritten. 115 pages. Published by J. R. Lippincott Co. Philadelphia, 1891. Price \$2.

The Cinnabar and Bozeman Coal Fields of Montana. By Walter Harvey Weed. Illustrated. Published by the Geological Society of America. Rochester, 1891.

Trattato della bonifica idraulica delle terre impaludate. By Davide Bocci. Illustrated, 191 pages. Roma, 1891.

Alteration of Contract by Parole.—By a written contract the owner of land leased to a coal operator the right to take coal out of a pit on the north side of a designated road. Afterward the parties orally agreed that the operator was to have the privilege of entering on land on the south side of the road, and to receive a lease of the coal therein after doing certain work. The last agreement was an independent contract, and not a change of the written contract by parole, and on the owner's breach of the oral agreement, the operator was entitled to recover the value of his work from defendant. The fact that the operator negligently worked the mine on the north side of the road is no defense to his action for actual damages resulting to him from a breach of the oral agreement. *Heitman v. Weinman, Supreme Court of Pennsylvania, 21 At. Rep., 29.*

Accidents in Italian Mines in 1889.—The total number of accidents in the mines of the Italian Kingdom during 1889 amounted to 196, with 68 deaths and 171 injured, while in 1888 there were 301 accidents, with 87 deaths and 286 injured persons. Taking the larger production of 1889 into consideration it appears that a remarkable improvement has been realized as regards the safety of the mines. Thus, for every 1,000 persons there were 6.13 accidents, 1.74 deaths and 5.82 cases of injury in 1888, while in 1889 there were 4.00 accidents, 1.39 deaths and 3.48 cases of injury. Comparing the value of the production with the number of deaths, there was one death for an output of the value of \$117,029 in 1888, and one for an output of the value of \$152,993 in 1889. In 1887 there was one death for every 720 persons employed.

CORRESPONDENCE.

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. All letters should be addressed to the MANAGING EDITOR. We do not hold ourselves responsible for the opinions expressed by correspondents.

The Temperature Obtained in Lead and Copper Cupolas.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: My attention was called some time ago to the critical remarks of the *Chemiker-Zeitung** on the method of charging lead or copper cupolas for the purpose of obtaining a hotter furnace without any larger consumption of fuel, as advocated in my article published in the ENGINEERING AND MINING JOURNAL of December 27th, 1890. I have been too busy so far to answer, but will not longer delay in defending the correctness of my views on the subject.

My critic says: "By the manner of charging, as advocated, the required amount of heat is increased. This can be advantageous only in case that more fuel has been burnt previously than necessary, and when consequently a damaging superfluity of heat existed. It must be denied that a saving of fuel may be effected by increasing the required amount of fuel."

I do not want to dispute the self-evident assertion contained in the latter part of the criticism. I merely deny that I have in any way advocated such a course in my article in question.

The amount or number of heat units practically utilized will be the same, whether we charge in one way or in another, as long as the final products of the furnace-running are the same. It will be a like case as if we heat one pound of water from 0° C. to 100° C. and then add three pounds of water of 0° C. to it, thus getting four pounds of water of 25° C., or if we take four pounds of water of 0° C. and heat it to 25° C., we will have utilized the same amount of heat units in either case, and will have been able to do it with the same amount of fuel; but we will have obtained a much higher temperature, even if in a smaller volume of water, by the first method.

Similarly, we will, by the method of charging advocated by me in the article in question, obtain a higher temperature in the zone of fusion near the tuyères while confining this zone of higher temperature to a smaller space. As usually charged, we will obtain with the same amount of fuel a somewhat lower temperature in the zone of fusion; but the latter will extend higher up into the stack than with the first method of charging. In the one case we will get a cooler throat and a hotter tuyère region, in the other a warmer throat and a colder zone of fusion, with the same amount of fuel. I still contend that the first state of affairs is the most conducive to a well-running lead or copper cupola, *ceteris paribus*.

That I am correct in my observations and remarks on the subject, is further evidenced by the well-known fact, which need only be mentioned to be acceded to by every practical lead or copper smelter using cupola furnaces: "The hotter the tuyères (with the same charge) the cooler the throat, and the hotter the throat the colder the furnace at the tuyères." I think I have at least indicated the reason why this is so.

CARL HENRICH.

NOBLE, Ill., May 30, 1891.

THE REACTIONS IN THE ALUMINUM ELECTROLYTIC PROCESS OF THE PRESENT DAY.

Written for the Engineering and Mining Journal by Alfred H. Bucherer, Chemist

The character of the reaction in the chief process by which pure aluminum is produced on a commercial scale in Europe and in this country, has been the subject of discussion among metallurgists and chemists, but often opinions have been passed on it which prove the lack of thorough study and of practical investigation. The author of this article has had opportunity to see this process worked for a long space of time, and has experimented largely with the great facilities offered by the plant of the Cowles Company and of the Pittsburg Reduction Company, and therefore thinks he may be able to throw some light on this interesting question.

There are two interpretations of the reactions in the electrolytic bath. Heroult, for instance, whose French patent, No. 175,711, was issued in 1886, describes his process as the electrolysis of alumina dissolved in a bath of the double fluorides of aluminum, and of a metal more electro-positive than aluminum. Deville, about 37 years ago, clearly expressed the idea that the current decomposes the double fluoride of aluminum and of a metal more electro-positive than aluminum, and that the oxide of aluminum which is fed into the bath by mixing it with the carbon of the anode serves for regeneration of the bath of fluorides. Still more distinctly Lossier, in a German patent of the year 1884, No. 31,089, expresses the idea that the fluoride is decomposed, and that the liberated fluorine, together with carbon, regenerates the fluoride bath. Lossier, in his specification, is even much ahead of the present process by ambitiously attempting to reduce silicious alumina by a very ingenious device. I quote from his specification: "The aluminum fluoride is decomposed under the influence of a current from the dynamo. The aluminum separates in a melted condition at the cathode, and being lighter than the liquid forming the bath, it remains on the surface of the same. The fluorine is liberated at the positive pole, and together with the carbon acts on the aluminum silicate coating and thus forms aluminum fluoride, which remains in the bath, while, on the other hand, silicon fluoride (a gaseous compound) and carbon oxide escape through the escape pipe." Heroult, in his French patent of April 23d, 1883, and Hall, in his United States patent, 1889, express distinctly the idea that the oxide is reduced by direct action of the current, the double fluorides serving only as solvents; taking for example, cryolite, the double fluoride of aluminum and sodium ($\text{Na}_2\text{Al}_2\text{F}_6$), we use it, dissolve alumina in it, and then pass the current through and effect the reduction of the metal; the aluminum being deposited at the negative electrode, and carbonic oxide appearing at the positive electrode, which latter consists in a carbon cylinder. The fact that carbonic oxide is generated in the operation and further the fact that the fluorides waste only slightly, might at first sight corroborate the

opinion expressed in the patent that alumina is directly decomposed and split up into aluminum and oxygen, the latter combining with the carbon of the positive electrode, and forming carbonic oxide.

Now let us examine more closely into the correctness of these two opposite theories. We have three compounds on which we can expect the current to act, namely, sodium fluoride, aluminum fluoride and aluminum oxide. If we were permitted to assume that, in the fused bath, one of these compounds was a non-conductor, and consequently a non-electrolyte, the answer to the question which compound was acted upon by the current would be much facilitated; as we have here, however, a perfectly liquid and homogeneous mass, and as the alumina is thoroughly dissolved, we cannot suppose the current to select on its path through the bath only one of three compounds, and leave the others untraversed. In order to more fully explain this, let us examine what a solution really is. First, let us take a simple example, the solution of common salt in water. What happens? When we dissolve common salt (Na Cl) in water, the elements of the dissolved compound simply exert their affinities for the elements of the solvent until an equilibrium is established; the sodium attracts the oxygen, and, as is well known, this affinity is strong, and the chlorine attracts the hydrogen of the water. A solution of the above character is then in reality a chemical combination of the solvent with the compound dissolved. For a second example take a case where the affinity of the elements of the compound to be dissolved for each other is overwhelmingly stronger than the affinities for the elements of the solvent. No solution takes place, and the mass is but a mechanical mixture, as in the instance of mud and water. Now for a third case where decomposition ensues. In the case of silver chloride, for instance, the affinity of silver for chlorine is so much greater than that for oxygen that the additional affinity of chlorine for hydrogen is not sufficient to effect solution; taking mercurous chloride or calomel we find that it is insoluble in water, since the affinity of mercury for oxygen is very small as compared with its affinity for chlorine, and the affinity of the two atoms of chlorine for hydrogen not sufficient to effect solution. If, however, the same quantity of mercury is combined with a double quantity of chlorine, as is the case with mercuric chloride, then the attraction of the hydrogen in the water for chlorine is doubled and solution is effected. Cuprous and cupric chlorides form similar examples. It is evident from this explanation that the force by which elements are held together in a compound is diminished by dissolving the compound or fusing it with appropriate other compounds, a fact which is further illustrated by the observation that the electrical energy required to decompose a certain compound is considerably diminished if that compound is in a complex solution, or fused together with appropriate other compounds of greater stability.

If we examine, with this view of a solution, the Heroult bath, we see at once the complex relation which exists between the attractions of the various elements of the three compounds for each other. The sodium attracts the oxygen and also exerts its affinity for aluminum, since the formation of aluminum-sodium alloy is accompanied by the evolution of a considerable amount of heat and takes place at a low temperature. There is also interaction between aluminum fluoride and aluminum oxide, resulting in the formation of an oxyfluoride of aluminum; thus the aluminum is completely dissolved. From the above it follows that the fused bath of cryolite and alumina conducts the current as a whole, and the question remains to be answered which of the three compounds present is dissociated by the action of the current. No doubt the least stable compound will be acted upon by the current, *i. e.*, that compound the elements of which are held together by the least force under the precise conditions of temperature, solution, etc., of the electrolytic bath. To determine this stability *a priori* according to definite laws is a task which at the present stage of chemical knowledge we cannot undertake. Thermo-chemistry can sometimes act as a guide, because the amount of heat evolved in the formation of a compound is in close relation to the force by which the elements of that compound are held together, and we can calculate from the amount of heat which is evolved in formation of a compound the electromotive force that is required for decomposing that definite quantity of a compound which is called its electro-chemical equivalent. I make a remark here incidentally that the distinction made between chemically equivalent quantities and the electrochemically equivalent quantities is unjustified. Looking at the different quantities of iron which are liberated when the same current during the same time electrolyzes ferrous and ferric chloride, we conclude that three molecules of ferrous chloride are equivalent to two molecules of ferric chloride, and from a purely chemical standpoint we should say that one molecule of ferrous chloride is equivalent to one molecule of calcium chloride, while three molecules of calcium chloride are equivalent to two molecules of ferric chloride, from which it follows that one molecule of ferric chloride is chemically not equivalent to one molecule of ferrous chloride, but that rather, as is the case in electrolysis, three molecules of ferrous chloride are equivalent to two molecules of ferric chloride; we can therefore more simply express the relation of electromotive force and heat of combination by saying that the electromotive forces of compounds are to each other as the heats of combination evolved in the formation of equivalent quantities of these compounds.

In stating this law we must not forget, however, that temperature, pressure, etc., modify this force, and a single example will illustrate this fact. Compare, for instance, the heats of formation of equivalent quantities of sodium oxide and sodium chloride; we find that sodium oxide evolves about one-half as much heat in its formation as is evolved by two molecules of sodium chloride, yet sodium chloride dissociates into sodium and Cl at a temperature of 1,500° C., while sodium oxide (Na_2O) is practically infusible at any temperature except that of the electric arc. It is ever apparent that the force which holds the two elements in sodium chloride together must be weakened before the temperature of dissociation is reached, and the electromotive force to accomplish this dissociation must be very much smaller than we should infer from its heat of combination, and certainly much smaller than that required to dissociate any Na_2O . It is also evident that at a temperature of dissociation the electromotive force must be zero. Since we have no direct measure of the stability of the compounds in question under the conditions of the electrolytic bath, we have to look for another method of solving the question. This method consists in studying the chemical reactions of the substances at the temperature of the electrolytic bath, which I think is about 900° C. Viewing first sodium

* No. 2, 1891. † Translated from the German.

fluoride and aluminum fluoride, we know that at the temperature mentioned sodium fluoride is the most stable compound; that is to say, the affinity of fluorine for sodium is stronger than that of fluorine for aluminum, for sodium is capable of displacing aluminum in its fluoride, a reaction which occurs according to this equation: $6\text{Na} + \text{Al}_2\text{F}_6 = 6\text{NaF} + 2\text{Al}$. At a higher temperature sodium is not capable of effecting this displacement; in fact, it is well known that aluminum placed in fused cryolite has been dissolved, and this can only be explained by the reversion of the above reaction, namely, $6\text{NaF} + 2\text{Al} = \text{Al}_2\text{F}_6 + 6\text{Na}$.

In metallurgy such reversions of reactions are not infrequent: zinc oxide, for instance, at a certain temperature, can be reduced by carbon, the products being metallic zinc and carbonic oxide. At a higher temperature zinc vapor is capable of reducing carbonic oxide, the products being zinc oxide and carbon. Some chemists have tried to account for the absorption of aluminum by supposing the existence of a subfluoride of aluminum. Aluminum sub-compounds have never been proved to exist, and from the position of aluminum in the tables representing the periodic law, the existence of such compounds is highly improbable. The passing off of sodium vapor in case pure cryolite is electrolyzed at too high a temperature can easily be observed; the sodium vapor burns then with its characteristic brilliant yellow flame. We are then permitted to assume that of the two compounds, sodium fluoride and aluminum fluoride, the current would decompose aluminum fluoride, in spite of the fact that there are indications that aluminum fluoride in its formation evolves more heat than equivalent quantities of sodium fluoride.

The question now remains to be answered, which is the most stable compound, aluminum oxide or aluminum fluoride? From a calculation made by me I should conclude that the heat of formation of aluminum fluoride for lower temperatures is greater than that of the oxide, but whether at the temperature of the electrolytic bath the stability of halogen salts is not very materially weakened is another question. The halogen salts, as a whole, are easily dissociated, so that we may suppose that at the temperature of 900°C . the affinity of fluorine for aluminum is considerably diminished, while, on the other hand, we know that metallic oxides, with exception of the noble metals, are extremely stable at very high temperatures.

The following facts will show how temperature affects the stability of aluminum fluoride. Aluminum fluoride is insoluble in liquid water, that is to say, the great affinity of aluminum for oxygen is not capable of weakening the strong union between fluorine and aluminum so as to effect a solution; nevertheless, we know that if we heat cryolite to such a temperature as to effect volatilization, which temperature is not much above that of the electrolytic bath, and then bring it in contact with vapor of water, reaction takes place, and aluminum oxide is formed according to the equation $\text{Al}_2\text{F}_6 + 3\text{H}_2\text{O} = \text{Al}_2\text{O}_3 + 6\text{HF}$; in this reaction, of course, the great attraction of hydrogen for fluorine plays its rôle; the probability is, then, that in our case aluminum fluoride more easily decomposes than the oxide. Another method for determining the strength of union of the oxide as compared to that of the fluoride, would be to measure the resistance of either compound to the passage of the current. Unfortunately aluminum oxide fuses at so high a temperature that accurate measurements are practically impossible. To determine the resistance of alumina when dissolved in the electrolytic bath is evidently an impossibility for the reason that the fluorides and the oxide together as a whole conduct the current; yet measurements were made. The resistance of the bath with the oxide was first measured, then the resistance was measured of the bath containing no alumina. The resistance in the first case was considerably smaller than in the case of the bath free from alumina.

It does not require great sagacity to perceive at once all the errors of such measurements. It is one of the elementary principles in the art of electrolysis that a complex solution conducts the current incomparably better than a single compound, *i. e.*, we can decompose a certain compound by using a current of a certain electromotive force, and we can decompose the same compound by using only one-half of that electromotive force if we dissolve certain other salts in the same solution. This fact is in close connection with our theory of a solution, namely, that the force by which the elements in a compound are held together is diminished by the attraction of these elements for the elements of other compounds in the solution. In the case of our electrolytic bath we must ascribe the difference of electromotive force in the two cases partly to the fact that the solution of alumina increases the conductivity of the bath; but there are more potent factors that fully explain the rise of resistance of the fluoride bath when it is free from alumina. Let us suppose, for the sake of argument, the stability of alumina and of the fluorides under the conditions of the electrolytic bath to be the same, then neglecting also the solution effects of alumina on the conductivity; then in case the alumina be decomposed the oxygen of the alumina will combine with the carbon and produce heat energy, which is imparted to the bath and helps to keep the same in fusion, and thus that part of electrical energy which would be required to furnish this heat by converting electrical into heat energy is saved, and consequently less voltage is required to decompose the alumina and overcome the resistance of the bath and keeping the same in fusion, than if the bath were free from alumina and the current decomposed only the fluoride of aluminum. That this heat furnished by the combustion of carbon is quite considerable appears from the following calculation. Supposing two pounds of aluminum be reduced in one hour by the electric current, then $1\frac{1}{2}$ pounds of oxygen are liberated. This amount of oxygen would combine with the carbon of the anode to form carbonic acid. We know, however, that one kilogram of oxygen when it combines with carbon evolves 6,000 calories of heat; hence $1\frac{1}{2}$ pounds would evolve about 5,000 calories, an amount of heat sufficient to raise the temperature of 1,000 pounds of water one degree Centigrade.

From this follows that the increase of voltage indicated when the bath is exhausted from alumina, can throw no light on the respective electromotive forces required to decompose the various compounds.

To my mind there is only one phenomenon in the electrolytic process under discussion which clearly indicates that the reaction takes place, and that is the evolution of carbonic oxide at the anode. There is no doubt that in case oxygen was liberated by electrolysis, this oxygen would combine with the carbon of the electrode to produce carbonic acid, since it

is well known that carbon in pure oxygen invariably burns to carbonic acid, and not to carbonic oxide. Therefore we cannot escape the conclusion that the carbonic oxide is generated by a chemical reaction, and this consists in a combined attack of carbon and fluorine liberated from the aluminum fluoride on the oxide, according to the equation $\text{Al}_2\text{O}_3 + 3\text{C} + 6\text{F} = \text{Al}_2\text{F}_6 + 3\text{CO}$. This reaction is very similar to that by which Deville manufactured aluminum chloride for his old chemical aluminum process $\text{Al}_2\text{O}_3 + 3\text{C} + 6\text{Cl} = \text{Al}_2\text{Cl}_6 + 3\text{CO}$. One might feel inclined to explain the evolution of carbonic oxide, which undoubtedly takes place, as appears from the amount of carbon consumed for each pound of aluminum produced, from a subsequent reduction of the carbonic acid by the carbon, but this only occurs in case carbonic acid is led over a red-hot carbon. It is not the case in our bath, since only that part of the carbon cylinders is red-hot which represents the electrolytically active zone, that is to say, that part of the carbon surface at which the anion is liberated. A reduction of carbonic acid to the oxide is therefore excluded. Another objection to the reduction of alumina by secondary action might be found in the fact that positive copper electrodes are said to be capable of substituting carbon. This is only true in as far as copper is capable, by its affinity for oxygen at higher temperatures, to substitute carbon as long as metallic copper is exposed to the dissolved alumina, but as soon as this no longer happens, the current simply decomposes the original fluoride, which latter is no longer regenerated by alumina. The fact that the fluorides waste only slightly is by no means a proof that they are not acted upon by the current. The fluorine being liberated at the anode in the most immediate vicinity of alumina and carbon, there is no chance for the fluorine to escape; it must act on the alumina. Examples of the secondary reaction in the electrolytic processes are frequent, and nowhere is there waste of the true electrolyte observed. Take, for instance, an anode of copper pyrites, place it into a slightly acidulated solution of copper sulphate, and pass the current; there will be a decomposition of copper at the cathode, and sulphur will drop from the anode, while the copper sulphate solution remains perfectly unchanged and constant.

It is, then, my opinion that the cycle of reactions by which aluminum is produced in the various electrolytic processes in whatever form they may appear, is the following: The current acts on the aluminum fluoride, aluminum is deposited at the cathode and fluorine at the anode. The free fluorine at once exerts its affinity for the aluminum in the alumina, and with the help of carbon forms aluminum fluoride, and at the same time carbonic oxide is formed. The aluminum fluoride in turn is decomposed. This interpretation is more or less distinctly anticipated by Deville and the various patentees and inventors who adopted his ideas for the manufacture of aluminum.

Devil, in order to make the action of fluorine on alumina in presence of carbon more efficient, intimately mixed the alumina with the carbon, and made the anode out of it, which he placed into fused cryolite. Lossier, in a patent granted by the German government in the year 1884, clearly expresses the idea that the fluoride is decomposed, and that the liberated fluorine together with carbon regenerates the fluoride bath by jointly acting on silicious alumina, as I have mentioned above. He is the first who fed in alumina, or rather silicious alumina as such, unmixed with carbon. I quote from his specifications: "Attraction of the aluminum silicates serving as aluminum ore is thus directly used for the feeding of the electric bath," and further "this arrangement forms consequently an apparatus for continuous manufacture because the introduction of raw material and the gathering of the manufactured metal can take place without interruption."

Bell, in his English patent of the year 1861, has simply adopted the ideas of Deville. He regenerates his cryolite bath by feeding alumina into the same, by making it a part of the anode. In examining thus the principles and ideas by which aluminum hitherto has been produced on a commercial scale we cannot help concluding that all of it has been produced by methods worked and suggested by Deville. That Deville preferred to work his purely chemical processes is obviously due to the fact that at his time electricity could not be obtained cheaply, and only after the epoch-making application of electric heat and energy, made by Messrs. Cowles, to the manufacture of aluminum, which, in turn, as is on record in the history of dynamo electric machinery, has given impulse to the manufacture of large dynamos, has the manufacture of aluminum attained its present great development, and the fact has been demonstrated that purely chemical processes are a matter of the past.

British Coal in Italy.—The amount of British coal imported into Italy in 1890 was as much as 1,493,600 tons, against 1,307,600 tons in 1889 and 1,279,400 tons in 1888. Of the above total import in 1890, 749,000 tons were from Cardiff, 574,700 tons from Newcastle, and the rest was Scotch and North English coal from Liverpool and Hartlepool.

Method of Preparation of Pure Phosphoric Acid.—M. Nicolas, in *Compt. Rend.*, 111, p. 974, describes a method of preparation of pure phosphoric acid in which a known quantity of pure calcium phosphate is gradually added to a slight excess of pure dilute hydrofluoric acid, contained in a leaden or platinum vessel, the mixture being well stirred after each addition. An energetic action takes place and considerable heat is evolved. When all the calcium phosphate has been added, the high temperature of the mixture must be maintained for some time in order to complete the reaction. After the removal by filtration of the calcium fluoride which is formed, the solution of phosphoric acid is evaporated. At the point when the solution commences to become viscid, the excess of hydrofluoric acid used is volatilized. The evaporation is continued until a thick syrup, containing 60%—70% of phosphoric anhydride, is obtained. Meta- and pyrophosphoric acids may be prepared by further continuing the evaporation and heating. The various calcium salts of phosphoric acid described by Erlenmeyer may be readily prepared by adding hydrofluoric acid to a large excess of calcium phosphate, and after mixing well, dissolving out with warm water the acid salts produced. Impure phosphates, such as bone-ash, may be used for the preparation of phosphoric acid, provided that the resultant acid, after being evaporated to carbonize the organic matters present, is diluted with water, filtered and again evaporated.

REPRESENTATIVE AMERICAN METALLURGISTS.

Charles H. Aaron.

One of the main reasons for the remarkable and rapid progress that has been made in the metallurgy of the precious metals in the United States has been the freedom with which practical men of experience have written of their work. Of these benefactors of the art there are few who have done more than Mr. Charles H. Aaron, of San Francisco, whose portrait we present in this issue.

Mr. Aaron was born in England in 1833, but a few years later his parents removed to New South Wales and most of his boyhood was spent in that comparatively new colony. This was not long, however, for at the early age of fourteen, being naturally of a roving disposition, he determined to go to sea, and the next six years of his life were spent upon the ocean. Arriving in California in 1853, however, when the gold mining excitement was at its height, he decided to leave the water and join in the search for the precious metal. The next ten years, consequently, he spent in placer and river gold mining.

In 1863 Mr. Aaron began the study of assaying and metallurgy, and since that time has been engaged in the practice of this profession. He undertook his studies with energy and with the originality of one of his peculiar and natural ability, and his work soon began to show results. In 1865 he discovered the reaction between ferrous chloride and cupric oxide in presence of water, although he never claimed to be the first to do this, and published an account of it, pointing out its effect in the pan-amalgamation of silver ores. The same reaction was used in the first Hunt and Douglas copper process described in 1866. In 1865 Mr. Aaron went to Lower California as assistant metallurgist in the Triunfo mill, of which he had full charge for several months prior to the reconstruction of its works, when he left to take charge of another mill.

In 1867 Mr. Aaron invented the process, known by his name, of treating silver ores without roasting, and two years later introduced it in Mono

Mr. Aaron has at various times done some mining and prospecting work on his own account with indifferent success. He is the author of several technical handbooks on the metallurgy of silver ores which have been well received, and he has been a contributor to scientific and technical periodicals for the past twenty-six years.

He has invented and published several original methods in assaying, including a scheme for assays of nickel and cobalt ores, and a metallurgical process for these two metals, although this has never been put in practice; also methods of assaying copper and zinc, and some new and comparatively short rules for finding the quantities of metal and gangue in ore specimens.

Mr. Aaron, who is one of the most modest of men, never claims the position in the metallurgical science which the profession at large acknowledges that he holds. He is, without doubt, one of the best authorities upon the lixiviation of silver ores that we have at the present time, and his work in this direction has been of great value on account of his long experience, his close observation, and the manner in which he has carried out his original investigations. He deserves much credit, too, for the free manner in which he has made public the results of his work.

Liability of Corporation for Contract made before Organization.—Plaintiff and others agreed to lease mining lands and to form a corporation. A lease was obtained, with right to forfeiture. The mines were operated, and plaintiff made advances to the association, when its property was sold by creditors. A corporation was formed by members of the old association and the same lands leased, the lessor having declared a forfeiture of the old lease. Prior to its organization it was agreed between the parties that the new corporation should assume the debts of the old association, and issue to plaintiff stock in payment for his services and advances. In an action to compel the issuance of a certificate



CHARLES H. AARON.

county, California, where he continued to work it for five years on his own account, and again, later, for others. When the Patchins process was patented it was found to be simply a modification of the Aaron process, and the company owning it consequently paid Mr. Aaron a considerable sum of money for the relinquishment of his right. The Aaron process, although independently invented, was chemically similar to the Mexican *caso y cocimiento*, but both chemically and mechanically improved. Mr. Patchins' invention really consisted in an improved apparatus.

In 1874 Mr. Aaron patented the use of sulphurous acid in the amalgamation of silver ores in the presence of copper oxides. This process was used by him for some time at Benton, Mono county, Cal., with good results and great economy. A few years later he became interested in the San Francisco copper mine in Nevada County, Cal., of which he was appointed superintendent, with the object of experimenting on the extraction of copper by heap roasting and leaching. After trying different methods he adopted a process invented by Mr. C. Burger, by whom the work was subsequently conducted on a large scale, Mr. Aaron retiring from the superintendency to take charge of a silver mill elsewhere.

About 1878, in partnership with William Irelan, Jr., the present State Mineralogist of California, Mr. Aaron established chlorination works at Melrose, near San Francisco, on a contract to treat the auriferous sulphurets from the Murchie mine, at Nevada City, which other operators had found too refractory. It was here that he demonstrated the volatility of gold during roasting under certain conditions, which is described in his work on leaching. After this Mr. Aaron passed several years in Arizona as an independent assayer and as superintendent of silver mills, among others that of the Silver King Company, and subsequently was engaged in general professional work.

In 1887 he went to Honduras to examine some mines for the late Senator Hearst, and upon his return to California passed a year in the service of the State Mining Bureau of California. In 1889 he went again to Honduras as metallurgist of the Santa Lucia Mining and Milling Company, of which he was afterward made superintendent, and remained in that position until failing health caused his return to California for medical treatment.

of stock, and for an accounting, the decision rendered was that, as the corporation had never ratified the agreement to pay the debts of the old association, and the new lease was not obtained by virtue of the old one, but by independent contract with the owner, and the new corporation was not benefited by the property of the old association, plaintiff could not recover.—*Carey v. Des Moines Co-op. Coal & Min. Co.*, Supreme Court of Iowa, 47 N. W. Rep., 882.

Iron and Steel Works in China.—At last there appears to be solid prospect of railway enterprise and industrial development in China, says the *Engineer*. The Chinese government is erecting extensive steel works at Learghoo, under the superintendence of Mr. Henry Hobson, C. E., and a party of English mechanics from Workington, on the Solway Coast. From the north of England has come the whole of the plant required in the construction of the steel works and blast furnaces, and the workmen employed are exclusively Chinese, 3,000 in number. The designer of the works is Mr. E. P. Johnson, who has been engaged by the Chinese government as draughtsman under the engineer. In a letter to his friends at home Mr. Johnson gives an interesting account of the progress of the enterprise. There being danger of floods, the site has had to be guarded by an embankment about a mile and a half in length. On each side are lofty hills, which are linked by the embankments, thus shutting the water out of the works on all sides. Neither master nor workpeople understand each other; yet good progress is made, the adaptable Chinaman readily understanding by signs all he is required to do. The quality of the work is stated to be very good indeed, and really better than could be done by Englishmen with Chinese tools. The article used as a bricklayer's trowel resembles a butcher's cleaver. A more unsuitable tool for a trowel could scarcely be imagined, but the conservative Chinamen will not use any other. All the embankments and excavations have been made without the use of a single wheelbarrow or plank. When there is anything to be carried the Chinese get around it in great numbers. Each man takes his fair share of the weight, and the army of carriers bear off bodily, if required, a 10-ton boiler. The Viceroy visited the works and gave the foreign engineers a dinner in honor of the undertaking.

CAVES IN ANTHRACITE COAL MINES.*

By G. M. Williams, Inspector of Mines of Third Anthracite District, Pennsylvania.

The word cave, or cave-in, is generally used to denote the collapse of an extensive portion of the workings of a mine. Frequently they are the cause of much annoyance, much danger, and considerable expense. Caves occur because the pillars reserved for the support of the overlying strata are not strong enough to support the weight resting on them. This weight increases with the depth of the workings beneath the surface, so that where the overlying stratum is twice the thickness there is twice the weight resting on every square foot of the pillars. If we take the average specific gravity of the rocks intervening the coal seams of the anthracite-coal region of Pennsylvania to be 2.5, which I think is low enough, the average weight per cubic foot would be 156 pounds, and at a depth of 500 feet the weight of a column one foot square would be 78,000 pounds. In a mine having a vertical depth of 500 feet about eight-fifteenths of the coal is taken out from the breasts, leaving the remaining seven-fifteenths as pillars to support the overlying rocks.

Under these conditions there is a weight equal to 15 times 78,000 divided by 7, or 167,142 pounds, resting on every square foot of the pillars; a weight exceeding 83 tons. In a mine 800 feet deep where the width of breasts and pillars are each 8 yards, the weight on every square foot of the pillars is nearly 125 tons; and in a mine where the depth is 1,000 feet and the breasts 7 yards wide, and pillars 8 yards, the weight resting on every square foot is nearly 146 tons. Thus we know that in mines where the combined width of both breast and pillar equals 48 feet an additional weight of 374 tons is to be sustained by every lineal foot of the pillars for every 100 feet of additional depth, and this should at all times be taken in consideration when determining what should be the relative width of breasts and pillars.

In present practice there seems to be no rule by which the required size of pillars may be determined upon. If the existing pillars prove too small in one place larger ones are tried in another, so that in every mine it is not known whether the pillars are of sufficient size until they are tested and found to hold, and then they may be larger than is necessary, but no one can conclusively determine that. A better system is certainly needed, and if the crushing strength of anthracite coals of different qualities were ascertained a more definite method of determining the required size of pillars could easily be adopted. This, no doubt, would lead to a safer method of mining and to a greater production of coal from a given area of land.

There are certain general rules which are applicable in all cases, and which are considered and applied by all intelligent foremen in the mines of Luzerne county, viz.: Larger pillars are necessary in *thick* than in *thin* coal seams; in seams having beds of *free, easily fractured* coal than in beds of *tough, tenacious* coal; in seams of *clean, pure* coal than in seams *interlaid* with *slate or bony* coal; and in coal having "slips" and *breaks* than *solid, compact* coal. Every old mine-foreman has learned these by experience, and the knowledge is very valuable.

It is of the utmost importance that the width of the breasts, and also the width of the pillars, at equal depth beneath the surface should be regular and uniform. To prevent a mine from caving, breasts should be driven at uniform width and uniform direction, *i. e.*, so as not to encroach on the strength of the pillars.

Indifference to the necessity of adhering to this rule and a failure to enforce it in the direction or management of the workings have caused more trouble through caves than anything else within the knowledge of the writer. In a number of cases where large areas of valuable workings collapsed the trouble originated at weak points in one or two pillars where the breasts, having been driven too wide, had taken coal which should have been left as a part of the pillars.

When a pillar or a section of a pillar becomes too weak to sustain the pressure it begins to crumble and crush, and every piece of coal that falls off lessens its strength to withstand the pressure. Finally it gives way so that the weight of the unyielding overlying strata is thrown on the adjacent pillars. This additional weight proving too much, they also begin to crumble and give way. Thus the squeezing and crushing continues and spreads from pillar to pillar until a point is encountered of sufficient strength to withstand the pressure and cause the overlying rocks to break, when the workings within the radius of the "squeeze" collapse and cave in. This is about the history of the origin, progress, and end of nearly all caves which occur in coal mines.

Occurrences of this nature invariably bring on new perils. During the progress of a "squeeze" it is impossible to divine when or at what point the air may be converted into an explosive condition by the presence of fire-damp.

The fire-damp occluded in the pillars is released by their crushing. Crevices may be opened in the top rocks into a gaseous seam above, and the pent-up gas released from there. Wherever it issues from, we know that it is liable to appear in any mine and convert the air into an explosive state at any moment during the progress of a squeeze and immediately after the occurrence of a cave-in. Therefore it should make no difference whether the fire-damp had ever been seen in the mine or not, no one should take, or be permitted to take, a naked light into a region affected by a squeeze, nor into the air currents returning from such regions, lest explosive gas may unexpectedly appear and be ignited, causing an explosion.

Before permitting naked lights to be used at any point between a region that is squeezing and the outlet, the affected workings should be thoroughly examined, tested with a safety lamp, and ascertained to be safe. And during the whole time that naked lights would be permitted in the return air currents there should be a constant watch kept in the vicinity of the squeeze, prepared to insure safety by apprising the workmen of any approaching danger. This simple precaution is necessary in every case where a mine is affected by a squeeze, and in no case should it be neglected.

▲ letter from Ceylon says that the pearl fishery last season was the second largest on record during the present century. The amount realized by the Government was more than 900,000 rupees, equal to \$289,800.

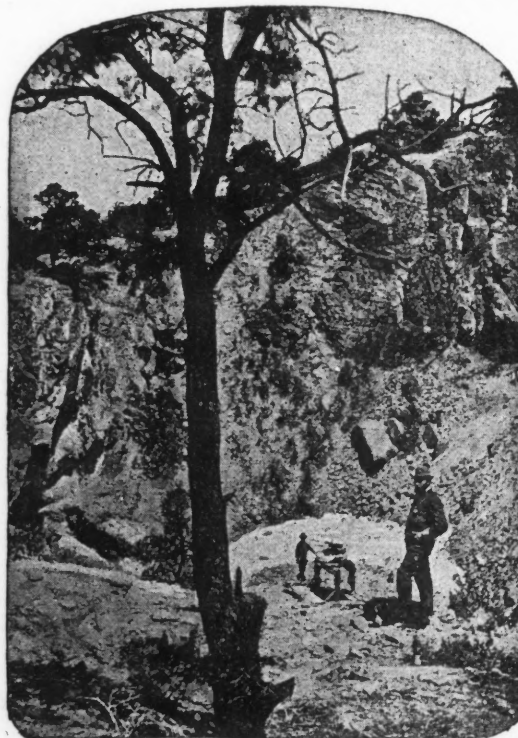
* From annual report

SANTA FE, NEW MEXICO.

Written for the Engineering and Mining Journal by S. E. Raunheim.

Santa Fé, the city of the holy faith of St. Francis, is the capital of New Mexico. Previous to the 15th century, a settlement of Pueblo Indians (aboriginal New Mexicans) had existed on this site, then called "Ogaphage." When the Spanish (*conquistadores*) under Cabeza de Vaca came up the Rio Grande from Old Mexico in search for gold and for the treasures of Cibola (the seven cities), they found a flourishing Tegua Pueblo village as early as 1538, and the adobe (sun-dried bricks) house represented on the left in the accompanying engraving. It is therefore without doubt the oldest dwelling house in the United States. The church of San Miguel, which is shown in the engraving, was erected by Juan de Onate, the first *Adelantado*, or Governor, of the territory between 1582 and 1597. When the Pueblo Indians revolted against Spanish rule in August, 1680, forced to work in the mines as slaves under the "*martio*" law, and driven to despair by the terrible Spanish inquisition, they drove out their oppressors after besieging the city for nine days, killing 20 priests and every Caucasian to be found. The roof and all the woodwork of the San Miguel church were almost entirely destroyed, nothing but the bare walls being left.

After the Spaniards reconquered the city in 1692, under Diego de Vargas, the church of San Miguel was, after the year 1693, the only Spanish chapel in Santa Fé. In 1710, under Governor Augustin Flores Vergara, it was fully restored, and it is now the oldest church in use in the United States. In the gallery are some oil paintings representing the *Annunciata* evidently older than the church itself, brought from Spain by the



TURQUOISE MINE, LOS CERRILLOS, N. M.

missionaries accompanying Antonio de Espejo in 1582. One of these paintings indicates plainly the year 1287, but the name of the painter I could not make out, nothing but the letters "I E A D," of which A D may stand for *Anno Domini*, being visible. Other places of more or less historic interest in and about the ancient city are the governor's palace erected in 1605, destroyed by the Pueblos in 1680, and reconstructed with adobes between 1697 and 1716; the old cathedral, of which the walls date in part from 1622, although the edifice proper was erected only in 1761; and old Fort Marcy, an American military post constructed by Kearney in 1846 on the site of a strategic military point used by the Pueblos in their revolt in 1680.

About eight miles west of Santa Fé is the Pueblo Indian village of Tezuquo, a modern representative of the settlements of the inhabitants of New Mexico in pre-Columbian times. This ancient people possessed many of the characteristics and habits of civilization of the present Pueblos, their descendants; they lived in houses, two, three and four stories high, built of sun-dried bricks or stones; movable ladders leading to the roof; the entrance being effected by means of a scuttle. The houses were clustered together for mutual protection from wild tribes, and the villages were located upon or near fertile valleys, where the Indians produced maize (corn), cotton and vegetables, wove cotton cloth for *mantas* (blankets), hunted the bison, deer and bear, and made leather out of the hides or skins of these animals during the cold season. In such an advanced state of civilization the Pueblos were found by the early Spanish conquerors. Over fifty ruins were found by Professor Bandelier in Santa Fé county, those known to have been occupied in the sixteenth century consisting of the communal many-storied adobe houses mentioned above, of which those without record must have been abandoned previous to 1538. The latter consist in part of adobe houses, and in part of cave shelters known as cliff dwellings, in the cañon of the Sierra del Valle, north of Santa Fé. The friable volcanic tufa of the sides forming the cañon has been scraped out in numerous places into artificial caves, each group of which constituted a Pueblo village, and imitating as much as practicable the system of the many-storied communal adobe village.

