it chiefly in combination; and, at the present day, the employment of the pure metal is less general than that of its alloys. It is not improbable that copper will unite with all the metallic elements, but its alloys with zinc, tin, nickel, and the precious metals, are the most valuable and best known. The most useful is "brass," consisting essentially of copper and zinc. It is first mentioned by Aristotle, who states that the people who inhabited a country adjoining the Black Sea, prepared their copper of a beautiful white color by mixing it with an earth found there, and not with tin, as was the custom in other lands. The ancients, however, were not acquainted with the nature of the change that took place; and it is a remarkable example of the slowness by which man arrives at truth when led by experience alone, that brass should have been made during a period of 2,000 years without the metal which brought about the change in the copper being discovered. Brass was made with the utmost secrecy in Germany during several centuries, and some families were raised to great opulence by its manufacture.

The first brass works in England were put into operation in 1649, in the county of Surrey, and the whole of the metal was then made of "rose" copper from Sweden. The first mill for drawing brass wire was erected in 1663. The advantages of brass over copper are its less cost, it being partly composed of a metal cheaper than copper; it is harder, does not oxidize or rust so easily; it melts at a lower temperature, and is hence better for small castings; it has not that tendency to fill with minute bubbles, which property is so disadvantageous in copper founding; it cuts smoother in the lathe, and will bear a higher polish; its color may be made to resemble gold, which adapts it for ornamental purposes; and, lastly, it is more ductile and tenacious. Generally, as the proportion of zinc rises, the hardness and fusibility increases, while the malleability and weight decrease. The brass founder in speaking of his mixtures, specifies the amount of zinc only, it being understood that the ratio is to the pound of copper. The largest consumption of brass is in the manufacture of pins. Brass foil is made from a very thin sheet of brass of 11 copper to 2 zinc.

The next alloy in importance is called "bronze." Tin is now substituted for zinc. Like brass, it is harder and more fusible than copper, and denser than the mean of its constituents. Its color is usually reddish-yellow, but when exposed to the air, a basic carbonate of copper is formed, which furnishes the greenish hue commonly seen on the surface of statues, and by which the alloy is best known. Bronze possesses the singular property of becoming so malleable, that it may be hammered and coined when it is heated and rapidly cooled; and by heating it, and allowing it to cool slowly, it may be made to regain its former hardness and brittleness. Bronze for statuary, for cannon, for bells, and for gongs, is, respectively, of the following proportions of copper and tin: 84 to 11, 89 to 11, 78 to 22, 76 to 22.

Speculum metal is the third alloy in importance, the standard proportions being about 66 copper to 34 tin. The speculum of the great Rosse telescope is composed of copper, with a little less than half its weight of tin, making a composition very hard and brittle, and capable of very fine polish.

German silver is a mixture of copper, 57, nickel, 24, and zinc, 13, and originated in China under the name of "packfong." Large quantities are manufactured at Sheffield, in England, where it is formed into forks, spoons, and vessels for the table, and being plated with silver by the electrotype process. is sold as a substitute for silver. When well made, it cannot be distinguished by an unpractised eye from many of the silver alloys, even when brought on the touchstone; but by dissolving a small piece in nitric acid, and adding a few drops of hydrochloric acid, no milky precipitate is formed, which would be the case were a silver alloy so treated. Good German silver is tougher and harder than brass, and resists the action of air better. Lastly, copper is used, in various proportions, to give the requisite durability to gold and silver coins.

The foregoing are the principal alloys of copper; there are a number of others, the names and properties of which are known to artisans. An alloy of 90 copper to 10 arsenic, is white, slightly ductile, and more fusible than copper, and is not attacked by the atmosphere. This is used for scales of thermometers and barometers, for dials, candlesticks, etc. With iron, copper combines in small proportions; 1 per cent, however, causes iron to weld badly. With aluminum it forms an alloy of considerable malleability and great hardness, capable of taking a very high polish.

THE DOWNFALL OF PARIS.

"Plenty more at the same shop. Country orders executed with neatness and dispatch," exclaimed the renowned Dick Swiveller, after administering a wholesome chastisement to Quilp the Dwarf. The facility with which that well-earned drubbing was administered, and the profound repose with which the chastiser rested upon his laurels, have been, to illustrate great things by small, repeated in the Franco-Prussian war, and in the attitude of Germany toward France, in the hour of her deserved humiliation. France has been whipped as easily as Dick Swiveller punished the dwarf, and her capital has succumbed to a fate that has long been inevitable.