Santa Fé is now, however, rapidly losing its character as an old Spanish city, with the march of improvement which accompanies the develop-

ment of the agricultural and mining interests of the adjacent country. With irrigation, grains, vegetables and fruits might be raised with great success in many places in this part of New Mexico, the climate being well adapted for this purpose. Even now many portions of Santa Fé county are cultivated under the system in vogue among the natives with good results. It is the mining interests of the country which are the most important, however.

Prominent among the mining districts of Santa Fé county is that of Cerrillos, 20 miles south of the city of Santa Fé. There are ruins of numerous Tegua and Tanos Indian settlements in this vicinity, the mines having been worked previous to 1680 by them. Among the important mines now being operated is the Cash-Entry, one of a group of silver-lead mines owned by English capitalists, at which a 250-ton concentrating mill was erected last year. Many other lead and silver mines in the immediate vicinity are not yet well developed for lack of capital. With what work has been done, however, they show large bodies of paying mineral. Turquoise is found on Mt. Chal-Chi-huiltl, in thin veinlets running through a mass of yellowish white, aluminous rock, covering about 25 acres. These deposits are now being systematically worked, and in 1889 stones valued at \$23,675 after cutting were taken from them. The turquoise of New Mexico was worked by the Aztecs before the advent of the Spaniards, and since then by the Pueblo Indians. The color of this stone is blue, and its hardness is fully equal to that of the Persian, or slightly greater, owing to impurities, but it lacks the softness of color of the Persian turquoise. The Indian method of mining the stone was to pour cold water on the rocks after previously heating them by fires built against them—a variety of "fire-setting." This process deteriorates the color of the stone, however, tending to change it to a green.

The Cerrillos coal fields are situated from 2 to 6 miles from the railroad

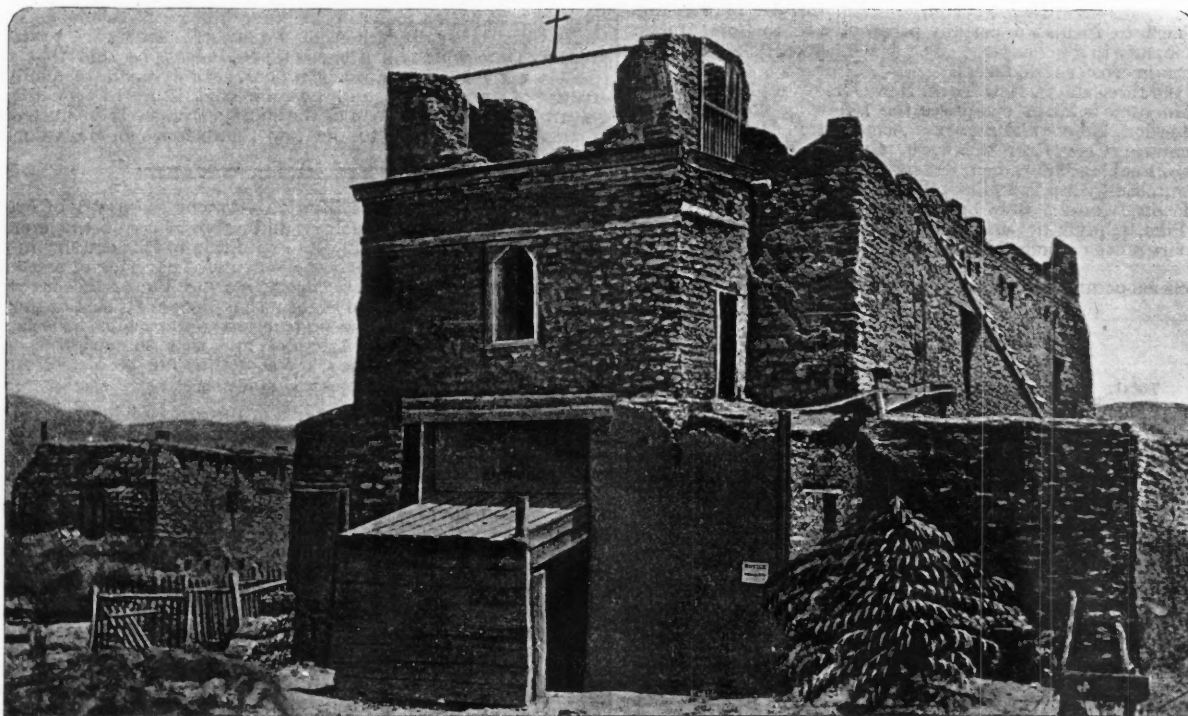
some of which have been worked quite extensively. The various iron deposits are enormous, and near the immense coal beds on the northwest slope of the Ortiz Mountains. East of Santa Fé is the Pecos River mining district, where promising claims have been located near the Pecos River and in the Mountains of Glorieta.

THE BRITISH MINT REPORT FOR 1890.

From the report of Sir Charles Fremantle, Deputy Master of the British mint, for the year 1890, it appears that 66,387,045 pieces of imperial coin of the aggregate value of £9,460,860 were struck, as compared with 58,740,172 pieces to the value of £9,541,671 in 1889, and 28,856,162 pieces to the value of £3,070,053 in 1888. The coinage for the year 1890 was made up of £7,662,898 in gold, £1,708,415 in silver, and £89,547 in bronze.

For the new gold currency some room was made by the withdrawal of the pre-Victorian gold coinage, an operation as to which Sir Charles Fremantle gives a number of details. In all, £2,334,573 in sovereigns and £128,575 in half sovereigns have been withdrawn under the Coinage Act, 1889. The sovereigns withdrawn had, on an average, lost in weight 2.236 grains each, and the half sovereigns as much as 3.046 grains each. In this case, therefore, as in others, actual experience has proved that the half sovereign is relatively a more expensive coin to maintain than the sovereign. The total cost of withdrawing the coins was £51,299, of which £48,705 represented the deficiency in weight, and £2,532 the defining in standard, the remainder consisting of some petty incidental expenses.

Of silver coin of all kinds the issue in the United Kingdom amounted last year to £1,340,175, which compares with an issue of £1,792,125 in 1889. As against these issues, however, there was withdrawn worn silver coin to the value of £269,700 in 1890, and £213,000 in 1889, so that the net



CHURCH OF SAN MIGUEL, SANTA FÉ, NEW MEXICO.

station Los Cerrillos. An anthracite coal bed covers an area here of more than 10,000 acres. Nine seams of coal have so far been opened, separated by layers of fine clay or metamorphic slate. These seams are between 3 and 5 feet thick. An analysis of the anthracite shows: Water, 2.10%; volatile matter, 6.63%; fixed carbon, 86.22%; ash, 5.05%; total, 100%. Adjacent to the anthracite fields are the bituminous coal banks, covering over 20,000 acres. This coal is classed fifth on a list of thirty varieties tested by the U. S. War Department for its calorific properties. Coke of very superior quality is made from the Cerrillos coal, being equal to the best Connellsville coke. The coal and coke trade of New Mexico is, however, in its infancy yet, and greater railroad facilities are wanted to make the coal production one of the leading industries of the territory.

About 16 miles south of Cerrillos or 36 miles south of Santa Fé are the new and old placer districts formed by the wash of the Ortiz, the Tuerto, and the San Ysidro mountains. The extraction of the gold from sand and gravel, here, by panning and rocking, has afforded subsistence to the natives for years. It is claimed that even in their crude and primitive ways of working they realize about \$500,000 annually.

A few miles further south are the Tuerto Mountains, where valuable leads of gold, copper and lead ores abound. The archean lime rock of this district, interstratified and intercepted by eruptive rock, is thoroughly mineralized. Perhaps sixty copper prospects are already opened and about a dozen lead claims located. The copper ores, oxidized near the surface, soon change with great depth into copper pyrites requiring concentration. A small percentage of gold is contained in the carbonates. The Santa Fé Copper Company is working one of the copper mines in these mountains, the Big Copper Mine, which was described by the writer and illustrated by a map in the ENGINEERING AND MINING JOURNAL of April 13th, 1889. The Livingstone, another very promising copper mine in the district, is owned by Governor Prince and Raunheim. The Lucky Lincoln works an argentiferous lead ore deposit of valuable grade.

Four miles north of the Tuerto Mountains is situated the Ortiz range, containing numerous leads of gold, silver, copper, lead and iron ores,

addition to the silver currency was £1,070,475 last year, and £1,579,125 in 1889. Sir Charles Fremantle gives tables which show that the net increase of silver currency in the 11 years 1880-90 was £4,828,951.

As a consequence of the higher price of silver the coinage profits were much smaller than in the previous year. On silver there was a profit of £321,000, as against £800,037, and on bronze a profit of £67,621; and deducting the loss on gold the net result of the year's operation was to leave a surplus of receipts over expenses of £244,618. The report contains the following figures of the coinage of the principal nations of the world:

| COINAGE IN 1890, | | |
|---------------------------------|------------|------------|
| | Gold, | Silver. |
| | £ | £ |
| London..... | 7,662,898 | 1,708,415 |
| Sydney..... | 2,808,000 | 8,551,160 |
| Melbourne..... | 2,473,537 | 7,363,167 |
| India..... | 23,050 | nil |
| United States..... | 4,404,350 | 62,141 |
| Germany..... | 4,967,461 | 332,938 |
| France and colonies..... | 824,112 | 226 |
| Russia..... | 4,480,556 | nil |
| Italy..... | 54,576 | nil |
| Switzerland..... | 100,000 | 806,232 |
| Belgium..... | nil | 71,828 |
| Austria and Hungary..... | 581,803 | 100,000 |
| Sweden, Norway and Denmark..... | nil | 1,455,050 |
| Holland..... | 367,417 | 111,111 |
| Spain..... | nil | nil |
| Portugal..... | 1,074,253 | 4,818,007 |
| Mexico..... | 83,777 | 1,458,947 |
| Japan..... | 56,976 | nil |
| Egypt..... | 352,842 | nil |
| Turkey..... | 92,060 | nil |
| | 30,410,662 | 26,839,222 |

The mean price paid for silver purchased by the British Mint last year was 48½d. per ounce, and as coins are issued from the mint at 66d. per ounce, there was a seignorage or gain of 17½d. per ounce, or 35½%, which was considerably below the seignorage realized in immediately preceding years,

BLUESTONE QUARRYING IN THE UNITED STATES.*

By William C. Day.

Bluestone is the name given to one of the varieties of sandstone. It consists of exceedingly small particles of silica cemented together by silica. Practically, the entire cementing material is silica, with the exception of a slight amount of argillaceous material, which is present to a very limited extent. Owing to the minuteness of the silica and the firmness of the siliceous cement the stone is extremely hard and durable, but naturally difficult to work. Its hardness and durability, however, as well as the manner in which it occurs in the earth, make it well adapted for purposes of street paving, such as flagging and curbing, and most of it is devoted to these uses.

The business methods involved in the operations of quarrying and putting bluestone into the hands of the consumers are peculiar. A certain amount of the stone is quarried from regularly organized quarries, with a definitely invested capital and plant or facilities for quarrying; but in addition a large quantity is produced irregularly and spasmodically by men who invest no capital and have no definite organization as producers of stone. Their operations are conducted as follows: Provided with a very simple equipment of the most ordinary quarry tools, they dislodge the stone found on land belonging to other persons and transport it to a number of shipping points, selling it there to dealers, who make a business of collecting stone in this manner and then shipping it to the place where used. The dealers pay the individuals who quarry the stone an amount which simply compensates the seller for his time and labor, while the owner of the property receives a certain definite percentage from the dealer for the amount of stone thus taken from his land. During the year 1889 and a number of years previous some of the dealers at various points in New York state constituted the members of the Union Bluestone Company, with headquarters in New York city. Each member of this company was entitled to furnish a certain percentage of the total amount sold by this company in a given year. The dealers may, therefore, be regarded in a certain sense as producers.

The area in the three states, New York, New Jersey and Pennsylvania, from which bluestone is taken comprises the following counties. *New Jersey*: Hunterdon, Mercer and Sussex. *New York*: Albany, Broome, Cayuga, Chemung, Chenango, Delaware, Greene, Jefferson, Oneida, Orange, Otsego, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, Steuben, Sullivan, Tompkins, Ulster, Washington, Wyoming and Yates. *Pennsylvania*: Bradford, Lackawanna, Luzerne, Lycoming, Monroe, Pike, Schuylkill, Susquehanna, Wayne and Wyoming. The number of square miles embraced in this area is 26,897.

TOTAL BLUESTONE PRODUCTION, INCLUDING PURCHASES BY WHOLESALE DEALERS IN 1889.

| States. | Total. | | Returns from regularly operated quarries. | | | | Purchases by wholesale dealers. | |
|--------------|-----------|-------------|-------------------------------------------|----------|------------------|-----------|---------------------------------|-----------|
| | | | Rubble and bridge stone. | | Dimension stone. | | | |
| | Cu. ft. | Amount. | Cu. ft. | Am't. | Cu. ft. | Am't. | Cu. ft. | Am't. |
| New Jersey | 15,649 | \$8,550 | ..... | ..... | 15,649 | \$8,550 | ..... | ..... |
| New York | 4,069,942 | 1,303,321 | 1,514,767 | \$91,495 | 842,957 | 423,908 | 1,652,218 | \$27,918 |
| Pennsylvania | 1,100,749 | 377,735 | 126,859 | 2,273 | 659,654 | 263,686 | 314,236 | 111,776 |
| Total..... | 5,126,340 | \$1,689,606 | 1,641,626 | \$93,768 | 1,518,260 | \$696,144 | 1,966,454 | \$330,694 |

The total number of bluestone quarries systematically operated was 217, of which 3 were in New Jersey, 142 in New York, and 72 in Pennsylvania. The total number of men employed in these was 1,793, to whom were paid wages to the amount of \$527,634, the total expense in the production of this quantity of stone being \$608,582. The total capital invested in these quarries was \$635,757, of which \$428,380 was in land. The average daily wages paid were as follows: Foreman, \$2.53; quarrymen, \$2.02; mechanics, \$2.37; laborers, \$1.44; boys, \$0.80.

Much of the region in which the bluestone industry is prosecuted is composed of rough mountain land, of little value except for the stone to be obtained from it. Over this region quarrymen, operating on the limited scale already indicated, are continually prospecting for such ledges of stone as will justify their labor, which is carried on with extremely simple implements, producing the stone principally in the form of flagging. Originally the stone was quarried for flagging only, but recently it has been applied to a long list of purposes, such as rubble masonry, retaining walls and bridge stone, sidewalks, crosswalks, curbing, gutters, flagging, stepstones, flooring, vault covers, bases of tombstones, porch and hitching posts, and house trimmings, such as platforms, steps, door and window sills, lintels, and caps.

Although the name of the stone implies that it is of a blue color, this is not invariably the case. The colors vary from dark blue of slate color to bluish gray, and sometimes the stone presents a greenish tinge and in other cases a brown. The stone is known commercially by quite a number of names, which designate, approximately, the region from which it is taken. Among the names in common use may be mentioned the following: Hudson River bluestone, Hudson River flagging, North River bluestone, North River flagging, Pennsylvania bluestone, Wyoming Valley bluestone, Delaware River bluestone, Delaware flags, bluestone flagging, and bluestone. The methods of transportation employed by bluestone quarrymen in getting their product from the quarries to the dealers necessitate the employment of a large number of teams, principally horses, although oxen are also employed in Pennsylvania. The principal shipping points for general distribution to which stone is transported directly from the quarries in New York state are Kingston (including Wilbur and Rondout), Malden,

Saugerties, Catskill and Coeymans, all along the Hudson River. Leading into Kingston are stone tramways, constructed over a distance of nine miles, coming from quarries at West Hurley, and between other quarries and shipping points similar tramways are in use. These enable exceedingly heavy loads to be hauled. Ruts have been worn in the stone by the heavily-laden wagons, and these ruts answer the purpose of a track, from which it is impossible for the wheels to escape in the course of a trip.

Bluestone occurs in beds, the surface layers of which are often quite thin. The thickness, however, increases with the depth, so that layers well below the surface are frequently of considerable thickness. In many quarries the stone is taken out with considerable ease by the very simplest tools and methods, so that in many cases powder is not used. When the stone exceeds six inches in thickness it is necessary to drill a row of plug holes and remove it by a series of wedges. In the quarries operated principally for flagging the blocks are simply pried out by iron or steel bars. The Knox system of blasting is in use at some of the principal quarries in New York state. Some quarries also operate mills, where the usual machinery, such as planers, saws, and rubbing beds, is operated. At some of these mills the facilities are very complete, but do not differ essentially from those in use in mills operating upon other kinds of stone.

The methods of conducting the bluestone industry vary considerably in different localities. The royalty paid by the shipping agent or dealer to the owner of the property ranges from one-half to one and one-half cents per superficial foot. In some cases a percentage ranging from 5% to 10% of the price received from the sale is charged by the owner of the land. The dealers keep no account of the number of feet or the total value of the stone obtained from any particular quarryman, nor do they keep a permanent record of the property from which a particular quarryman has secured the stone sold by him. Furthermore, the dealers keep a record of the stock purchased in various ways, generally measuring it in superficial feet, without taking any account of the particular thickness, or in linear feet, without noting either of the other dimensions beyond certain general limits which these dimensions do not exceed. In regard to the value of property from which bluestone is taken, it may be said that this is extremely variable, depending, as it does, entirely upon the quality and the amount of stone contained in it, as the land is worth very little for agricultural purposes. As soon as the supply of stone is exhausted the value of the property drops to the low figure at which it is valued as agricultural land.

Cretaceous Deposits of Mexico.—Among the results of Prof. Angelo Heilprin's study of the geology and paleontology of the cretaceous deposits of Mexico, made during his expedition to that country in the spring of 1890, are the conclusions that the deposits, covering or scattered over a large part of the country, are continuous with the cretaceous area of the interior basin of the United States; that they are a part of the middle or upper cretaceous series; that no true lower cretaceous beds have been so far identified in Texas or Arkansas; and that no marine deposits of unequivocally lower cretaceous age have thus far been determined in the United States east of the Rocky Mountains.

Aqueous Origin of Gold.—Some of the great gold quartz veins of Australia are considered by very high authorities, says Dr. Willis E. Everett, to have been formed from a deposition of quartz and silica, by condensation from an aqueous solution of an alkaline silicate of gold. The microscopic researches of both Sorby and Howitt, have shown that in the minute cavities of vein-silica, or in crystals of quartz, an aqueous fluid has been found, which upon analysis has been shown to consist of water, holding sulphates and chlorides of potash, soda and lime in solution, all of which substances are earth alkalies. Also in this fluid found in the minute cavities of vein quartz, even free sulphuric and chlorhydric acids have been found, thus giving rise to the former possible combination of an aqueous solution of an alkaline silicate of gold, with aqueous solutions of the hyposulphites and chlorides of gold, the free acids being formed as soon as the conversion of the gold in the metallic state took place. Following up this line of reasoning, every peculiarity of the genesis and structure of an auriferous or gold-bearing quartz vein can be explained by presuming that the deposition of the quartz came from water which held alkaline silicates, salts and acids in solution, and precipitated them upon condensation of this aqueous solution, which was then followed with crystallization of the silica into quartz and the silicated gold into metallic gold. The associated minerals found in the veins of quartz with gold may also have been derived from the same sources.

Analysis of a Chromite.—According to William Ireland, Jr., State Mineralogist of California, throughout the Santa Lucia Mountains and the coast hills of San Luis Obispo county, Cal., are found serpentine rocks with beds of chromite, in greater or less masses, existing as loose and fragmentary rocks in the ravines and on the hillsides, and as pockets and veins on the mountains. One of the best mines of the neighborhood is the Pick and Shovel, located on the South Fork of Chorro Creek, at an elevation of 1,800 feet. A sample of the chromite from this mine, selected as free from gangue as possible, analyzed by Mr. H. Pemberton, Jr., gave the following results: Cr₂O₃, 52.68%; Al₂O₃, 11.40%; Fe₂O₃, 3.52%; MgO, 16.23%; FeO, 11.77%; MnO, 0.15%; SiO₂, 3.40%; H₂O, 0.94% total, 100.09%.

An analysis of the gangue showed it to be serpentine, containing a trace only of ferrous oxide. No other foreign mineral could be detected, on a careful examination. Deducting, therefore, the water, silica, and quantity of magnesia (3.26%) combined with the silica (as serpentine), and calculating the remainder to 100 parts, we obtain for the pure mineral: Cr₂O₃, 56.96%; Al₂O₃, 12.32%; Fe₂O₃, 3.81%; MgO, 14.02%; FeO, 12.73%; MnO, 0.16%; total, 100.00%. The mineral was decomposed by fusion with sodium carbonate (Christomanos' process slightly modified). The mixture of ore and Na₂CO₃ is heated overnight by a Bunsen burner, the crucible being loosely covered by its lid. Next morning it is heated for one hour over the blast lamp, with frequent stirring. The process has the advantage of giving complete decomposition of the mineral, with the introduction of no bases other than the alkalies. The ferrous oxide was determined by solution in sulphuric acid in a closed tube, under pressure. According to Francis C. Phillips (*Fres. Zeitschrift*, xii, 189), 1.34 is the specific gravity of the acid that is most favorable to the solution of chromite in this manner.

*Abstract of Census bulletin No. 71.

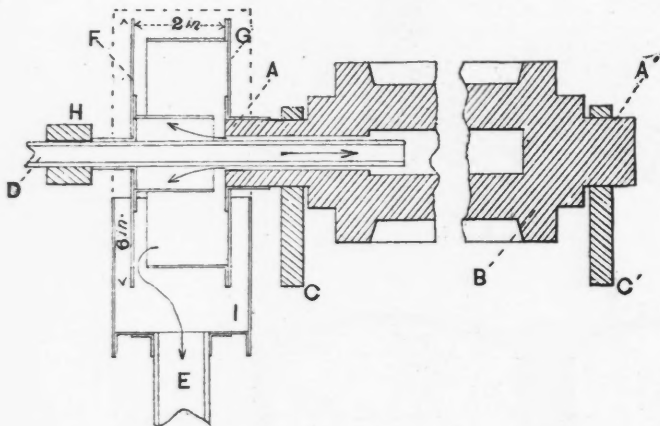
A WATER-COOLED REVERSIBLE CAST-IRON MOULD FOR CASTING DORE BULLION.

Written for the Engineering and Mining Journal by F. Gutzkow, San Francisco, Cal.

A recently devised for a refinery where my process of refining bullion, described in the ENGINEERING AND MINING JOURNAL of February 28th, 1891, is being introduced, a reversible water-cooled cast-iron mould for casting the doré silver into thin slabs for parting. The mould is double and swings around two axes, which rest in open grooves on a wrought-iron frame standing on four legs. The whole is, therefore, a kind of table, the mould forming the table-plate when in horizontal position. Its outside dimensions are about as follows: 2 feet long, 1½ feet wide and 2 feet high. The silver slabs discharge on an iron truck, placed underneath, which is removed when sufficiently loaded, the slabs piling on one another in regular layers. A convenient handle for turning completes the contrivance. When it is held to a certain mark the mould is in a fairly horizontal position.

The plant is intended to supersede the present method of placing a dozen moulds around the furnace door on the floor, of dumping the slabs by hand and mitten, and of dragging them away with a pair of tongs. Now, the assistant dumps the slab on the truck as soon as it is chilled, and the melter finds his mould always on the same spot. Thus he can support his ladle from above by hook and chain, can take larger weights, and pour several slabs from one ladle. The mould, being emptied so rapidly, does not heat very quickly; still, when a ton or two of silver is operated on, it would, after awhile, become so hot as to delay the chilling of the slabs, and I have therefore devised the plan of water-cooling. The apparatus is not fit for nice adjustment, and simply a plain, rough-and-ready plan to let the water in and out the water-chamber in the interior of the mould was called for.

The accompanying diagram represents a vertical section through the



WATER-COOLED REVERSIBLE MOULD FOR CASTING DORE BULLION.

two axes *A* and *A'*. The mould *B* receives the silver in either of the two cavities of 12 inches \times 12 inches \times ½ inch each. The water-chamber measures 12 inches \times 12 inches \times 1 inch. The axes turn in grooves on the wrought-iron bars *C C'*, which are part of the frame previously mentioned. The axle *A'* is solid, but axle *A* is perforated by a ¼-inch hole. The water enters through the ½-inch pipe *D*, escapes around it, and finally discharges into the waste pipe *E* after passing through the two open drums *F* and *G*. These drums are made of galvanized sheet-iron. Drum *F* is fastened to the water pipe *D*, which itself is stationary, being held by the clamp *H* either to floor or ceiling or to the table by connecting with *C*. Drum *G* is fast to the axle *A*, and revolves with it. The dotted lines indicate a hood which rests on the semi-circular funnel *I*, and protects the drums from injury. Further explanation is hardly necessary. The nozzle *D* need not enter the water-chamber farther than shown, because each turn of the mould mixes the water in the chamber sufficiently. The ring-shaped aperture around *D* in *A*, which forms the outlet, must be smaller in area than the opening of *D* in order to insure a pressure in the water-chamber. It will be noticed that only the water-jet touches the mould. Consequently any little eccentric movement of the axes does not matter.

German Coal Industry.—The German coal industry is one which is each year assuming larger proportions, and it is predicted, says the British Consul-General at Hamburg in a report to his government, that the day is not far distant when that market will be lost to the British coal trade. It is said that the members of the trade in England treat the probable loss of that market as of no consequence; but it amounts to £1,500,000 or more annually. The question does not end here, however, for the Germans venture to assert that they will in time invade the English markets with German coal when the network of canals is completed, which, it is said, will be in about 10 or 15 years' time. This scheme of canals will connect all the principal rivers. The Rhein-Ems canal, to be completed in four or five years, is to connect the Rhenish-Westphalian coal and iron industry with the German North Sea ports, whence coal is to be exported and placed on the English markets at cheaper rates than the home production. The Oder-Sprea canal, already in existence, is to be widened, so as to enable larger barges, such as will be used on the Rhein-Ems canal, to be employed, and along this waterway the Silesian coal will be supplied to Berlin, and again through the Sprea and Havel to the whole Elbe district.

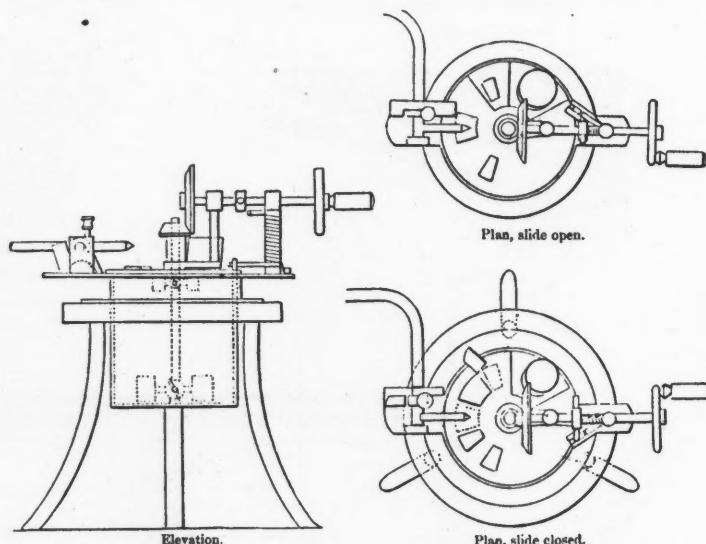
DETERMINATION OF THE FLASH-POINTS OF HEAVY MINERAL OILS.*

By J. Gray F. I. C.

The necessity for a speedy and accurate method of determining the flash-points of heavy mineral oils is fully recognized by those who are called upon to make numerous tests, and perhaps no one is more alive to the uncertainty of the methods which are at present employed than the chemists of the Scotch mineral oil works. Although the old method of taking flash-points, known as the "open test," which is known to give discordant results even in the hands of the same operator, according to the variable and almost uncontrollable conditions under which it is carried out, is gradually being superseded by the Abel's cup test, in which the oil cup and cover of the well-known petroleum tester are employed, the latter is not entirely satisfactory. It has been adopted with the provision that the time of heating to 300° Fahr. be not less than 15 minutes, but I have found that the flash-point of an ordinary Scotch 885° oil will vary as much as 6° Fahr. according as the time of heating varies between 15 and 90 minutes, when the test is carried out with the ordinary Abel's cup. It would, therefore, be necessary to state the maximum as well as the minimum time of heating, in order to make the results indisputable. With oils having a wide range of flash-points the fixing of an absolute time is a practical impossibility.

The new apparatus which is illustrated in the accompanying engravings, which was designed to make the determination of flash-points more simple and accurate, is an adaptation of the Pensky-Marten slide and stirrer to the Abel cup. In working with the Pensky-Marten apparatus, I found the results under varied conditions to be excellent, and was struck with the idea that it could be simplified, and made more suitable for every-day work in the technical laboratory.

The stirrers, consisting of two sets of vanes, one in the oil and the other in the vapor space, are attached to a vertical shaft passing through the



APPARATUS FOR DETERMINING FLASH POINTS OF HEAVY MINERAL OILS.

cover and terminating at the top in a small beveled wheel, the bevel of which is milled. A horizontal shaft (carried on two supports) terminates at one end with a beveled wheel gearing, with the one on the stirrer shaft, and at the other end with a disc carrying a small handle with which to rotate the shaft. This shaft also carries a collar with two pins projecting about ½ in. at diametrically opposite points. By sliding the shaft slightly to the right, the bevel wheels are put out of gear, and the pins projecting from the collar are drawn into position for actuating the testing arrangement. This consists of a sliding cover on the top of the lid proper, so arranged that when the former is moved it depresses the pip light to the proper point, and brings the orifices opposite those on the fixed lid. There are three orifices, one at which the test light is applied, the other two, situated one at either side of it, being for the admission of air. It will thus be readily seen that the change from stirring to testing and vice versa can be instantly performed.

The results got by this apparatus are identical with those got by the Pensky-Marten. They are not affected by the source of heat, a naked flame giving the same results as the sand bath. It is immaterial what the rate of heating is, provided it is not too rapid to prevent a correct reading of the thermometer. I prefer to reduce the rate of heating when nearing the point at which the oil is expected to flash. The stirrers do not require to be worked continuously, but merely at intervals. I find it advisable, however, to stir more frequently when the rate of heating is fast.

The First 12-inch Steel Gun Cast in the United States.—The first 12-inch steel gun made in the United States has been completed at the Watervliet Arsenal, Troy, N. Y., and shipped to the Sandy Hook proving ground for trying. The gun weighs 52 tons. It is 36.66 feet long, and the length of its bore is 34 feet. Its charge is 440 pounds of powder, and its projectile weighs 1,000 pounds. The powder pressure that will be exerted on its interior when the gun is fired is 16.5 tons to the square inch. The initial velocity of the projectile will be 1,940 feet per second, the muzzle energy 26,000 foot tons. The tube and jacket forgings for this gun were purchased at Le Creusot, France, and the remaining forgings were obtained from the Midvale (Pa.) Steel Works. This is the largest steel gun built in this country, and the test, which will take place in a week or two, is looked forward to with great interest.

* Journal of the Society of Chemical Industry, April 30, 1891.

THOMSON-VAN DEPOELE ELECTRIC WINDING ENGINES FOR MINE HAULAGE.

Among the many advantages of the electric system of mine haulage is the ease with which the electric locomotive may be helped with auxiliary power. The capacity of an ordinary haulage plant is limited by the maximum grade, and it is necessary to provide sufficient power to overcome that. In many cases it happens that there is only one steep grade on the line, without which it would be possible to use much smaller locomotives, or it may be that it becomes necessary, after a plant has been installed, to extend the line up a steeper grade than that for which it was originally designed. An auxiliary stationary hoist, set at the top of the hill, which could, of course, be operated from the same circuit as the locomotive, would overcome these difficulties. The Thomson-Van Depoele Electric Mining Company has recently designed a special electric winding engine for this purpose. The illustration shows one of these recently made for a western coal mine. The plant originally consisted of one hoist, but its work and the results obtained by its use proved so eminently satisfactory that two other hoists were immediately ordered.

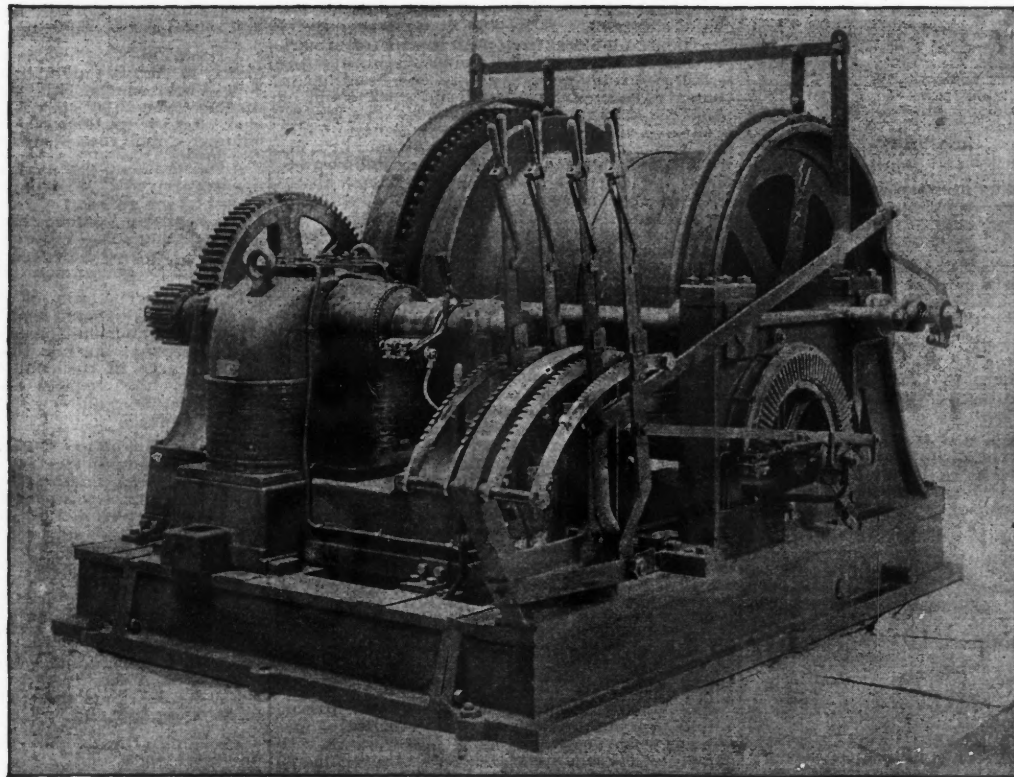
The outside dimensions of the hoist are 9 feet by 7 feet 4 inches, and the total height is nearly 6 feet. The motive power is furnished by a Thomson-Houston motor of 35 horse-power and wound for a potential of 440

volts with the other findings, and, in the absence of exceptions, conclusive as to defendant's right to the 10,000 shares. *Egan v. Clasbey, Supreme Court of the United States, 11 Sup. Ct. Re.p., 231.*

PATENTS GRANTED BY THE UNITED STATES PATENT OFFICE.

The following is a list of the patents relating to mining, metallurgy and kindred subjects issued by the United States Patent Office.

- TUESDAY, JUNE 24, 1891.
- 453,220. Die for Welding Links. John C. Palfierro, Richmond, Va.
 - 453,227. Process for Making Steel. Riley P. Wilson, New York, N. Y.
 - 453,299. Process for Making Phosphate of Alumina. Charles Graser, Baltimore, Md.
 - 453,317. Method of Magnetic Separation. Henry C. Townsend, New York, N. Y.
 - 453,315. Ingot-stripping Device. William R. Hinsdale, Newark, N. J.
 - 453,346. Oil-burner. William A. Meyers, Bolivar, N. Y.
 - 453,355. Process of Coating Metals with Oxides. Alexander E. Haswell and Arthur G. Haswell, Vienna, Austria Hungary.
 - 453,374. Air-Compressor. Owen A. Clark, Fife Lake, Mich.
 - 453,391. Steam Boiler or Generator. Bentley L. Rehardt, Camden, N. J.
 - 453,444. Method of and Apparatus for Operating Aqua-ammonia Engines. Charles L. Horack, Brooklyn, N. Y.
 - 453,529. Process of Smelting Sulphides. William L. Austin, Toston, Mont.



THOMSON-VAN DEPOELE ELECTRIC WINDING ENGINE FOR MINE HAULAGE.

volts. It is series-wound and runs normally under load at a speed of 1,100 revolutions per minute. A speed reduction from the motor armature to the drum of 25½ is accomplished by one intermediate shaft with proper gears and pinions. This gives a rope speed of a little over 500 feet per minute, or 0.492 feet per revolution of the motor. The drum, which is mounted on a sleeve and is thrown into action with the large gear by a friction clutch, is 4 feet in diameter, with a 36-inch face. Its rotation, when running independently, is governed by two band brakes which extend around nearly the entire circumference of the drum. The outfit is equipped with five controlling levers, four of which are shown in the illustration. One operates the rheostat contact, one the drum clutch, two are brake levers, which are entirely independent one from the other, and the last throws the reversing switch, giving the drum, when thrown into action with the motor, positive motion in either direction of rotation. The controlling levers are all latched and all within easy reach of the operator. The gears and pinions are noiseless, carefully covered to prevent accidents, and the motor has self-oiling bearings.

Interpretation of Mining Stock Contract.—Plaintiff, who with others held an option on a mine, in consideration of \$5,000 furnished by defendant, agreed to deliver to him, at its original cost, \$5,000 worth of stock in a corporation about to be formed to work the mine. The court found as facts that \$6,000 was paid for the option and \$5,000 for the mine; that the corporation organized with 100,000 shares of stock, and subsequently assumed certain debts previously incurred by the option holders, and also borrowed of them certain sums of money, debts and loans together amounting to \$14,127; but that this sum, as well as the \$6,000 paid for the option, was repaid out of the net earnings of the company; and also found that the original cost of the entire stock was \$50,000, or 50 cents per share. On this basis 10,000 shares of stock were actually delivered to defendant, and plaintiff seeks to recover a portion thereof, claiming that the actual cost was 62½ cents per share. The finding that the cost was 50 cents per share was a finding of fact, and not inconsis-

DIVIDENDS PAID BY MINING COMPANIES DURING MAY AND FROM JANUARY 1ST, 1891

| NAME OF COMPANY. | Paid in May. | Paid since Jan. 1st. | NAME OF COMPANY. | Paid in May. | Paid since Jan. 1st. |
|--------------------------------|--------------|----------------------|-----------------------------------|--------------|----------------------|
| Adams Co. | \$7,500 | \$22,500 | Mammoth, Utah..... | \$40,000 | \$200,000 |
| Alaska-Readwell, Alaska..... | | 150,000 | Maxfield, Utah..... | | 8,000 |
| Alice, Mont..... | | 25,000 | May Mazzeppa, Colo..... | 12,500 | 62,500 |
| American, Idaho..... | | 100,000 | Mollie Gibson, Colo..... | 100,000 | 200,000 |
| American Belle, Colo..... | | 50,000 | Montana Ltd., Mont..... | | 79,200 |
| Aspen, Colo..... | 20,000 | 100,000 | Morning Star, Colo..... | | 50,000 |
| Atlantic, Mich..... | | 40,000 | Morning Star D., Cal..... | 3,600 | 7,200 |
| Bald Butte, Mont..... | | 40,000 | Mt. Diablo, Nev..... | | 10,000 |
| Bannister, Mont..... | 6,000 | 30,000 | Napa, Cal..... | | 20,000 |
| Bates-Hunter, Colo..... | 7,500 | 5,000 | New Guston, Colo..... | | 110,000 |
| Bimetallic, Mont..... | 70,000 | 350,000 | Newton, Cal..... | 5,000 | 5,000 |
| Boston & Mont., Mont..... | 125,000 | 250,000 | North Banner Cons., Cal..... | | 10,000 |
| Calliope, Colo..... | | 5,000 | North Star, Cal..... | | 50,000 |
| Calumet & Hecla, Mich..... | | 500,000 | Ontario, Utah..... | 75,000 | 375,000 |
| Centennial - Eureka, Utah..... | 30,000 | 90,000 | Osceola, Mich..... | | 50,000 |
| Central, Mich..... | | 20,000 | Parrot, Mont..... | 18,000 | 90,000 |
| Champion, Cal..... | 3,400 | 18,700 | Peiro, Utah..... | 2,500 | 5,000 |
| Clay County, Colo..... | 4,000 | 20,000 | Plumas Eureka..... | | 35,150 |
| Cœur d'Alene, Idaho..... | | 20,000 | Quicksilver, Pref., Cal..... | | 64,300 |
| Cor ez, Nev..... | | 138,500 | Quincy, Mich..... | | 200,000 |
| Daly, Utah..... | 37,500 | 187,500 | Retriever, S. Dak..... | 5,000 | 12,500 |
| Derbe Blue Gravel..... | | 10,000 | Rialto, Colo..... | 8,000 | 6,000 |
| Elkhorn, Mont..... | | 200,000 | Richmond Cons., Nev..... | | 20,250 |
| Glengarry, Mont..... | | 5,000 | Running Lode, Colo..... | | 10,000 |
| Granite Mountain, Mont..... | 100,000 | 700,000 | San Miguel Con., Colo..... | 75,000 | 150,000 |
| Hecla Con. Mont..... | 15,000 | 75,000 | Sierra Butte..... | | 25,000 |
| Helena & Frisco, Mont..... | 10,000 | 50,000 | Silent Friend, Colo..... | | 32,500 |
| Henri & Victor, Mont..... | 10,000 | 30,000 | Silver Glimmer, Colo..... | 1,500 | 4,500 |
| Homestake..... | 12,500 | 62,500 | Silver Mfg. of L. V., N. Mex..... | 25,000 | 75,000 |
| Horn Silver, Utah..... | | 50,000 | Tamarack, Mien..... | 200,000 | 400,000 |
| Iaho, Cal..... | 9,300 | 32,750 | W. Y. O. D., Cal..... | 1,500 | 14,500 |
| Iron Mountain, Mont..... | | 25,000 | Yankee Girl..... | | 150,000 |
| Jackson, Nev..... | | 5,000 | | | |
| Little Rule, Colo..... | 10,000 | 50,000 | | | |
| | | | Total..... | 1,045,300 | 5,966,110 |

PERSONALS.

Mr. F. Augustus Heinze, mining engineer, has gone to Montana on professional business.

A. Maitland, prominently identified with Lake Superior iron mining interests, was in the city this week.

Mr. E. Garyot, mining engineer, has returned to this city from a professional examination of mineral lands in West Virginia.

Prof. Henry S. Munroe will have charge of the Columbia College School of Mines' summer school of Surveying at Litchfield, Conn.

Mr. Robert E. Booraem, mining engineer, of Jersey City, N. J., sailed for Europe last week. He will remain abroad until August.

Professor J. F. Kemp, of Cornell University, Ithaca, N. Y., has been appointed adjunct professor of geology at Columbia College, New York.

Mr. F. M. Endlich, mining engineer and general manager of the Yankee Boy Mining Company, of Ouray, Colo., has gone to Idaho on professional business.

Mr. Louis Janin, Jr., mining engineer, is at present in this city. He has just returned from Central America, where he has been on professional business.

There is a vacancy on the editorial staff of the ENGINEERING AND MINING JOURNAL. Editorial, professional experience and literary ability are essential qualifications.

Mr. William H. Radford has returned from the Transvaal, South Africa, and has now gone to take charge of the Darien Gold Mining Company's property at Caña, U. S. of Colombia.

Mr. Thomas H. Leggett, mining engineer, of New York, has been appointed manager of the Standard Consolidated Mining Company, of Bodie, Cal., and leaves for the mine immediately.

Mr. John E. Rothwell, superintendent of the Golden Reward Chlorination Works, of Deadwood, South Dakota, has been in Canada for several weeks past; he passed through this city this week on his way West.

Dr. P. de P. Ricketts and Mr. John H. Banks, mining engineers and metallurgists, have removed their office and laboratories to 104 John street, where they will continue to carry on their business under the firm name of Ricketts & Banks.

Mr. J. Hooper, of the Little Warrior Coal Company, has been appointed state mine inspector of Alabama by Gov. Jones. Joseph Squire and A. W. Haskell, engineers of the Cahaba Coal Mining Company, have been appointed state mining engineers.

OBITUARY.

David Brooks, the widely-known electrician, who was the inventor of the underground conduit system adopted by the Western Union Telegraph Company, died on the 30th ult., aged seventy years.

M. Dublan, Finance Minister of Mexico, died on the 30th ult. at Tacubaya. President Diaz, in an interview, said that the minister's death would make absolutely no change in the financial policy of the government. Assistant Secretary Gamboa will remain at the head of the Department of Finance for the present.

Mr. George Cavendish, chairman of the Golden Leaf, Limited, of London, was drowned while rowing on the Thames on the 17th ult. He was 41 years of age. Mr. Cavendish was not much known in the joint-stock company world, and his name will be chiefly remembered for the well-devised scheme of reconstruction which he conceived, matured and carried out by which the Carlisle Company, of New Mexico, and the Empire, of Montana, were placed upon their present basis under the title of the Golden Leaf.

Prof. Charles Arad Joy, a well-known chemist and scientist, died of heart failure on the 29th ult. at his home in Stockbridge, Mass. He was born in Ludlowville, Tompkins County, N. Y., Oct. 8, 1823. He graduated from Union College in 1844 and from the Harvard Law School in 1847. The same year he was appointed on the United States Geological Survey of the Lake Superior region under Josiah D. Whitney and Charles T. Jackson. Subsequently he went to Europe and studied chemistry in Berlin, at Göttingen, where in 1852 he received the degree of Doctor of Philosophy, and at the Sorbonne in Paris. On his return Professor Joy was called to the chair of chemistry at Union College. He held this position until 1857, when he was called to the same chair at Columbia College, where he remained until 1877. Failing health, the result of a sunstroke received in 1876 at the World's Fair in Philadelphia, necessitated his retirement from active work then, and he has since been pursuing his studies quietly in Germany and at his Stockbridge home. Professor Joy was a member of the juries of the International World's Fairs of London, Paris, Vienna, and Philadelphia, and was a member of many scientific bodies. He was a proli-

fic contributor of popular articles on scientific subjects to magazines, and had been connected in editorial capacity with the *Scientific American* and the *Journal of Analytical and Applied Chemistry*.

EXPORT NOTES.

The total value of the imports into the republic of Costa Rica in 1890 was about \$4,000,000, of which nearly \$1,500,000 came from the United States. The American imports exceeded those of Great Britain by nearly \$500,000, whereas five or six years ago they were far below those of that nation.

The natural gas discovered in the Argentine Republic has been found, after analysis by Dr. Arta, to be nearly if not quite as valuable in heating and lighting power as that found in the United States. One of the greatest drawbacks in the former Republic has been lack of fuel for manufacturing purposes; the rich properties of the gas are therefore of great importance.

The United States Consul at Singapore writes that at Raub, in the Province of Pahang, Malay Peninsula, the development of gold mines already discovered is but a question of a few months, the greatest drawback at present being a scarcity of experienced miners; that, with a corps of American miners to direct the Chinese coolies in the building of timber chutes and in the handling of the ore to the best advantage, the work could be pushed to a rapid financial success. The ground is of a soft shale foundation, with plenty of fuel and water at hand. The operators are now figuring with American firms for a 100-stamp mill, water-wheel and electrical machinery, and hope thereby to open a section of country that will compare favorably with the old gold fields of the United States and Australia. Up to the present time the output of the Raub mine has been about \$30,000 in gold.

A correspondent of the *New York Times* writing from Greytown, Nicaragua, states that there is an unmistakable demand for American products in that country, but that at the same time there is a general complaint that our manufacturers either shove off old stock or neglect to take any pains to suit the tastes of the people or provide against the peculiarities of the climate. A large number of American sewing machines are used in Nicaragua, and there is a growing demand for them. A good deal of California wine, principally the sweet varieties, is also sold in the country, and the call for it seems to be increasing. The gist of the commercial situation is that, if American manufacturers would send agents to this country to study the tastes of the people and make goods to suit those tastes, a large trade could be worked up. The difficulties of interior transportation are at present a serious obstacle to trade, but with improved facilities on the San Juan and Lake Nicaragua, which will come as the work on the canal progresses, these will to a great extent be overcome, as all the principal towns are within easy reach of the lakes.

Mr. Martin, British vice consul at Rostor, Russia, reports that the sales of agricultural machinery were somewhat less in 1890 than in 1889, as, with the exception of the Voronej government, the harvest in the Caucasus and surrounding districts was very unsatisfactory. About 55 steam threshers and engines were sold, all of English make, worth about \$143,600, and about 100 horse-gear threshers of German manufacture, valued at about \$40,800. The sales of American machinery amounted to 700 reapers (\$122,100), about 65 binders (\$24,000), 200 mowers (\$23,250), and 350 hay-rakers (\$18,000), besides all the extra parts for these machines. A larger number would have been sold had it not been for the prevailing cheapness of hand labor during harvest time. The American reaping machines are well adapted to the wants of the country, and are the kind exclusively in use, with the exception of the few hundred Russian reapers which are annually sold to German colonists and farmers who prefer cheap machines; the durability of the latter is, however, very questionable.

The British minister at Santiago, Chili, has recently made a report to his government which will be of as much interest to American exporters as to English. He says that notwithstanding the financial disturbances which have lately occurred in some parts of South America, there is at this moment a vast field for profitable trade in the lower half of the American continent, and although there are many difficulties to surmount, there are vast natural resources and a continually increasing population who are day by day more receptive of modern improvements, more desirous of modern luxuries. To facilitate trade with South American people, the minister recommends: First, the study of Spanish in commercial schools, and the sending out of young men of good business training, and having an interest, however small, in the companies which they represent, to reside in Spanish America, and, so to speak, grow up with the country. Second, the adoption of the metric system of weights and measures. Third, the issue of illustrated catalogues in Spanish, in which the weights and measures must be according to the metric system, and a publication of the same in the papers having wide circulation in Spanish-America. Fourth, study the wants of each coun-

try, and manufacture special lines of goods suited to the market. The low rate of exchange and a high tariff in Chili, for instance, cause a demand for low-priced articles. This demand is met by the Germans, who suit themselves to the market. Many first-class firms object to putting their names on any but first-class goods; this, of course, gives a foreign imitator an opportunity of getting a comparatively high price for a worthless article. A high-class New York manufacturer gets over the difficulty by omitting his name on the second-rate article, and thus retains a connection with the South American market which otherwise he would have lost.

INDUSTRIAL NOTES.

The New York Metallurgical Works, which have been in existence since 1879, are offered for sale, owing to the death of the manager, the late Eugene W. Riote. The works have a complete plant for the experimental working of ores.

The Branchville Ore Milling Company, of No. 7 Nassau street, New York, which recently made an assignment to C. C. Fowler, has, it is said, liabilities amounting to \$12,016.07; nominal assets, \$20,039, and actual assets, \$5,474.23.

A remarkably big blast is to be made at the stone quarry of Mr. P. Callanan, at South Bethlehem, New York, on the 16th inst. It is proposed to displace over 50,000 cu. yds. of rock at one explosion. Two years ago a blast which displaced 30,000 tons of rock took place at this same quarry.

A consignment of the Witherson smokeless powder has arrived at Wilmington, Del., and is being tested by the government at Springfield. The E. I. Du Pont de Nemours Company is reported to be developing a new invention and to be negotiating for a site near Newport, where works are to be erected for government purposes.

Prof. Elihu Thomson, of Boston, Mass., has received a cable dispatch from the Paris representative of the Thomson-Houston International Electric Company, stating that the first prize of 100,000 francs in the competitive electric-meter test under the auspices of the Paris municipal council has been divided between his meter and that of Aron.

The Westinghouse Electric Company held its adjourned annual meeting last week. Reports showed that satisfactory progress had been made in the reorganization, about \$4,000,000 (80,000 shares stock having assented to the plan proposed. A resolution was adopted advising all stockholders to assent to the scheme, and that the meeting be adjourned until June 23.

There is some talk of a ferro-manganese furnace being erected at Rome, Ga., by R. F. Williams, of New York, and others, and a meeting will be held shortly to effect an organization. The capital of the company, including plant and 3,000 acres of mineral land in Floyd county, will be about \$300,000. All the plans will be decided on at the forthcoming meeting.

The Elmira Iron and Steel Rolling Mill Company's universal plate mill, at Elmira, N. Y., together with the engines, machinery, etc., necessary to operate it, has been leased for one year by N. D. Doxey, formerly superintendent of the plate and bar mills of that company, and J. F. Bailey, of Philadelphia. Operations will begin in about three weeks. The rolling mill has been idle since June, 1890, when the men went on strike.

The F. T. Aschman Steel Casting Company, of Sharon, Pa., has applied for a charter of incorporation under the name of the Aschman Steel Casting Company. The incorporators are J. J. Spearman, E. A. Wheeler, F. T. Aschman, Edward Roberts, W. S. Roberts, Geo. A. Baird and Fay Alderman. More capital will be employed, and the plant of the firm will be considerably enlarged.

The Electrical Supply Company, of Chicago, Ill., has been making extensive improvements in the machinery and methods of manufacturing its well-known Shield Brand and moisture-proof wires and cores. The company states that the new process adds not only to the strength of the outer guard, but also to the imperviousness of the inside coating. These wires rank deservedly high in mining and engineering work.

The Amalgamated Association of Iron and Steel Makers is now holding a session in Pittsburgh, Pa., to consider the question of wage. On the 3d inst. the wage committee reported in favor of last year's scale, with slight variations; \$5.50 for puddling and 70c. for heating and rolling bar. Both President Weihe and Vice-President Carney advised that the convention accept the scale, and not unbalance the present condition of markets and affairs between iron manufacturers and men.

The Berlin Iron Bridge Company, of East Berlin, Conn., has received an order from the Companhia Nacional de Foejas e Estalciros, of Rio de Janeiro, Brazil, for a large iron building to be used in connection with its ship building plant. The order for the machinery has been given to J. A. Fay & Co., of Cincinnati, O. The building will be made entirely of iron, 165 feet wide by 300 feet long, and will be shipped by steamer from this country,

the parts being carefully marked so that it can be erected in place by native workmen at Rio de Janeiro.

The Nordberg Manufacturing Company, Milwaukee, Wis., has removed to its new works, 480 to 486 Virginia street. The company began the manufacture of the Nordberg poppet-valve engine, which was described and illustrated in the ENGINEERING AND MINING JOURNAL, May 3, 1890, which is said to be an improvement on the Sulzer engine, manufactured in Germany, some of which were imported by the Schlitz Brewing Company some four years ago. Greater economy, durability, and range of cut-off are some of the advantages claimed for this engine. The first engine is 175 H. P., and will be set up by the middle of June, and goes to the Jos. Schlitz Brewing Company.

The Pulaski Iron Company's (Pulaski City, Va.) annual report for the year ending March 31, 1891, has just been issued. The company owns the Pulaski furnace, the plant, with houses, etc., being valued at \$324,424.07, while the mineral properties aggregate 2,369 acres, which represent, including 200 shares of the Virginia Mining Company at cost, \$150,640.74. During the fiscal year the furnace was out of blast for repairs 68 days and other stoppages carried the total to 103 days. During the time that it was in actual operation, 292 days, the furnace made 30,401 tons, equivalent to 116 1/4 tons per day, at an average cost of \$12.01. The total ore consumption of the furnace was 71,168 tons, the average yield of which was 42.71%. During the first six months of the fiscal year the average net price received at the furnace for pig iron sold was \$13.08, while during the last six months the net price was \$12.72, the average for the entire year being \$12.88. There were paid a 10% dividend on \$300,000 capital on May 15th, 1890, and in August and November of 1890, and February, 1891, a dividend of 2 1/2% for each quarter on \$450,000 capital. The bonds of the company amounted to \$150,000, having been cancelled and exchanged for stock at par.

The Sturtevant Mill Company, of Boston, Mass., advises us that the Croton magnetic iron mines, located at Brewster, N. Y., after an exhaustive test of several months with various machines for grinding their magnetic iron ore preparatory to concentrating, have decided to adopt the Sturtevant mill. A second machine has been erected at their present works, and an order placed with the manufacturers for eight more for their new works to be erected this season, which will give a daily grinding capacity of 2,500 to 3,000 tons. They report that one 20-inch machine readily grinds 20 gross tons per hour, giving a product granular in form, which is superior for concentration, and making less fines than any other process. The Sturtevant mill has also been adopted at the Benson mines, Little River, N. Y. The Orford Copper Company, after running one of these machines several years, grinding copper matte, has recently put in another to increase its output, which speaks well for its merits. These machines are used not only for this class of work, but also for grinding quartz, phosphate rock, cement, limestone and similar material. The company reports a large number of recent orders for the machines.

SOUTHERN INDUSTRIAL NOTES.

(From our Special Correspondent.)

The Roanoke Rolling Mill Company, of Roanoke, Va., according to reports, is to be reorganized with a capital stock of \$160,000; Mr. G. B. Lessig, of Pottstown, Pa., will be engaged as manager.

The Southern Mill Supply Company has been incorporated at Savannah, Ga., with a capital stock of \$50,000, by J. J. McDonough, L. M. Warfield, C. H. Dorset and others, for the purpose of manufacturing mill supplies, machinery, etc.

The Atlanta Iron and Steel Casting Company has been organized at Atlanta, Ga., with a capital stock of \$150,000 for the purpose of making malleable steel castings by the Bates process. The following officers were elected: Edward Van Winkle, president; W. L. Atwater, vice-president; A. R. Ryan, secretary, and W. H. Trezevant, treasurer. Work will be commenced at once.

The City Council of Atlanta, Ga., has decided to adopt the plans of Rudolph Hering, of New York, for the construction of the new water-works. The estimated cost of the works is \$792,000. The plant will consist of a pumping station on the Chattahoochee River with a 4,000,000 and a 6,500,000-gallon pumping engines; a re-pumping station with a 4,000,000 and two 6,500,000-gallon pumping engines; two 3-inch forcing mains 14,480 and 18,500 feet long; a clear water basin of 35,000,000 gallons, and filters with a daily capacity of 6,500,000 gallons.

MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

If any one wanting Machinery or Supplies of any kind will notify the "Engineering and Mining Journal" of what he needs, his "Want" will be published in this column.

Any manufacturer or dealer wishing to communicate with the parties whose wants are given in this column can obtain their addresses from this office. No charge will be made for these services.

We also offer our services to foreign correspondents who desire to purchase American goods, and shall be pleased to furnish them information concerning American goods of any kind, and forward them catalogues and discounts of manufacturers in each line, thus enabling the purchaser to select the most suitable articles before ordering.

These services are rendered gratuitously in the interest of the subscribers and advertisers; the proprietors of the "Engineering and Mining Journal" are not brokers or exporters, nor have they any pecuniary interest in buying or selling goods of any kind.

GOODS WANTED AT HOME.

2,249. A 110 horse-power locomotive boiler, with hoiler feeder and all fixtures complete. Also a full set of furniture machinery, shafting and pulleys. North Carolina.

2,250. Two rum stones for making cornmeal; also holts, packers, elevators, conveyors, water-wheels, shafting, and pulleys. Georgia.

2,251. Foot and hand power scroll-sawing, broom, and brush machinery; also lathes for light work. Georgia.

2,252. Water motors and water meters. Georgia.

2,253. A 20 horse-power engine to drive a 56 and a 30 inch saw. Kentucky.

2,254. A good second-hand shaft 2 1/2 inch x 12 feet long, with three pulleys, one 12 1/2 inch, one 10 inch, and one 6 or 7 inch face. Kentucky.

2,255. A good second-hand iron-planer 60 inches by 60 inches to 72 inches by 72 inches by 16 feet to 20 feet. Colorado.

2,256. Bids on both an electric and dummy line four miles long. Georgia.

2,257. A full set of supplies for a broom-handle and broom factory. Tennessee.

2,259. An oxy-hydrogen blowpipe for laboratory use. Washington.

2,260. A hand-power hydraulic testing machine for ascertaining the tensile and crushing strength of vitrified brick, stone, and all building material. Washington.

2,261. An electric-light plant. Georgia.

2,262. Tobacco machinery, including engines and pipes for heating factory. North Carolina.

2,263. Sash and door machinery. North Carolina.

2,264. A complete set of machinery for making barrels, a saw mill, a carriage, and a lot of 4 ply, 6 inch, 10 inch, and 12 inch cotton helting. Alabama.

2,265. A good 24-inch re-saw machine, a 4, 6 or 8-inch molding machine, a band saw, a scroll saw, and an emery wheel. North Carolina.

2,666. Machinery for the manufacture of mechanical wood pulp. North Carolina.

2,267. Water wheels. North Carolina.

2,268. A locomotive, 35 or 40 pound rails with joints and splices. North Carolina.

2,269. Water works machinery for a city of 5,000 inhabitants. Maryland.

2,270. Boilers, one mile 25-pound rails, and one mile wire rope. Tennessee.

2,271. Two elevators. Alabama.

2,272. A road machine. Maryland.

2,273. Three miles of either 6 or 8-inch water-pipe. Maryland.

AMERICAN GOODS WANTED ABROAD.

2,233. Machinery for the extraction of the fibers of the aguave or maguey produced in Mexico and South America.

2,240. A portable drilling machine with electric power for drilling holes in plates, castings, etc. Sweden.

2,244. A combination (letter) lock to be fixed to a strong wooden box with a door 2 inches thick. Size of lock required about 4 inches, with a combination capable of being changed from time to time. Mexico.

2,258. Machinery for making soap, candles, and starch. Mexico.

2,274. Catalogues and price-lists of arms, ammunition, crucibles, cutlery, electro-plates, glassware, hardware specialties, lamps and locks. Mexico.

GENERAL MINING NEWS.

Commissioner Carter, of the general land office, is reported to have recently issued an order saying that: "Hereafter plats which have been incorporated as part of the description of mineral patents will be omitted. Persons desiring to secure copies of plats of mining claims can procure them in the office of the surveyor-general of the state or territory in which they are located. The issuance of patents has heretofore been greatly retarded by the system of making copies. It is assumed that claimants will prefer the patents to the pictures."

(From our Special Correspondent.)

TENNESSEE COAL, IRON AND RAILROAD COMPANY.—The annual report of this company shows

the operations for the fiscal year ending January 31st, 1891, to have been as follows:

| Divisions. | Output. | Divisions. | Output. |
|------------------------------|---------|----------------------------|-----------|
| | Tons. | | Tons. |
| Tracy City, coals..... | 351,898 | Birm'gh'm, pig iron..... | 47,071 |
| Tracy City, coke..... | 113,118 | Birmingham, coke..... | 77,383 |
| Cowan, pig iron..... | 13,331 | Pratt Mines, coals..... | 1,061,968 |
| So. Pittsburg, pig iron..... | 67,210 | Pratt Mines, coke..... | 237,167 |
| So. Pittsburg, coals..... | 169,319 | Ensley, pig iron..... | 132,766 |
| So. Pittsburg, coke..... | 50,346 | Inman Mines, iron ore..... | 109,508 |

The total earnings amounted to \$663,880.78, of which \$453,988.54 was expended for interest on bonds, floating debt, sinking funds and dividends on preferred stock, leaving a balance of \$209,901.24, equivalent to a dividend of 2 1/2% on the common stock. All of it, however, has been absorbed in betterments and in improvements, and is to be written off to the depreciation account and to reductions in valuation. The same course was pursued last year with accumulated profits of \$327,572.59, so that since 1883 \$1,990,385.85 has been put into the business. The total capital expenditures from October 1st, 1886, to January 31st, 1891, have been as follows:

| | Oct. 1, 1886, to Jan. 31, 1890. | Feb. 1, 1890, to Jan. 31, 1891. | Total. |
|------------------------------------|---------------------------------|---------------------------------|----------------|
| Ensley division..... | \$1,276,474.28 | \$59,275.94 | \$1,335,750.22 |
| Pratt mines division..... | 782,514.87 | 37,036.01 | 819,550.88 |
| S. Pittsburg division..... | 363,590.20 | 75,847.63 | 444,437.83 |
| Birmingham division..... | 7,157.10 | 21,541.94 | 28,699.04 |
| Cowan division..... | 521.28 | 811.82 | 1,333.10 |
| Tracy City division..... | 407.36 | 1,400.04 | 1,807.40 |
| Land account, Nashville books..... | 47,986.35 | 6,595.34 | 54,581.69 |
| Totals..... | \$2,483,651.44 | \$202,508.72 | \$2,686,160.16 |

The company has now outstanding \$5,187,844.73 in bonds, \$9,000,000 in common and \$1,000,000 in preferred stock.

The report of the general manager of the Alabama division, H. G. Bond, shows that at the Alice furnaces, on a total output of 47,071 tons, there was realized a net profit of \$44,933.82. The Ensley division, with an output of 132,766 tons, made a profit on the iron of \$172,024.19, swollen by other items to \$193,497.38, the capital expenditures for the division being \$63,690.94. The iron made from July 1st, 1888, to April 1st, 1890, showed an average cost of \$9.13, while the cost of that made in 1890 was \$9.67, the increase being due to unusual and extraordinary expenses charged to working account and to an unprofitable contract on brown ore to be delivered at Ensley at \$1.55 per ton, with a guarantee of 50% metallic iron and not more than 12% silica.

ALABAMA.

FRANKLIN COUNTY.

(From our Special Correspondent.)

ISELL COMPANY.—This company has been organized with a capital stock of \$250,000 for the purpose of developing the mineral resources of certain lands adjoining the town of Isbell. J. P. Drouillard, of Nashville, Tenn., is president; J. E. Isbell, vice-president, and W. T. Baxter, of Nashville, Tenn., secretary. Among other improvements it is stated that the company will erect an iron furnace.

JEFFERSON COUNTY.

(From our Special Correspondent.)

Many coke ovens have been fired recently, among which are: 160 at Jasper and 100 at Ivy mines, on Horse Creek, by the Lady Ensley Coal, Iron and Railroad Company, and 200 at Johns by the De Bardeleben Coal and Iron Company.

Notwithstanding the dullness of the iron market, there are probably more furnaces running in this state than at any previous time. Nearly all the mines, both coal and iron, are being worked, although not all of them vigorously. In the Birmingham district there are 25 or 26 furnaces, of which 20 are running, 4 being closed down for repairs. Of the latter, the Sloss Iron and Steel Company has one that is being relined, and will blow in about the middle of this month; the repairs to Trussvale furnace, recently purchased by Gilreath, Spence & Hardie, will be completed during the latter part of the month, when it will at once go into blast, and the Tennessee Coal, Iron and Railroad Company's fourth Ensley and one of the De Bardeleben Coal and Iron Company's Oxmoor furnaces will be blown in by the last of the month. Of the furnaces in operation the De Bardeleben Coal and Iron Company has 5 at Bessemer and 1 at Oxmoor; the Tennessee Coal, Iron and Railroad Company has 3 at Ensley City and 2 at Birmingham; the Sloss Iron and Steel Company has 2 at Birmingham and 1 at North Birmingham; the Woodward Iron Company has 2 at Woodward; the Pioneer Mining and Manufacturing Company has 2 at Thomas; the Vanderbilt Steel and Iron Company has 1 at East Birmingham, and the Williamson Iron Company has 1 at Birmingham.

CAHABA COAL MINING COMPANY.—This company is exporting large quantities of coal from Blocton to Cuba and other foreign ports by way of Mobile and Pensacola.

HENDERSON STEEL MANUFACTURING COMPANY.—This company has recently adopted the recommendation of the special committee appointed for that purpose to make financial arrangements for the completion of its second furnace and the erection of a 300-ton blooming train.

ROCK CREEK COAL AND COKE COMPANY.—This

company has been incorporated by Walter Moore and J. J. Moore with a capital stock of \$250,000. The objects of the company are to mine coal, build coke ovens, furnaces, mine ore, etc. Its offices are at Birmingham, and its mines west of the city. Mr. Moore is prominent in coal and iron circles, being general manager of the Lady Ensley Coal, Iron and Railroad Company, and president of the Horse Creek Coal and Coke Company.

WOODSTOCK IRON COMPANY.—This company has made several changes recently. Mr. Walter C. Crafts, who has been general manager for the past two years has resigned, and his place been taken by Mr. Stephen Noble, of Ironaton. Nearly all the mines have been closed down and there is no definite information as to when operations will be resumed; it is reported, however, that improvements will be made to the machinery so as to decrease the cost of mining, and that then all four of the furnaces will blow in.

TALLADEGA COUNTY.

(From our Special Correspondent.)

TALLADEGA IRON AND STEEL COMPANY.—This company will issue \$200,000 worth of bonds for the purpose of making many improvements to its iron furnace, which will be put in operation under a new management.

ALASKA.

ALASKA-TREADWELL GOLD MINING COMPANY, LIMITED.—The May clean-up showed a bullion production of \$67,300, of which \$22,850 came from sulphurets, 516 tons of the latter being treated. The mill ran 28 days, crushing 19,470 tons of ore. The expenses for the month were \$24,000.

CALIFORNIA.

The first meeting of the State Board of Examining Surveyors was held recently in San Francisco. Permanent officers were elected as follows: Chairman, L. Wagoner; vice-chairman, S. Harrison Smith; secretary, Otto von Getoera. The law creating the board was passed at the last session of the Legislature, and was framed to regulate future surveys made in the State. By it all licensed surveyors are required to file with the County Recorder complete maps of all surveys made by them, thus creating a class of surveyors whose work shall be official, and whose certificates shall be prima facie evidence of correctness in all the courts of the State. This board was created to pass upon the qualifications of all persons desiring such license.

AMADOR COUNTY.

PLYMOUTH CONSOLIDATED GOLD MINING COMPANY.—A representative of the ENGINEERING AND MINING JOURNAL obtained the following facts concerning the affairs of this company: The financial statement to May 1 shows receipts of \$30,421.77, derived as follows: Surplus January 1, \$2,258.93; bullion production for April \$5,812.62; miscellaneous \$2,350.16. Expenditures \$10,465.67, leaving a surplus of \$19,956.10. Recent advices from the mine are to the effect that the upraise in the vein—previously referred to in these columns—is now in 170 feet. At the face the ore body is 43 feet wide, averaging \$6 per ton. It is stated that the mine is now paying expenses.

BUTTE COUNTY.

(From our Special Correspondent.)

GOLDEN FEATHER CHANNEL COMPANY, LIMITED.—The work on the walls of the canal of this company was completed on the 15th inst. The canal is 6,000 feet in length, from which 5,130 cubic yards of rock were excavated; 6,000 barrels of cement have been used in its construction. Work was inaugurated in July, 1889, and to date the expenditure has been \$300,000. Operations will be commenced on the flume immediately, this having been delayed by high water in the Feather River; by the first of July it is expected that the entire undertaking will be completed.

INYO COUNTY.

(From our Special Correspondent.)

NEWTOWN.—Since H. M. Yerrington and associates took hold of this mine at Cerro Gordo a very considerable amount of money has been expended in development work. A big ledge of galena ore, rich in silver, is being worked. The mine is now on a paying basis, and during the coming summer work is to be more actively worked than heretofore. The force of men has been put to work prospecting the Union mine, opened by the same parties, and the indications so far are said to be promising.

MONO COUNTY.

STANDARD CONSOLIDATED MINING COMPANY.—An ENGINEERING AND MINING JOURNAL reporter learns from Wm. H. Oscanyan, vice-president of this company, that the mine is yielding and stamping 1,400 tons of rock a month, from which about \$20,000 in bullion and from \$1,000 to \$3,000 in concentrates are derived. The expense of operation is placed at about \$15,000. Returns received by him two weeks ago showed the battery pulp to assay \$19.66 and the tailings \$8.95. Twenty stamps are in operation. Drifting and stoping operations are being carried on on the 300, 350, 400, 450, 500, 550-foot levels. Our informant states that the ore reserves now in sight are sufficient to supply the mill with ore for a long time to come. Seventy men are employed on the location.

NEVADA COUNTY.

GRASS VALLEY GOLD EXTRACTION COMPANY.—This company's extensive works for applying the Pollock process of gold chlorination are now completed. About \$70,000 has been expended on the plant.

(From our Special Correspondent.)

NEVADA CITY.—A promising body of high-grade sulphuretted ore has been discovered on the 400 level north of the upper shaft. At present there are two streaks of ore, showing each about a foot thick, which are coming together as the work advances. The ore is apparently as rich as any ever found in the old workings.

SAN DIEGO COUNTY.

(From our Special Correspondent.)

There is considerable excitement throughout the Julian district over the discovery of silver ore about 30 miles from the town of Julian.

WARLOCK.—The ore from this mine, now being sent to the mill, is not expected to run under \$50 a ton. In the Chapparal mine, which adjoins the Warlock on the north, a vein, thought to be the extension of the Warlock, has been struck.

COLORADO.

Mineral surveys approved by the U. S. Surveyor-General of Colorado, during the week ending May 29th, 1891: Survey No. 6,884, Land District, Leadville, name of claim Black Hawk; 6,885, Leadville, St. Jo; 6,899, Garfield, 99; 6,870, Montrose, Verda Lode and Verda Mill Site; 6,871, Montrose, Ada.

UNITED COAL COMPANY.—This company has purchased the Florence mine, located near Williamsburg, and will at once make preparations to work it on an extensive scale. A new shaft is to be sunk and a tramway to connect it with the railroad is to be constructed. The mine has been operated for the past year by the Cañon Fuel Company. It produces coal of excellent quality.

CLEAR CREEK COUNTY.

ATLANTIC-PACIFIC RAILWAY TUNNEL COMPANY.—Four men were killed in the east heading of the tunnel by a premature explosion on the 22d ult.

LAMARTINE.—Two additional boilers have been placed at this mine, and the underground workings are now to be fitted with electric lights. Large shipments are being made, although it is reported that most of the work at present being done is development work. In the fifth level the ore body is showing an average width of nearly six feet. All of the ore of the mine is of high grade.

SILVER GLANCE MINING COMPANY.—The shareholders of this company held their annual meeting in Georgetown on the 19th ult., and elected the following board of directors: J. F. Tucker, Andrew McClelland, J. R. Ely, Theo. King, and F. P. Dewey. J. F. Tucker was elected president of the company, and F. P. Dewey secretary and treasurer. The latter was also appointed to look after the company's interests. The company declared dividend No. 3, of \$1,500, last week, making \$5,970 paid during the past six months. Its property is being operated under lease.

EAGLE COUNTY.

IRON MASK MINING COMPANY.—Extensive surface improvements are at present being made by this company and development work in the mine will not be pushed until these are completed. The mine is said to be looking well in all parts, however. A new strike was recently made in a raise from the 10th level, which has cut a body of ore 6 feet thick, assaying 8½ ounces silver and ¾ ounces gold per ton, and 40% lead.

GILPIN COUNTY.

SIoux CITY GOLD MINING COMPANY.—This company has been organized to acquire the Lutz mine, located in the Russell Gulch mining district, owned by A. J. Williams and B. F. Randall, of Denver. The capital stock is \$610,000. One-half was taken by a Sioux City, Ia., syndicate, and the other half is retained by Messrs. Williams and Randall. J. E. Borge, of Sioux City, Ia., is the president of the company; E. H. Randall, of Denver, secretary; A. J. Williams, of Denver, treasurer; and B. F. Randall, of Denver, general manager.

GUNNISON COUNTY.

The dumps of the old Tomichi and Moffatt smelters are being worked over, and it is said that considerable bullion is being saved.

HINSDALE COUNTY.

HOTCHKISS.—A small streak of very rich gold telluride ore has been uncovered in this mine. The property is being worked by Charles Davis under lease and bond.

LAKE COUNTY.

SWAMP ANGEL.—It is reported that a large body of argentiferous iron ore has been struck in this property, located on the west slope of Rockhill, Leadville, at comparatively shallow depth. The ore at present uncovered is said to average 100 ounces silver per ton and 50% excess of iron and manganese over silica.

ULSTER NEWTON MINING COMPANY.—This company has leased its property, which has been idle for several months, to Messrs. Morrison and Dyatt, of Leadville. They intend to go to work upon the 500-foot level, following a small streak of rich lead carbonate ore west of the shaft.

OURAY COUNTY.

MINE OWNERS' TRUST, LIMITED.—The new ore body struck last week is officially reported to assay 400 ounces silver per ton for first class ore, and 110 ounces for second. The vein is three feet wide, compact and well defined.

RIO GRANDE COUNTY.

Much attention is now being attracted to Creede Camp, and there has been a large influx of prospectors during the past spring. Considerable exploration work is now going on in the district. The Denver & Rio Grande Railway Company is now making a survey for an extension of its line from Wagon Wheel Gap to Creede Camp.

HOLY MOSES MINING COMPANY.—This company owns the only producing mines in the Creede district, and it is the profits which it has been making in the past two years which has caused the present boom in the district. Ex-Senator T. M. Bowen is the principal shareholder in the company which owns the Holy Moses, Ethel, and Ridge mines. They are located about 1½ miles above Ryderville.

FLORIDA.

POLK COUNTY.

Rails are now being laid on the 7 miles of roadway connecting the new mining town of Phosphoria with the South Florida Railroad at Bartow. The Florida Phosphate Co., Limited, one of the largest concerns in the state, will be shipping nodular phosphate over this branch before the end of June. The Pharr Phosphate Co., whose plant is situated on this new line about two miles from Bartow, began mining on the 11th ult.

WASHINGTON COUNTY.

(From our Special Correspondent.)

It is reported that 1,000 acres of land between St. Andrews and Chipley have been leased by E. N. Dekle and W. B. Daniels of Marianna, who will organize a company for the purpose of developing phosphate mines, erecting works, etc., on the property.

GEORGIA.

DAWSON COUNTY.

(From our Special Correspondent.)

In the vicinity of Dawsonville it is reported that several prospectors have discovered placer deposits of considerable promise. The gold is said to be coarse and is found on a slate bed rock underlying about two feet of gravel. The find will be developed at once.

LUMPKIN COUNTY.

(From our Special Correspondent.)

FITTS.—Judge Ivey is making preparations for hydrauliclicking this property, located on Cane Creek.

MILLER-RIPLY.—Gen. Murray states that he will at once erect a 10 stamp mill on this property, at Dahlonega.

TREFOIL.—Work is being vigorously prosecuted both at the mine and mill. A series of tests is being made with a view of ascertaining the efficiency of the Howard amalgamators. These amalgamators are said to be the outgrowth of and improvement upon the Wiswell mill. They are placed below the sluiceways from the stamp batteries. If these machines demonstrate the value of the claims made for them the mill will be equipped with them permanently.

VICTORIA MINING COMPANY.—Capt. W. H. Horner, Manager of this Company, has purchased the Kelley lot adjoining the Victoria mill.

POLK COUNTY.

(From our Special Correspondent.)

POLK MINING COMPANY.—This company, of Cedartown, is reported to have purchased a tract of iron land near the ball ground, which it will develop at an early day.

IDAHO.

SHOSHONE COUNTY.