The causes which led to the war have been sufficiently discussed; the causes of the defeat of France, and the effect which the triumph of the German arms will have upon Europe and the world at large, are fruitful themes.

Many will attribute the Prussian success to superiority of numbers. Others will see in it only a triumph of one breech-loading gun over another. Others will see deeper reasons in the difference of the character of the two nations, and, searching for the cause of the difference, will find it in their systems of education, which, on the one hand, has created a nation of educated soldiers, and, on the other, has led to the mental, moral, and physical degeneration of a nation, once the terror of all Europe.

We quote the following eloquent extract from an article written for the London *Fortnightly Review*, by Emile De Laveleye:

The most formidable corps in the French armies was, it used to be said, the Turcos and the Zephyrs. They met men in spectacles, coming from universities, speaking ancient and modern languages, and writing on occasion letters in Hebrew or Sanskrit. The men in spectacles have beaten the wild beasts from Africa. In other words, intelligence has beaten savagery. Are we to be surprised at this, when we know that war, like industry, is becoming more and more an affair of science?

Who does not know the immense sacrifices that Germany has made for the advancement and diffusion of knowledge—spending, for instance, twenty thousand pounds sterling at Bonn in a chemical laboratory, forty thousand at Heidelberg in a physical laboratory? Little Wurtemberg devoted more money to superior instruction than big France. A thing unheard of, France made the very fees of the university students a source of revenue. She gave, without counting it, more than a couple of millions of pounds sterling (between fifty and sixty million francs) for the new opera, and she refused forty thousand pounds for school buildings. Last year, on the deck of the steamer which was conveying us to the inauguration of the Suez Canal, M. Duruy, the one man of merit who ever served under the imperial government, told me the tale of his griefs in the ministry of public instruction. He wanted to introduce compulsory education; the Emperor supported him; he had all the other ministers against him. He had organized fifteen thousand night schools for adults; it was with difficulty that he succeeded in carrying off forty thousand pounds against the fatuous resistance of the Council of State. There was the whole system of public instruction to re-organize, and he could get nothing. They preferred to employ the gold of the country in maintaining the ladies of the ballet, in building barracks and palaces, in gilding monuments, the dome of the Invalides, the roof of the Sainte Chapelle. It was in vain that men like Jules Simon, Pelletan, Duruy, Jules Favre, cried out, year after year, "There must be millions for education, or France is lost." The Government was deaf. It denied nothing to pleasure, to luxury, to ostentation. It denied everything to education.

Again history repeats itself. Again a nation surrendering itself to the utmost refinement of luxury, and disseminating false tastes and demoralizing influences from its Capital to corrupt other nations, has found itself in the hour of peril, unable to resist an attack from a frugal and industrious people, by whom its luxury and pomp has been crushed into the very dust of humiliation.

A daily exchange has asked the question, How much debt can a nation endure and maintain its existence? and thinks the enormous debt of France will throw some light on this question. *We* ask, has it not been demonstrated in this short and decisive struggle, how much luxury a nation can endure and live?

For a long time, Paris has been the fashionable exemplar of the civilized world. What has been done in Paris has been feebly imitated in America, and has more or less influenced the diet, manners, dress, and even the literature of all other nations. The stage has been corrupted by it, and the polished iniquity of the modern Babylon has tainted, more or less, the morals of every capital city in the world. Babylon has fallen. It remains now to be seen whether the seeds of evil which have hitherto emanated from the chastised city, will exert their demoralizing power to the downfall of other nations.

There is no truth more deeply engraved on the pages of history, than that extreme luxury begets a contempt for the homely industries of life, a disregard of a high standard of popular intelligence and the means of maintaining it, a contempt for severe discipline, and rebellion against it, and a general weakness of character that renders a nation powerless against a race of sturdy, intelligent, enduring, and united people.

This war has been a triumph of knowledge and subordination over ignorance and insubordination; of settled earnest principle and purpose over passion and impulse; of thorough organization and fixed policy over incompetency and vacillation of purpose. It teaches a lesson all nations would do well to learn.