CEUR D'ALENE SILVER-LEAD MINING COMPANY.—The electric power transmission plant which has been ordered for this company's mine from the Edison General Electric Company consists of two 25 horse power Edison electric power generators to be located 1½ miles from the mill and driven by water power, using Pelton wheels under about 600 feet head. The mill machinery will be driven by an 80 horse power motor, belted direct to the main shaft of the mill. The Ingersoll steam air compressor now in use will be operated by a 60 horse power motor belted to the fly wheels of the compressor. The Lidgerwood steam hoist now being used, will be operated by a 60 horse power motor geared direct to the present driving shaft. The pump located on the 500 foot level will be driven by an 80 horse power motor. The entire plant of the company is at present being operated by steam and the application of electricity will be so arranged that all the machinery or any portion of it can be operated by either steam or electric power at any time.

CEUR D'ALENE & SPOKANE MINING COMPANY.—On the War Eagle, where superintendent Jennings is now at work with a force of men, it is said a splendid showing presents itself. The vein is four and a half feet wide, and streaks of galena and copper are found running through it in many places. This company now owns six claims, and

has them stocked for \$600,000. The War Eagle is the only claim upon which work is being done.

MORNING.—It is reported that the sale of this mine has finally been consummated, the purchaser being a syndicate of New York and Milwaukee capitalists. The price is said to be \$600,000, of which \$300,000 is to be paid within 60 days, and the balance in one year, one year and a half and two years. The money goes to the Spokane National Bank, which had a mortgage on the property, negotiations for its sale having been proceeding since the bank closed its doors.

WYOMING.—This claim was recently located on Grouse gulch, about 2½ miles west of Milo Creek, by George Gardiner and A. J. Devlin. A discovery of 3 feet of chloride ore is reported to have been made on the surface. A shaft has been sunk 30 feet on one wall. Development work will be pushed and the prospect seems more than usually promising for a mine.

ILLINOIS.

At the Dumferline mines, controlled by White Breast Coal Company, and the Williams mines, at St. David, the miners have been out since May 1. The operators wanted the miners to sign contracts waiving the benefits of the recent law passed in the interest of the miners. They refused to sign, and by assistance of farmers and neighboring towns expected to hold out until the law went into effect on July 1. The operators came to terms, however, and the miners went to work on the 4th inst.

EGYPTIAN.—The employes of this mine, at Duquoin, struck on the 1st inst. The operators say they agreed to pay every two weeks, with 10 hours' work. The men claim they were to receive 10 hours' pay for nine hours' work, and weekly pay.

INDIANA.

As the striking miners at Cable & Co.'s four mines, at Washington, have refused to return to work, the mines have been closed until next fall.

KANSAS.

A special report shows that during the week ending May 30th the output of ore from the mining districts of Galena and Empire City was: Rough ore, pounds milled, 1,637,100; zinc ore, pounds sold, 976,840; lead ore, pounds sold, 74,600; sales aggregated a total value of \$12,610.

MARYLAND.

ALLEGANY COUNTY.
(From our Special Correspondent.)

AMERICAN COAL COMPANY.—This company of Lonaconing, has let the contract for the erection of a cable haulage plant at the Jackson mines; other improvements will also be made.

GEORGE'S CREEK COAL AND IRON COMPANY.—This company has decided to put in new machinery, and otherwise improve its mines and mining plant.

MICHIGAN.

COPPER.

CENTENNIAL MINING COMPANY.—The stamp mill at this company's mine is undergoing a thorough overhauling. There is plenty of water in the pond for washing purposes, and there will not be any trouble in keeping the mill running when it is once started. The rock-house at No. 6 is fast approaching completion. The underground appearance of the mine is said to be improving. The No. 3 shaft, which is being sunk at the rate of from 70 to 75 feet per month, is now down 2,400 feet. The lode at the bottom is about 6½ to 7 feet wide, and carries but very little copper. No. 4 shaft is down to the eleventh level. When sinking was stopped the shaft was in ground that would pay to work. The No. 6 shaft in which the rich chute of copper was struck near the surface, is down 50 feet below the fourth level, with scarcely any copper in sight. The first level extends north 575 feet, where the lode is about 6½ feet wide, and carries copper. The second level is in about 450 feet. The lode, which is not without copper, is about five feet wide. The third level is in about 250 feet. These drifts are on the foot-wall. A cross-cut lately run about 10 feet from the breast to the hanging shows that the lode at that point is about 15 feet wide, seven feet of which is very good. For a distance of about three feet from the foot it was poor, the balance carrying more or less copper. The fourth level is in about 100 feet. There the lode, which is only four feet wide, is poor.

KEARSARGE MINING COMPANY.—The walls of the building designed to hold the new hoisting plant are partly up. The machinery is being made by the E. P. Allis Co., of Milwaukee, and is to be delivered by July 15th.

PEWABIC.—There are about 30 men at work in this mine, stripping down and straightening the shaft and making other repairs.

QUINCY MINING COMPANY.—The product of this company's mine for May was 550 tons of mineral as against 502½ tons in April and 423½ tons for the corresponding period a year ago.

The annual meeting of this company was held at its eastern offices, 56 Broadway, on the 3d instant; 42,650 out of the 50,000 shares were represented. The number included the 10,000 shares of treasury stock recently paid for the Pewabic property. Routine business was transacted. The annual reports issued some time since were approved and

officers elected as follows: Directors, Thomas F. Mason, president; T. Henry Mason, vice president; Nathaniel H. Daniels, Edward Rice, and Samuel B. Harris. W. Rogers Todd was elected secretary and treasurer.

TAMARACK MINING COMPANY.—The work of blasting out each side of the cross cut on the Osceola lode, at the fourteenth level, is going on. The lode at this point is from 18 to 20 feet wide and well charged with fine copper and barrel work. The lode is 750 feet east of the Calumet & Hecla lode. Nos. 3 and 4 shafts are pushing steadily downward, No. 3 being down about 1,000 and No. 4 about 900 feet.

TAMARACK JR. MINING COMPANY.—The foundation for the new compressor at No. 1 shaft is finished. With this plant ten air drills will be available for use. The plat has been cut at 2d level and sinking for the 3d level is under way. The winze on the lode for the same point has been started. Eighty-six feet of ground, showing up rich, have been opened up at the 2d level north and south of shaft.

IRON—GOGEBIC RANGE.

PENOKEE & GOGEBIC DEVELOPMENT COMPANY.—It is reported that the mines of this company will shut down if sales of ore are not soon made. This would involve the Colby, Palms, Aurora, Comet and other properties.

IRON—MARQUETTE RANGE.

CLEVELAND IRON MINING COMPANY.—At the annual meeting of the stockholders of this company held at Cleveland, O., on the 27th ult. the following directors were elected for the ensuing year: E. R. Perkins, T. P. Handy, W. J. Gordon, J. H. Wade, Jr., William G. Mather, Samuel Mather, Peter White, William Bingham and W. S. Tyler.

IRON—MENOMINEE RANGE.

DUNN.—This mine is hoisting 800 tons per day. The daily shipments average 1,000 tons. At the commencement of shipping operations the stock piles held 40,000 tons. The mine is 380 feet deep at No. 3 shaft. At the south end is a large open cut down to the ore. An immense block of ore is shown, which is mined to the first level and taken to the surface through No. 1 shaft. No. 2 shaft, which is in the stripping, is out of use. The new 10-foot drums are sufficient to remove the product of the mine's two openings.

MANSFIELD MINING COMPANY.—This company's mine, the only Bessemer ore producer in the Crystal Falls district, has commenced ore shipments. There are 10,000 tons of ore in stock. The third level of the mine is being worked and a start will soon be made for the fourth. The shaft is now 15 feet on the way.

MILLIE MINING COMPANY.—At this company's mine an average of from 40 to 50 tons of ore is being hoisted daily. The stock pile contains between 7,000 and 8,000 tons. The hoisting will probably be continued for two or three weeks, at the end of which time it is calculated that about all the ore that is now broken underground will be on the surface.

PENN IRON COMPANY.—Owing to the fact that the cost of reopening the lower levels of the Norway mine, says the *Norway Current*, closed by the recent cave, will be much more than the value of the ore that could be secured thereby, the pumps will be pulled out, and future work be done above the water level. There is still much ore to be mined, and the life of the mine will not be shortened much, if any, by the abandonment of the lower levels, as the pillars were pretty well taken out before the cave-in.

SHERIDAN.—On the second level of this mine a cross-cut has been carried north 160 feet, encountering the ore. From the north cross-cut a drift was driven west 40 feet, also cutting the ore. It is the intention to raise from the second to the first level and bring the two together. There is now an abundance of ore in sight. It is said that the owners propose to get the mine in the best possible shape to mine ore whether any is sold this year or not.

MISSOURI.

JASPER COUNTY.

(From Our Special Correspondent.)

JOPLIN, June 1.

The long-looked-for advance in the price of zinc ore finally came last week, and it was in good demand at \$24 per ton. The English buyers were in the market and about cleaned up the surplus stock on hand at the various mines. The advance in the price of ore is due solely to their have purchases.

Lead ore advanced \$1 per thousand and now stands at \$24.75.

Following are the sales from the different camps as far as reported:

Joplin mines, 1,403,910 pounds zinc ore and 167,850 lead; value, \$19,284.

Webb City mines 740,240 pounds zinc ore and 62,507 lead; value, \$9,657.

Carterville mines 1,712,280 pounds zinc ore and 123,030 lead; value, \$21,880.25.

Zincite mines 143,340 pounds zinc ore and 1,700 lead; value, \$1,795.

Oronogo mine 72,080 pounds zinc ore and 8,470 lead; value \$1,003.

Carthage mines 33,200 pounds zinc ore; value, \$332.

Galena, Kan., mines 976,840 pounds zinc ore and 74,600 lead; value, \$12,610.

All districts, total value, \$36,531.25.

Pittsburg, Kan., spelter output: R. Lanyon & Company, 139,000 pounds; S. H. Lanyon & Brother, 96,400 pounds; W. & J. Lanyon, 96,500 pounds; Granby Milling and Smelting Company, 96,000 pounds; Weir City Zinc Company, 163,000 pounds; total, 646,500 pounds. Coal output for same week, 950 cars, aggregating 19,000 tons.

Mr. P. L. Schwartz, who is operating a tract of land just north of the city limits, has spent several months in systematic prospecting work, and is now opening up several large deposits of lead and zinc ore, from which he is making a regular output every week.

Mr. Carl Spark, assistant chief engineer of the Fort Scott & Memphis Railroad, has been prospecting some mining lots on the Empire Zinc Company's land for the past nine months, and has always been encouraged to go ahead by a few shins of ore which have led him to open what seems to be a bonanza deposit of zinc ore. The mines of the entire district are now looking more prosperous than at any time during the year 1891, and from now to the end of this year the output promises to be very large.

NEWTON COUNTY.

(From our Special Correspondent.)

SENECA, June 2.

The mines of this comparatively new camp are steadily and surely coming to the front. The hills around the little town are alive with prospectors sinking new shafts and opening up deposits of lead and zinc ore. The Potwio and Holmes mines are keeping up their steady production of 4,000 to 5,000 pounds of lead every day. These were the first mines opened here, and the ones that have led to the discovery of rich deposits of ore in the hills. The Seneca Lead and Zinc Company, operated by the Huber Milling Company, is putting in some additional machinery, and in the meantime is continuing development on its ore body.

MONTANA.

It is currently reported in Helena that Jay Gould, during his coming visit there, will look into the matter of extending the Union Pacific system so as to give it a direct entrance into Helena over its own lines. Over 10 years ago the Union Pacific started to build from a point on the Utah Northern in the direction of Helena. The line was graded for 30 miles up to Jefferson cañon and within 80 miles of Helena, when work was stopped. Two years later the Northern Pacific made its way there and got control of the freight business. It is believed that the Union Pacific people now see their mistake in not completing their line to Helena and the 80 remaining miles of the contemplated road will be finished.

BEAVERHEAD COUNTY.

GOLDEN LEAF, LIMITED.—The second general meeting of the shareholders of this company was held in London on April 30th, at which a report of the preceding year's operations was submitted by the directors. This company, in which there are now between 1,200 and 1,300 shareholders, was organized in April, 1890, being a reconstruction of two companies, the Empire and Carlisle. The Golden Leaf property was purchased. No work was done at the Carlisle property, the only intention of the company concerning it being to sell its machinery. The result of operations in the Golden Leaf and Empire mines was not as favorable as had been anticipated, but a good deal of the expenses were exceptional. The produce of the Golden Leaf was £16,036 and of the Empire £4,478; the expenses of the two mines were £14,273, leaving a balance of £6,241 and a balance of profit of £2,186. The two mines are now yielding a profit of between £700 and £800 per month. This improvement in affairs has been accomplished by reduction in working expenses so that ore is now mined and milled for less than \$2 per ton (see *ENGINEERING AND MINING JOURNAL*, May 2, 1891) instead of \$6 to \$7 as formerly. Shipments of ore from the Golden Leaf mine were not commenced until September, however, and its output was that of eight months only. The outlook in this mine is now considered encouraging. Mr. J. Henry Longmaid was appointed general superintendent of the company during the year and it is largely through the economies instituted by him and the skill with which he has operated the mines and mills that the condition of the company is so much improved. The bullion output of the company for April was about \$11,500.

DEER LODGE COUNTY.

CHAMPION MINING COMPANY.—At a recent meeting of the trustees of this company an assessment of two cents per share was ordered. The money will be payable as soon as the regular routine of business will allow. More men have been added to the force at the mine and this is reported as looking well. The hanging wall has not yet been reached.

ELIZABETH MINING COMPANY.—The officials and stockholders of this company, as well as of the Granite and Bi-Metallic, returned to St. Louis on the 26th ult. from the annual election in Montana, and are all greatly pleased with the conditions and prospects of the properties. The drift at the time of their visit was in 350 feet, the vein

was perfectly defined and the work all in vein matter, showing streaks running 7 to 15 ounces. The ultimate point the company is drifting for is the Butte cross cut, which is about 600 feet distant from the present face, and there it is hoped a chute or chimney of paying ore will be uncovered.

GRANITE MOUNTAIN MINING COMPANY.—Of the many claims that are owned by this company the Cleveland, on the south side of the mountain and about one-half mile from Granite, is thought to be quite promising. A few months since sinking was commenced on this property and now the two-compartment shaft is down over 200 feet. Preparations are being made to set up a larger hoist, and it does not seem improbable that soon the force employed there, consisting already of nineteen men, will be increased. Should ore be found here in paying quantities the tramway, which is within 100 feet of the shaft, will be most conveniently located. A station could be put in at this point with little or no interference to the working of the Rumsey branch. It is thought that possibly the object of the enterprise is to give the main workings an air shaft. The amount of development in levels that extend from the Ruby shaft are known only to a limited few.

HOPE MINING COMPANY.—This company's mill has now been running steadily for some time. On the 7th ult. a shipment of 3,044 ounces of silver was made, on the 14th ult. 4,399 ounces were shipped, and on the 20th ult. the clean-up gave 4,708 ounces. The average battery assay for the week ending May 26, was 36 ounces, tailings four ounces, and per cent. saved 89. Under date of May 21 the superintendent writes that the bin at the mine is full of good ore, say 175 tons assaying from 40 to 45 ounces. Good ore is also being mined below the 140-foot crosscut in two places, and continues in the No. 1, raise 140-foot level. The south vein on the 230 foot level has one foot of mill ore, giving 22 ounces. An assay of quartz "out of south vein, 230-foot level," gave 32 ounces; red ore is being taken from there, and as soon as 10 to 12 tons are mined a thorough test will be made. A raise will be started on the 230-foot south vein, as 15 feet good ore has been on the hanging wall side, and apparently improves as it goes up.

LORD NELSON MINING COMPANY.—August Meyer, president and general manager of this company, has lately arrived from the East. Development work on a large scale will now shortly be resumed. Hoisting machinery and a pump will be placed in position and a shaft will be sunk to the depth of 300 feet. The company owns three full claims, the Elizabeth, San Lorenzo and the Lancaster, in the Flint Creek mining district, on the eastern slope of Franklin Mountain. The formation is granite and easily traceable for a distance of nearly 5,000 feet and like nearly all other veins in the district it has a slight dip to the south. The development work consists of two tunnels on the vein and a two-compartment shaft 65 feet in depth. Tunnel No. 1 shows the vein a distance of 130 feet. Tunnel No. 2 exposes it more than 700 feet, carrying ore almost the entire distance and varying in width from a few inches to five feet.

PURITAN.—Mr. James K. Pardee has made arrangements for the development of the Puritan and Silver Star properties, on which he holds a bond. He has secured a list of subscribers, each taking a tenth interest. Each subscriber places a sum of money at his disposal for the development, which will be continued until the bond expires. If the showing at that time is satisfactory a company will be organized and work will progress on a larger scale.

(From our Special Correspondent.)

WELCOME.—From this property, located 12 miles west of Anaconda, and recently worked under lease and bond by some gentlemen of that city, several cars of ore have been shipped to Great Falls. The bond has been taken up and the mine has been paid for. The ore is a free smelting lead ore, carrying iron and about \$20 in silver.

GALLATIN COUNTY.

A Colorado company is about to commence dredging the bed of the Missouri River, near Three Forks, for gold. The dredge has already been launched, and the amalgamation boat and coal tender are now on the stocks.

JEFFERSON COUNTY.

RUBY.—Messrs. Smith & Rust recently completed the purchase of this mine near Radersburg. The ore is free-smelting carbonate, carrying a large excess of iron, and is, therefore, very desirable for smelting purposes. A hoist will be immediately erected on the Ruby, and a large force of men put to work. Many car loads of ore have formerly been shipped from this mine with a profit.

MISSOULA COUNTY.

IRON MOUNTAIN MINING COMPANY.—The annual meeting of the stockholders of this company was held recently in Helena. A resolution was adopted authorizing the trustees to contract for and construct a concentrator to work the low grade ores and also authorizing the board to construct necessary roads and tramways to facilitate the construction and operation of a concentrator. The meeting elected the following trustees for the ensuing year: R. S. Hale, Samuel Word, A. M. Holter, C. Kauffman, Chas. L. Dahlor, Frank Hull

and J. K. Pardee. There is quite a commotion at the mine. Wages have been reduced and a strike is expected. It is reported that carmen and miners have been reduced to \$3.25 per day and topmen to \$2.50. It is thought that a miners' union will be formed, and that a strike will ultimately be the result.

SILVER BOW COUNTY.

BLACK ROCK.—A shot in the Oneida, a neighboring mine, holed through to this one during the past week 14 feet below the 200-foot level. The Oneida is the property of the Forhis Bros. The Black Rock belongs to W. A. Clark. The fact that this shot broke through may lead to some complications between these gentlemen. The Black Rock is at present giving employment to forty-eight men above and below ground and is one of the sources of supply for the Butte Reduction works. It is chiefly worked for the ore contained in its lower levels.

BOSTON AND MONTANA CONSOLIDATED COPPER AND SILVER MINING COMPANY.—This company's smelting works at Great Falls, it is said, are expected to be so far completed that operations can be begun before the end of the current year. It is thought that a sufficient part of the plant will be in readiness for use by November. The May product was 2,200,000 pounds of refined copper. The silver production in April was 24,069 ounces against 26,793 in March. The entire cost of the new smelting works will probably be \$1,000,000, instead of \$750,000, as was first estimated. The increased cost is due to a change in the original plans by which the works are to be made considerably larger than was first proposed. Concerning the increased expenditure, it is stated that Mr. Bigelow's visit to Great Falls is to push the works to completion and not to reduce the cost of the plant. The plan now being carried out will enable the smelter to treat 1,000 to 1,200 tons per day, instead of 500 tons originally intended. It is estimated that the company will save from \$25,000 to \$40,000 per month in smelting when its new works are ready.

EMMA NEVADA MINING COMPANY.—This property is opened by a 200-foot tunnel, which taps the lead 150 feet from the surface, and a shaft. Some samples from the stopes assay from 300 to 800 ounces silver and \$40 in gold. The shaft is down only fifty feet, but it is being opened up and will be put down to a depth of 200 feet. A shipment of ore is made every other week.

SOCIETE ANONYME DES MINES DE LEXINGTON.—For some unknown cause work on the lower levels of this company's property has been entirely suspended during the past week. The crosscut for the south lead is in a considerable distance, but there are yet 800 feet to be run before this lead will be encountered. Drifting had continued on the north or Allie Brown vein, and, it is said, with flattering result. From the upper levels above the 600 the usual quantity of ore is being hoisted, and the mill is kept steadily crushing, not only ore from this mine, but also a vast amount of custom ore. This mine is carefully and systematically managed by superintendent Kellogg. The large compressor is now idle, owing to suspension of work in the bottom; hand drills are chiefly used for mining the ore after drifts have been run.

STEVENS.—D. G. Bricker, one of the most successful leasers of Butte, has taken hold of this old-time gold and silver producer, and proposes to work it extensively during the coming year. The mine has been idle for some time past, but rich horn silver and chlorides are said to have been formerly taken out.

(From our Special Correspondent.)

HIWATHA MINING COMPANY.—This company, which has recently levied an assessment, has been sinking steadily since last fall. The lead was lost, and the shaft went through 116 feet of a break. At a depth of 300 feet ore has been encountered again. A cross-cut exposes 3 feet of vein matter in place, 20 inches of which is rich black sulphuret. This strike is most encouraging for all interested in the Cataract district, as it demonstrates the continuation of the mineral veins to some depth.

SAILOR'S DREAM.—This gold mine in Brown's Gulch, 14 miles north west of Butte, is under lease and bond to R. B. Wallace and others, of Butte. A recent shipment to the Silver Bow Sampling Works returned 5 ounces gold and 10 ounces silver per ton. There are 25 tons of ore on the dump which averages much better. This mine is being developed by an adit tunnel now in 150 feet. The vein is very strong, although the pay streak is not large. Developments so far have been more than paid for by the ore extracted.

SPRINGFIELD.—This mine, situated one mile north of the Alice mine, after being idle several years has started up under lease and bond, and is rapidly developing into a valuable silver producer. A rich streak of ruby silver ore was struck 4 feet from the shaft on the 81 foot level, and in the face of the drift, now about 10 feet in, the vein is rapidly widening, with every indication of a big ore chute ahead. A few years ago the Springfield shipped several lots of ore returning over \$400 per ton. At that time water was encountered in such quantities in the bottom of the 115-foot shaft that work was abandoned until now. Owing to other mines having since partly drained the hill the water has gone down to about 90 feet, leaving exposed on the 50-foot level 2 feet of good milling ore, some of which runs high in native silver.

NEVADA.

ELKO COUNTY.

(From our Special Correspondent.)

BELLE ISLE MINING COMPANY.—The west cross-cut from the south drift, 350 level, has cut the ore found in the intermediate level at a point 58 feet from the old stope. The vein is large, and shows considerable ruby silver.

COMMONWEALTH MINING COMPANY.—The first level stopes have produced last week 108 cars of first-class ore, assaying \$225 per ton, and 40 cars assaying \$45 per ton. The east cross-cut has been extended, cutting a small seam of high-grade ore. The face of the north drift is still in low-grade ore, with stringers of rich ore.

NORTH COMMONWEALTH MINING COMPANY.—The Union mill continues to run steadily, and crushed last week 203 tons, the average battery assay being \$284.61 per ton. There were sent to the concentrator 578 carloads of ore, the average assay of which was \$27 per ton. This yielded 45 tons of concentrates. Another shipment of bullion has been made valued at \$41,112.81, leaving crude bullion on hand valued at \$18,000.

ESMERALDA COUNTY.

(From our Special Correspondent.)

HOLMES MINING COMPANY.—Shipments are being regularly made. The last one made this week consisted of 9,952 ounces of silver, contained in 10 bars of bullion. The greatest success has attended the operations of the new leaching plant, which has surpassed all the expectations formed of it. Col. W. J. Sutherland is expected to return from England some time during July, when further changes in the leaching plant will probably be made.

STATE LINE MINING COMPANY.—J. Wagner, of Carson, recently obtained a judgment against this corporation for \$2,574.80, and proceeded to levy upon all its property. The property was all for sale by the sheriff, who demanded an indemnity bond from Mr. Wagner, which up to date has not been filed. Meantime the sheriff is in a quandary; he protests he will not sell the property until the bond is filed, and Mr. Wagner's attorney maintains that by his refusal he and his bondsmen render themselves liable to a suit for damages, which they will institute.

STOREY COUNTY—COMSTOCK LODGE.

(From Our Special Correspondent.)

SAN FRANCISCO, May 28.

CONSOLIDATED CALIFORNIA AND VIRGINIA MINING COMPANY.—During the week ending May 23d, there were extracted 2,421 tons, of which 933 were shipped to the Morgan mill and 1,488 tons to the Eureka mill. The average assay value of all the ore worked was \$33.10 per ton. It is rumored that a dividend of 50 cents per share will be paid in June, and from thence on regularly during the year. The new ore body which is being opened in virgin ground above the 1,100-foot level is showing well. Ore is now being stoped from the west side of the south drift on this level, and the opening so far made shows a width of ore of 30 feet, which, according to the report, is not the limit of the ore body, as both sides of the stope are still in ore.

OPHIR MINING COMPANY.—Forty-seven tons of ore were taken last week from the opening near the point where the raise from the 1,465 level made connections with the drift run west from the winze, 122 feet below the 1,300 level. The average assay value of this was \$22.50 per ton. A shipment of four bars of bullion, valued at \$13,261.75, has been received at the local office, being the product of 835 tons of ore worked at the Morgan mill. The yield of the ore in bullion per ton was \$15.86, of which \$5.94 was gold and \$9.92 was silver. The average assay value of the battery samples per ton was \$26.41.

WHITE PINE COUNTY.

OSCEOLA AND CUMBERLAND MINING COMPANY.—This company will begin operations during the current month, undertaking development work in each of its four mines, the Cumberland, Osceola, Royal Flush, and Revenue. Good veins of gold ore have been opened in each of these properties. The pay streak in the Cumberland vein is said to be 4 feet wide, averaging \$28 per ton in gold, and that in the Osceola 3 feet wide, averaging \$22 per ton.

OSCEOLA GRAVEL MINING COMPANY.—This company is handling a large amount of gravel this season and it is expected that it will make a clean-up considerably larger than last year. The excellent report of Mr. George W. Maynard, M. E., the president of this company, and Benjamin Hampton, the general manager, for the year 1890 was published in our last issue.

(From our Special Correspondent.)

JOANNA.—The terms of sale as set forth in the ENGINEERING AND MINING JOURNAL of May 23d have not been ratified. At the last moment, after all the details had been arranged, the Montana syndicate became frightened at the possible result of the lawsuit pending over the property. Mrs. Walcott, of San Francisco, claims an interest in the mine, and heretofore her case has made a strong showing in the courts.

NEW MEXICO.

GRANT COUNTY.

AZTEC MINING COMPANY.—The mill was recently shut down, and it was expected to start again

about the first of the month. Work on the mine is being confined almost exclusively to development. Vice-President Wm. Einstein recently returned to St. Louis from a seven weeks' visit to this and other properties in New Mexico in which he is interested. At the Aztec work is progressing day and night with the most satisfactory results. The tunnel, upon which they have been at work for some time, is progressing rapidly. It is now in over 300 feet, which is over half the distance to be run before it gets below the Kleptomania workings, which is the point it is driving for. A number of veins have been struck, but were not explored. The company has been sinking another 100 feet on the Kleptomania shaft and opening up the third level, and has also sunk two winzes from No. 2 level, both of which are in fine ore all the way down. The mill while running was producing rich bullion.

PACIFIC GOLD MINING COMPANY.—This mine is producing steadily. It has now plenty of water, and 15 of the 20 stamps of the mill are running regularly on ore from the mine. On May 10th a check for \$754 was received at the St. Louis office. On the 15th a bar of gold bullion valued at \$2,750.34 and on May 19th another check for \$690.60 were received, making a total output for the month up to that time amounting to \$4,194.94.

SANTA FE COUNTY.

SANTA FE MINING COMPANY.—This company is preparing to erect smelting works for the reduction of the ores of its mine at Matebuala. The furnaces are to be erected at the mouth of the mine, where water can be procured from an old aqueduct. The mine is now opened to a depth of 250 meters, and a large amount of low grade ore has been exposed, which it is estimated can be mined and worked so as to yield a profit of from \$1 to \$1.50 per ton. The horse whims in use at the present time are to be replaced by a steam hoisting engine.

SIERRA COUNTY.

SILVER MONUMENT MINING COMPANY.—Nearly all of the machinery for this company's concentrator has arrived. Work on this structure has been somewhat delayed by the heavy rains of the past two weeks.

NEW YORK.

CLINTON COUNTY.

CHATEAUGAY IRON COMPANY.—According to reports from Plattsburgh, N. Y., the separator owned by this company at Lyon Mountain was burned on the 25th ult.

NORTH CAROLINA.

ANSON COUNTY.

(From our Special Correspondent.)

WADESBORO BROWN STONE COMPANY.—The quarries belonging to this company will be sold on the 20th inst. Although the quarries are not developed sufficiently to supply the great demand for stone for building purposes, the stone is largely used in many of the finest buildings, not only in this state, but in the adjoining states. It is understood that the stock will be bought in and the company reorganized with a capital stock of several hundred thousand dollars, and that the quarry will then be opened on a large scale and the necessary machinery purchased.

OHIO.

OIL.

The showing made by the fields of this state for the month of May is as follows: Completed wells 116, a decrease of 40; new production 4,411 barrels, a decrease of 2,132 barrels; dry holes 14; new work comprises 79 drilling wells and 15 rigs, showing a decrease of 3 and 2 wells respectively.

PENNSYLVANIA.

PHILADELPHIA & READING RAILROAD COMPANY.—This company has gained control of the Gettysburg & Harrisburg Railroad. The line is 31.5 miles long, extending from Carlisle to Gettysburg, Pa. The Philadelphia & Reading thus secures a connection with the Cumberland Valley Railroad at Carlisle, with an entrance into that town, and a connection with the Western Maryland road at Gettysburg, which will open up a new line between Harrisburg and Baltimore.

COAL.

The Schuylkill Coal Exchange has issued a report dated Pottsville, June 1st, 1891, which shows the collieries drawn to return prices of coal sold in May, 1891, to determine the rate of wages to be paid, make returns as follows: Wm. Penn Coal Company, Wm. Penn Colliery, \$2.11; P. & R. C. & I. Company, Locust Spring Colliery, \$2.24; North Mahanoy Colliery, \$2.23; Indian Ridge Colliery, \$2.18; Thomas Coal Company, Kehley Run Colliery, \$2.22; total, \$11. The average of these rates is \$2.20. The rate of wages to be paid for work done during the last two weeks of May and the first two weeks of June, 1891, is 10% below \$2.50 basis.

Two of the four men who were rescued from the Jeansville mine after nineteen days' imprisonment, have begun suits for damages against J. C. Hayden & Co., the operators of the mines. They claim \$25,000 damages each. They allege that the accident was due entirely to the negligence of the company, and that their long imprisonment without food resulted in permanent injury to them.

REDSTONE COKE, COAL AND OIL COMPANY.—This company has placed two electric drilling machines with a capacity of 950 tons each per day in its mines at Grindstone. A dynamo of 500 horse power furnishes the current.

OIL.

The Washington county oil field, it is said, shows signs of resuming its pristine importance. A big strike was made last week by the Philadelphia Company on the Butter Huggins farm. Oil was found at 2,200 feet, and in or about the 50-foot sand.

The report of the old fields of this state for the month of May shows that 314 wells were completed, or 26 more than during the month of April. The new production was 70,875 barrels, an increase of 165 barrels. This was principally caused by the heavy strikes made in the McCurdy field. There were 48 dry holes, or 21 less than in April. The new work at the end of the month shows a net increase. There are, however, seven less wells drilling than at the end of April, or a total of 830. The rigs up make a total of 208, which is 22 less new rigs than at the close of last month.

STONE.

The Joseph Lutz Slate Quarry, in Lynn township, Lehigh county, in which several Philadelphians have sunk considerable money, has been sold by the sheriff to Dr. W. P. Kistler, of Allentown, for \$21,728.26. The quarry was opened 12 years ago by A. F. Creitz and Moses and Benjamin Henry, who several years ago sold it to the Laurel Hill Slate Company. The company became involved, and the quarry was sold by the sheriff to Frank G. Hollowbush, of Philadelphia. The latter afterwards sold it to Joseph Lutz, of Allentown, who then gave three mortgages on the property. The first was to Mr. Hollowbush for \$14,222; the second to Joseph E. Roberts, of Camden, N. J., for \$5,660, and the third, aggregating \$20,500, to E. W. Patton, one of the mercantile appraisers of Philadelphia; William H. Reitz, of Lynnport, in trust; Miss Emily N. Black, of New Jersey, and Joel M. Hill and James L. Marstetter, Esq., of Allentown. These lost all by the sale to Dr. Kistler. The quarry is a large one, fully equipped, and covers 50 acres of land. A stock company capitalized at \$100,000 is to be organized to work the property.

SOUTH DAKOTA.

LAWRENCE COUNTY.

ORO FINO.—This mine, it is reported, has recently been purchased by the Burlington & Missouri River Railroad, and work on the property will be commenced shortly. The Oro Fino has long been considered one of the best mines of the Hills, and a large amount of money was taken out at one time, but poor mining left it in such shape that an immense cave occurred some years ago, and very little work has been done since. Nearly all the free-milling gold has been mined out, but according to reports there is a large vein of pyritous iron ore going down vertically that assays quite high in both gold and silver.

PENNINGTON COUNTY.

SPOKANE.—This mine at Squaw Creek is said to make a handsome showing at a depth of 40 feet, the ore being very rich and the full width of the vein 5 feet. The ore that has been tested averages about \$70 in silver and lead, and consists of a mixture of galena and carbonate. Other good prospects are being located and quite a camp has sprung up in the last two months. The Custer people are building a new road nearly the entire distance, about 15 miles to the northeast. When completed this will make the mines easily accessible from Custer, and ore will probably be shipped from that point.

UTAH.

JUAB COUNTY.

BULLION-BECK & CHAMPION MINING COMPANY.—It is reported that a new strike of very rich ore has been made in the lower workings of the mine. The company is steadily putting on more men and increasing its output. The Caroline mine, which is worked through the openings of this company, is also shipping a considerable amount of high-grade ore.

SHOEBRIDGE.—This mine, once a large producer of high grade ore, has been purchased by Schewe Bros., of Colorado, who will resume work in it, sinking the shaft deeper. The mine was worked at good profit until a body of pyritous ore was encountered. It is thought that rich ore may be found again beneath this, as such has been the case in other mines of the district where there has been a similar formation.

SALT LAKE COUNTY.

NIAGARA MINING & SMELTING COMPANY.—The litigation between this company and the South Galena Mining Company, Old Jordan Mining Company, L. E. Holden, A. H. Holden, Frank Hoffman, and Henry Denhalter, has been compromised on terms not yet made public. The suits were commenced about a year ago by the Live Pine Consolidated Mining Company, whose interest was afterwards purchased by the Niagara Company, and involved the South Galena, Old Jordan, and Highland mines. The trouble ended, mining operations will be again commenced in these properties.

OLD TELEGRAPH MINING COMPANY.—It is reported that the May output of this company

amounted very nearly to \$30,000, being larger than the product for any month for many years. The ore has greatly improved in value of late.

PETRO MINING COMPANY.—A new ore chute has been opened in the Petro mine, at Bingham; it was found in drifting along the vein from the chute which is now being stopped. The new ore body shows a breast of galena ore five feet in width, with two feet of quartz along the wall, all of which is said to be of good grade.

VIRGINIA.

PRINCE EDWARD COUNTY.

(From our Special Correspondent.)

FARMVILLE COAL AND IRON COMPANY.—It is reported that this company will put in a basic steel plant and build 100 new coke ovens.

SHENANDOAH COUNTY.

(From our Special Correspondent.)

MARYLAND MINERAL, MINING AND MANUFACTURING COMPANY.—This company has been incorporated by R. H. Lacy, B. H. Richards, J. T. Young and others with a capital stock of \$150,000. Its purpose is to develop ochre mines in the vicinity of Edenburg.

WEST VIRGINIA.

MINERAL COUNTY.

(From our Special Correspondent.)

ELK GARDEN BIG VEIN MINING COMPANY.—This company has been incorporated at Elk Garden with a capital stock of \$50,000 for the purpose of developing a tract of land known as the Pierce property, consisting of 100 acres, which it is reported as having purchased. The incorporators are: Wm. Brofey, John Fahey, M. J. Fahey and John Power.

WYOMING.

CARBON COUNTY.

GOLD HILL INVESTMENT COMPANY.—The headquarters of this concern are in Laramie, Wyo., with a branch office at Gold Hill. It has a strong financial backing, and is now having a building erected at Gold Hill. As soon as the business there warrants it, a state bank will be established for the accommodation of the miners. Reports from the superintendent, D. N. Stickney, are said to be most favorable.

FOREIGN MINING NEWS.

BELGIUM.

SOCIETE ANONYME DES MINES ET FONDERIES DE ZINC DE LA VIEILLE-MONTAGNE.—This concern has made a net profit for 1890 of 6,368,443 francs, or 1,270,000 francs more than for 1889, and is thus enabled to declare a dividend on the ordinary share capital of 37½%, the largest amount paid since the formation of the company. The works produced of crude zinc 53,711 tons; of rolled zinc, 50,021 tons, and of zinc white, 8,694 tons. Monsieur Gaston Saint Paul de Sinzay has been appointed director-general of the company in the place of his father, lately deceased. The company has secured concessions in Algiers for two zinc mines, and it is stated that it is expected these mines will give a large production for the next few years.

BRITISH COLUMBIA.

(From our Special Correspondent.)

WEST KOOTANIE DIVISION.

NELSON, May 10.

The new mining law of the Province—now in force—is an improvement on the old one in several respects. Aliens can still record claims, but they must be 18 instead of 16 years of age. The yearly re-recording of a claim is no longer necessary, and the time allowed for executing the \$100 worth of work has been extended from 6 to 12 months. The end lines must be parallel, and the claim has to be marked by three posts, numbered 1, 2 (center stake) and 3, placed at equal distances along the center line. No person can relocate a claim which he has previously abandoned. The \$500 expenditure requisite for a "Crown Grant" no longer includes houses, buildings, or other like improvements. In addition, prompt action can be taken against a defaulting partner.

It is reported that Engineer Duchesnay has found a practicable, though somewhat difficult route through the gold range for the proposed extension of the Columbia & Kootenay Railway to the Pacific coast.

HOT SPRINGS DISTRICT.

A considerable amount of prospecting and claim development is going on, but the larger properties are practically idle, owing in a great measure to the late money stringency in the East and the large amount of water which has to be handled. Little will be done this summer on the Blue Bell property, and the same may probably be said of the United and Number One mines, owned by the Revelstoke Mining Company.

DICTATOR.—The ledge was tapped after running the tunnel 146 feet. It was found to be 3½ feet wide.

KOOTENAY CHIEF.—The work on this claim, the south extension of the Blue Bell mine, has hitherto been confined to stripping and surface trenching. A contract has been let for sinking a shaft on the south extension. The ore body has an

average thickness of 12 feet, and consists of a mixture of galena, blende, and iron and copper pyrites in a quartzose gangue, and its silver contents are low. The country rocks are limestone, quartzite and mica-schist.

REVELSTOKE MINING COMPANY.—This company has bought the Eureka claim, which is the north extension of the Number One, for \$1,000.

SKYLINE KRAO.—Sinking is to be resumed on the Skyline as soon as the pumping plant can be increased. The Krao, which has been shut down during the winter, is to be opened up by the new owners.

NELSON DISTRICT.