In this war the "spectacles" have won 800,000 prisoners, including the Emperor and the Marshals of France, 6,000 cannon, 112 eagles, and a large quantity of stores, munitions, and small arms. And all this has been done in a time so short, that history may be searched in vain for a precedent. The humiliation of the French nation is complete; perhaps the military pride of Germany will be stimulated in equal proportion, but we believe that a nation educated as are the Germans, will know how to use power in a manner that will add to, rather than diminish the glory of their great victory.

BOYNTON'S LIGHTNING SAW.

In another column will be found an advertisement of this saw, to which we would call the attention of those interested in the cutting of timber and cord wood, and in the manufacture of lumber. The teeth of this saw are of even length, double pointed, cutting only with the outside vertical and projecting edges, and clearing simultaneous with the same. All the teeth being M shaped, they are as easy for the unskilled laborer to sharpen and keep in order as the old-fashioned tooth. The two points of the tooth operate as one, preventing gouging out while cutting, and clearing by direct action beneath dust and fiber. These saws are gaining in public favor rapidly. In a trial of a cross-cut, operated by two sawyers, it, in our presence, has repeatedly cut off a beam of white oak, 12 by 6½ inches, in from five to seven seconds, and with from 8 to 10 strokes of the saw. The invention will, we think, greatly lessen the labor of a large class of the most industrious and hard-working men to be found on this continent—the lumbermen—and its use will result in a saving of both wood and labor, in the cutting of cord wood.

THE PRESENT AND THE PAST.

NUMBER III.

Why did mankind for so long a time fail to recognize the existence and the magnitude of the effects produced by these unceasing agencies of destruction? In great measure, because the ideas of civilized men, regarding the earth and its history, were cramped within the narrow scope of each one's limited, individual experience. Men living in temperate climates did not dream that in the circumpolar regions millions of tuns of rocks were annually riven from those frost-bound lands, were borne down to the sea upon the great glacier-rivers, and were set afloat on icebergs, to be finally scattered far and wide over the beds of distant oceans; nor did they ever calculate what would be the effects of a tropical rainfall, two, three, four, or even twenty times heavier than any which they themselves had ever witnessed; much less did they think of multiplying the mass of material removed in a single year by its repetition over a long series of past ages.

What if a village here and there, along the coast, were driven back, step by step, house by house, by the steady encroachment of the sea; what if its ancient church, formerly miles inland, now toppled on the verge of the treacherous cliff, and the bones of the dead in its churchyard, here projected from the topmost layer, there lay fallen on the beach, the prey of the relentless foe? This might be taking place in our village, but which of us reasoned, from these premises, that the whole coast of the British Islands—allowing for the few local exceptions, where sand banks or river rills are slightly encroaching on the sea—was being eaten into at an average rate of perhaps three feet in a century? Ours were clay cliffs, and readily crumbled; but the granite walls of Cornwall, whoever deemed them perishable, much less thought of estimating the rate of their destruction?

But, now-a-days, when each one of us may work the experiences of travelers in all parts of the world into his chain of reasoning, no one has a right to claim ignorance of these truths of nature. Read what Kane and Hayes have written of Greenland glaciers, and of the origin of icebergs; read what other explorers tell of the vast number of icebergs engaged in the unceasing task of burying the remains of the Antarctic continent in the waters of the great Southern Ocean; read what Alpine travelers narrate of the incessant crashing of displaced rocks, and constantly recurring roar of avalanches, laden with the ruins of the mountains, whose cliffs re-echo these, the prophetic sounds of their future doom; read such accounts—and they are at least as interesting to a well-cultivated mind as political diatribes, or sensational novels—and you will form some idea of the grand scale of King Frost's labors, and of the littleness of your own unaided experiences.

We know what heavy summer showers are in New York, where the annual rainfall is double that of damp, foggy London; but our rainfall is only half of the average under the equator, in which zone, moreover, there are vast regions that seldom, or never, receive even a passing shower, thus greatly raising the average of the other portions. In fact, we cannot rightly estimate the force of the rainfalls in the warmer parts of the earth by comparing total averages; the rain in those regions falls in a downpour concentrated into the course of but four or six months; a condition of things admirable described by the Indian lady, bewailing the rainy season:

> "They count our rainfall up in grudging measure,
> With gages all too shallow for our woes;
> They talk of inches of the liquid treasure—
> When we have yards with every wind that blows!"

And this is scarcely exaggeration. More rain has been recorded as falling in localities in India and Australia, in twenty-four hours, than falls in London in the whole year.

We read in Lyell of places where the rainfall amounts to 530 inches in six months, or about eleven times as much as falls in New York in the twelvemonth! No wonder that of such regions he adds: "Numerous landslides, some of them extending three or four thousand feet along the face of the mountains, composed of granite, gneiss and slate, descend into the beds of streams and dam them up for a time, causing temporary lakes, which soon burst their barriers. 'Day and night,' says Dr. Hooker, 'we heard the crashing of falling trees, and the sounds of boulders thrown violently against each other in the beds of torrents. By such wear and tear, rocky fragments, swept down from the hills, are in part converted into sand and fine mud; and the turbid Ganges, during its annual inundation, derives more of its sediment from this source than from the waste of the fine clay of the alluvial plains below.'"

You who watch the roadside rill perhaps have never thought what millions of such muddy streamlets are engaged all the land over in Nature's great freight trade; aye, and what millions of tuns of earthy freight they each day transport onwards towards the sea. The Ganges and the Brahmapootra have their sources in such rills, and it has been calculated that these two rivers together carry down from the interior of Southern Asia to their common delta about 2,500,000,000 tuns of solid matter in the course of the year. To modify Lyell's statement, if a fleet of more than 600 Indiamen, "each freighted with about 1,400 tuns weight of mud, were to sail down the river every hour of every day and night for four months continuously, they would

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only transport, from the higher country to the sea, a mass of solid matter equal to that borne down" by these two rivers. Such an accession of earth would cover annually 1,650 square miles of surface—or, in one year, one third more than the dry land of Rhode Island; in three years, nearly the area of Connecticut; and in twenty-eight years, nearly that of the State of New York, with a layer of soil one foot in thickness! And this amount is denuded from the water shed of but two rivers! "But," says the unconvinced reader, "how small is the area of New York State when compared with the vast extent of country drained by these mighty streams! The foot in New York State must be reduced to a fraction of an inch over the slopes of the Himalayas, and of Northern India." To which we reply, how short a time is twenty-eight years compared to the age of these rivers! For on this point other evidence steps in, and we learn that the deposits in their delta, even as far as our limited knowledge of them goes, are sufficient to cover our State with seven hundred feet of earth; or, in other words, that material enough to form a mountain range nine hundred miles in length, twenty-five miles in breadth, and sloping from the plain to a hight of twenty-eight hundred feet, has been in the course of time removed from the basins of the Ganges and the Brahmapootra. Should the reader figure this out he will say, "At this rate you give these rivers an antiquity of twenty thousand years." And why not? Or twice as long, if you will? Lyell, with very good grounds for the statement, says of the Mississippi, that it has been transporting its earthy burden to the ocean during a period far exceeding perhaps one hundred thousand years. Perchance, now, you begin to understand why men remained so long in ignorance of the vast operations of Nature? As long as the world was thought to be but six thousand years old, men saw no purpose in her slow movements, and the results she had already achieved were but so many incomprehensible puzzles.

SCIENTIFIC INTELLIGENCE.

COLORED CEMENTS.

Professor Bottger prepares cement of diverse colors and great hardness by mixing various bases with soluble glass.

Soluble soda glass of 33° B. is to be thoroughly stirred and mixed with fine chalk, and the coloring matter well incorporated. In the course of six or eight hours a hard cement will set, which is capable of a great variety of uses. Bottger recommends the following coloring matters:

1. Well sifted sulphide of antimony gives a black mass, which, after solidifying, can be polished with agate, and then possesses a fine metallic luster.
2. Fine iron dust, which gives a grey black cement.
3. Zinc dust. This makes a grey mass, exceedingly hard, which, on polishing, exhibits a brilliant metallic luster of zinc, so that broken or defective zinc castings can be mended and restored by a cement that might be called a cold zinc casting. It adheres firmly to metal, stone, and wood.
4. Carbonate of copper gives a bright green cement.
5. Sesquioxide of chromium gives a dark green cement.
6. Thénard's blue, a blue cement.
7. Litharge, a yellow.
8. Cinnabar, a bright red.
9. Carmine, a violet-red.

The soluble glass with fine chalk alone gives a white cement of great beauty and hardness.

Sulphide of antimony and iron dust, in equal proportions, stirred in with soluble glass, afford an exceedingly firm, black cement; zinc dust and iron in equal proportions yield a hard, dark grey cement.