DANDY.—A. M. Esler, of Gem, Idaho, has purchased an eighth interest in this claim, which is the west extension of the Silver King, for \$4,000, and has secured a bond on the remaining seven-eighths for \$172,500. Mr. Esler purposes doing considerable work on the property, but it will be impossible to place much machinery on the ground until the Hale wagon road has been finished. Bids for its completion are being asked for by the Provincial government.

DEMOCRAT.—Low grade ore has been struck at a depth of 24 feet on this claim, in which J. E. Boss, of Spokane, recently acquired a half interest. Similar ore has been found on the Annie claim. These discoveries are interesting as tending to prove the coninity, easterly and westerly, of the Iroquois ore body. Surveys of Dandy, Democrat and Iroquois are to be made at once for the purpose of obtaining "Crown Grants."

JIM CROW.—Attempts are being made to secure a bond on this property for \$15,000. The claim adjoins the California (see *ENGINEERING AND MINING JOURNAL*, August 10th, 1890).

OLLIE.—A one-half interest in this claim has been bonded to A. H. Kelly, part owner of the Dandy, for \$10,000.

ROYAL CANADIAN.—The tunnel is now in 182 feet, and the lead, which had pinched down to six inches, is now over three feet wide and is looking well.

SILVER KING.—The mine now employs 17 men. The winze is down to the 174-foot level. The tunnel has been extended 50 feet beyond the old cross-cut, and the south cross cut was advanced six feet during the past week. Sifted ore, much of it high grade, is to be seen on all sides.

WHITEWATER.—Twenty men are now on the pay-roll of this promising gold property, the new trail is nearly finished and the Huntington mill will be ready for work by the end of May.

WILD CAT.—A one-fourth interest in this gold property was recently bonded to R. C. Ferguson and R. G. Tatlow, of Vancouver, for \$12,500. Twenty to thirty tons of the ore is to be run through the Poorman mill, and if the results are satisfactory machinery will be placed on the property at once. The claim has been developed during the winter and can now show 200 feet of tunnel and crosscuts.

TRAIL CREEK DISTRICT.

Mining matters have been quiet in this camp for some time, the leading spirits being deeply engrossed in real estate business. The Lily May shaft is down 33 feet in ore, showing less galena and more fine-grained iron pyrites. The Le Roi shaft is down 70 feet, but full of water, and an extension of time has been granted the parties to whom it is bonded, to place machinery on the claim. The Idaho claim has been bonded to Mr. Durant, one of the holders of the Le Roi bond. Work has been stopped on the Springer group; reason not known.

GERMANY.

The extensive limestone beds at Zscherben, near Halle, Saxony, have been acquired by a company which intends shortly to commence the construction of large Portland cement works.

MEXICO.

(From our Special Correspondent.)

MONTEREY, May 23.

The Monterey Smelting Company has blown in its third 50-ton furnace, and everything about the plant is working to perfection. This company owns some very good mines in the Sierra Mojada and Mula districts, from which heavy shipments of silver and lead ores have been arriving daily for the past four months. It has also been receiving some high grade ores from the San Jose and San Carlos districts, tributary to the Monterey & Mexican Gulf Railroad, in the State of Tamaulipas.

Mr. A. W. Geist, General Manager of the Great National Smelting Company, has taken a four months' option on a ten-year lease on the famous San Antonio mine, situated on Santa Catarina Mountain, eight miles northwest from this city. It is owned by D. Humbird, of Hudson, Wis., and has been a reliable producer for many years.

The old Iguana mines, located 100 miles northeast of Monterey, are again coming into prominence as producers of ore carrying silver glance, ruby and native silver. These mines were discovered by the early Spaniards, and are extensively developed. Twenty-five tons of the ore shipped to Monterey this month netted the owners over \$4,000.

Messrs. O. H. Harker, of Denver, and James F. Elyan, of this city, two well-known mining en-

gineers, are engaged in making a thorough examination of the San Juan mine, 20 miles west from Monterey, on the Window Mountain. The San Juan is a heavy lead producer, and is one of the prominent mines that were shut out by the famous Windom ruling on the silver-lead ore question. The Window Mountain takes its name from a circular opening through the mountain, thirty feet in diameter, and about 500 feet below the apex.

The Nuevo Leon Smelting Company, Monterey's first smelting enterprise, has commenced the shipment of its bullion to Newark, N. J., over the Monterey & Mexican Gulf Railroad, popularly known as the Tampico Route. Smelter products have become an important feature of the railway traffic, and the Tampico Route has the honor of handling the first solid train of mineral exported from Mexico.

The old, reliable Vallecillo mines continue producing steadily. These mines are on a true fissure vein that has been opened by several shafts to an average depth of 500 feet for about three miles in length. The strike of the vein is southwest to northeast and it dips north 45°. The width of the vein ranges from 5 to 12 feet; the matrix is spar, which is thickly interspersed with coarse galena. On the foot wall there is a solid streak of clean galena that ordinarily averages 10 inches in width, though it occasionally widens out to 3 feet. The entire vein matter, excepting the solid galena, is concentrated in a most primitive manner, with water pumped from the mine. Last year's sales of concentrates averaged 74% lead and 35 ounces silver per ton. These mines belong to the Vallecillo Mining Company, a close corporation, and have been profitably and continuously worked since 1852, except during the civil war in the United States. At that period Major Lowrey, a strong Unionist, shut down the mines rather than produce lead that would find its way across the Rio Grande River, 50 miles distant, to the Confederacy. He was offered a pound of cotton, then worth 75c. per pound, for every pound of lead bullion he could produce. This company is now working 125 men. The mine is well equipped and economically managed. When the lead and silver market is not satisfactory the company stores its concentrates. There are now on hand at the mine ore-house nearly 1,000 tons of sacked concentrates. A very peculiar feature of this fine property is that it is situated in a level prairie some twelve miles from the nearest mountains.

Renewed interest is manifested in the Linares and Matchula railroad project. It will open up a rich mineral country and insure the location of a smelter at Linares. The mine owners in the districts tributary to Linares have assured the management of the Tampico Route that they would subscribe for stock to the extent of \$150,000 in a smelting enterprise to be located at Linares, providing experienced smelting men of means could be secured to take the lead in the matter.

The Tampico Route is opening up a magnificent agricultural and mineral country. It will be completed to the port of Tampico within 30 days. Preparations are being made to properly handle the heavy traffic already assured through that port.

Seven steamship lines now call regularly at Tampico and new lines will be added by Messrs. Walker and McVitie, of Galveston, who are now at Tampico establishing a commission and shipping house in connection with their extensive ship brokerage business. The opening of this port by the Monterey and Mexican Gulf Railroad will give renewed impetus to the mining and smelting interests of Mexico. The management of this road, in addition to having been chiefly instrumental in securing the three immense smelting plants and other industrial enterprises for Monterey, has opened up rich mineral fields heretofore inaccessible. It will reduce largely the freight charges on coal, coke, machinery and supplies imported and on ore and bullion exported.

Capital is coming in freely and Mexico is making marvelous strides in her industrial and commercial importance. More of her mines are now being worked than ever before, her peace and credit are firmly established, and foreign capital invested in mining and other enterprises is exempt from taxation and is zealously guarded by state and federal governments. The recent storm which swept over the financial world was scarcely perceptible here. There were no failures nor was any enterprise disturbed.

MEETINGS.

Bodle Consolidated Mining Company, at the office of the company, No. 407 Montgomery street, San Francisco, Cal., June 15th, at 1 P. M.

Homestake Mining Company, at the office of the company, Room 49, Nevada Block, No. 309 Montgomery street, San Francisco, Cal., June 9th, at 11 A. M.

DIVIDENDS.

Granite Mountain Mining Company, dividend No. 77 of 25 cents per share, \$100,000, payable June 10th, at the office of the company, Room 123, Laclede Building, St. Louis, Mo.

Maryland Coal Company, dividend of one cent., payable July 1st, at the office of the company, No. 35 Broadway, New York. Transfer books close June 15th, and reopen July 2d.

Mollie Gibson Consolidated Mining and Milling Company, dividend No. 5 of five cents per share, \$50,000, payable June 10th, at the office of the company, in Colorado Springs, Colo.

ASSESSMENTS.

| COMPANY. | No. | When levied. | D't'ng' in office. | Day of sale. | Amn't per share. |
|---------------------------------|-----|--------------|--------------------|--------------|------------------|
| Alliance, Utah..... | 13 | Apr. 21 | May 26 | June 15 | .10 |
| Calcedonia Silver Nev..... | 44 | May 2 | June 4 | June 23 | .15 |
| Consol. Imperial, Nev..... | 31 | May 6 | June 11 | July 1 | .05 |
| East Sierra Nevada, Nev..... | 2 | Apr. 14 | May 22 | June 15 | .05 |
| Idlewild, Cal..... | 2 | May 1 | June 1 | June 20 | .10 |
| Live Oak Drift Gravel, Cal..... | 13 | Apr. 15 | June 2 | June 22 | .02½ |
| Navajo, Nev..... | 21 | May 20 | June 25 | July 17 | .20 |
| New Basil Con., Cal. | 18 | Apr. 15 | May 18 | June 15 | .05 |
| Peerless, Ariz..... | 16 | Apr. 24 | May 29 | June 18 | .10 |
| Piedmont, Nev..... | 2 | May 21 | June 31 | July 22 | .05 |
| Scorpion, Nev..... | 2 | Apr. 14 | May 22 | June 15 | .10 |
| Scorpion Silver, Nev | 26 | Apr. 14 | May 22 | June 15 | .15 |
| Sierra Nevada, Nev. | 91 | May 13 | June 17 | July 7 | .50 |
| Silver Hill, Nev..... | 28 | Apr. 23 | May 25 | June 18 | .20 |
| Union Con., Nev..... | 43 | May 15 | June 23 | July 13 | .30 |
| Utah, Nev..... | 12 | May 6 | June 12 | June 20 | .25 |
| Valley View, Cal. | 2 | Apr. 13 | May 14 | June 8 | .02 |
| Yellow Jacket, Nev. | 45 | Apr. 14 | May 16 | June 20 | .50 |

MINING STOCKS.

[For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, St. Louis, Pittsburg, Birmingham, Ala., London and Paris, see pages 673 and 674.]

NEW YORK, Friday Evening, June 5.

The mining stock market for the week under review has been almost featureless. As compared with last week it has been more quiet, and does not make promise of any change for the better in the near future. A significant fact is the marked absence of the so-called bulls on the market. They are not talking these days. In fact, most of them seem to have lost hope. The market continues sympathetic to the prevailing financial depression, which seems to forbid any class of speculation. The prices of the week, considering the general condition of affairs, have been very well maintained. The features of the week, if such they can be called, were the semi-activity in California and Colorado stocks.

The total number of shares sold during the week, which, it will be remembered, consisted of only five days, owing to the holiday on Saturday, aggregated 42,800. Of this number 10,500 shares were of dividend paying stock. The sales for the corresponding week in last year were of 68,550 shares.

The Comstocks were not sufficiently dealt in on the local exchange to give them a market of their own, and were it not for San Francisco quotations, which serve as beacon lights, the traders in these securities would be hopelessly at sea. As has been the case for several weeks past, a few of the stocks were placed upon the market in odd lots. These received sales which discouraged further trading. The cause of the recent slump in the San Francisco market has begun to dawn upon the dear public, and of late it has been rather wary.

A few shares of Alta, which, during the week ending May 29th, sold from \$1.05 down to 90c., were disposed of on Monday at 8½c. The second lot sold to-day at 95c. Of Best & Belcher, which, during the week ending May 22d, sold from \$6.87 to \$4.70, 100 shares changed hands to-day at \$4.45. A small lot of Chollar, which has been declining for two weeks, having closed on May 21st at \$2.40, sold early in the week at \$2.89. To-day a second lot was transferred at \$3. Mexican is another of the Comstocks which has halted with its downward tendency. It closed last week at \$3.35. It sold yesterday and to-day at \$3.40 and \$3.25. Sales in Utah during the week aggregated 700 shares, being at 90c., 80c. and 70c. The quotation of the previous week was 90c. Belcher sold 100 shares Tuesday at \$2.50. Consolidated California & Virginia has not recovered from the slaughter made by the San Francisco bears three weeks ago. It continues to hang at or near the quotation of \$11, the highest point reached being \$11.50 on Monday. The last sale was on Thursday at \$10.75. On the last call to-day \$10.25 was bid and \$10.75 asked. Crown Point, which sold last week at \$2, was in little demand at \$1.90 and \$1.80, although a few sales were made at these prices. Gould & Curry received one sale yesterday at its price three weeks ago, namely, \$2.45. Hale & Norcross was in little demand, and a bid at \$2.40 brought out 100 shares. This is 10c. below transactions reported week before last. Ophir, of which a 100-share lot sold on May 25th at \$5.25, disposed of an equal number of shares at \$4.25. Savage, whose last sale was recorded May 16th at \$3.25, sold 200 shares to-day at \$1 less, the quotation being \$2.25. Yellow Jacket, from the closing of \$2.70, sold off to \$2.65 on Tuesday and dropped still lower, closing at \$2.50 to-day. Comstock Tunnel although not in great demand, developed considerable strength during the week, selling as high as 22c. and not lower than 20c.; the sales aggregated 5,200 shares. The

closing to-day on the last call was not particularly strong at 18c. bid and 20c. asked.

Twenty thousand or more of the two-cent variety of California stocks went to swell the total of the week's transactions. In addition there were quite a number of the better class of securities sold, and at sustained values. Astoria, which sold steadily last week at 1c., developed considerable strength, selling steadily at 2c. to the extent of 8,000 shares. Belmont, whose steady rise has been chronicled from week to week in our columns, and which closed last Friday at 60c., made a gain of 2c. during the week, selling at 62c. to-day. It closed strong, at 60c. bid and 62c. asked. Brunswick, which was very weak last week, developed very little strength, selling at 8c. and 9c. to the extent of 2,200 shares. The closing was 8c. bid and 10c. asked. Bodie Consolidated, whose last sale was chronicled on May 25th at \$1.25, sold during the middle of the week at \$1.10 and \$1.25, to the extent of 350 shares. An odd lot of Bulwer, consisting of 300 shares, changed hands yesterday at 28c. Standard received one sale, consisting of 100 shares at 95c., on Thursday. Recent advices from this company state that the bullion returns for May were \$20,700; cash on hand June 1st, \$14,000. The reader will find a few pertinent facts concerning the operation of this company in our news columns. Middle Bar was the active stock of the week. It developed much more strength than was manifest last week, selling 11,800 shares at the one price of 2c. Plymouth did not receive a sale this week. Transactions of two weeks ago were on a basis of \$2. To-day there is considerable inquiry for the stock, and on the last call it received the quotation of \$2.25 bid and \$3 asked. The reader will learn the cause of this improved tone of the stock by consulting our mining columns.

The Colorado stocks developed quite a little activity. The buying was mostly for eastern holding, and is taken as a good indication for the future. Chrysolite sold 700 shares during the middle of the week at 24c. and 25c. against 20c., last week's closing. Leadville Consolidated was in active demand, and sold 2,800 shares at the one price of 11c. Little Chief was quite active during the early part of the week, and orders for 1,400 shares were placed at 33c. and 32c. On the last call to-day it closed 30c. bid and 35c. asked.

Mutual Smelting and Mining as usual was quite active. Its general quotation was \$1.40, the same being its closing. Sales amounted to 800 shares.

Caledonia sold on June 1st at 90c. A meeting was held in San Francisco on the 2d inst. Reports concerning the transaction of this meeting are said to be responsible for the slump to 75c., which occurred to-day. A small transaction was made at that price. The stock was weak on the last call at 60c. bid and 75c. asked. Deadwood, which sold on May 19th at \$1.25, sold 200 shares on Tuesday at \$1.40 and \$1.35.

Horn Silver was in quite active demand, the opening price being \$3.50 and the closing \$3.40, the sales 550 shares. On the last call it closed strong at \$3.30 bid and \$3.45 asked.

Silver King, of Arizona, opened the week at 8c., sold down to 5c., and rallied to and closed at 6c. Sales amounted to 700 shares. On the last call it closed at 4c. bid, 10c. asked. Phoenix did not appear in the market until to-day, when 500 shares sold at 36c.

Martin White, which entered the market last week at 90c., developed considerable activity and strength. On Monday it opened at \$1, rose to \$1.10 on Tuesday, and the day following to \$2.25, reacting and closing at \$2 on Thursday; 1,300 shares were sold. Favorable reports on the property are said to be the cause of the transactions and the advancement in prices.

El Cristo, of South America, sold Monday at 30c. and 33c., disposing of 1,200 shares. The quotation last week was 40c. There is no particular reason assigned for the drop aside from the general depression.

Boston. June 4. (From our Special Correspondent.)

The upward movement in copper stocks noted in our letter last week was of rather short duration, although for a day or two the market showed a good degree of activity, and buyers were much encouraged; stocks coming out rather freely, however, there was more than the market could take at the advanced prices, and the decline of the metal in London from the highest point quoted had a tendency to check the speculative feeling. For the past two days the market has been rather tame, and prices have receded to very near those prevailing before the boom started.

Boston & Montana sold up to \$44, a good deal of stock being taken at \$41, the buying being chiefly by the short interest, although, no doubt, some was taken for the long account. The stock sold to-day at \$41, which was about the price before the movement started.

Calumet & Hecla, sold at \$259 and receded to \$250, selling at this price to-day.

Butte & Boston was taken quite freely at 16 1/2 @ 16, but fell off with the rest of the market to \$15.

Oscocla sold up to \$38 1/2 on the spur, a small lot touching \$30. On the reaction it dropped to \$33 1/2, just what it sold for last Thursday. Franklin sold at \$18 1/2, declined to \$18, and is quite steady at that price.

Kearsarge advanced to \$14, but declined to \$13 on

the reaction. Centennial sold up to \$17. There is very little doing in this stock, but the reports from the mine are very encouraging, and it is expected that the stock will be more active before many months; the latest sale was at \$16 1/2.

Quincy advanced to \$110 for a few shares, but sold at \$104 to-day.

Atlantic has been quiet at \$15 1/2 @ \$16. Tamarack touched \$160, reacting to \$152.

Allouez sold at \$3 1/2, an advance of 1/4. Santa Fe sold up to 60c., but declined to 50c. to-day.

Huron sold at \$2 1/2 @ \$2 1/2, and National at \$2 1/2.

The sharp advance and the prospect of an active market for copper stocks brought out some of the small fry, and we note sales of Dana at 25c.; Native at 14c.; Star at 8c. and Washington at 20c. Arnold sold at 80c.

3. P. M.—The market closed very dull, in marked contrast to last week. Boston & Montana gained 1/4 to \$42. A lot of 10 shares of Osceola sold at \$37 1/2. Calumet & Hecla was firm at \$250, while Quincy declined to \$102 1/2 for a small lot. Santa Fe was steady at 50c.

Denver.

Prices and sales for the week ending May 30th, 1891:

Table with columns: Company, Opening, H., L., Closing, Sales. Lists various mining companies like Alleghany, Bangkok-C-B, Bates Hunter, etc.

* Buyer 30. † Seller 60. ‡ Seller 60. a Asked. b Bid.

San Francisco. May 28. (From our Special Correspondent.)

The tendency of the mining stock market during the week ending to-day has been downward, temporary advances of certain middle and Gold Hill stocks notwithstanding. The news from the Consolidated California and Virginia mine continues to be most satisfactory, but it suits the manipulators just at present to depress the market, and, consequently, the leader is being hammered down. To-day it is ruling at \$9.75, with 50c. off in the informal session. The sales have not been particularly large, all offerings being quietly absorbed. The late deal, when the stock was run up to \$21 and as suddenly forced down to present prices, has been so palpable an imposition, that those who have burnt their fingers—although they are not so many as might be imagined—are buying in now to hold for a rise rather than gambling on margin. It is the opinion on the street that Consolidated California and Virginia will now decline to \$6.

In the north end group, outside of the leading stock, things have been very quiet, Ophir selling the steadiest and ruling to-day at \$4.95.

Of the middle stocks, Potosi has been quoted as high as \$4.75, selling at 75c. off to-day. Savage has sold moderately at \$2.60, and Best & Belcher, \$3.85.

The outside group of stocks have taken their tone from the general market. North Commonwealth ore is being crushed steadily at the Union mill and bullion shipments regularly made, but, notwithstanding this, the stock is quoted to-day at 60 @ 65c. Commonwealth is quoted to-day at 85c., the mine also showing up fairly well. As before pointed out, the Tuscarora group of mines are handicapped in public opinion, and in this, as well as other ways, the stocks have suffered.

By Telegraph.—Following were the quotations on the first call on the San Francisco Exchange, Friday, June 5th: Alta, 80c.; Best & Belcher, \$3.95; Belle Isle, 75c.; Bodie, \$1.00; Bulwer, 30c.; California & Virginia, \$10.25; Chollar, \$2.45; Crown Point, \$1.70; Commonwealth, 65c.; Gould & Curry, \$2.05; Hale & Norcross, \$2.20; Mexican, \$2.95; Mono, 40c.; Navajo, 15c.; North Belle Isle, 60c.; Nevada Queen, 25c.; Ophir, \$4.90; Potosi, \$4.40; Savage, \$2.05; Sierra Nevada, \$1.90; Union Consolidated, \$2.10; Utah, 65c.; Yellow Jacket, \$2.35.

St. Louis. June 3.

(From our Special Correspondent.)

St. Louis stocks have been inactive for the past week, and prices, on the whole, very steady. The only important event was the calling of a meeting of the Central Silver stockholders to adopt some method of carrying on the working of the mine. At present things are at a standstill, as the company has no funds in the treasury. Granite Mountain declared its monthly dividend of 25c. a share. Silver Age was a favorite this week and was in good demand, selling from an opening of \$1.50 to \$1.80 to-day. During the week 800 shares were sold. Yuma also was in demand, but there was little of the stock to be had. It opened at 77 1/2c. and closes at 85c., with sales at 85c. and 81c., amounting in all to 350 shares.

Elizabeth fell off from \$2 to \$1.97 1/2. Sales amounted to 1,400 shares, a good part of which went at \$2.02 1/2. American & Nettie had a few good sales at 43 1/2c. The market opened at 40c. and closes at 25c. Sales, 500 shares.

Granite Mountain sold 100 shares at \$23.75. The market is only fair at \$24.

Bimetallic was in demand with no offerings, and opening at \$32.50, closes at \$33.50, and was at one time bid at \$33.75.

Central Silver had a sale of 1,000 shares at 3c. The market is very weak at 2 1/2c.

Two hundred shares of Little Albert sold at 10 1/2c.

Mickey Breen had an uneventful week, only one sale of 300 shares being made. The stock sold at 67 1/2c., but is now quoted at 65c.

Aspen. May 30.

The last quotations of Aspen mining stocks were as follows:

Table with columns: Stock Name, Price. Lists Argentine Juniata, Best Friend, Bushwacker, etc.

a Asked.

Deadwood. May 30.

The following are the closing quotations of mining stocks in this market:

Table with columns: Stock Name, Price. Lists Bullion, Golden Reward, Hermit, Iron Hill, etc.

b Bid.

Lake Superior Iron Stocks.

(Special Report by A. M. Helmer, Milwaukee, Wis.)

Table with columns: Iron Stock Name, Price. Lists Ashland, Aurora, Anvil, Brotherton, etc.

Salt Lake.

The anniversary of the opening of the Salt Lake Stock Exchange will occur on Friday, June 5. It has been decided by the Board of Directors to commemorate the occasion by giving a mid-day lunch immediately after "morning call" to the members and invited guests. The lunch will be spread in the basement of the new Walker building, two doors west of the Exchange.

PRICES AND SALES FOR THE WEEK ENDING MAY 30, 1891.

Table with columns: Name and Location of Company, Open- ing, High- est, Low- est, Clos- ing, Sales. Lists Alice, Alliance, Anchor, Apex, etc.

PIPE LINE CERTIFICATES.

The petroleum market for the last week has been very dull, with a tendency toward greater strength. Buckeye certificates have been unchanged, and are quoted at about 16c. A quiet absorption of the latter seems to be going on.

The exports of mineral oils for the ten months ending April 30th were 598,202,000 gallons, of a value of \$43,691,000, against 542,277,000 gallons valued at \$42,047,000 for the same period in the preceding year.

| CONSOLIDATED STOCK AND PETROLEUM EXCHANGE. | | | | | |
|--------------------------------------------|-------|-------|-------|-------|--------|
| Opening. Highest. Lowest. Closing. Sales. | | | | | |
| May 30..... | ..... | ..... | ..... | ..... | ..... |
| June 1..... | 69 | 69% | 69 | 69 | 5,600 |
| 2..... | 69% | 70 | 69% | 69% | 8,000 |
| 3..... | 69% | 70% | 69% | 69% | 21,000 |
| 4..... | 70% | 70% | 70 | 70 | 31,000 |
| 5..... | 70% | 70% | 68% | 68% | 8,000 |
| Total sales in barrels..... | | | | | 73,000 |

| NEW YORK STOCK EXCHANGE. | | | | | |
|-------------------------------------------|-------|-------|-------|-------|--------|
| Opening. Highest. Lowest. Closing. Sales. | | | | | |
| May 30..... | ..... | ..... | ..... | ..... | ..... |
| June 1..... | 68 | 68 | 68 | 68 | 10,000 |
| 2..... | 68% | 69 | 68% | 69 | 15,000 |
| 3..... | 69% | 69% | 69% | 69% | 12,000 |
| 4..... | 69% | 69% | 69% | 69% | 3,000 |
| 5..... | 69% | 69% | 68 | 68 | 20,000 |
| Total sales in barrels..... | | | | | 60,000 |

COAL TRADE REVIEW.

NEW YORK, Friday Evening, June 5.
STATEMENT of shipments of anthracite coal (approximate) for the week ending May 30th, 1891, compared with corresponding period last year.

| Regions. | May 30, 1891. | May 31, 1890. | Difference. |
|------------------------|---------------|---------------|----------------|
| Wyoming Region. Tons | 457,401 | 355,309 | Inc. 102,092 |
| Lehigh Region " | 119,317 | 102,371 | 16,946 |
| Schuykill Region " | 227,496 | 198,225 | 29,181 |
| Total..... Tons | 804,124 | 655,905 | Inc. 148,219 |
| Total for year to date | | | |
| Tons | 14,197,582 | 11,920,390 | Inc. 2,277,192 |

PRODUCTION OF BITUMINOUS COAL for week ending May 30th, and year from January 1st:

| EASTERN AND NORTHERN SHIPMENTS. | 1891. | | 1890. |
|---------------------------------|---------|-----------|-----------|
| | Week. | Year. | Year. |
| Phila. & Erie R.R..... | 1,046 | 46,872 | 52,634 |
| Cumberland, Md..... | 84,916 | 1,715,171 | 1,586,758 |
| Barclay, Pa..... | 3,613 | 72,960 | 59,213 |
| Broad Top, Pa..... | 5,307 | 219,786 | 324,247 |
| Clearfield, Pa..... | 61,219 | 1,775,083 | 1,663,114 |
| Allegheny, Pa..... | 19,701 | 567,791 | 573,558 |
| Beach Creek, Pa..... | 40,071 | 935,994 | 809,809 |
| Pocahontas Flat Top..... | 51,121 | 1,011,199 | 826,235 |
| Kanawha, W. Va..... | 46,895 | 350,340 | 874,135 |
| Total..... | 313,889 | 7,325,196 | 6,769,703 |

| WESTERN SHIPMENTS. | 1891. | | 1890. |
|-----------------------|--------|-----------|-----------|
| | Week. | Year. | Year. |
| Pittsburg, Pa..... | 18,046 | 451,576 | 385,255 |
| Westmoreland, Pa..... | 26,311 | 788,879 | 678,416 |
| Monongahela, Pa..... | 6,657 | 220,203 | 141,757 |
| Total..... | 50,834 | 1,460,658 | 1,205,458 |

Grand total..... 364,723 8,785,854 7,975,161
PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending May 30th, 1891, and year from January 1st, in tons of 2,000 lbs.: Week, 77,914 tons; year, 1,213,347 tons; to corresponding date in 1890, 2,291,531 tons.

Anthracite.

The official figures for the production during May will not be received before next week. However, an estimate places the production during that month at 3,200,000 tons, as against 2,500,000, the tonnage allotted. In the face of this fact the question naturally arises, will the June allotment of 3,400,000 be surpassed in a proportionate manner? It is thought by many, however, that this is hardly probable, because of the enlarged limit.

The trade of to-day is made up largely of deliveries under orders placed at May prices. It was estimated by one of the sales agents yesterday that there is a sufficient amount of this tonnage to keep the ports busy until June 10th. Orders for delivery under June prices are exceedingly few, but will doubtless multiply as old orders are filled and in the face of the promised advance for July.

Pea coals are reported more plenty. Lehighs are very scarce, in fact a number of operators report that they are not in the market for this class. Prices on Lehigh coals for the present are quoted as follows: Lehigh Valley Coal Company, Packer and Spring Mountain, broken, \$3.90; egg and stove, \$4; chestnut, \$3.85. Lehigh and Wilkes Barre Coal Company, broken and egg, \$4; chestnut, \$3.75; stove, \$3.90—f. o. b. The New York and Lehigh Coal Exchange, of which Cox Bros. & Co. are prominent operators, has adopted the following circular: Lump, \$4.10; broken, \$4.10; egg, \$4; stove, \$4.15; chestnut, \$4, for June shipments at the Amboys, Elizabethport, and Port Johnston.

Concerning Cox Bros. & Co.'s case against the Lehigh Valley, the last step taken was the motion of District Attorney Reed, made June 2d, before Judge Acheson, of the U. S. Circuit Court at Philadelphia, to have notices served on the defendant. The Court ordered that the defendant file its answer, which was made returnable the first day of July.

The cases of J. C. Haddock and Haddock, Shonk & Co. against the Delaware, Lackawanna & Western will be started next month. We learn from the plaintiff that the Interstate Commerce Commission will issue witness subpoenas, and that the taking of testimony by deposition will be commenced before a commissioner to be agreed upon.

An important point in the Interstate Commerce Act which bears directly upon the cases now pending is the clause which provides that the finding of a lower court shall be operative pending an appeal. It is section 16 of the act as amended, and reads as follows:

"When the subject in dispute shall be of the value of two thousand dollars or more, either party to such proceeding before said court may appeal to the Supreme Court of the United States, under the same regulations now provided by law in respect of security for such appeal, but such appeal shall not operate to stay or supersede the order of the court or the execution of any writ or process thereon."

From this it will be seen that if a lower court upholds the finding of the Interstate Commerce Commission the defendant cannot postpone its execution pending a hearing before the U. S. Supreme Court. A section styled the "New Section" of the Interstate Commerce Act gives the circuit and district courts of the United States jurisdiction in alleged overcharges in interstate traffic, and provides that the money involved be paid into the court or otherwise as the court may think proper, pending the determination of the question of fact.

This clause, at the will of the court, prevents the common carrier from receiving a compensation for tonnage handled while the case is before the courts, and will have a tendency to cause an early settlement rather than protracted litigation.

Bituminous.

A large tonnage continues to come forward. Shipments, however, show signs of falling off in volume. In fact, contractors who have been busy laying in supplies in excess of immediate requirements have their fill. For this reason affairs in the bituminous world will be quiet during the latter part of this month. There is considerable talk of increasing the seaboard allotment. Indeed, it is claimed that with present situation such an increase is necessary. Doubtless this feeling will weaken when the trade begins to feel the reaction which is in store for it.

Low freight rates continue to prevail, and the large number of large vessels pressed for charters indicates that the coal shipments are falling off. Rates are substantially the same as those quoted last week.

NOTES OF THE WEEK.

R. G. Feltus has been appointed general shipping agent of the Philadelphia & Reading Coal and Iron Company, with headquarters at the general office of the company.

It is said that the Lehigh Valley R. R. will connect with the Wilkesbarre & Western at a point near Shickshinny. This will give it a direct line to the undeveloped coal field lying between Kingston and Nanticoke.

Boston.

June 4.

(From our Special Correspondent.)

The advance of 15 cents which was instituted by the agents at their recent meeting to take place June 1, has had very little effect upon the action of the market up to the present. It is a trifle early to look for anything specially new from this source, and after a couple of weeks have elapsed any influence it may have will make itself manifest. The firm tone of the market was assurance enough to warrant an advance in prices, and a move in this direction was anticipated by dealers here for some time. The new price has not helped the demand any. Buyers appear content to await developments, and consequently there is very little doing. The new price is being adhered to by all the leading agents, although rumor says that more than one operator is working on the old prices. An early improvement is looked for in the demand. Agents say that when buyers realize that the new price has come to stay, they will not lose much time in making purchases.

The bituminous market is quiet. Coal continues to come forward rapidly, and agents are active trying to keep it moving. Prices are being shaded to a considerable extent by some of the dealers. Coal on cars here will not command more than \$3.50. The cargo price, \$2.50 f.o.b., holds steady.

The freight situation continues steady. New York rates hold at 60¢/70¢. From Philadelphia, 70¢/75¢ is quoted, weak; from Baltimore, 75¢/90¢. There is very little call for coal at retail, and none is expected for some weeks. Prices are steady.

The city of Boston contract for hard coal was awarded to L. G. Burnham & Co., who, with Jordan & Co., were the only bidders upon the entire lot.

The receipts of coal at this port for the week ending May 30th were 33,805 tons of anthracite and 13,718 tons of bituminous, against 30,381 tons of anthracite and 24,718 tons of bituminous for the corresponding week last year. The total receipts thus far this year have been 619,333 tons of anthracite and 545,349 tons of bituminous, against 506,073 tons of anthracite and 387,083 tons of bituminous for the same period last year.

Buffalo, N. Y.

June 4.

(From our Special Correspondent.)

The retail price of anthracite coal was advanced 25c. per net ton on June 1st, excepting pea size. The quotations are now \$4.75 for grate, egg, stove and chestnut, and \$3.75 for pea. Trade is moderately active.

Wholesale quotations of anthracite coal were also advanced 15c. per gross ton over May quotations. The rates now are \$4.55 for grate and \$4.65 for egg, stove and chestnut, f. o. b. vessels, Buffalo; \$4.30 for grate, and \$4.40 for egg, stove and chestnut on cars at Buffalo and at bridges for shipment west.

Bituminous coal is quiet and the market easy; supply large. Published rates are nominal at present.

Vessel owners have made no money this season thus far, and a considerable number of vessels have not yet been taken out of winter quarters. Many propellers have come down to Buffalo light and the up freight alone does not pay expenses. The rates ruling here from opening of navigation to June 1st were: To Chicago, 60c.; to Milwaukee, 50¢/60c.; to Toledo, 40¢/50c.; to Detroit, 25¢/30c.; and to Duluth and Superior, 40c. per net ton. There was a good demand for vessels this week for all ports on the upper lakes, also Toledo and Detroit. The annexed statement of the coal shipments this season shows great activity and in the aggregate beats the record of 1890 by nearly 100,000 net tons.

Receipts and shipments of coal by railroads at Buffalo were not reported. There have been no receipts by lake thus far this season. Shipments by lake from the opening of navigation to June 1st were 445,610 net tons, as compared with 354,010 tons in 1890 and 360,570 tons in 1889. The receipts by canal this season to June 1st were 481 net tons, as compared with 967 tons in 1890 and 3,102 tons in 1889; the shipments to June 1st were 5,919 net tons, as compared with 223 tons in 1890 and 843 tons in 1889.

The coal shipped by lake from this port for this season to June 1st was distributed about as follows:

| To— | Net tons. | To— | Net tons. |
|-------------------|-----------|--------------------|-----------|
| Chicago..... | 171,360 | Sheboygan..... | 9,930 |
| Milwaukee..... | 98,100 | Bay City..... | 1,120 |
| Duluth..... | 46,035 | Pt. Barwell..... | 30 |
| Toledo..... | 27,917 | Superior..... | 37,340 |
| Racine..... | 14,440 | Green Bay..... | 4,750 |
| Kenosha..... | 6,330 | Saginaw..... | 2,130 |
| Gladstone..... | 6,300 | Deperre..... | 1,210 |
| Detroit..... | 5,080 | Alpena..... | 100 |
| Manistique..... | 60 | Fort William..... | 4,060 |
| Ashland..... | 1,250 | S. Ste. Marie..... | 630 |
| Mackinaw..... | 150 | Cheboygan..... | 1,050 |
| Sundry ports..... | 6,208 | | |

At Toledo the dispute between the coal handlers and their employers has been settled on the basis of 11 cents per ton, with wages to be paid weekly.

On Tuesday last at a meeting of the Buffalo Freight Committee it was decided to adopt the anthracite coal tariff of last November for all Illinois points north of Rock Island on and after the 15th instant, provided the approval of the western railroads is given in the meantime.

Mr. Robert R. Hefford is building an addition to his coal elevator on the Blackwell canal, in the shape of a coal trestle. The old trestle of the Lehigh Valley on the Blackwell canal is to be torn down, as all business is now concentrated on the Tift Farm improvements.

The headquarters of Mr. W. L. Kingman (lately at Rochester, N. Y.), the general coal agent, of the New York Central Railroad and its leased lines, is now in New York City.

The Fire Commissioners of our city, a few days since awarded the contract for supplying the fire department with coal for one year from June 1st to Messers. P. & G. Groben. The price for nut, egg and stove was \$4.75 per net ton; for bituminous \$1.45 per net ton. The exact amount of coal to be provided was not specified, the contract being for all that will be needed during the year, estimated at about 1,400 net tons.

Chicago.

June 4.

(From our Special Correspondent.)

Operators and shippers of anthracite are making no sales for forward delivery beyond June 30. All orders unfilled, or parts of orders not shipped before July 1, are subject to cancellation, or if shipments are continued an advance on circulars will be charged. The stocks of hard coal at this point are about 75,000 tons less than they were at this time a year ago. It is more than likely that the season will open earlier than usual, as dealers and consumers have little or no coal on hand. There is already quite a good inquiry from some of the larger country towns tributary to this center, and the recent advance has been discussed in all of its bearings, and is apparently acceptable generally to the trade. The tone of the market is confident and healthy.

Bituminous coal is in very fair demand and in excess of that of a year ago, though on some grades prices are somewhat irregular. There is still a considerable amount of trouble in the soft coal mining region around Ottumwa, Ia.; Spring Valley, Ill., and at several points in Indiana. At Washington, Ind., Cable & Co. have closed their four mines until autumn on account of some of the men going on strike. This affects upward of 600 men. It is generally believed that nearly all classes of soft coal will advance later on.

The is still meager and altogether

insufficient. Demand is greatly in excess of supply, and, naturally, prices are very firm.

Prices of anthracite per ton of 2,000 pounds f. o. b. Chicago are: Lehigh lump, \$6.75; large egg, \$5.40; small egg, range and chestnut, \$5.40. Retail prices per ton are: Large egg, \$6.25; small egg, range and chestnut, \$6.50.

Prices of bituminous per ton of 2,000 pounds f. o. b. Chicago are: Pittsburgh, \$3.25; Hocking Valley, \$3.10; Youghiogheny, \$3.40; Indiana block, \$2.35@ \$2.50; Illinois block, \$2.15@ \$2.25.

Coke.—Connellsville, 72-hour, per ton f. o. b. Chicago, \$5.05; crushed, \$4.75; Walston, \$5; New River, \$5.

Pittsburg. June 5.

(From our Special Correspondent.)

Coal.—The firmness noted for some time continues. Since our last report there has been a slight rise in the Ohio River, but not sufficient for boating purposes; still a few tows were sent out with about 1,500,000 bushels; as was predicted, several of the tows grounded and some were sunk. The amount loaded and ready for shipment upon the first rise (there is invariably a rise in June) will exceed 18,000,000 bushels. It will require a boating stage for at least two weeks to take out the coal loaded. As soon as all the empties are loaded the mines will be closed down for want of boats to load. Coal in the lower markets is scarce and prices are still going up.

Connellsville Coke.—The big coke strike is now a thing of the past, and if the coke workers are wise it will be a long time before we have another. The loss in money has been large, the amount of suffering great, and we fail to see who has been benefited. Prices of coke are nominal at \$1.90; the new scale is not yet decided on. The trade prospects are improving, as the railroads have indicated that they will make some concessions. The week's output was 63,207 tons; previous week, 50,825 tons; increase, 12,382 tons. Shipments were 2,716 cars, consigned as follows: To Pittsburg and river ports, 919 cars; to points west of Pittsburg, 1,432 cars; points east of Connellsville, 365 cars. The shipments to Pittsburg and the West are about 50% of the average in good times; shipments East not more than 25%.

METAL MARKET.

Prices of Silver Per Ounce Troy.
New York, Friday Evening, June 5, 1891.

| May | June | May | June | May | June | May | June |
|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 30 ^e | 1 ^e | 2 ^e | 3 ^e | 4 ^e | 5 ^e | 6 ^e | 7 ^e |
| Sterling | London | N. Y. | London | N. Y. | London | N. Y. | London |
| Exch'ge. | Price. | Cts. | Exch'g. | Price. | Cts. | Exch'g. | Price. |
| ..... | ..... | ..... | 3 | 4.88 | 44½ | 97½ | |
| 4.88 | 44½ | 96¾ | 4 | 4.88 | 44½ | 97½ | |
| 4.88 | 44 5-16 | 97½ | 5 | 4.88 | 44¾ | 97¾ | |

* Holiday.

There have been large buying orders in this market, supposed to be for foreign account, and prices have also received an impulse on the shipment of 500,000 ounces to London. The market closes steady at the advance.

The United States Assay Office at New York reports total receipts of silver for the week to be 126,000 ounces.

Government Silver Purchases.

The Treasury Department informs us that the amount of silver purchased during the past week was as follows:

| | Offered, ounces. | Purchased, ounces. | Average price. |
|-------------|------------------|--------------------|----------------|
| June 1..... | 556,000 | 216,000 | .9716 |
| " 3..... | 944,000 | 320,000 | .9776 |

WASHINGTON, D. C., June 5.—(By Telegraph.)—The Treasury Department purchased 434,600 ounces of silver to-day at prices ranging from .978 to .981.

Silver Bullion Certificates.

| | Price. | | Sales. |
|---------------------------|--------|-----|---------|
| | H. | L. | |
| May 30 ^e | 97¼ | 97¼ | 80,000 |
| June 1..... | 97¾ | 97¾ | 170,000 |
| June 2..... | 97¾ | 97¾ | 135,000 |
| June 3..... | 97¾ | 97¾ | 71,000 |
| June 4..... | 98 | 97¾ | 47,000 |
| June 5..... | 97¾ | 97¾ | |
| Total sales..... | | | 503,000 |

* Holiday.

Domestic and Foreign Coin.

The following are the latest market quotations for American and other coin:

| | Bid. | Asked. |
|---------------------------------------|-------|--------|
| Trade dollars..... | \$.76 | \$.79 |
| Mexican dollars..... | .76 | .77 |
| Peruvian soles and Chilean pesos..... | .75 | .76½ |
| English silver..... | 4.86 | 4.88 |
| Five francs..... | .94 | .95 |
| Victoria sovereigns..... | 4.88 | 4.90 |
| Twenty francs..... | 3.87 | 3.89 |
| Spanish doubloons..... | 4.75 | 4.78 |
| Spanish 25 pesetas..... | 15.55 | 15.70 |
| Mexican doubloons..... | 4.78 | 4.85 |
| Mexican 20 pesos..... | 19.50 | 19.90 |
| Ten guilders..... | 3.96 | 4.00 |
| Bar silver..... | .97¾ | .98¼ |

Coinage at the Mints of the United States.

The following statement shows the coinage executed at the mints of the United States during May, 1891:

| Denomination. | Pieces. | Value. |
|-----------------------|-----------|-------------|
| Double eagles..... | 44,000 | \$880,000 |
| Eagles..... | 9,000 | 90,000 |
| Half eagles..... | 22,000 | 110,000 |
| Total gold..... | 75,000 | \$1,080,000 |
| Standard dollars..... | 2,591,831 | 2,591,831 |
| Dimes..... | 2,210,754 | 221,075 |
| Total silver..... | 4,802,585 | \$2,812,906 |
| Five cents..... | 486,000 | 24,300 |
| One cent..... | 1,300,000 | 13,000 |
| Total minor..... | 1,786,000 | 37,300 |
| Total coinage..... | 6,663,585 | \$3,930,206 |

U. S. Bonds.

The Secretary of the Treasury issued a circular on the 2d inst. notifying holders of outstanding 4½% bonds that the existing rate of interest on those bonds will cease September 1st next, and that such bonds are not redeemed on or before that date may be extended for an indefinite period with interest at 2%. It is estimated that \$23,000,000 of these bonds are held by National banks to secure circulation, and that \$10,000,000 more are held in trust by banks and other institutions, and that there will be no difficulty in extending this amount at a lower rate of interest. This will leave only \$18,000,000 bonds to be redeemed in case the holders are not prepared to extend them.

Gold Exports.

Gold shipments continue to be made from this country upon a large scale. The amount of gold taken for export during the first five days of this week amounted to \$6,850,000, and \$1,500,000 additional goes to-day. Among the shipments of the week was that of \$500,000 from Boston, which is the first that has been made from that port for some time.

Foreign Bank Statements.

The governors of the Bank of England, at their weekly meeting on Thursday, lowered its minimum rate of discount from 5% to 4%. In the week the bank gained £3,109,116 bullion, and the proportion of reserve to liabilities was raised from 40.60% to 44.35%, against an advance from 41.94% to 42.67% in the corresponding week last year, when its discount rate was unchanged at 3%. On the 4th inst. the bank gained £422,000 bullion on balance. The weekly statement of the Bank of France showed an increase of 4,575,000 francs in gold and 4,525,000 francs in silver.

Copper.—The strong market for copper remains practically unaltered since last week. The rise in London has been fully upheld; a slight reaction took place in the course of the week, but the market regained its natural strength, and closes to-day at £55 7s. 6d. for spot and £56 2s. 6d. for three months. According to latest advices received the bullish feeling in London continues unabated.

The prices realizable in Europe for all kinds of copper are now fully equal to and in some cases decidedly better than what American consumers are willing to pay. So far the great body of consumers in the United States do not as yet appear to have shown any confidence in the upward movement, the reason being that the demand for manufactured goods has so far not improved. There is no doubt but that the continued and extensive exports of all kinds of copper will have their effect before long, and as soon as any demand shall spring up we are sure to find the market pretty bare of supplies and producers reluctant sellers. At present Lake copper cannot be bought below 13c., and we hear of some smaller parcels having changed hands at slightly higher prices. Arizona pig copper is not obtainable in any quantity, and casting copper is held very firmly at between 11½c. and 12c. A further advance may be expected at any moment. Prices for best selected and tough remain unchanged from last week.

We are reliably informed that the great Anaconda sale is going through. The debenture and preference shares have all been "underwritten," and only the £1,000,000 of common stock is to be put on the market simultaneously in London, Paris, Berlin and New York. The Anaconda matte in England is all sold; 5,000 tons about two weeks ago on a basis G. M. B. and G. M. C. over three months, and the other 5,000 tons a week ago; delivery extending over a year on the same basis. As the remainder of the stock is held by friends of the new Anaconda company, and the mine is shut down, the market price of copper must improve. The prospectus is ready, but it may be September before the money market looks sufficiently auspicious to launch the new concern. The recent drop in copper on the Exchange in London was due to the belief that the object of Mr. Livermore's visit to Europe was to place a large line of Lake. There seems to be a very erroneous impression abroad about the stocks of copper in the United States. They are, in fact, lighter than on the first of the year, and are not likely to increase. The outlook for copper appears to us to be good, and higher prices may rule at no distant date.

The exports of copper from the port of New York during the past week were as follows:

| To | Copper Matte. | Lbs. | Value. |
|-------------------------|---------------|---------|----------|
| By S. S. Runic..... | 4,605 bags. | 445,419 | \$34,000 |
| " " Germanic..... | 2,165 " | 247,575 | 17,000 |
| To Havre— | Copper. | Lbs. | |
| By S. S. La Bretagne... | 99 casks | 123,750 | \$18,000 |
| " " " " " " " " " " | 299 bars | 40,530 | 5,472 |
| To Hamburg— | Copper. | Lbs. | |
| By S. S. Amalfi..... | 90 casks. | 112,500 | \$14,625 |

Tin.—The market has developed considerably more strength during the week, prices advancing steadily in London as well as in the New York market, and in New York especially for June and July delivery. The statistics published during the week show a decrease of 600 tons, and this fact coupled with the continued small shipments from the Straits has no doubt influenced the market. The attention of consumers has also been drawn to the steadily advancing prices, and we are informed that the jobbing business has improved materially and inquiries are much more frequent. Prices here in New York are: for spot, 21½c.; June, 21½c.; July, 21½c.; August, 21c.; September, 21c.

The London market closes to-day at £94 for spot and £94 5s. for futures.

Lead.—We have to record a further advance and active business. Rather considerable quantities have been dealt in, and as high as 4½c. has been paid in New York for several hundred tons. Consumers continue to buy freely at the advance.

The London market is quoted at £12 12s. 5d. for Spanish and £12 15s. for English.

Chicago Lead Market.—Messrs. Everett & Post telegraph us as follows: "Market has ruled strong with quite an active demand. Sales foot up 600 tons at 4.20@4.25c. At the close 4.30c. is asked, with but little offering."

Spelter.—Values for this metal so far remain unchanged. Stocks in the hands of producers are light, and no disposition is evinced to sell forward delivery at prices at present obtainable for spot.

Antimony.—Antimony is obtainable at some what lower prices, and we quote: Hallett's, 14c.; L. X., 14½c.; Cookson's, 15½c.

At these lower prices consumers are eager buyers.

Quicksilver.—This market, aside from a quiet, steady trade, is featureless. The demand is moderate and prices remain about as last quoted, namely, \$43@44 for New York, and £8 for London.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, June 5.

All dealers agree that the local iron market could hardly be in more stagnant condition. The common verdict is that there is no business doing worth mentioning. The prime reason for this state of affairs is, of course, the strike of the foundry-men and house-smiths, which is still in progress. Notwithstanding the signs of weakening which were apparent a fortnight ago, the men are now as firm as ever, and no one can at the present time predict the outcome of this struggle. The few iron founders who started up their works a week ago last Monday are endeavoring to carry on their business, but are running shorthanded yet.

It is difficult to define the position of the iron market in general, reports from inland cities being so variable. There does not seem to have been any material change from last week, however, unless it be a slightly better feeling on account of the good crop reports. The settlement of the coke strike has occasioned a feeling of relief in all markets, although it has not had much effect upon them. We learn that several furnaces in the Mahoning and Shenango valleys are preparing to blow in again, some of them having made contracts for iron extending over the year. There is no evidence, however, that this resumption of work will be general.

American Pig Iron.—The market is very quiet, and absolutely without new features to report. We continue to quote prices: Northern No. 1 X, \$17.50@18; No. 2 X, \$16.50@17.50. Southern, No. 1 X, \$17.50@18; No. 2 X, \$16.50@17.

Spiegeleisen and Ferro-Manganese.—There is little business passing, and none but small lots are changing hands. We quote: Spiegeleisen, 20%, \$27.50@28.50; ferro-manganese, 80%, \$64.50@65.50.

Steel Rails.—Since the large transactions which we noted last week there have been none of consequence. The price remains unchanged at \$30 at the mills; \$30.75 at tidewater.

Rail Fastenings.—The spike manufacturers report business excessively dull, but that they are determined to get higher prices nevertheless. There seems to be an understanding among them to this effect. We quote spikes at \$2 delivered in New York, and dealers show no inclination to make concessions from this price. Angle plates are quoted at 1.70@1.80c.; bolts and square nuts, 2.65@2.75c.; hexagonal nuts, 2.85c., complete joint, iron and steel, according to weight.

Tubes and Pipe.—Business is reported to be very good. We continue to quote prices and discounts on car-load lots as follows: 47½% on hutt, black; 40% on galvanized; 60% on lap, black; 47½% on lap, galvanized; boiler tubes, 50% on all sizes; casing, all sizes, 50%.

Structural Iron and Steel.—The market does not show much change, orders still being small on

account of the strike of the housemiths. The effect of this is best appreciated by a walk through portions of the city where much building is going on and noticing the unfinished structures which are standing idle. We quote prices: Universal plates, \$2.25; bridge plates, \$2.10; angles, \$2.20; beams, \$3.10.

Merchant Steel.—Dealers report that business continues satisfactory, orders being freely placed. Prices are firm at the following figures: Best English tool, 15c., net; American tool steel, 7@8c.; special grades, 13@20c.; crucible machinery steel, 5c.; crucible spring, 3½c.; open hearth machinery, 2@60c.; open-hearth spring, 2@60c.; tire steel, 2@60c.; toe calks, 2@60c.; first-quality sheet, 10c.; second-quality sheet, 8c.

Old Rails.—The market is absolutely lifeless and prices depend entirely upon whether one is buyer or seller. We quote, nominally, \$21.50@22.50 for tees and \$25 for doubles.

Wrought Iron Scrap.—There is nothing doing. We quote: \$21@22 at yards.

Chicago. June 4.

(From our Special Correspondent.)

The local iron market exhibits hardening tendencies for both raw and finished material, which is the direct result of the heavy buying during May. June opens with many inquiries for large and small lots of coke and charcoal iron, mostly for forward delivery, and prices are decidedly stiffer for both grades. Three furnaces in this vicinity, with a combined monthly capacity of upward of 15,000 tons of coke foundry iron, went into blast last week. Except from the railroads demand for manufactured iron and steel is good, with possible exception of plates, though an improved inquiry is noted for tank steel. Old material and scrap are moving very slowly. There is very confident feeling in the market generally on account of the favorable crop prospects.

Pig Iron.—The week just closed, though broken by a holiday, has shown some large sales of local coke iron for forward, scattered deliveries, mainly to implement manufacturers, though several consumers in other lines were also represented. Two furnaces at Bay View, Milwaukee, and one at North Chicago were blown in last week, and their product is well sold up for several months ahead. Southern coke iron is firmer and furnace companies of that district are instructing agents not to accept contracts for long scattered deliveries without submitting same to headquarters for approval. The lowest price we hear of was a 2,000-ton order on the basis of \$10.25, Birmingham, Ala. The feeling is growing that better prices will be obtained a couple of months hence. All leading brands of Lake charcoal iron are held at \$18, and several orders for round quantities were booked at those figures last week. There are still several furnaces which offer limited quantities at \$17.50, but these cut no figure in the general market. Ohio softeners and silveries have sold well during the past two weeks in small quantities, and prices are now very firm as quoted.

Quotations per gross ton f. o. b. Chicago are: Lake Superior charcoal, \$18.00@19.50; Lake Superior coke, No. 1, \$15.75@16; No. 2, \$15.50@15.75; No. 3, \$14.75@15; Lake Superior Bessemer, \$17; Lake Superior Scotch, \$17@17.50; American Scotch, \$18.50@19; Southern coke, Foundry No. 1, \$16.25; No. 2, \$15.75; No. 3, \$15.25; Southern coke, soft, No. 1, \$15.75; No. 2, \$14.75; Ohio silveries, No. 1, \$18; No. 2, \$17; Ohio strong softeners, No. 1, \$18.50; No. 2, \$17.50; Tennessee Charcoal, No. 1 \$18; No. 2, \$17.50; Southern Standard Car Wheel, \$21@23.

Structural Iron and Steel.—Several new large buildings are under consideration which will require a good tonnage of beams and other structural material. Local demand from dealers is active. Quotations remain unchanged for car lots f. o. b. Chicago: Angles, \$2.20@2.25; tees, \$2.75@2.85; universal plates, \$2.35@2.45; sheared plates, \$2.30@2.40; beams and channels, \$3.20.

Plates.—Demand is less active for mill lots, though several large inquiries have come forward for tank steel. Warehouse business is fairly active for small quantities and the outlook is encouraging. Quotations remain unchanged: Steel sheets, 10 to 14, \$2.70@2.80; iron sheets, 10 to 14, \$2.60@2.70; tank iron or steel, \$2.50@2.70; shell iron or steel, \$3@3.25; firebox steel, \$4.25@5.50; flange steel, \$3.25@3.40; boiler rivets, \$4.25; boiler tubes, 2½ inches and smaller 55% larger than 2½ inch 60%.

Merchant Steel.—Demand from agricultural implement makers is excellent and numerous contracts were placed during the week, aggregating a large tonnage. Tool steel is in fair request from store, and at least one large order was placed by a railroad terminating here. Prices remain unchanged: Tool steel, \$6.75@7; tire steel, \$2.30@2.50; toe calk, \$2.50@2.65; Bessemer machinery, \$2.20@2.30; open-hearth machinery, \$2.60@2.75; open-hearth spring, \$2.75@3; crucible spring, \$3.75@4.

Steel Rails.—Several inquiries for fair-sized amounts, mostly for early delivery are now in the market, and the outlook is greatly improved, as a much better demand is expected in the course of a few weeks. Quotations are steady at \$31 for round lots and \$32.50 for small quantities. East-

ern mills are getting \$33 for carload lots f. o. b. Chicago. Other track supplies are in fair demand and spikes have been advanced 5@10c. per keg. Spice bars at \$1.95@2 for steel and \$1.85@1.95 for iron, and spikes at \$2.10@2.15 per 100 pounds.

Galvanized Sheet Iron.—Mill agents here have been instructed to hold prices exceedingly firm, and an early advance is now assured on this material. Contracts for forward delivery are not accepted except at an advance on present price. Business from warehouse is very good. Discounts are firm at 67½% off on Juniata and 67½% and 5% off on charcoal.

Black Sheet Iron.—Mill orders are numerous for 2,000 to 5,000 bundles for late summer and early fall delivery, and prices are very firm at 2@85@2@90c. for No. 27 common, and 3@20c. from stock here. Sheet steel is quoted at 3@20c. rates from warehouse.

Bar Iron.—Demand continues active from implement makers, and two of the larger manufacturers here have placed their orders for the season. Several car specifications are also in the market, and prices are held very firmly. Local mills quote 1@7½@170c. according to character of the business offered, and Valley mills 1@55@1@60c. at mill with half extras. Dealers report trade fair at 1@85@2c., according to quantity, quality, etc.

Nails.—Steel cut are again in better demand in this market, and one manufacturer's agent sold upward of 20,000 kegs to a western dealer at a little under \$1.60. Store price is \$1.80 for small lots, with 5c. off for carloads. Wire nails are weak and demand light from mill and store. Price is \$1.95 at mill and \$2.20 from store in small quantities.

Scrap.—Excepting for car lots, demand is extremely light and prices are nominal only. Quotations per net ton f. o. b. Chicago are: No. 1 railroad, \$18.50; No. 1 forge, \$18; No. 1 mill, \$14; fish-plates, \$21; axles, \$23.50; horseshoes, \$18; pipes and flues, \$13; cast borings, \$8; wrought turnings, \$10.50; axle turnings, \$12.50; machinery castings, \$11.50; stove plates, \$8; mixed steel, \$11; coil steel, \$15.50; leaf steel, \$15.50; tires, \$17.

Old Rails and Wheels.—Demand is exceedingly light, and, with the exception of a few small lots of iron rails which sold at \$22.50@22.75, there is nothing doing. Steel rails are dull at \$14@17, according to length and condition. Old car wheels are not moving, though offered at less than \$15.50.

Louisville. May 30.

(Special Report by Hall Bros. & Co.)

A number of inquiries for round lots have been made and some large purchases are reported, but while the general buying movement appears to be steadily growing, it has not yet increased sufficiently to establish an advance in prices. Sales of grey forge and No. 2 soft have been reported at about \$10 four months, Birmingham district, for forward delivery. There is a more hopeful feeling about the crop prospects, and in the money circle banks report an unusually heavy demand for this time of year, and while all demands from regular customers are promptly met they are not seeking outside business. As the money loaned is for legitimate business purposes, no uneasiness is felt from the extra demand. We quote:

Hot Blast Foundry Irons.—Southern coke, No. 1, \$14.25@14.50; No. 2, \$13.75@14; No. 3, \$13.25@13.50. Southern charcoal, No. 1, \$16.50@17; No. 2, \$16@16.50. Missouri charcoal, No. 1, \$17@17.50; No. 2, \$16.50@17.

Forge Irons.—Neutral coke, \$12.50@13; cold short, \$12.50@13; mottled, \$12@12.25.

Cr Wheel and Malleable Irons.—Southern, standard brands, \$19.50@20; Southern, other brands, \$17.50@18. Lake Superior, \$20.50@21.50.

Cleveland. June 4.

(From our Special Correspondent.)

Since our last report the iron industry of the North has come to the conclusion that the railroads are determined to ruin their business and give all the advantage to the Southern iron industry. The railroads from the mines to Lake ports have practically refused to make any reduction whatever on iron ore or pig iron. The same course has been followed by the railroads leading from Lake Erie ports to the furnaces both east and west of the Alleghenies. The coke men and the railroads carrying the coke have likewise refused to grant any concession, and it must be borne in mind that this uncompromising attitude is in the face of the fact that prices are lower than they ever have been before, and that there is no reasonable probability of any marked reaction in the future.

It appears that low prices have come to stay, although they may fluctuate some from time to time. Even under these conditions, however, it is impossible for either the iron mines or the furnaces to stop doing business. They will continue to a limited extent in order to keep in motion the enormous capital already invested in their businesses.

Furnaces in the Mahoning and Shenango valleys are preparing to go again into operation. The miners and consumers have finally agreed on a basis of price, and large sales of ore have been consummated. The principal transactions have been in the richer grades, as they are the only ones that can stand the ruinous prices which prevail. The ores that are moved most freely are the Minnesota,

Chandler, Cleveland, Lake Superior, Norrie and Lake Angeline.

Another feature which has disarranged the conditions of trade is the strike of the ore handlers at Lake Erie ports, so that at Cleveland and Ashtabula, the two largest ore-receiving ports on the lakes, there have been no vessels unloaded since the opening of navigation. As compared with last year, shipments to date thus far this year are at least 1,500,000 tons less. The season is already one-fifth gone. Under no circumstances can the time be regained, and it is likely that shipments from the mines this year will be somewhere between 5,000,000 and 6,000,000 tons, or from 3,000,000 to 3,500,000 tons less than in 1890. This will, undoubtedly, bring about a hardening in prices next fall and winter, although no marked advance is expected.

The prevailing quotations are as follows:

| Specular and Magnetic Ores. | |
|-------------------------------|-----------------------|
| Bessemer..... | 66@69.....\$5.25@6.00 |
| ..... | 60@61.....4.25@5.00 |
| Non-Bessemer..... | 66@69.....4.50@4.75 |
| ..... | 62@65.....4.00@4.50 |
| ..... | 57@60.....3.25@3.85 |
| Soft Hematites, Dried at 212° | |
| Bessemer..... | 62@65.....\$4.00@4.50 |
| ..... | 58@61.....3.50@4.00 |
| Non-Bessemer..... | 55@63.....3.25@4.25 |

Above prices are for deliveries at Lake Erie ports.

Philadelphia. June 4.

(From our Special Correspondent.)

Pig Iron.—There is too much anxiety on the part of makers of pig iron to either sell stocks on hand or secure contracts for the coming summer to attach any importance to the statements made in some quarters that prices are going to advance 25 to 50 cents for foundry and forge iron. A half dozen concerns are talking up the idea, and giving it out that it is likely to occur, but these same concerns are glad to take orders at \$18 and \$15 respectively. The situation is certainly a little better than it has been since last fall, and it is stated on the street that a number of Eastern anthracite furnaces will shortly blow in, but this statement must be hung up for the present. More iron of all kinds is selling. A good many contracts for summer delivery have been placed yesterday and to-day; there is no rush whatever, and no occasion for any. Southern iron is also being offered, and some small lots selling. No. 2 iron is rather dull, but would sell well if offers were accepted. Quotations are \$16@16.50. Very little Bessemer has been sold, and scarcely any inquiries are reported.

Foreign Material.—A few transactions have just been closed at \$64.

Steel Billets.—Between 6,000 and 7,000 tons are the figures given for the transactions for the past two or three days. Quotations, \$27.50 to \$28.

Merchant Iron.—Mill men at last think there will be a good deal of business placed this month, and certainly there ought to be considering the number of rumors in that direction. Prices have touched rock bottom, and there is no doubt but some large contracts will be made for finished iron for delivery during the next two, three and possibly four months. Sales of 100-ton lots have been made at \$1.60 and less.

Muck Bars.—\$26.50 is the usual price, delivered. Two offers were made to-day at \$26.

Skelp Iron.—Demand is irregular; quotations, \$1.70@1.85 respectively.

Wrought Iron Pipe.—At last, after a good deal of haggling over terms, two or three good-sized lots have been placed. A good deal of business is also about to be placed for tubes.

Sheet Iron.—The market is in the most unsatisfactory condition. It is evidently not altogether the fault of buyers, but makers are averse to selling iron for long periods ahead at scarcely any margin, which is about what they are obliged to do now.

Plate and Tank Iron.—Rumors have been afloat within the last two or three days that another cut has been made in iron and steel plate; this seems incredible considering the prices at which business has been done within a month. The explanation is that a large amount of work is to be placed, and that much of it will be perhaps disposed of before Saturday. Quite an improvement has taken place in business already, and if orders amounting to a few thousand tons are placed as it is said there will be, the extremely low quotations will disappear. Iron and steel tank are selling at from 2c. to 2½c.; shell, 2@30@2@40c.; steel flange, 2@50c.; steel fire-box, 3c.

Structural Iron.—A large amount of business will be undoubtedly closed before the end of this month for structural material. Contracts have already been placed for a good deal of material, but the details are for the present withheld. Angles are 2@2½c.; tees, 2@50c.; beams, 3@10c.

Steel Rails.—The bulk of this week's business has been done at \$30.50. The interior mills have been picking up a good deal of business, some of it coming from the New England states; for large lots \$30 is the price.

Old Rails.—Quotations, \$22.50.

Scrap.—No. 1 Railroad Scrap, \$21.50.

DIVIDEND-PAYING MINES.

NON-DIVIDEND PAYING MINES.

Main table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS, DIVIDENDS, and NON-DIVIDEND PAYING MINES. Includes entries for Adams, S. L. C., Albee, S., Alima & Nel Wood, G., Amador, G., American Bell, S. G., American Nettie, G. S., Amy & Silversmiths, Atlantic, C., Argenta, S., Aspen Mt. & S. S. L., Aurora, L. G., Badger, S., Bangkok Cora-Bells, Belle Isle, S., Belcher, S., Bellevue, Idaho, Bi-Metallic, S. G., Bodie Con. G. I., Boston & Mont. G., Boston & Mont. G. S., Brand, I., Brooklyn Lead, L. S., Brooklyn, Beck & C. S. L., Bulwer, G., Bunker Hill & S., Calcedonia, G., Callope, S., Calumet & Hecla C., Catalpa, S. L., Central-Eureka, S. L., Central, G., Chrysolite, S. L., Clay County, G., Clair D'Alene, S. L., Colorado Central, S. L., Commonwealth, S., Confidence, S. L., Cons. Cal. & Va., S. G., Contention, S., Cop. Queen Con. C., Cortez, S., Crescent, S. L. G., Crown Point, G. S., Cumberland, L. S., Daly, S. L., Deer Creek, S. G., Deadwood-Terra, G., Deere B. Grav., G., Junkin, S. L., Junstone, G. S., Eclipse, L. S., Elkauru, S. L., Enterprise, S., Eureka Con. S. L. G., Evening Star, S., Fathet de Smet, G., Franklin, C., Freeland, S. G., Fairfield, L. G. S., Gould & Curry, S. G., Grand Prize, S. G., Granite, S. L., Granite Mountain, S., Green Mountain, G., Hale & Norcross, G., Hecla Con. S. G. L. C., Hel'a Mt. & Red, S. L. G., Holmes, S., Honestake, G., Honorable, S. L., Hope, S., Horn-Silver, S. L., Hubert, G., Idaho, G., Illinois, N. M., Iron Hill, S. L., Iron Mountain, S., Iron-Silver, S. L., Jackson, O. S., Jay Gould, S., Kearsegar, C., Kentuck, S. G., La Plata, S. L., Leadville Con. S. L., Lexington, G., Little Chief, S., Little Rule, S., Mammoth, S. L. C., Martin White, S., Mary Murphy, S., Matchless, S. L., May Maz ppa, S. L., Minas Prietas, S. G., Minnesota, C., Mollie G. H. Con., S. Dak., Monitor, G., Mono, G., Montana, L. G. S., Morning Star, S., Moulton, S. G., Mount Pleasant, G., Mt. Diablo, S., Napa, Q., Nava, G., Nevada, S., New Guston, S., N. Hoover Hill, G. S., Northern Belle, S., Northern Belle, S., North Star, G., Ontario, S. L., Ophir, G., Original, S., Oro, S. L. G., Jaccolia, C., Parrot, C., Peacock, S. G. C., Plumas Eureka, G., Plymouth Con. G., Quicksilver, pref. G., Quincy, C., Reed National, S. G., Riato, G., Richmond, S. L., Ridge, C., Robinson Con. S. L., Running Lode, G., Savage, S., Sheridan, S. G., Shoshone, G., Sierra Buttes, G., Sierra Nevada, S., Sierra Nevada, S., Silent Friend, S., Silver Cord, S. L. G., Silver King, S., Silver Mt. of L. V. S. L., Small Hopes, G., Spring Valley, G., Standard, G. S., Stormont, S., St. Joseph, L., Sunnyside, G., Tamba'one, S. L., Tatum, G., Viola L., S., Ward Con., S., Woodstock, S. L., W. Y. O. D., Yankee Girl, S., Yellow Jacket, G. S., Young America, G.

G., Gold. S., Silver, L., Lead, C., Copper. * Non-assessable. + This company, as the Western, up to December 10th, 1881, paid \$1,000,000. † Non-assessable for three years. ‡ The Deadwood previously paid \$275,000 in eleven dividends, and the Terra \$75,000. Previous to the consolidation in August, 1884, the California had paid \$31,300 in dividends, and the Con. Virginia 40,000. § Previous to the consolidation of the copper Queen with the Atlanta, August, 1885, the Copper Queen had paid \$1,350,000 in dividends. ¶ This company paid \$190,000 before reorganization in 1890. ** This company acquired the property of the Raymond & Ely Company, which had paid \$3,075,000 in dividends.

NEW YORK MINING STOCKS QUOTATIONS. DIVIDEND-PAYING MINES. NON-DIVIDEND-PAYING MINES.

Main table of New York Mining Stocks Quotations, listing companies like Adams, Alice, Aspen, Atlantic, Belcher, etc., with columns for dates (May 30, June 1-5) and sales.

*Ex dividend. †Dealt in the New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. ¶Dividend shares sold, 10,500. Non-dividend shares sold, 38,800. Total New York, 44,300.

BOSTON MINING STOCK QUOTATIONS.

Main table of Boston Mining Stocks Quotations, listing companies like Atlantic, Bodie, Bonanza Development, Bost. & Mont., etc., with columns for dates (May 29, May 30, June 1-4) and sales.

Boston: Dividend shares sold, 8,565. Non-dividend shares sold, 5,580. Total Boston, 14,145.

COAL STOCKS.

Table of Coal Stocks, listing companies like American Coal, Cambria Iron, Cameron Coal & I. Co., etc., with columns for par value and dates (May 30, June 1-5).

*Holiday. **Sales in New York, 4,000; in Philadelphia, 9,003. Total sales, 59,370.

San Francisco Mining Stock Quotations.

Table of San Francisco Mining Stock Quotations, listing companies like Alpha, Alta, Belcher, Belle Isle, etc., with columns for closing quotations (May 29, May 30, June 1-4).

STOCK MARKET QUOTATIONS

Baltimore, Md.

Table with columns: COMPANY, Bid, Asked, L, H. Includes entries for Atlantic Coal, Balt. & N. C., Big Vein Coal, etc.

Prices bid and asked, lowest and highest, during the week ending June 3.

Birmingham, Ala.

Table with columns: COMPANY, Bid, Asked, L, H. Includes entries for Ala. Coal & I. Co., Ala. Conn. C. & C. Co., etc.

Pittsburg, Pa.

Table with columns: COMPANY, Bid, Asked, B, A. Includes entries for Allegheny Gas Co., Bridgewater Gas Co., etc.

CLOSING PRICES.

Table with columns: COMPANY, Bid, Asked. Includes entries for Adams, American & Nettie, Aztec, etc.

Trust Receipts.

Table with columns: Sales, H, L. Includes entries for American Cotton Oil, National Lead, etc.

Trust Stocks. June 5.

Table with columns: COMPANY, Highest, Lowest. Includes entries for Am. Cotton Oil, Sugar Refineries, etc.

Foreign Quotations.

Table with columns: COMPANY, Highest, Lowest. Includes entries for Almada, Mex., Amador, Cal., etc.

Paris. May 21.

Table with columns: Location, Price. Includes entries for Belmez, Spain, Callao, Venez., etc.

CURRENT PRICES.

Those quotations are for wholesale lots in New York.

CHEMICALS AND MINERALS.

Table with columns: Item, Price. Includes entries for Acid-Acetic, Carbonic, Chromic, etc.

Table with columns: Item, Price. Includes entries for Trinidad, refined, Egyptian, Baryta-Carbonate, etc.

Table with columns: Item, Price. Includes entries for Potassium-Cyanide, Bromide, Chlorate, etc.

THE RARER METALS.

Table with columns: Item, Price. Includes entries for Aluminum, Arsenic, Barium, etc.

BUILDING MATERIAL.

Table with columns: Item, Price. Includes entries for Bricks, Building Stone, Granite, etc.

\$12.00; 38, Safety Hammerless, 4 in., \$12.25; 38, Safety Hammerless, 5 in., \$12.50; 44, Single Action, 4 in., \$11.50; 44, Single Action, 5 in., \$11.75; 44, Single Action, 6, 6 1/4 in. 12.00; 44, Double Action, 4 in., \$12.50; 44, Double Action, 5 in., \$12.75; 44, Double Action, 6 1/4 in., \$13.00; 44, Double Action Favorite, 5 in., \$12.75.



Colts.
Discount, 10 per cent from following prices.

Double Action Army, 44 and 45 calibre, 4 3/4, 5 1/2, 7 1/2 inch bbl., \$13.00.
Double Action, 41 calibre, 2 1/4 to 6 inch bbl., \$11.20.
Single " 38 " 2 1/4 to 6 " \$10.00.
Single " Army, 45 calibre, 4 3/4, 5 1/2, and 7 1/2 inch bbl., \$12.00.
Single Action Army, 44 calibre, "Frontier," 4 3/4, 5 1/2, and 7 1/2 inch bbl., \$12.00.
New Line 32, \$4.00.
" " 30, 2.00.
" " 22, half or full plate, 2.10.
Old Model, 22 calibre, by the hundred, half or full plate, \$1.50.
Colt Deringer, 41 calibre, per pair half or full plate, 5.50.
National Deringers, 41 calibre, per pair, half or full plate, \$4.00.
New Police, 38, 4 1/4 in., nicked, \$6.66.



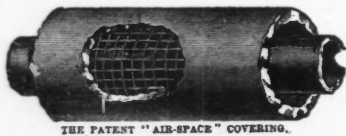
American Bull Dog

Double Action 32, 38 and 44 calibre, 2 1/4 inch barrel, \$1.60;
Double Action 32, 38 and 44 calibre, 4 1/4 inch barrel, \$1.85;
Double Action 32, 38 and 44 calibre, 6 inch barrel, \$2.10 net.

F. & W. British Bull Dog revolvers, 32 and 38 calibre 2 1/4 inch bbl., \$1.85 net.
F. & W. Automatic revolver, 32 and 38 calibre, 3 1/4 inch bbl., \$4.00 net.
H. & R. Automatic revolver, 32 and 38 calibre, 3 1/4 inch bbl., \$3.75 net.

Defender revolvers, Single Action, 22, wood handle, 65.
" " " " 22, rubber " 70.
" " " " 32, wood " 85.
" " " " 32, rubber " 90.
Remington Army revolver, Single Action, 44 cal., frontier cartridge, 5 1/4 inch barrel, \$6.50.
Remington Army revolver, Single Action, 44 cal., frontier cartridge, 7 1/2 inch barrel, \$6.00.
Remington Double Deringers, 41 cal., rim fire, \$4.05.

Asbestos Goods.



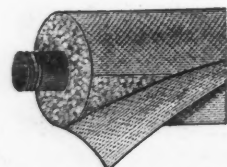
Patent air-space coverings. Per sq. ft., 25c. Discount, 20%.



Wick packing, per pound, 45c. Discount, 10%.



Removable pipe coverings. See list. Sq. ft. 20c. Disc., 25%.

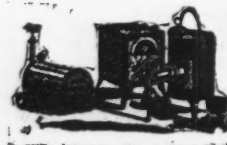


Fire felt covering for steam pipes. Per sq. ft., 25c. See list. Discount, 25%.

Asbestos fibre for filtering, per lb., 40c. disc 20%
Cord 3/8", and Sewing Twine, \$1.35
Asbestos cloth, 36 inches wide, per yard 2.25 " 10%
" cement for boilers, per bbl. 3.25 " 10%
" sheathing, per lb. .12 1/2 " 10%
" building felt, " .10 1/2 " 10%
" hair felt for hot and cold water pipes, per sq. ft. See spec. list.
Asbestos mill board, per lb. .12 1/2 " 10%
soldering blocks, per doz. See list.

Assay Furnace.

Hydro-Carbon Blow-Pipe Assay Furnace.
No. 2, Muffle Furnace taking C Battersea Muffle 8x4 1/2 x 3 in. \$10.00
No. 3, taking F Muffle, 10x6x4 in. 15.00
No. 1, Crucible Furnace taking Battersea, U or Colorado B Crucible, 4 in. dia. 5 1/2 deep. 4.00
No. 2, taking Batter-



As F. round, 5 in. dia., 6' 4 deep. \$5.00
Blow-Pipe No. 2, with half gallon tank, made entirely of seamless brass. 23.00
Blow-Pipe No. 3, with one gallon tank otherwise same as No. 2. 26.00
Blow-Pipe No. 2, Muffle Furnace No. 2, and Crucible Furnace No. 1. 37.00
Blow-Pipe No. 3, Muffle Furnace No. 3, and Crucible Furnace No. 2. 46.00
2 1/2 f. o. b. New York on wholesale orders.

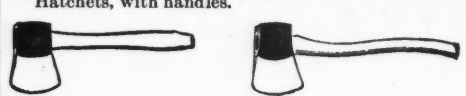
Axes, etc. Axes, Handled.
Brands, Collins. Sharp. Pecks. Dis., % doz. doz. doz. Net
3 1/4 @ 4 1/4 lbs. \$10.75 \$15.00 9.50
4 1/4 @ 5 1/4 lbs. 11.00 15.50 9.50
4 1/4 @ 6 lbs. 11.50 16.00 10.00
5 @ 7 lbs. 12.50 17.50 11.00

American Free-man
Brands, Hurd. Ideal. Blair. man. doz. doz. doz. Net
3 1/4 @ 4 1/4 lbs. \$8.50 \$11.00 \$8.00 \$6.50
4 1/4 @ 5 1/4 lbs. 8.50 11.00 8.00 7.00
4 1/4 @ 6 lbs. 8.75 11.25 8.25 7.00
5 @ 7 lbs. 9.00 11.50 8.50 7.50

Brands, Collins. Sharp. Pecks. Dis., % doz. doz. doz. 50 50 & 5
Three-quarter axe \$8.00 \$13.50 \$13.50 \$13.50

Brands, Collins. Hurd. Free-man. Dis., % doz. doz. doz. 60 50 25
Boys' axe, No. 2 8.00 13.50 13.50 13.50
Half axe 7.00 12.50 12.50 13.00
Quarter axe 6.50 10.00 10.00 11.00

Three-quarter axe \$13.50 \$13.50 \$7.50
Boys' axe, No. 2 13.50 13.50 7.50
Half axe 12.50 12.50 6.50
Quarter axe 12.00 12.00 6.00
Hatchets, with handles.