As soluble glass can be kept on hand in liquid form, and the chalk and coloring matters are permanent and cheap, the colored cements can be readily prepared when wanted, and the material can be kept in stock, ready for use, at little expense. Soluble glass is fast becoming one of our most important articles of chemical production.

USE OF IODINE IN THE MANUFACTURE OF CHLORAL.

The enormous consumption of the hydrate of chloral as an anodyne and the expense of its manufacture, render any modification of the old process of its preparation very acceptable. F. Springmuhl, assistant in the laboratory of Breslau, proposes the employment of iodine as an improvement. To every half pound of alcohol he adds half a grain of iodine. The alcohol, which is colored brown by the iodine, soon becomes clear on passing chlorine gas through the mixture, and the hydrochloric acid produced by the decomposition of the alcohol is passed through water for its absorption; while the residue of the vapor is removed by sulphuric acid and chloride of calcium. The liquid becomes hot at first, and has to be cooled; it is afterwards heated to ebullition. After passing chlorine gas for twelve hours through the half pound of alcohol contained in a tubulated retort, no more hydrochloric acid is observed, and only pure chlorine gas passes over. The liquid in the retort is neutralized with caustic lime, filtered and distilled. At 161° Fah., all the iodide of ethyl goes over; and between 230° and 240° Fah., the chloral, which is separately condensed, is then mixed with concentrated sulphuric acid, once more distilled, and finally purified by sublimation. The hydrate of chloral obtained in this way amounted, in two experiments, to ninety and ninety-six per cent of the theoretical quantity, and was of the best quality and free from iodine.

It is said that the purification of the hydrate of chloral can be best accomplished by the use of chloroform, benzole, oil of turpentine, or bisulphide of carbon, as solvents.

If 1 part of the hydrate of chloral be dissolved in 5 or 6 parts of the oil of turpentine at between 86° and 104° Fah., and the liquid be slowly cooled, beautiful plates and tables separate. The best solvent is the bisulphide of carbon; at 60° Fah., 1 part of the hydrate of chloral is soluble in 45 parts of the bisulphide; but at temperatures below the boiling point of the solvent, 4 or 5 parts of the bisulphide are sufficient to 1 part of the chloral. By allowing the liquid to cool slowly, large prisms, sometimes an inch long, separate, and in the air rapidly lose all traces of the bisulphide. When prepared in this way, the perfectly pure hydrate of chloral fuses between 120° and 127° Fah.

For medicinal purposes only the pure, crystalline product ought to be employed.

ARTIFICIAL ALIZARINE.

One part of anthracen is boiled for a few minutes with 4 to 10 parts of concentrated sulphuric acid diluted with water, and neutralized with carbonate of lime, or with a carbonate of soda or potash; and the sulphates of these bases removed by filtration or crystalization. The resulting liquid is heated to from 356° to 500° Fah., with caustic potash, to which chlorate of potash or saltpeter in an amount equal to the anthracen employed has been added, so long as a violet-ble color is produced. From this product the alizarin is thrown down by acids.

RARE MINERALS.

Professor Rammelsberg, of Berlin, has recently analyzed two rare minerals, called Fergusonite and Tyrite, the former from Sweden, and the latter from Norway, the composition of which discloses substances so little known that it is difficult to see to what uses they could be applied, even if we had them in great abundance. It so often happens, however, that elements of rare occurrence eventually become the very corner stone in some new technical discovery, that it is never well to pass over any of them as of no value. We give below the constituents of the minerals, and doubt if many of our readers are familiar with the earths mentioned:

	Fergusonite.	Tyrite.
Tantalic acid	8·73	45·00
Columbic acid	40·16	....
Stannic acid, Tungstic acid	0·91	....
Yttria	30·45	30·00
Ceria	7·80 (Ceria, Lanthana, Didymia)	5·74
Lanthana, Didymia		3·51
Iron	4·09	1·48
Urania	1·98	6·52
Lime	3·40	2·36
Alumina	....	1·05
Water	4·47	4·88
	101·99	100·54

The Insulation of Telegraph Wires in Cities.