AXE PATTERN. HUNTER'S.
Both patterns, same price.

Collins. Sharp. Pecks. Sim-mons. Dis., % doz. doz. doz. 50 50 & 5 50
Dozen \$6.00 \$10.00 \$9.00 \$9.00



SHINGLING. CLAW.
Brands, Collins. Sharp. Pecks. Mann. Dis., % doz. doz. doz. 50 50 & 5 50.5
No. 1 Doz. \$4.75 \$8.00 \$8.00 \$8.00
No. 2 " 5.25 8.50 8.50 8.50
No. 3 " 5.75 9.00 9.00 9.00

Claw. Brands, Collins. Sharp. Blair. Mann. Dis., % doz. doz. doz. 50 50 & 5 50.5
No. 1 Doz. \$5.25 \$9.00 \$9.00 \$9.00
No. 2 " 5.75 9.50 9.50 9.50
No. 3 " 6.25 10.00 10.00 10.00



LATHING. BROAD.
Brands, Collins. Sharp. Pecks. Blair. Dis., % doz. doz. doz. 50 50 & 5 60.5
No. 1 Doz. \$4.75 \$6.75 \$8.00 \$8.00
No. 2 " 5.25 7.50 8.50 8.50
No. 3 " 5.75 8.25 9.00 9.00

Broad. Brands, Collins. Sharp. Pecks. Blair. Dis., % doz. doz. doz. 50 50 & 5 60.5
No. 2 Doz. \$11.50 \$11.00 \$11.50
No. 3 " 7.50 13.00 13.00 13.00
No. 4 " 8.00 14.50 14.50 14.50
No. 5 " 9.00 16.50 16.50 16.50
No. 6 " 10.00 18.00 18.00 18.00
Broad Axes. Steel polls.

Brands, Collins. Hunt. Sharp. Pecks. Dis., % doz. doz. doz. 50 50 & 5 50
Dozen \$20.00 \$30.00 \$29.00 \$32.00



YANKEE, OR OHIO. PENNSYLVANIA. NEW ORLEANS.
Brands, Collins. Sharp. Pecks. Blair. Mann. Dis., % doz. doz. doz. 50 50 & 5 50
Dozen \$19.00 \$32.00 \$32.00 \$32.00 \$32.00
Handled, extra, \$4.

Adzes. \$27.00 \$27.00 \$27.00 \$27.00

RAILROAD. SQUARE HEAD. SHIP CARPENTER'S
Brands. Collins. Hunt. Sharp. Pecks. Hurd
Dis., % 10 45 50 50 50 50
Rail d, heavy, doz. \$14.00 \$26.00 \$26.00 \$26.00 \$26.00
Flat head " 15.00 24.00 24.00 24.00 24.00
Brands. Collins. Hunt. Sharp. Pecks. Hurd.
Dis., % 10 45 50 50 50 100
Square head, doz. \$12.50 \$24.00 \$24.00 \$24.00 \$24.00
Brands. Collins. Hunt. Sharp. Pecks.
Dis., % 10 45 50 50
Ship Carpenter's or Spur
Head, doz. \$13.00 \$25.00 \$25.00 \$25.00



Brands. Collins. Hunt. Sharp. Dis., % 10 45 50
Cooper's, handled and bolted, doz. \$16.00 \$27.00 \$25.00

Axle Grease.
Frazer's (2-lb. tins), per gross \$18.00
2-lb. wooden boxes, per gross \$12.00
Discount, 25 and 5 %
Dixon's Everlasting, boxes 1 lb., per doz. \$1.20
" 2 lbs., " 2.00

See Oils, page 10.
Miner's Bellows: 24 in., \$8.50;
26 in., \$9.75; 28 in., \$11.00; 30 in., \$12.25; 32 in., \$13.50;
34 in., \$14.75; 36 in., \$16.00;
38 in., \$17.25; 40 in., \$18.50;
42 in., \$20.00; 44 in., \$21.50;
46 in., \$23.00; 48 in., \$24.50;
50 in., \$26.00; 52 in., \$27.50;
54 in., \$29.00; 56 in., \$30.50;
58 in., \$32.00; 60 in., \$33.50;
Hand Bellows, per doz.: 6 in., plain, \$10; fancy, \$20; 7 in., plain, \$12; fancy, \$24; 8 in., plain, \$14; fancy, \$28; 9 in., plain, \$16; fancy, \$32; 10 in., plain, \$18; fancy, \$36.
50% disc.



Miner's Bellows: 24 in., \$8.50;
26 in., \$9.75; 28 in., \$11.00; 30 in., \$12.25; 32 in., \$13.50;
34 in., \$14.75; 36 in., \$16.00;
38 in., \$17.25; 40 in., \$18.50;
42 in., \$20.00; 44 in., \$21.50;
46 in., \$23.00; 48 in., \$24.50;
50 in., \$26.00; 52 in., \$27.50;
54 in., \$29.00; 56 in., \$30.50;
58 in., \$32.00; 60 in., \$33.50;
Hand Bellows, per doz.: 6 in., plain, \$10; fancy, \$20; 7 in., plain, \$12; fancy, \$24; 8 in., plain, \$14; fancy, \$28; 9 in., plain, \$16; fancy, \$32; 10 in., plain, \$18; fancy, \$36.
50% disc.

Belting. LEATHER BELTS.
Standard Manufacturers List.
Single belts per foot.

| Width. | Width. | Width. | Width. |
|----------------|---------------|------------------|--------|
| 1 inch.....10 | 6 inch.....76 | 20 inch.....2.84 | |
| 1 1/4 ".....13 | 7 ".....90 | 21 ".....3.02 | |
| 1 1/2 ".....17 | 8 ".....1.02 | 22 ".....3.20 | |
| 1 3/4 ".....20 | 9 ".....1.15 | 23 ".....3.37 | |
| 2 ".....23 | 10 ".....1.29 | 24 ".....3.54 | |
| 2 1/4 ".....26 | 11 ".....1.42 | 26 ".....3.92 | |
| 2 1/2 ".....30 | 12 ".....1.55 | 28 ".....4.30 | |
| 2 3/4 ".....33 | 13 ".....1.68 | 30 ".....4.64 | |
| 3 ".....36 | 14 ".....1.82 | 32 ".....5.00 | |
| 3 1/4 ".....43 | 15 ".....1.98 | 34 ".....5.35 | |
| 3 1/2 ".....50 | 16 ".....2.14 | 36 ".....5.70 | |
| 3 3/4 ".....56 | 17 ".....2.31 | 40 ".....6.40 | |
| 4 ".....63 | 18 ".....2.49 | 44 ".....7.10 | |
| 4 1/4 ".....70 | 19 ".....2.66 | 48 ".....7.80 | |

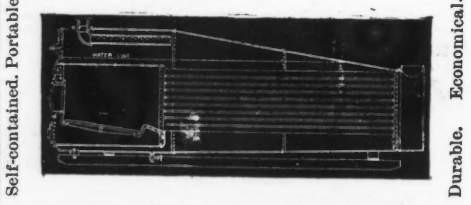
Double belts twice the price of single.
Dis. single and double belts, cemented, 50 and 5%
Dis. single and double belts, riveted and cemented, 50 and 5%
Dis. single belts, cemented and lacesewn, water-proofed, 50%
Dis. double belts, cemented and lacesewn, water-proofed, 45%.

Blowers and Disc Fans.

| | |
|--------------------|----------------------|
| 12 inches.....\$30 | 42 inches.....\$1.00 |
| 18 ".....40 | 48 ".....1.25 |
| 24 ".....50 | 54 ".....1.60 |
| 30 ".....65 | 60 ".....2.00 |
| 36 ".....85 | |

Discount 35% and 2 1/4 for cash.

Boller (Scotch Flue).



| | | | | | | | |
|---------------------|-------|--------|--------|--------|--------|--------|--------|
| Horse power..... | 8 | 10 | 15 | 20 | 25 | 30 | 35 |
| Diameter..... | 28" | 32" | 32" | 38" | 40" | 40" | 44" |
| Length, feet..... | 9 1/2 | 10 1/2 | 13 1/4 | 14 1/4 | 16 1/4 | 16 1/4 | 16 1/4 |
| Weight, pounds..... | 3500 | 4000 | 4500 | 5000 | 6500 | 6900 | 7500 |
| Price, \$..... | 387 | 487 | 580 | 634 | 767 | 767 | 767 |

Self-contained. Portable. Economical. Durable.

| | | | | | | | |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|
| Horse power..... | 40 | 45 | 50 | 55 | 60 | 70 | 80 |
| Diameter, inches..... | 44 | 48 | 48 | 52 | 52 | 58 | 58 |
| Length, feet..... | 17 1/2 | 16 1/4 | 18 1/4 | 18 1/4 | 18 1/4 | 18 | 19 |
| Weight, pounds..... | 8000 | 8500 | 8800 | 9500 | 10,000 | 11,000 | 12,000 |
| Price, \$..... | 827 | 920 | 1027 | 1147 | 1227 | 1387 | 1500 |

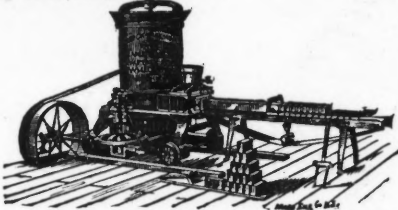
Discount -15%.

Brick Machinery.



| | |
|------------------------------------|------------------|
| Heavy Steam Power Machine..... | \$525.00 |
| Horse-Power Machines..... | 300.00 |
| Additional Horizontal Pugmill..... | 225 |
| Brick Moulds..... | \$2.50 to \$3.00 |
| Brick Trucks..... | 5.00 to 13.50 |
| Brick Barrows..... | 7.25 |
| Brick Barrows with Springs..... | 8.20 |
| Sand Barrows, steel tray..... | 6.40 |

Clay Working Machines.



| | Capacity. | Price. |
|----------------------------------|----------------------|---------|
| No. 20 A brick machine..... | 60,000 to 80M | \$3,500 |
| No. 20 B " "..... | 50,000 | 2,500 |
| No. 15 D " "..... | 40,000 | 1,800 |
| No. 10 D " "..... | 40,000 | 1,500 |
| No. 15 S " "..... | 30,000 | 1,400 |
| No. 10 S " "..... | 25,000 | 1,200 |
| Upright stock brick machine..... | 25,000 to 30M | 1,200 |
| No. 7 S brick machine..... | 20,000 | 650 |
| No. 6 S " "..... | 15,000 | 575 |
| No. 2 E " "..... | H. P. 3,000 to 8,000 | 400 |

Brushes.

PAINT BRUSHES. Intermediate prices not quoted. Prices per dozen.

| | No. 6. | 4. | 2. | 0. | 3-0. | 5-0. | 7-0. | Dis. |
|---------------|--------|--------|--------|--------|--------|--------|--------|------|
| X..... | \$1.15 | \$1.80 | \$2.50 | \$3.15 | \$4.00 | \$5.25 | \$6.75 | 25% |
| Atlantic..... | 1.25 | 2.15 | 3.80 | 5.25 | 7.00 | 10.00 | 13.00 | 25% |
| Standard..... | 1.60 | 2.60 | 4.00 | 6.00 | 8.00 | 11.00 | 16.00 | 25% |

VARNISH OVAL.

| | No. 6. | 4. | 2. | 0. | 3-0. | 5-0. | 7-0. | Dis. |
|------------|--------|--------|--------|--------|--------|--------|--------|------|
| Globe..... | \$1.15 | \$1.80 | \$2.50 | \$3.25 | \$4.00 | \$5.00 | \$8.00 | 25% |
| Crown..... | 1.25 | 2.00 | 2.75 | 4.00 | 5.25 | 7.00 | 10.00 | 25% |

VARNISH FLAT.

| | No. 1. | 1 1/2. | 2. | 2 1/2. | 3. | Dis. |
|--------|--------|--------|--------|--------|--------|------|
| X..... | \$0.48 | \$0.72 | \$0.96 | \$1.20 | \$1.40 | 25% |

SASH BRUSH.

| | No. 1. | 3. | 5. | 7. | 9. | Dis. |
|---------|--------|--------|--------|--------|--------|------|
| X..... | \$0.25 | \$0.40 | \$0.60 | \$0.85 | \$1.20 | 25% |
| XX..... | 0.40 | 0.75 | 1.10 | 1.40 | 2.00 | 25% |

WHITE-WASH.

| | No. 6. | 7. | 8. | Dis. |
|------------|--------|--------|--------|------|
| Brown..... | \$1.25 | \$1.60 | \$2.00 | 25% |
| Pure..... | 2.40 | 4.00 | 6.00 | 25% |

SHOE.

| | Per gross. | 25. | 15. | 26. | Dis. |
|-----|------------|---------|-------|-------|------|
| 10 | \$11.50 | \$12.50 | \$15 | \$18 | 25% |
| 27. | 20.00 | 24.00 | 29.00 | 35.00 | |

HORSE.

| | Patent. | Per gross, dis., 25%. |
|--------------|---------|-----------------------|
| Wood back | \$18.00 | \$20.00 |
| Leather back | \$24.00 | \$28.00 |

SCRUB.

| | Patent. | Per gross, dis., 25%. |
|--------------|---------|-----------------------|
| Wood back | \$12.00 | \$14.00 |
| Leather back | \$18.00 | \$21.00 |

SHAVING.

| | Per doz., dis., 25%. |
|--------|----------------------|
| Patent | \$0.60 |
| Patent | \$1.00 |
| Patent | \$1.50 |
| Patent | \$2.50 |

COUNTER.

| | Per doz., dis., 25%. |
|--------|----------------------|
| Patent | \$3.00 |
| Patent | \$4.00 |
| Patent | \$5.00 |

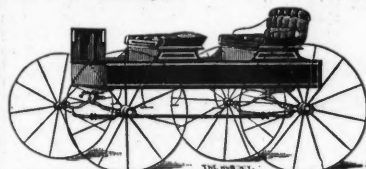
Carriages, Etc.



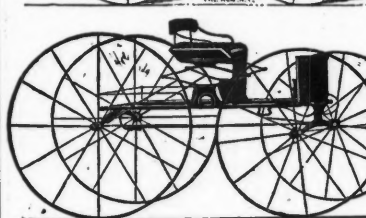
| Windsor Surrey. | Cut under Surrey. |
|-------------------------------|-------------------------------|
| Open, \$120. | Canopy top, \$185. |
| Canopy top, \$145. | Canopy top, \$185. |
| Leather extension top, \$185. | Leather extension top, \$220. |
| Pole or shafts. | Leather extension top, \$220. |



Brewster Spring, Open, \$55. Rubber top, \$76. Leather top, \$100.



Runabout, \$65.



Buckboard, \$30 : shafts



No. 0. Cart, top and fenders..... \$150
 No. 1. Cart, top and fenders..... 90
 No. 2. Cart, one man cart, open..... 65
 No. 2. Cart, one man, top..... 86
 No. 2. Cart, one man, top and fenders..... 90
 No. 3-H. Cart, two man, open..... 54
 No. 4. Cart, two man, top..... 86
 No. 5. Cart, two man, top and fenders..... 90
 No. 6. Cart, two men, top and fenders..... 90
 No. 7. Two man combination cart..... 110

Wide track 5 feet.
 Narrow track 4 feet 8 inches.
 Discount 33 1/2 per cent. off.

Crucibles.

| | No. | Inches. | Height. | Width. | Crucibles. | Covers. | Per doz. | Per doz. |
|--------------------|--------|---------|---------|--------|------------|---------|----------|----------|
| BATTERSEA TRIANGLE | S..... | 4 1/2 | 4 1/2 | 4 1/2 | \$1.00 | \$0.50 | 0.50 | |
| | T..... | 4 | 3 3/4 | 3 3/4 | 0.80 | 0.40 | 0.40 | |
| | U..... | 3 1/2 | 3 1/2 | 3 1/2 | 0.60 | 0.40 | 0.40 | |
| | V..... | 3 1/4 | 2 3/4 | 2 3/4 | 0.45 | 0.30 | 0.30 | |
| | W..... | 2 3/4 | 2 3/4 | 2 3/4 | 0.35 | 0.30 | 0.30 | |
| | X..... | 2 1/2 | 2 1/2 | 2 1/2 | 0.30 | 0.30 | 0.30 | |
| | Y..... | 2 1/4 | 2 1/4 | 2 1/4 | 0.25 | 0.30 | 0.30 | |
| | Z..... | 1 3/4 | 1 3/4 | 1 3/4 | 0.20 | 0.30 | 0.30 | |

Battersea Muffles, any size, made to order. See illustration in advertisement.

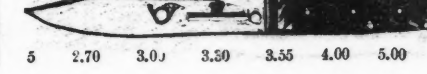
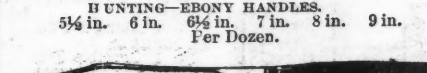
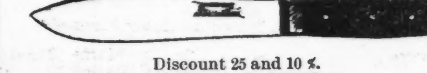
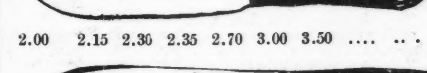
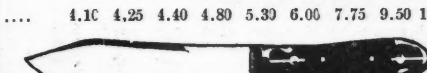
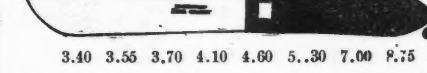
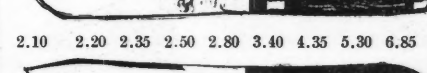
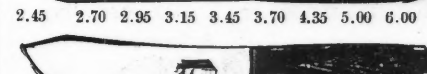
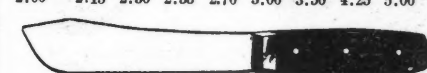
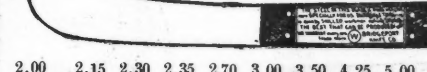
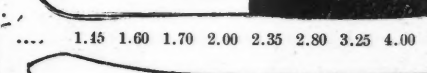
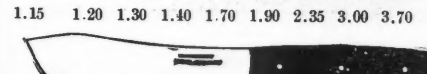
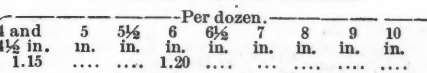
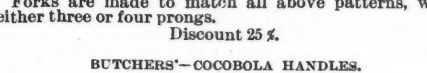
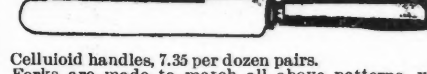
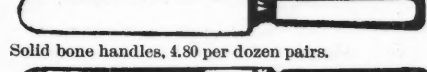
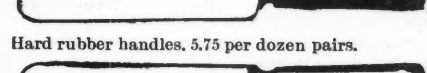
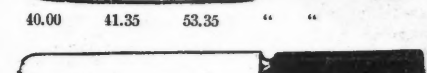
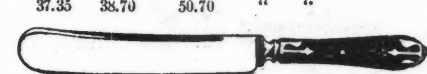
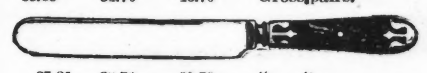
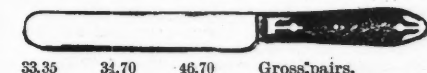
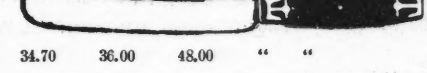
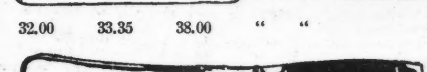
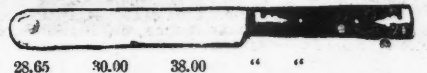
| No. | Long. Inches. | Wide. Inches. | High. Inches. | Price. Each. |
|--------|---------------|---------------|---------------|--------------|
| A..... | 7 1/2 | 3 1/2 | 2 1/2 | \$ 60 |
| B..... | 8 | 4 1/2 | 3 1/2 | 75 |
| C..... | 9 | 5 1/2 | 4 1/2 | 1.00 |
| D..... | 10 | 6 1/2 | 5 1/2 | 1.15 |
| E..... | 11 | 7 1/2 | 6 1/2 | 1.25 |
| F..... | 12 | 8 1/2 | 7 1/2 | 1.40 |
| G..... | 13 | 9 1/2 | 8 1/2 | 1.55 |
| H..... | 14 | 10 1/2 | 9 1/2 | 1.70 |
| I..... | 15 | 11 1/2 | 10 1/2 | 1.85 |
| J..... | 16 | 12 1/2 | 11 1/2 | 2.00 |
| K..... | 17 | 13 1/2 | 12 1/2 | 2.15 |
| L..... | 18 | 14 1/2 | 13 1/2 | 2.30 |

Export discount 15 %.

Cutlery.

KNIVES—TABLE.

| | 14.70 | 16.00 | 18.70 | 17.35 | 18.70 | 24.00 | 17.35 | 18.70 | 21.35 | 20.00 | 21.35 | 26.70 | 22.70 | 24.00 | 29.35 | 27.35 | 28.70 | 36.00 |
|----------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Japanned iron handles, \$10.70 per gross pairs. | | | | | | | | | | | | | | | | | | |
| Cocobola Ebony Bone handles, handles, 10.70 12.00 15.35 gross pairs. | | | | | | | | | | | | | | | | | | |
| medium size, full size. | | | | | | | | | | | | | | | | | | |
| medium, full size. | | | | | | | | | | | | | | | | | | |
| gross pairs. | | | | | | | | | | | | | | | | | | |
| gross pairs. | | | | | | | | | | | | | | | | | | |



Discount 25 and 10 %.
HUNTING—EBONY HANDLES.
 5 1/2 in. 6 in. 6 1/2 in. 7 in. 8 in. 9 in.
 Per Dozen.

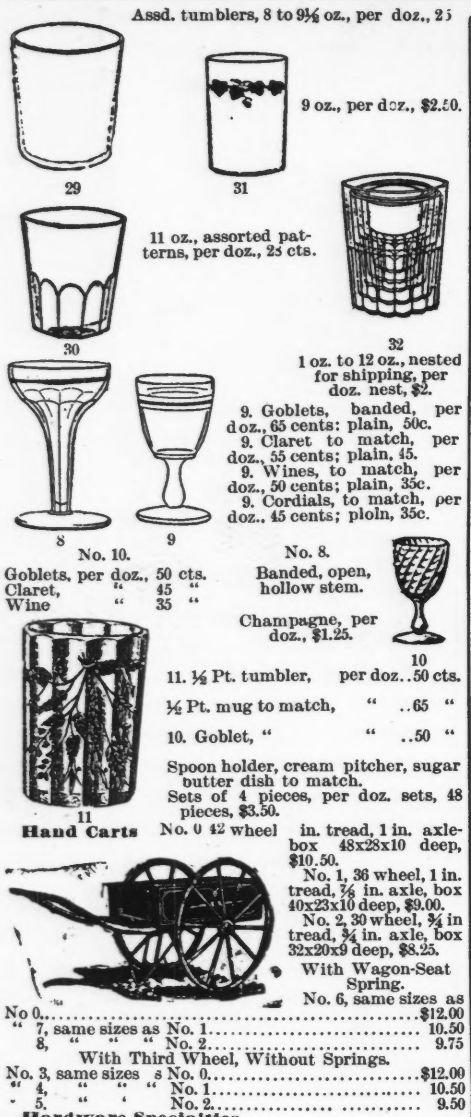
| | 5 | 2.70 | 3.00 | 3.50 | 3.55 | 4.00 | 5.00 |
|------------|---|------|------|------|------|------|------|
| Per Dozen. | | | | | | | |

| | 28.65 | 30.00 | 38.00 | 32.00 | 33.35 | 38.00 | 33.35 | 34.70 | 46.70 | 37.35 | 38.70 | 50.70 | 40.00 | 41.35 | 53.35 |
|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Gross pairs. | | | | | | | | | | | | | | | |

Hard rubber handles, 5.75 per dozen pairs.
 Solid bone handles, 4.80 per dozen pairs.
 Celluloid handles, 7.35 per dozen pairs.
 Forks are made to match all above patterns, with either three or four prongs.
 Discount 25 %.

BUTCHERS'—COCOBOLA HANDLES.
 Per dozen.

Assd. tumblers, 8 to 9 1/2 oz., per doz., 25



9 oz., per doz., \$2.50.

11 oz., assorted patterns, per doz., 25 cts.

1 oz. to 12 oz., nested for shipping, per doz. nest, \$2.

9. Goblets, banded, per doz., 65 cents; plain, 50c.
9. Claret to match, per doz., 55 cents; plain, 45.
9. Wines, to match, per doz., 50 cents; plain, 35c.
9. Cordials, to match, per doz., 45 cents; plain, 35c.

No. 10. Goblets, per doz., 50 cts.
Claret, " 45 "
Wine " 35 "

No. 8. Banded, open, hollow stem. Champagne, per doz., \$1.25.

10. 1/2 Pt. tumbler, per doz., 50 cts.
1/2 Pt. mug to match, " .65 "
10. Goblet, " .50 "

Spoon holder, cream pitcher, sugar butter dish to match. Sets of 4 pieces, per doz. sets, 48 pieces, \$3.50.

Hand Carts No. 0 42 wheel in. tread, 1 in. axle-box 48x28x10 deep, \$10.50.
No. 1, 36 wheel, 1 in. tread, 7/8 in. axle, box 40x23x10 deep, \$9.00.
No. 2, 30 wheel, 3/4 in. tread, 3/4 in. axle, box 32x20x9 deep, \$8.25.
With Wagon-Seat Spring. No. 6, same sizes as No. 0, \$12.00
No. 7, same sizes as No. 1, " 10.50
No. 8, " " 9.75
With Third Wheel, Without Springs. No. 3, same sizes as No. 0, \$12.00
No. 4, " " 10.50
No. 5, " " 9.50

HARDWARE SPECIALTIES.

AUGERS.
Patent Adjustable Hollow. No. 3.
Cuts from 1/4 to 1 1/4, pivoted jaws, graduated scale to 1-16ths, per doz., \$60.00.
Discount, 15 and 10%.

Patent Hollow Auger. No. 6.
Inch. 5-16 3/8 7-16 1/2
With bits... 12.00 12.00 12.00 12.00
Without bits 8.00 8.00 8.00 8.00
9-16 3/8 7/8 1 1/8
14.00 14.00 14.00 16.00 16.00 20.00
9.00 9.00 9.00 13.00 13.00 14.00
1 1/4 1 1/2 2.00
20.00 24.00 24.00
14.00 16.00 15.00
Discount, 15 and 10%.

BENCH DRILL.
Adjustable bed plate. 2 3/8 high drills to 1/2 in. hole, 3/4 run of screw.
List price, each, \$10.00
Net, " 4.25

Bench Vice, Steel Jaws, 3 1/2 in., opens 3 in.; weight, 12 lbs.; list price, each, \$4.00.; net price, each, \$1.60.

BENCH HOOK.
Patent, adjustable and reversible
List \$9 dozen, 1/2 dozen in box.
Discount, 30 and 10%.

BARN DOOR HANGER.
4 in., per doz. pairs, \$12.00
5 " " " " 14.40
Track, per foot, .06
One dozen pairs in case.
Dis., 50 and 10%.

BLACKSMITH'S TONGS.
Swivel Jaw.
No. 1, 16 in., per doz., \$10.00
2, 18 " " " " 10.00
Dis. 20 and 10%.

CASTERS.
Swivel Store Truck
No. 20, japanned, 4 in. wheel, each, .55
No. 25, " " " " .75
Noiseless turned wheel.
No. 30, japanned, 4 in. wheel, each, 1.30
No. 35, " " " " 1.60
Discount, 60%.

CLOTHES REEL.
Extra heavy, gray iron, japanned.
List per doz., \$15.00
Net " 7.00

JACK SCREWS.
New pattern wrought iron screw.
No. Rise of High. Diameter Price.
20 4 1/4 in. 10 in. 2 in. \$4.50
25 6 3/4 " 12 " 2 " 5.25
30 8 1/2 " 14 " 2 " 5.75
35 11 1/2 " 16 " 2 " 6.50
Discount, 40%.

Store Truck, stationary.
No. 50, 5-inch wheel, 1 1/2 inch wide each, \$1.05.
No. 60, 5-inch, extra heavy, 1 1/2 inch wide, each \$1.50.
Discount, 25%.

SCREW CLAMPS.
Adjustable.
3 in., per doz., \$4.00
5 " " " " 6.50
7 " " " " 9.00
9 " " " " 10.50
12 " " " " 15.00
16 " " " " 20.00
1/2 doz. in box.
Discount, 20 and 10%.

CLAMPS.
New Door Frame.
3 ft. long, per doz., \$8 list; \$5 per doz. net.

Malleable Iron Screw Clamps.
Per Doz. Per Doz.
3 in. \$7.00 7 in. \$20.00
4 " 10.00 8 " 25.00
5 " 12.00 9 " 27.50
6 " 16.00 10 " 30.00
3, 4, 5, 6 in., 1/2 doz. in box.
Dis., 70%.

WINDOW SCREEN FRAMES.
Patent Japanned Corners.
No. 25, 36 by 36 corners and screws, without bead, per doz., \$2.50.
No. 25, 36 by 36 corners and screws, with bead, per doz., \$2.90.
No. 35, 42 by 42 corners and screws, without bead, per doz., \$2.90.
No. 35, 42 by 42 corners and screws, with bead, per doz., \$3.30.
Black satin stain, sticks 3/8 by 1 in.
Dis., 25, 10 and 5%.

PULLEY HOOK (New Floor.)
Deep cut thread, forged point. Per doz.
3/4 in. wrought iron, 8 in. long, list, \$1.90
net, 1.00

WELL WHEEL.
New pattern. Japanned.
In. 8 10 12 14 16
Pr.d. 7.00 9.50 12.50 20.00 30.00
Discount, 70%.

PULLEYS.
Side, No. 45, Japanned.
Inches... 1 1 1/2 2 2 1/2 3 4 5
Per doz. .90 1.00 1.60 2.40 3.50 9.00 15.00
2 inch and under, 2 dozen in box; 2 1/2, 3 and 4, 1 dozen in box; 5 inch, 1/2 dozen in box.
Discount, 70%.

HAY FORK PULLEY.
New pattern.
No. 15, 5 in. iron wheel, per doz., \$4.00
25, 5 in. wood " " 4.50
66, 6 in. " " " 6.00
4 dozen in case, 8 dozen in barrel.
No. 15, per dozen, \$1.75 net.

SHRAVES.
Patent Common
Turned and polished iron wheels, round corners, brass pin, one set in box.
2 1/2 inch, \$1.50
3 " 1.60
4 " 2.00
5 " 2.60
Discount, 60%.

SINKS.
All 6 inch deep.
14 x 20 in., \$1.50 18 x 30 in., \$2.50
15 x 25 in., 1.75 18 x 32 in., 3.00
15 x 27 in., 2.00 18 x 36 in., 3.00
16 x 24 in., 1.80 20 x 30 in., 3.00
16 x 28 in., 2.10 20 x 36 in., 3.70
17 x 30 in., 2.25 20 x 40 in., 4.00
18 x 24 in., 2.10
Discount, 60 and 10%.

SPOKE POINTERS.
No. 1, points 1 1/2 in. diameter, Per doz. \$9.00
No. 2, points 2 1/2 in. diameter, \$15.00
Discount, 15 and 10%.
1/2 dozen in box.

WISE.
(Bench Vice, Steel Jaws.)
3 1/2 in. opens 5 in., weight 12 lbs.
List price, each, \$4.00
Net " " 1.60

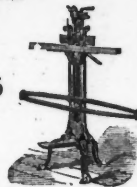
Silent Saw Vice.
No. 10, 10 in. jaw, per doz., \$15.00
Dis., 35%.

No. per dz. gr. lbs. No. per dz. gr. lbs.
Amateur vise... \$2.25 70 1 1/2 3.00 80
Anvil 2 3 1/2 5.00 220
3 3 1/2 14.25 700
2 2 200 4 1/2 21.00 1,425
3 1 11.25 615 Combination hand... 5.25 85
4 18.00 1,350
10 24.00 1,675
Spot cash discount, 33, 20 and 2, f.o.b.
Nos. 1, 1 1/2, 2 and 2 1/2 are packed in dozens; Nos. 3 and 3 1/2 in half dozens; Nos. 4, 4 1/2 and 10 in quarter dozens, and No. 20 singly. Each hand vise is put up in neat box and packed in half dozen lots.
1 Hinge pipe vise, 0 to 2 in. pipe, Each \$10.00
2 " " 0 to 4 in. pipe, 20.00
1 Malleable pipe vise, 0 to 2 in. pipe, 8.00
1 Combination pipe and bench vise, 0 to 2 in. pipe, 16.00
Discount, 50%.

WRENCHES.
Cces Wrenches.
BLACK.
Knife Handle.
Size. # doz. Size. # doz.
6 inch \$9.00 10 " 12.00 15 inch 24.00
8 " 10.00 12 " 14.00 18 " 30.00
21 inch 36.00
BRIGHT.
Knife Handle.
4 inch \$10.00 10 inch 14.00 18 inch 32.00
6 " 10.00 12 " 16.00 21 " 38.00
8 " 11.00 15 " 26.00
Discount, 55, 10, 7 1/2 and 3 %
Coes Mechanics' Screw Wrenches, same list, less 50, 10, 10, 7 1/2 and 3 %
Patent Screw Wrench, same list. Dis. 50, 10, 7 1/2 and 3 %.



Foot Power Former. \$20.00; Knives extra, \$1.00 each. Dis., 35%.



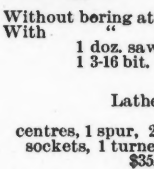
Mortising Machine. \$22.00; Chisels, \$1.00 each.



Blind Slat Chisels, 3 set bits, \$5.00. Dis., 20%.



Tenoning Machine. Price, \$25. Dis., 35%.



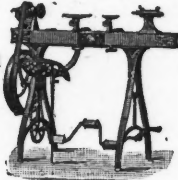
Velocipede Scroll Saw.

Without boring attachment.....\$20.00
With 1 doz. saw blades, } Included. Dis., 35%
1 3-16 bit.

Lathe.

centres, 1 spur, 2 tool rests and sockets, 1 turned face-plate, \$35.

Dis., 30%.



Lathe.

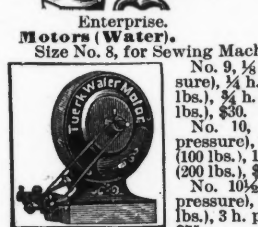
One turned face-plate, two pointed and one spur center, two rests, with sockets and plate for hand tools, slide rest-wrench, belting, etc., \$40.

Dis., 25%.



Meat Cutters.

5, each.....\$2.00
10, " 3.00
22, " 4.00
41, " 50.00
This is a power machine.
Dis., 50%.



Enterprise Motors (Water).

Size No. 3, for Sewing Machines, etc., \$18 each.
No. 9, 1/2 horse-power (30 lbs. pressure), 1/2 h. p. (50 lbs.), 1/2 h. p. (100 lbs.), 3/4 h. p. (150 lbs.), 1 h. p. (200 lbs.), \$30.
No. 10, 1/2 horse-power (30 lbs. pressure), 1/2 h. p. (50 lbs.), 1 h. p. (100 lbs.), 1 1/2 h. p. (150 lbs.), 2 h. p. (200 lbs.), \$50.
No. 10 1/2, 1/2 horse-power (30 lbs. pressure), 1 h. p. (50 lbs.), 2 h. p. (100 lbs.), 3 h. p. (150 lbs.), 4 h. p. (200 lbs.), \$75.

No. 11, 1 horse-power (30 lbs. pressure), 1 1/2 h. p. (50 lbs.), 3 h. p. (100 lbs.), 4 1/2 h. p. (150 lbs.), 6 h. p. (200 lbs.), \$100.
No. 12, 2 horse-power (30 lbs. pressure), 3 h. p. (50 lbs.), 6 h. p. (100 lbs.), 9 h. p. (150 lbs.), 12 h. p. (200 lbs.), \$175.
No. 13, 3 horse-power (30 lbs. pressure), 5 h. p. (50 lbs.), 10 h. p. (100 lbs.), 15 h. p. (150 lbs.), 20 h. p. (200 lbs.), \$285.
Dis., 30%.

Governors for 11 and 12, \$25 extra; for No. 13, \$35 extra.
Price..... \$120 \$160 \$200 \$250 \$300
MINING WHEELS 16 18 20 22 24
Power according to pressure:
3 to 50, 10 to 100, 15 to 150, 20 to 200, 30 to 300 H. P.



Concentrating Machinery.
Blake Improved Crusher: 10x7, weight 7,500; \$410.00.
Blake Improved Crusher: 15x9, weight 9,000; \$580.00. Discount 25%.
Cornish Crushing Rollers: 20 diameter, 10 face, weight 5,400; \$450.00.
Cornish Crushing Rollers: 20 diameter, 14 face, weight 6,000; \$500.00.
Cornish Crushing Rollers: 22 diameter, 14 face, weight 9,500; \$625.00.
Cornish Crushing Rollers: 27 diameter, 14 face, weight 13,000; \$750.00.
Cornish Crushing Rollers: 30 diameter, 14 face, weight 15,000; \$850.00.
Discount 25%.

Complete Sizing Arrangement, consisting of Revolving Screens of Steel Sheet and Hydraulic Classifier. For Concentrator, 25 tons capacity, \$250; 50 tons capacity, \$350; 75 tons capacity, \$450; 100 tons capacity, \$600. Discount, 10 per cent.
Automatic working Jig Machines, all complete, wood-work included, with slide motion: 2 sieves, \$310; 3 sieves, \$360; 4 sieves, \$450.

With Eccentric Motion, all complete, woodwork included: 1 sieve, \$200; 2 sieves, \$270; 3 sieves, \$320; 4 sieves, \$330.
Automatic working Double Jig Machines, all complete, woodwork included: 4 sieves, \$210; 6 sieves, \$335; 8 sieves, \$425. Discount, 25 per cent.
Single Rittinger Percussion Tables, all the iron parts, \$350; Double Rittinger Percussion Tables, all the iron parts, \$500. Discount, 10 per cent.
Improved Rotary Tables, all the iron parts and pipes, \$200. Discount, 25 per cent.