Glass, when placed in the shade, becomes completely coated with a thin film of water whenever the moisture contained in the atmosphere amounts to above 40 per cent of saturation. During rain the atmosphere sometimes reaches the point of complete saturation, or 100 per cent. When this is the case, any article of glass, even if exposed to the atmosphere alone, and not to the direct action of the rain, is soon completely covered with moisture, and under these circumstances its surface becomes a conductor of electricity.

The atmosphere of all large cities is heavily charged with soot, smoke, and ammoniacal salts, arising from combustion; and these, being taken up by the particles of falling rain and moisture, increase the conducting power of the latter to an enormous extent. Careful experiments made in Manchester, England, where the atmosphere is very impure, showed that the conducting power of the rain water which fell in that city was more than 300 times that of distilled or absolutely pure water. Speaking of this subject, Latimer Clark says: "Pure water offers a very high resistance, but if it contain any acids or saline matters in solution, the resistance is much smaller; hence it is that clear rain in the country does not greatly injure the working of a line, but in towns, where the atmosphere is less pure, the insulation often becomes very imperfect in wet weather."

The comparative insulation of wires, in the city and country, under otherwise similar conditions, may be seen by the following actual measurements, taken at the New York office of the Western Union Company: No 1 wire east showed a mileage insulation, between 145 Broadway and Harlem river, of 66,000 ohms, while from Harlem river to New Haven, Conn., the same wire gave 282,000 ohms per mile No. 3 east, to Harlem, gave 53,500 per mile; Harlem to Hartford, Conn., 218,000. The insulation in the country exceeded that in the city in the proportion of more than 4 to 1.

The European telegraphic engineers have endeavored to surmount this difficulty by changing the insulators at short intervals, as their surfaces became smoked and dirty. This, however, is but a partial remedy, as the trouble arises as much from the great conductivity of rain water, under the conditions referred to, as it does from dirt upon the surface of the insulators. They have also largely resorted to the expedient of running the wires underground, a method involving great expense, and yet of rather questionable benefit, as far as immunity from interruption is concerned. Considerable embarrassment is also occasioned by inductive action, when underground wires are employed, especially in working automatic or printing instruments.

It is to an American inventor that the credit is due of being the first to discover a practical and effectual means of insulating wires in cities; and equal credit should be accorded to the American telegraphic superintendent who had the boldness to put the plan into practice on a large scale, and with the most successful results—we refer to the magnificent lines built by General Anson Stager, of the Western Union Company, in the principal Western cities, which are considered by competent judges to be, perhaps, the finest examples of telegraphic construction in the world.

The hight of the city poles above the ground is sixty-five feet. They carry fifty No. 9 wires, arranged upon nine cross arms, and insulated with the Brooks insulator. A test of these lines in rain, after two years' exposure, shows the insulation, within eight miles from the office, to be so high as to be beyond the range of measurement of either the Siemens universal galvanometer or the Varley differential—the instrument usually employed for these tests. These lines, as specimens of telegraphic engineering, are equally creditable in a mechanical point of view. The massive spars, ranged with mathematical accuracy for miles along the straight and level streets of Chicago, instead of detracting from the appearance of the thoroughfares, are a positive ornament to them. The ordinary sized poles are twenty-one feet in hight, and fitted with similar insulation. These are used on the Central Pacific Railway line, the Michigan Central, and the Philadelphia and Reading Railroad line. The latter, by the way, is a very good specimen of substantial construction, eight wires being carried upon two cross arms, and not high enough from the ground to strain the poles too much upon the sharp curves which abound upon that road. —*The Telegrapher.*

NEW BOOKS AND PUBLICATIONS.

MINES AND MINING OF THE ROCKY MOUNTAINS, THE INLAND BASIN, AND THE PACIFIC SLOPE. Comprising Treatises on Mining Law, Mineral Deposits, Machinery, and Metallurgical Processes. By R. W. Raymond, Ph. Dr., U. S. Commissioner of Mining Statistics. Illustrated with 140 Engravings. Beveled boards, extra English cloth. New York: J. B. Ford & Co. 1871. Price, $4·50.

This volume contains, in a condensed form, a vast amount of information concerning our American mining industry, its condition, prospects, methods, and appliances. It comprises a description of all the gold and silver mining districts of the West; a careful discussion of the laws affecting their titles; a thorough essay on mineral deposits in general, their occurrences, characters, and classification: twenty-seven chapters, profusely illustrated, on the mechanical appliances of mining and on metallurgical processes; and an appendix, with valuable tables of statistical information. Three alphabetically arranged analytical indexes, one of Mines, one of Mining Districts, and one of Subjects, complete the work. With these the vast body of information contained in these 800 octavo pages is remarkably convenient and accessible for purposes of reference. The style of the book is free from obscure technicalities, and eminently adapted to interest and instruct the non-professional reader; while yet it is clear, terse, and accurate enough to satisfy the demand of experts.