Nails and Tacks.

| Swedes. | | Tacks. | |
|----------------------------------------------|--------------------------------------------|------------------------------|------------------------------|
| Per doz. | 1/2 3/4 1 1 1/2 2 2 1/2 3 | 1/2 1 1 1/2 2 2 1/2 3 | 1/2 1 1 1/2 2 2 1/2 3 |
| 1/2 wt. | 35 40 46 50 55 60 65 75 | 12 14 16 18 20 24 28 32 | 12 14 16 18 20 24 28 32 |
| 6 8 10 12 14 16 18 20 24 oz. | 85 1.00 1.20 1.40 1.60 1.75 1.85 2.15 2.55 | 1 1 1/2 2 2 1/2 3 4 | 1 1 1/2 2 2 1/2 3 4 |
| Doz. full weight | 60 70 80 90 1.00 1.10 1.20 1.40 | 6 8 10 12 14 16 18 20 24 oz. | 6 8 10 12 14 16 18 20 24 oz. |
| 1.60 1.90 2.30 2.70 3.10 3.40 3.80 4.20 5.00 | 1 1 1/2 2 2 1/2 3 4 | 1 1 1/2 2 2 1/2 3 4 | 1 1 1/2 2 2 1/2 3 4 |
| lb., bulk | 1/2 3/4 1 1 1/2 2 2 1/2 3 4 | 1 1 1/2 2 2 1/2 3 4 | 1 1 1/2 2 2 1/2 3 4 |
| or paper | 1.60 1.25 1.00 80 66 58 52 46 | 6 8 10 12 14 16 18 20 24 | 6 8 10 12 14 16 18 20 24 |
| 36 32 31 30 29 28 28 28 28 | | | |

Discount, 67 1/2, 10 and 2%.

O. H. Swedes.

Price, same as Swedes. Swedes steel tacks same list price as iron.

Upholsterers.

Discounts, 72 1/2, 10 and 2%. Price, same as Swedes.

| Cut Tacks. | | Price per dozen ounces. | |
|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| 1/2 wt. | 1 1 1/2 2 2 1/2 3 4 6 8 10 | 1 1 1/2 2 2 1/2 3 4 6 8 10 | 1 1 1/2 2 2 1/2 3 4 6 8 10 |
| 12 14 16 18 20 24 28 32 | 12 14 16 18 20 24 28 32 | 12 14 16 18 20 24 28 32 | 12 14 16 18 20 24 28 32 |
| 1 1 1/2 2 2 1/2 3 4 6 8 10 | 1 1 1/2 2 2 1/2 3 4 6 8 10 | 1 1 1/2 2 2 1/2 3 4 6 8 10 | 1 1 1/2 2 2 1/2 3 4 6 8 10 |
| 80 90 1.00 1.10 1.20 1.30 1.50 | 80 90 1.00 1.10 1.20 1.30 1.50 | 80 90 1.00 1.10 1.20 1.30 1.50 | 80 90 1.00 1.10 1.20 1.30 1.50 |
| 1.80 2.10 2.40 2.70 3.00 3.30 | 1.80 2.10 2.40 2.70 3.00 3.30 | 1.80 2.10 2.40 2.70 3.00 3.30 | 1.80 2.10 2.40 2.70 3.00 3.30 |

Discount, 70, 10 and 2%.

Carpet Tacks, flat and oval heads.

| Blued, doz. | | oz. | |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| 1/2 wt. | 35 40 45 50 55 65 75 85 95 | 35 40 45 50 55 65 75 85 95 | 35 40 45 50 55 65 75 85 95 |
| 1.05 1.15 | 1.05 1.15 | 1.05 1.15 | 1.05 1.15 |
| 65 70 80 95 1.10 1.25 1.40 | 65 70 80 95 1.10 1.25 1.40 | 65 70 80 95 1.10 1.25 1.40 | 65 70 80 95 1.10 1.25 1.40 |
| 1.55 1.70 1.85 2.00 | 1.55 1.70 1.85 2.00 | 1.55 1.70 1.85 2.00 | 1.55 1.70 1.85 2.00 |
| 4 6 8 10 12 14 16 | 4 6 8 10 12 14 16 | 4 6 8 10 12 14 16 | 4 6 8 10 12 14 16 |
| 50 55 60 75 85 1.00 1.10 | 50 55 60 75 85 1.00 1.10 | 50 55 60 75 85 1.00 1.10 | 50 55 60 75 85 1.00 1.10 |
| 1.20 1.35 1.45 1.60 | 1.20 1.35 1.45 1.60 | 1.20 1.35 1.45 1.60 | 1.20 1.35 1.45 1.60 |
| 4 6 8 10 12 14 | 4 6 8 10 12 14 | 4 6 8 10 12 14 | 4 6 8 10 12 14 |
| 95 1.05 1.15 1.40 1.60 1.85 | 95 1.05 1.15 1.40 1.60 1.85 | 95 1.05 1.15 1.40 1.60 1.85 | 95 1.05 1.15 1.40 1.60 1.85 |
| 16 18 20 22 24 | 16 18 20 22 24 | 16 18 20 22 24 | 16 18 20 22 24 |
| 2.10 2.35 2.60 2.85 3.10 | 2.10 2.35 2.60 2.85 3.10 | 2.10 2.35 2.60 2.85 3.10 | 2.10 2.35 2.60 2.85 3.10 |

Discount, 72 1/2, 10 and 2%.

Finishing Nails.

| Inch. | | 3/4-8 4-8 4 1/2-8 5/8 5 1/2-8 6-8 7-8 1 | |
|-------------------|----------------------------|-----------------------------------------|----------------------------|
| Per b. | 48 40 32 28 26 24 22 20 18 | 48 40 32 28 26 24 22 20 18 | 48 40 32 28 26 24 22 20 18 |
| 1 1/2 and larger. | | | |

Discount, 60, 10 and 2%.

Chair Nails.

| Doz. 1/2 wt.; doz. full wt.; pound B. or P. | | Inch. | |
|---------------------------------------------|-------------------------|-------------------------|-------------------------|
| Per b. | 31 48 35 31 29 27 25 23 | 31 48 35 31 29 27 25 23 | 31 48 35 31 29 27 25 23 |
| 1 1/2 2 1 1/2 2 1 1/2 2 1 1/2 2 | | | |

Discount, 60, 10 and 2%.

Common and patent brads.

| Price per doz. | | Price per lb. in papers or bulk. | |
|----------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 1/2 wt. | 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 3.00 | 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 3.00 | 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 3.00 |
| 2-8..... | .50 | 1.00 | 1.25 |
| 3-8..... | .60 | 1.20 | .80 |
| 4-8..... | .65 | 1.30 | .58 |
| 5-8..... | .72 | 1.44 | .48 |
| 6-8..... | .80 | 1.60 | .36 |
| 7-8..... | .90 | 1.80 | .30 |
| 1..... | 1.00 | 2.00 | .26 |
| 1 1/2..... | 1.12 | 2.24 | .25 |
| 1 3/4..... | 1.26 | 2.52 | .24 |
| 1 1/2..... | 1.82 | 3.64 | .22 |
| 1 3/4..... | 2.25 | 4.50 | .20 |
| 2..... | 2.43 | 4.86 | .18 |

Dis. 60, 10 and 2%.

Packing.

Eureka, 75c. per lb. Dis., 40%.
Soapstone—Standard, 8c. per lb. XX, 11c. per lb.
Crown—No. 1, 23c. per lb.
No. 2, 26c. per lb.
Climax, 9c. per lb. Net.

SELDEN'S PATENT.

For Steam, Air, Water and Ammonia. With Rubber Core, 60 cents per lb. Dis., 25 and 5%. With canvas core, 50 cents per lb. Dis., 30 and 5%.

Paper, Waxed.

| White. | | Per ream. | |
|--------------------------------------|--------|--------------------------------|--------|
| XX, 24 x 36..... | \$2.20 | XX, 24 x 36..... | \$2.20 |
| "Sparks" A No. 1 Brand, 24 x 36..... | 2.10 | "Progress No. 2," 24 x 36..... | 1.80 |
| "Progress No. 2," 24 x 36..... | 1.80 | "Climax," 24 x 36..... | 1.60 |
| "Climax," 24 x 36..... | 1.60 | 24 x 36..... | 1.36 |

FF, or B. F., 24 x 36..... 4.00
Colored..... 2.40
A, 24 x 36..... 2.00
B, 24 x 36..... 2.00
Manilla..... 1.88
A, 24 x 36..... 1.88
"Climax," 24 x 36..... 1.40
Discount, 5%.

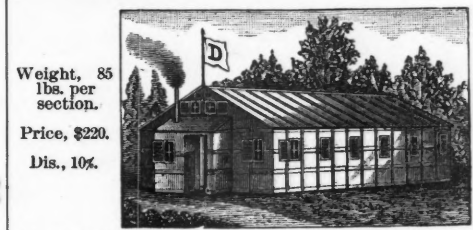
| Manilla. | | White. | |
|----------|----------------------|--------|----------------------|
| No. | Flat bags. Sq. bags. | No. | Flat bags. Sq. bags. |
| 1/4 | Per M. \$1.25 | 1/4 | Per M. \$1.70 |
| 1/2 | 1.50 | 1/2 | 2.05 |
| 1 | 1.85 | 1 | 2.60 |
| 1 1/2 | 2.00 | 1 1/2 | 2.80 |
| 2 | 2.25 | 2 | 3.12 |
| 3 | 2.70 | 3 | 3.70 |

Mikado. Price, same as Swedes. Discount, 72 1/2, 10 and 2%.

Portable Houses.

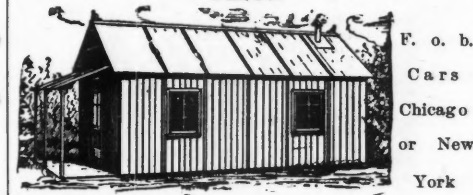


Weight, 450 lbs. Price, \$150. Closes securely. Dis., 10%.



Weight, 85 lbs. per section. Price, \$220. Dis., 10%.

No. 10—26 x 33 ft., including veranda and rear extension. Main part, 19 x 26 ft. Dis., 10%. \$500.00



F. o. b. Cars Chicago or New York

| Size. | Doors. | Windows. | No. porch. | End porch. | Side porch. |
|---------|--------|----------|------------|------------|-------------|
| 7 x 9 | 1 | 2 | \$64.00 | \$71.00 | \$73.00 |
| 7 x 12 | 1 | 2 | 75.00 | 82.00 | 87.00 |
| 7 x 16 | 1 | 2 | 90.00 | 97.00 | 106.00 |
| 7 x 19 | 2 | 4 | 117.00 | 124.00 | 136.00 |
| 10 x 9 | 1 | 2 | 70.00 | 80.00 | 79.00 |
| 10 x 12 | 1 | 2 | 92.00 | 102.00 | 104.00 |
| 10 x 16 | 1 | 4 | 108.00 | 118.00 | 124.00 |
| 10 x 19 | 2 | 4 | 134.00 | 144.00 | 153.00 |
| 10 x 26 | 2 | 4 | 172.00 | 182.00 | 198.00 |
| 10 x 32 | 2 | 6 | 203.00 | 213.00 | 235.00 |
| 12 x 12 | 1 | 2 | 102.00 | 114.00 | 114.00 |
| 12 x 15 | 2 | 4 | 138.00 | 150.00 | 154.00 |
| 12 x 19 | 2 | 4 | 160.00 | 172.00 | 179.00 |
| 12 x 26 | 2 | 4 | 193.00 | 205.00 | 219.00 |
| 12 x 32 | 2 | 6 | 245.00 | 257.00 | 277.00 |

Post Hole Diggers.

| | |
|-------------------|------------------------|
| Little Giant..... | \$36.00 doz 11 cu. ft. |
| Hercules..... | 30.00 " " " |
| New Champion.... | 20.00 " " " |
| Scheidler..... | 36.00 " " " |

Dis. 40 .o.b. New York or Boston.

Presses.

41, 42, 43, 44, 45. Combined press for cutting, forming, horning and seaming.

Particulars of flat front presses, including beds, slides, bolsters, plates, etc.

Prices are net, delivered on steamers in New York, including insurance, etc.

| Nominal size of press..... | 41 | 42 | 43 | 44 | 450 |
|-------------------------------------------------|-------|-------|-------|--------|--------|
| Price, including et ceteras..... | \$140 | \$220 | \$300 | \$420 | \$700 |
| Weight, about..... lbs | 600 | 1050 | 1900 | 3600 | 7200 |
| Greatest diameter that can be wired..... ins | 5 | 7 | 10 | 14 | 20 |
| Greatest depth that can be wired..... ins | 8 | 10 | 13 | 16 1/2 | 20 |
| Hole through bed—circle intersecting..... ins | 4 1/2 | 6 | 8 1/2 | 12 | 17 |
| Hole through back—width..... ins | 8 | 9 1/2 | 12 | 15 1/2 | 20 1/2 |
| Width between die clamps—clear..... ins | 8 | 11 | 15 | 20 | 27 |
| Distance back from center of slide bar..... ins | 4 1/2 | 5 1/2 | 7 | 9 | 12 |
| Height to slide-bar, when up..... ins | 5 1/2 | 6 1/2 | 7 1/2 | 8 1/2 | 9 |
| Stroke of slide-bar..... ins | 1 | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 |
| Adjustment of slide-bar..... ins | 1 | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 |
| Diameter of fly-wheel..... ins | 20 | 26 | 32 | 38 | 44 |
| Width of fly-wheel..... ins | 3 | 4 | 5 | 6 | 7 |
| Weight of fly-wheel, about..... lbs | 125 | 250 | 420 | 725 | 1100 |
| Speed per minute, about..... rev | 120 | 110 | 100 | 90 | 80 |
| Cubic feet boxed, about..... | 30 | 40 | 50 | 60 | 70 |

Printers' Sundries.

Wood rules, 12 cents per yard.
Wood rules, on end wood, 15 cents per foot.
EUREKA STAND,
12 full cases.

Price without cases.....\$12.00
Boxing and cartage..... 1.25

SHOOTING STICKS. Each.
No. 1, 75c.
No. 2, \$1.
No. 4, 45c., black.
No. 4, 60c., bright.
No. 5, 60c., black.
No. 5, 75c., bright.



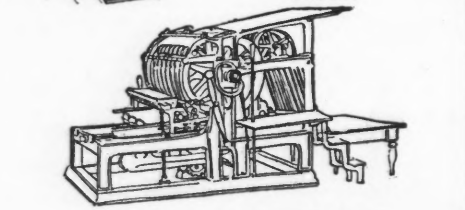
GAUGE PINS—ALL SIZES.
Brass, 40c. doz. Steel, 60c. doz.
Wire, 25c. doz. Golden, 40c. doz.

MITRE BOXES.
Regular size, 2 in., 50c. each.
Extra size, 3 1/2 in., 75c. each.



Curtis' Lead Cutter.....\$2.00
PROOF PRESS, "OUR OWN."
x 32, complete, with Brayer.....\$28.00

THE GLOBE PRESS.
8 x 12 in. inside clear, with
throw-off.....\$150.00
9 x 13 in. inside clear, with
throw-off..... 175.00
10 x 15 in. inside clear, with
throw-off..... 200.00
11 x 17 in. inside clear, with
throw-off..... 250.00
Steam fixtures..... 15.00
Fountain..... 12.50
Dis. 20%.



THE "LIBERTY" CYLINDER PRESS.
For Newspaper and Job Printing.
Bed. Form.
No. 5-29 x 42 24 x 40.....\$1,200
6-33 x 47 28 1/2 x 45.....1,300
7-37 x 51 33 x 49.....1,600
Dis., 20 and 5%.

THE "LIBERTY" JOB PRINTING PRESS.
Size of chase.
No. 2 - 7 x 11.....\$300
2a - 9 x 13.....250
3 - 10 x 15.....300
3a - 11 x 17.....350
4 - 13 x 19.....400
5 - 14 1/2 x 22.....500
Dis., 12% and 5%.

Two sizes built extra strong for boxmakers, embossing, etc.
No. 3a-11 x 17.....\$375
4 - 13 x 19.....425
Dis., 12 and 5%.

Fountains, either size, \$25 extra, if ordered with press.
Steam fixtures, either size, \$15 extra.
THE AMERICAN CARD AND BILL HEAD PRESS.
No. 5-4 x 6.....\$10
7-6 x 9.....30
8-8 x 12.....60
Dis., 20% and 5%.



THE "LIBERTY" PAPER CUTTER.
Cuts 30 inches.....\$140.00
Extra knife..... 18.80
Dis., 12% and 5%.

THE "LIBERTY" IMPOSING TABLES
Marble top.
No. 1-24 x 36.....\$24
2-32 x 48.....38
3-26 x 74.....44
4-36 x 48.....48
Dis., 12% and 5%.

Slate Top.
No. 1-24 x 36.....\$15
2-32 x 48.....25
3-26 x 74.....32
Dis., 12% and 5%.



Kelsey & Co.,
The Eagle card and
Paper Cutter, 24 1/2 inch
\$12 each, \$100 per doz.,

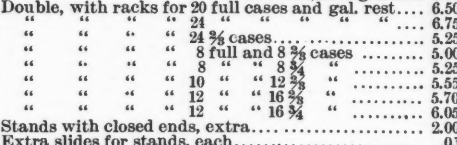
| Number of cases. | TYPE CABINETS. Stained. | | Grained. | |
|------------------|-------------------------|------------|----------|------------|
| | Flat. | Gal. ley.* | Flat. | Gal. ley.* |
| 12% | 12.00 | 14.50 | 14.00 | 17.00 |
| 16% | 15.00 | 17.50 | 17.00 | 20.00 |
| 18% | 16.50 | 19.00 | 18.50 | 21.50 |
| 20% | 18.00 | 20.50 | 20.00 | 23.00 |
| 12% | 15.00 | 17.50 | 17.00 | 20.00 |
| 16% | 18.00 | 20.50 | 20.00 | 23.00 |
| 18% | 19.50 | 22.00 | 21.50 | 24.50 |
| 20% | 22.00 | 24.50 | 23.00 | 26.00 |

| Number of cases. | Pine. | | Cherry. | | Napanoch. | | Walnut. | |
|------------------|-------|------------|---------|------------|-----------|------------|---------|------------|
| | Flat. | Gal. ley.* | Flat. | Gal. ley.* | Flat. | Gal. ley.* | Flat. | Gal. ley.* |
| 12% | 18.00 | 21.00 | 20.00 | 23.00 | 22.00 | 25.00 | 23.00 | 26.00 |
| 16% | 22.00 | 25.00 | 24.00 | 27.00 | 26.00 | 29.00 | 27.00 | 30.00 |
| 18% | 24.00 | 27.00 | 26.00 | 29.00 | 28.00 | 31.00 | 29.00 | 32.00 |
| 20% | 26.00 | 29.00 | 28.00 | 31.00 | 30.00 | 33.00 | 31.00 | 34.00 |
| 12% | 21.00 | 24.00 | 23.00 | 26.00 | 25.00 | 28.00 | 26.00 | 29.00 |
| 16% | 25.00 | 28.00 | 27.00 | 30.00 | 29.00 | 32.00 | 30.00 | 33.00 |
| 18% | 27.00 | 30.00 | 29.00 | 32.00 | 31.00 | 34.00 | 32.00 | 35.00 |
| 20% | 29.00 | 32.00 | 31.00 | 34.00 | 33.00 | 36.00 | 34.00 | 37.00 |
| 12 full | 24.00 | 27.00 | 26.00 | 29.00 | 28.00 | 31.00 | 29.00 | 32.00 |
| 16 " | 28.00 | 31.00 | 30.00 | 33.00 | 32.00 | 35.00 | 33.00 | 36.00 |
| 18 " | 30.00 | 33.00 | 32.00 | 35.00 | 34.00 | 37.00 | 35.00 | 38.00 |
| 20 " | 32.00 | 35.00 | 34.00 | 37.00 | 36.00 | 39.00 | 37.00 | 40.00 |

*Furnished with galley top and extra drawer for copy.
Dis., 20 and 5%.

CASE STANDS AND RACKS.

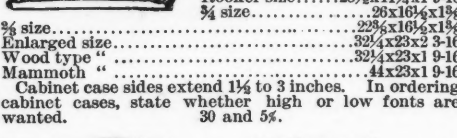
Stands.
Single, without racks ..\$3.75
" with racks for 8
full cases..... 4.06
Single, with racks for 10
full cases..... 4.2
Single, with racks for 12
full cases..... 4.50
Single, with racks for 14
full cases..... 4.75
Double, without racks..... 4.25
" with racks for 8
full cases..... 4.50
Double, with racks for 16
full cases, and gal. rest 6.25
Double, with racks for 20 full cases and gal. rest..... 6.50
" " " " 24 " " " " 6.75
" " " " 24 1/2 cases..... 5.25
" " " " 8 full and 8 1/2 cases..... 5.00
" " " " 8 " " 8 1/2 " " 5.25
" " " " 10 " " 12 1/2 " " 5.55
" " " " 12 " " 16 1/2 " " 5.70
" " " " 12 " " 16 3/4 " " 6.05
Stands with closed ends, extra..... 2.00
Extra slides for stands, each..... .03



Double, with racks for 20 full cases and gal. rest..... 6.50
" " " " 24 " " " " 6.75
" " " " 24 1/2 cases..... 5.25
" " " " 8 full and 8 1/2 cases..... 5.00
" " " " 8 " " 8 1/2 " " 5.25
" " " " 10 " " 12 1/2 " " 5.55
" " " " 12 " " 16 1/2 " " 5.70
" " " " 12 " " 16 3/4 " " 6.05
Stands with closed ends, extra..... 2.00
Extra slides for stands, each..... .03

LEAD CUTTERS,
From \$2 up,
Dis., 20 and 5%.

THE "LIBERTY" TYPE CASES. Outside Measurements.
Full size..... 32 1/2 x 16 1/2 x 19-16
Rooker size..... 28 1/2 x 14 1/2 x 19-16
3/4 size..... 26 1/2 x 16 1/2 x 19-16
1/2 size..... 22 1/2 x 16 1/2 x 19-16
Enlarged size..... 32 1/2 x 23 x 2-3-16
Wood type..... 32 1/2 x 23 x 1-9-16
Mammoth "..... 44 x 23 x 1-9-16
Cabinet case sides extend 1 1/2 to 3 inches. In ordering cabinet cases, state whether high or low fonts are wanted.
30 and 5%.



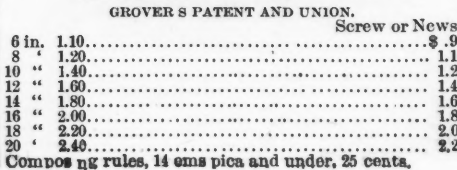
THE "LIBERTY" STEEL SHOOTING STICKS.
Bright, \$1 each.
Nickelplated, \$1.25 each.
Dis., 40%.

STANDARD METAL FURNITURE
25c. a pound.
In fonts of 25, 50, 75 and 100 lbs.
Dis., 15%.

THE "LIBERTY" MALLETS.
Hickory, small.....\$.20
" medium..... .25
" large..... .30
" iron bound..... 1.00
Lignum Vite, No. 4..... .30
" " No. 3..... .40
" " No. 2..... .50
" " No. 1..... .70
Dis., 20 and 5%.

THE "LIBERTY" PLANERS AND PROOF PLANERS.
Midget planer..... 10c.
Small Maple..... 20c.
Large..... 25c.
Galley " b'ked with leather..... 30c.
Proof planer, faced with cloth, 50c.
Dis., 40%.

COMPOSING STICKS.
GROVER'S PATENT AND UNION.
Screw or News.
6 in. 1.10.....\$.90
8 " 1.20..... 1.10
10 " 1.40..... 1.20
12 " 1.60..... 1.40
14 " 1.80..... 1.60
16 " 2.00..... 1.80
18 " 2.20..... 2.00
20 " 2.40..... 2.20



THE "LIBERTY" COMPOSING STICKS.

Grover.
6 in., Steel.....\$.90
8 " "..... 1.00
10 " "..... 1.20
12 " "..... 1.40
14 " "..... 1.60
16 in., Steel.....\$1.80
18 " "..... 2.00
20 " "..... 2.20
Extra Clasp..... .10
Extra Knee..... .40

Screw.
6 in., Steel.....\$.75
8 " "..... .80
10 " "..... 1.00
12 " "..... 1.15
14 " "..... 1.30
16 in., Steel.....\$1.45
18 " "..... 1.60
20 " "..... 1.75
Extra Knee..... .30
" " Screw and Nut..... .10

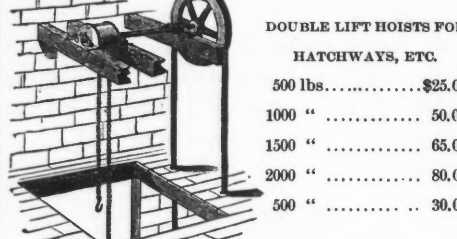
Dis., 40%.
Yankee.
6 in., Steel.....\$.75
8 " "..... .80
10 " "..... 1.00
12 " "..... 1.15
14 " "..... 1.30
16 in., Steel.....\$1.15
18 " "..... 1.30
20 " "..... 1.45
Extra Clasp and Screw..... .15

Other Sizes to Order.
Dis., 40%.
Albion.
6 in., Steel.....\$1.00
8 " "..... 1.10
10 " "..... 1.20
12 in., Steel.....\$1.50
14 " "..... 1.75
Extra Screw and Nut..... .10

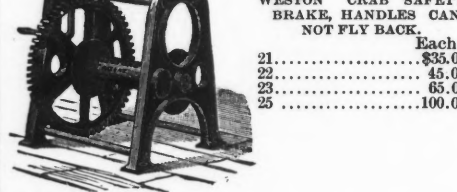
Pulley Blocks.

WESTON DIRECT.
Each.
1/2 ton.....\$10
3/4 ton..... 13
1 ton..... 15
1 1/2 tons..... 20
2 tons..... 25
3 tons..... 30
4 tons..... 40

Geared.
1 ton.....\$34
2 tons..... 55
3 tons..... 60
4 tons..... 80
5 tons..... 110
6 tons..... 150
8 tons..... 210
10 tons..... 250



DOUBLE LIFT HOISTS FOR HATCHWAYS, ETC.
500 lbs.....\$25.00
1000 "..... 50.00
1500 "..... 65.00
2000 "..... 80.00
500 "..... 30.00



WESTON GRAB SAFETY BRAKE, HANDLES CAN NOT FLY BACK.
Each.
21.....\$35.00
22..... 45.00
23..... 65.00
25..... 100.00



Pumps.
Fig. 199. Fig. 202 1/2. Fig. 205.
No. 0 1 2 3 4 5 6 8
Iron.....\$3.50 \$4.00 \$4.50 \$5.00 \$5.50 \$6.50 \$8.00 \$10.00
s. d. s. d. s. d. s. d. s. d. s. d. s. d. s. d. s. d. s. d.
14 4 16 8 18 9 20 10 22 11 27 1 33 4 41 8
Brass cyl..... 5.50 6.00 7.00 8.00 10.00 13.00 18.00 25.00
s. d. s. d. s. d. s. d. s. d. s. d. s. d. s. d. s. d. s. d. s. d.
22 11 25 0 29 2 33 4 41 8 54 2 75 0 104 2
Brass..... 7.75 8.75 10.50 14.00 17.00 21.00 27.00 35.00
s. d. s. d. s. d. s. d. s. d. s. d. s. d. s. d. s. d. s. d. s. d.
32 3 1/2 36 5 1/2 43 9 58 4 70 10 87 6 112 6 145 10
Iron, 65% Brass and Brass Cyl., 60%.

Fig. 205. No. 1 2 3 4
65% \$4.25 \$4.75 \$5.25 \$5.75
17 5/8 19 9/16 21 10/16 23 11 1/16
Fig. 390. Fig. 394. Fig. 442.



| No. | Capacity. | With Wheels and Drop Lever. | Platform. | Price. |
|-----|------------|-----------------------------|---------------|---------|
| 4 | 1,000 lbs. | 26 | by 17 inches. | \$51.00 |
| 5 | 1,200 lbs. | 28 | by 20 " | 59.00 |
| 6 | 1,600 lbs. | 29 | by 21 " | 70.00 |
| 7 | 2,000 lbs. | 32 | by 23 " | 82.00 |
| 8 | 2,500 lbs. | 33 1/4 | by 24 1/4 " | 94.00 |
| 9 | 3,000 lbs. | 38 | by 30 " | 125.00 |

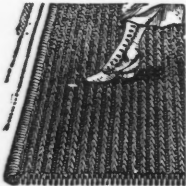
Shears.

The Patent "Eureka"



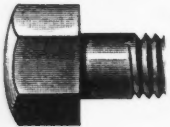
No. 1 cuts round metal up to 1/4 in. steel to 1/8, \$12.
No. 2 cuts round metal up to 3/8 in. steel to 3-16, \$20.
Discount, 25%.

Steel Wire Mats.



(Style A) "Hartman Flexible." Galvanized Steel Wire. Each... \$1.50
No. 2. Size 16x24. Each... 2.00
No. 3. " 18x30. " 3.00
No. 4. " 22x36. " 4.50
No. 5. " 26x48. " 5.25
No. 6. " 30x48. " 6.50
No. 7. " 36x48. " 8.00
No. 8. " 36x60. " 10.00
No. 9. " 36x72. " 10.00

Brass mats "list" double the price of galvanized Style A) for similar sizes.
3 doz. lots, dis. 33 1/4%.
6 doz. lots, dis. 40%.
12 doz. lots, dis. 40 and 5%.



Screws.

STEEL SCREWS ADD 50% TO LIST. Prices are per 100. Hexagon Cap Screws. Heads on Steam-tight Screws not polished, unless so ordered. Can make these 12 inches long.

| Diam. head. | 7-16 | 1/2 | 9-16 | 5/8 | 3/4 | 13-16 | 1 | 1 1/4 | 1 1/2 | 1 3/4 | 1 3/8 |
|----------------------|------|------|------|------|-----|-------|------|-------|-------|-------|-------|
| Length head. | 3/4 | 5-16 | 3/8 | 7-16 | 1/2 | 9-16 | 5/8 | 3/4 | 7/8 | 1 | 1 1/8 |
| Diam. screw. | 1/4 | 5-16 | 3/8 | 7-16 | 1/2 | 9-16 | 5/8 | 3/4 | 7/8 | 1 | 1 1/8 |
| Length under head. | 3/4 | 5-16 | 3/8 | 7-16 | 1/2 | 9-16 | 5/8 | 3/4 | 7/8 | 1 | 1 1/8 |
| Thread to in. | 20 | 18 | 16 | 14 | 12 | 12 | 11 | 10 | 9 | 8 | 7 |
| Add for each 1/4 in. | 30 | 40 | 50 | 60 | 80 | 1.00 | 1.30 | 1.60 | 2.00 | 2.40 | 3.00 |

Dis., heads ground, 60 and 10%; dis., heads black, 60, 10 and 5%; dis., heads extra finish, 50 and 10%; dis., heads case-hardened, 55% and 16 dis.; dis., heads polished after hardening, 45 and 10%.



SQUARE CAP SCREWS.

| Diam. head. | 3/8 | 7-16 | 1/2 | 9-16 | 5/8 | 3/4 | 1 1/4 | 1 1/2 | 1 3/4 | 1 3/8 |
|----------------------|-----|------|-----|------|-----|------|-------|-------|-------|-------|
| Length head. | 3/4 | 5-16 | 3/8 | 7-16 | 1/2 | 9-16 | 5/8 | 3/4 | 7/8 | 1 |
| Diam. screw. | 1/4 | 5-16 | 3/8 | 7-16 | 1/2 | 9-16 | 5/8 | 3/4 | 7/8 | 1 |
| Length under head. | 3/4 | 5-16 | 3/8 | 7-16 | 1/2 | 9-16 | 5/8 | 3/4 | 7/8 | 1 |
| Thread to in. | 20 | 18 | 16 | 14 | 12 | 12 | 11 | 10 | 9 | 8 |
| Add for each 1/4 in. | 25 | 35 | 45 | 55 | 65 | 90 | 1.20 | 1.50 | 1.80 | 2.30 |

Dis., heads ground, 65 and 10%; dis., heads black, 65, 5 and 5%; dis., heads extra finish, 55 and 10%; dis., head case hardened, 60 and 10%; dis., heads polished-hardened, 50 and 10%.



MILLED HEADS, COLLAR SCREWS
25 and 10% discount.

| Diameter of Collar. | 1/4 | 1/2 | 3/4 | 1 | 1 1/4 | 1 1/2 | 1 3/4 | 2 | 2 1/2 | 3 |
|-----------------------------|------|------|------|------|-------|-------|-------|------|-------|-------|
| Diameter of Screw. | 1/8 | 3/16 | 1/4 | 5/16 | 3/8 | 7/16 | 1/2 | 5/8 | 3/4 | 7/8 |
| Length under Head to Point. | 2.50 | 2.80 | 3.10 | 3.75 | 4.40 | 5.00 | 6.25 | 6.85 | 8.25 | 11.25 |
| Threads to inch. | 40 | 30 | 20 | 18 | 16 | 14 | 12 | 12 | 11 | 10 |
| Add for each 1/4 inch. | 30 | 40 | 50 | 60 | 80 | 1.00 | 1.30 | 1.60 | 2.00 | 2.40 |

MILLED FROM SOLID BAR.



| Fillister. | Bevel Head. | Button Head | |
|--------------------|----------------------------------------|-----------------------------------------|-------------------------------|
| Diam. Head | 3-16 1/4 3/8 | 7-16 9-16 1/2 3/4 | 13-16 1/2 1 |
| Length Head | 3/8 3-16 1/4 5-16 3/8 | 7-16 1/2 9-16 5/8 3/4 | 9-16 5/8 3/4 |
| Diam. Screw | 1/8 3-16 1/4 5-16 3/8 | 7-16 1/2 9-16 5/8 3/4 | 9-16 5/8 3/4 |
| Length under Head. | 3/4 2.00 2.25 2.50 3.00 3.50 4.00 5.00 | 2.25 2.50 2.75 3.25 3.75 4.25 5.00 6.00 | 6.60 8.90 9.00 12.00 |
| Thread to in. | 40 30 20 18 16 14 12 12 11 10 | 40 30 20 18 16 14 12 12 11 10 | 40 30 20 18 16 14 12 12 11 10 |

Head on Bevel and Button Head Screws, 1-16 larger in diameter than above specifications. Price, according to size of head. Discount, 50 and 10%; case hardened, 45 and 10%; case hardened also polished, 35 and 10%.

Spades and Shovels.

JONES

Patent plain black solid cast-steel shovels and spades.

| No. | D. or long handle sq.-point shovels. | No. | Black Pol'd |
|-----|--------------------------------------|-----|-------------|
| 20 | 2 | 2 | \$15.50 |
| 21 | 3 | 3 | 16.25 |
| 22 | 4 | 4 | 17.00 |
| 23 | 6 | 6 | 17.50 |
| 24 | 8 | 8 | 20.50 |

Pt. plain back solid cast steel shovel.

25. D or long handle round-point shovels. 3 16.25 17.25

Patent solid cast steel spade.

28. D or long handle spades. 2 6.00 17.00
29. " " " " 3 16.50 18.00

Patent plain back solid cast steel.

26. Long round joint shovel No. 2. 15.50 16.50
27. " square No. 2. 15.50 16.50

32. B. handle square-point molders shovels. 2 17.00

33. D. handle square point railroad extra heavy. 2 15.75

34. D. handle round point railroad, extra heavy. 3 16.50

35. L. handle round point shovel, with foot cap. 2 16.00 17.00

GRAY'S CAST.

| No. | D. or long handle sq.-point shovels. | Price |
|-----|--------------------------------------|-----------------|
| 50 | 2 | \$12.00 \$13.00 |
| 51 | 3 | 12.75 14.00 |
| 52 | 4 | 12.75 14.00 |
| 55 | 2 | 12.25 13.25 |
| 56 | 3 | 13.00 14.25 |

Patent solid corrugated cast steel scoop.

SCOOPS.

Jones' patent plain back solid corrugated cast steel scoops.

| No. | D. or long handle solid cast steel. | Price |
|--------|-------------------------------------|-----------------|
| 90 | 2 | \$13.50 \$14.50 |
| 91 | 4 | 14.50 15.50 |
| 91 1/2 | 6 | 16.50 17.50 |

| No. | Description | Price |
|-----|-------------------------------------------|----------------|
| 92 | Cast steel D. or long handle. | 13.50 14.50 |
| 93 | " " " " " " " " | 14.50 15.50 |
| 94 | " " " " " " " " | 16.50 17.50 |
| | | Half polished. |
| 95 | " " " " " " " " | \$20.00 |
| 96 | " " " " " " " " | 22.50 |
| 97 | " " " " " " " " | |
| | motive or coal (heavy). | 17.50 |
| 98 | " " " " " " " " | |
| | Long or D. handle for salt heavy. | 17.50 |
| 99 | " " " " " " " " | |
| | D. handle flour and house furnace. | 10.50 |
| 100 | " " " " " " " " | |
| | D. handle r'd-pt. for coal (extra heavy). | 20.00 |
| 101 | " " " " " " " " | |
| | ash pit, furnace L. handle. | Polished. |
| 102 | " " " " " " " " | 13.00 |
| 103 | " " " " " " " " | 13.50 |
| | D. handle. | 14.00 |



Ditching spade.

| | | |
|-----|--------------------------------------------------------|-------------|
| 124 | D handle ditching (flat). | 18.00 19.50 |
| 125 | D handle post hole (concave). | 18.00 19.50 |
| 126 | D handle Alcock (for clay and brick). | 16.00 17.00 |
| | Discount on shovels and spades, 50 and 10% scoops, 50. | |

Boxed f.o.b. New York, Boston or Montreal. The solid shovels, spades and scoops are made from cast steel bars by a recently patented process, the blade and strap being in one piece, not welded. All goods are American patterns.

Stencil Inks.

| No. | Per can. | Per cake. | No. | Per can. | Per cake. |
|-----|-----------|-----------|-----|-----------|-----------|
| 1 | 7 cents | 3 cents | 3 | 30 cents | 12 cents |
| 2 | 10 " | 5 " | 4 | 30 " | 20 " |
| | | | | | |
| | 10 cents. | 6 cents | 3 | 30 cents. | 22 cent |
| | 15 " | 9 " | 4 | 50 " | 40 " |
| | | | | | |
| | 12 cents | 8 cents | 3 | 50 cents. | 42 cents |
| | 20 " | 15 " | 4 | 50 " | 80 " |

Per doz. cans or cakes, net, per gross, 20% less.

| Small bottles per | 100 | 500 | 1,000 | Price |
|-------------------|-----|-----|-------|--------|
| | | | | \$2.75 |
| | | | | 12.00 |
| | | | | 20.00 |

STENCIL COMBINATIONS.

Contains Alphabet, Figures, Brush, and Ink.



| 1/2 inch, per doz. | Price |
|--------------------|--------|
| 1/2 | \$4.80 |
| 3/4 | 5.40 |
| 1 | 5.40 |
| 1 1/4 | 7.50 |
| 1 1/2 | 8.40 |
| 1 3/4 | 10.00 |
| 2 | 10.00 |
| 2 1/2 | 15.00 |

Dis., 20%.

Tools.

ARTISANS.

Chisel (Mason). Stone, 5 and 8c. lb., net.

Mill Picks. Cast steel, 2 to 3 lb. \$22 per doz. Dis., 60 and 5%.

Stone Axes, Cast Steel. All sizes, 50c. per lb. Dis., 70 and 10%.

Five lbs. and over, 40c.; with teeth, 45c.; 3 to 5 lbs., 45c.; with teeth, 50c.; under 3 lbs., 50c.; with teeth, 55c.

Nos. 40 and 41, spalling or stone hammer, 5 lbs. and over, 36c.; 3 to 5 lbs., 40c.; under 3 lbs., 45c. per lb. Nos. 40 and 41, spalling hammers, 9 to 20 lbs., steel face er lb., 17c. Dis., 70 and 10%

Ship or Top Mauls, Steel Face 4 to 8 lbs., 28c. per lb.

Dis., 50, 10 and 5%.

Steel Wedges, wood, 1st qual., 5c. lb.

Cooper Froes. 8 in. doz. \$13.00. 10 in. doz. 13.50. 12 in. doz. 14.00. 14 in. doz. 14.50. 16 in. doz. 15.00.

Discount, 6%.