VICKS' CATALOGUE AND FLORAL GUIDE.

One of the handsomest illustrated floral catalogues that come annually to our office is Vick's, of Rochester, N. Y. This year it comes to us more beautiful than ever. It is printed on tinted paper, and contains more than 200 engravings of the choicest varieties of flowers and vegetables, two of which occupy full pages, and are finely colored. Anyone having a taste for horticulture should inclose 25 cents to James Vick, Rochester, N. Y., and have a copy of his catalogue and guide mailed to him.

HIDE AND SEEK. A Novel. By Wilkie Collins, Author of "Woman in White," "Dead Secret," and many other popular Novels.

Messrs. T. B. Peterson & Brothers, 306 Chestnut street, Philadelphia, have just issued an edition of "Hide and Seek." Price, 75 cents.

A TEXT-BOOK OF ELEMENTARY CHEMISTRY, THEORETICAL AND INORGANIC. By George F. Barker, M. D., Professor of Physiological Chemistry in Yale College. New Haven, Conn.: Charles C. Chatfield & Co.

Prof. Barker has brought to the preparation of this work extensive knowledge of his subject, and, what is perhaps even more important, the fruits of an experience only to be obtained in teaching, through the want of which many able men have failed in their attempts to write good text-books for students. We are, after examination, prepared to give the book hearty commendation. Not that it is wholly without fault in plan and execution, but that these are so few, and the merits of the book are so obvious, as to disarm criticism. Accustomed to different methods of thought, the slight defects referred to may, perhaps, be only such to us, and may appear merits to others. The book is admirably calculated to introduce beginners into the science of chemistry. It is printed and bound in beautiful style.

NOTICES OF MINING MACHINERY, AND VARIOUS APPLIANCES IN USE, CHIEFLY IN THE PACIFIC STATES AND TERRITORIES, FOR MINING, RAISING AND WORKING ORES. With Comparative Notices of Foreign Apparatus for Similar Purposes. By William P. Blake. New Haven, Conn.: Charles C. Chatfield & Co.

This work is a reprint of a part of a report made by its author to the U. S. Commissioner of Mining Statistics, and printed as Part. IV. of the Commissioner's Report to Congress for the year 1870. Since the preparation of the report, there have been important advances in the construction of mining machinery, which have suggested certain modifications in this reprint. The work is replete with important and valuable information.

ST. LOUIS, THE FUTURE GREAT CITY OF THE WORLD. Illustrated with a Map, by L. U. Reavis. Second Edition. St. Louis: Published by order of the St. Louis County Court.

This book contains a large mass of facts, historical, geographical, geological, mineralogical, and statistical, in regard to St. Louis, one of the most important commercial and manufacturing centers of the great West. The whole is arranged in a very readable style, and printed in large pamphlet form.

A CHRONOLOGY OF PAPER AND PAPER MAKING. By Joel Munsell. Fourth Edition. Albany: Joel Munsell, 82 State street.

To those who know with what ability Mr. Munsell can compile, and in what a fine style he can print a work of this character, we need not say one word in regard to the value of the one now announced; and readers of this class are not few. For the benefit of those who are not familiar with Mr. Munsell's works, we will say, however, that the volume opens with a history of paper and paper making, which is followed by a chronology of paper, including improvements in its manufacture, and various industrial applications, arranged as the author so well knows how to do, in admirable form for reference. The work should be in every technical library, and is full of interest to the general reader.

SCIENTIFIC ADDRESSES, by Prof. John Tyndall, LL.D., F.R.S., Royal Institution, on the Methods and Tendencies of Physical Investigation; on Haze and Dust; on the Scientific Use of the Imagination. New Haven, Conn.: Charles C. Chatfield & Co.

WE are indebted to Mr. Dewitt C. Cragier for a copy of the Ninth Annual Report of the Board of Public Works of the City of Chicago, a voluminous and well-prepared document. Mr. Cragier will please accept our acknowledgements.

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