Patent Office Printing.

One of the most important branches of the work of the United States Patent Office is the printing of a liberal supply of copies of patents and the Patent Office Gazette.

The Norris Peters Company, of Washington, having special facilities for doing this work, have heretofore been awarded the contract almost every year for several years back, and have given universal satisfaction, not only to the Patent Office officials, but to all patent attorneys requiring duplicate photo-lithographic copies of drawings. We are informed this year a change has been made which is likely to create much inconvenience for attorneys.

It appears the usual course of advertising for bids for photo-lithographing and printing Patent Office work was pursued, and when the bids were opened on May 5 last, the Norris Peters Company was the only bidder. For some unexplained reason the bid was rejected by the board appointed to open bids, and new bids were advertised for, to be opened on June 15. On that date three bids were received and opened: One from Andrew B. Graham, one from the Sackett & Wilhelms Company of this city, and one by the Norris Peters Company.

The bid of the Norris Peters Company was the lowest on the first seven items, which embraces all of the work except the Official Gazette, and was about two thousand dollars less than the bid of the Sackett & Wilhelms Company, while on the Official Gazette the Sackett & Wilhelms Company were the lowest bidders. The board declined to divide the contract, but awarded the work to the Sackett & Wilhelms Company of this city as being the lowest bidders in the aggregate. It is believed that the work done by the Sackett & Wilhelms Company will be printed from aluminium, and not from stone, as has been done heretofore. In thus awarding the printing to a New York party, the drawings of the current issues of patents, etc., must be shipped by express to the Sackett & Wilhelms Company here, which is certain to cause great inconvenience to the attorneys practising before the Patent Office, as they will not be able to refer to drawings or to see them after they have passed to issue. Aside from this, there is the possible risk of loss of the original drawings through accidents or fire in transit, and the necessity of the office going to the expense of having every drawing photographed prior to being sent away for reproduction, as a check in the event of loss or possible change.

The printing required by the Patent Office has grown to such immense proportions that it is time a change was made in the methods pursued. There should be established a photographic and printing department in the Patent Office itself, equipped with every facility for rapidly reproducing drawings by the most modern machinery, supervised by a corps of experienced practical men, subject to the direction of the Commissioner of Patents.

It is a most unusual course to entertain bids from printing concerns located at distant points. If this plan is to be favored in the future, a printing establishment located on the California coast would have the same chance to be awarded a bid as one in Baltimore, only a few miles away. The consequent delay and inconvenience to attorneys and inventors is of no apparent importance. In the case of the Patent Office, it is a mistaken policy, which we suppose will be demonstrated as the contract is carried out. Attorneys and others should not be slow in lodging complaints with the Commissioner of Patents when their work is delayed or interfered with by reason of this change.

Newly-Discovered Property of Tin-Aluminium Alloy.

In a paper lately read before the Academie des Sciences, M. Hector Pecheux brings out a rather remarkable property which he observes in tin-aluminium alloys. If a rod of such alloy, having a freshly-filed surface, is placed in cold distilled water at 13 deg. C., an abundant supply of gas is given off from the filed part of the rod. This generally stops after two or three minutes. This phenomenon was observed with four alloys containing different proportions of the two elements. Analysis of the gas shows oxygen and hydrogen in the proportions of an explosive mixture. A rod of one or the other metal alone, or a rod which is not filed at the surface, will not cause the action. The rods he used were cast in a sand mold. Considering that on account of the sudden cooling in the mold the surface of the rod may have become tempered, he concludes that the action is due to this cause; at the surface of the rod the alloy takes the form of juxtaposed molecules of the two metals, and in the cold water these act like a series of thermo-electric elements of tin-aluminium (owing to the heating of the rod by the operation of filing), and the water is decomposed. This is due to the fact that the molecules of tin and aluminium have a considerable difference in specific heat (Al = 0.218 cal. Sn = 0.0562 cal.) and after the filing they have not the same temperature. Therefore they set up an electromotive force due to the thermo-electric action, and this stops when they become cooled by the water. If a filed rod is placed in an acid copper sulphate solution, bubbles of oxygen are given off and copper is deposited on the rod. A non-filed rod of tin or aluminium precipitates the copper, but no gas is given off. Sulphate of zinc produces a similar action, but gives off less oxygen.

Electrical Notes.

The power station which is being erected in London for the supply of the electric current to operate Mr. Yerkes' railroads is rapidly approaching completion. This power station when finished will be one of the largest of its type in the world. It is situated on the bank of the Thames at Chelsea. It is rectangular in shape, measuring 450 feet in length by 180 feet in width. It is erected in three tiers, and will have four chimney stacks, each 275 feet in height, with an internal diameter at the top of 12 feet. Brick has been employed throughout. A large river basin has been constructed, so that barges can come alongside the building, and unload the coal direct into the bunkers, a Temperley and a laced steel conveyor being built for this purpose. Large water filters have also been built, so that the water used in the boilers can be filtered first, thereby removing all impurities and reducing furring in the tubes to the minimum. The building has been divided into two sections. The riverside half contains the battery of sixty-four Babcock & Wilcox water-tube boilers, each of which develops about 1,200 horse-power. The boilers are erected in two tiers, with the coal bunkers above. Mechanical stokers and superheaters have been adopted. In the second part of the building the turbines and generators are installed. The plant will comprise eight turbines working eight generators, the power supplied aggregating 60,000 horse-power. The current will be of the alternating type, and the potential will be 11,000 volts. Nearly 20,000 tons of steel have been used in the construction of the building, and the foundations, which are of concrete and brick, are sunk to a depth of forty feet. Three electric railroads will draw their power from this station—the District, the Baker Street and Waterloo, the Great Northern, Piccadilly and Brompton, and in cases of emergency the Central London and the Metropolitan and District railroads. The total cost of the station will be $12,500,000.

In October, 1886, in a small room on the top floor of an old house in Pittsburg, Pa., three hundred incandescent lamps were lighted continuously for a period of about two weeks by alternating current, transmitted a distance slightly exceeding two miles, over a single-phase circuit comprising two copper wires of No. 4 B. & S. gage. The potential used was 1,000 volts, the frequency about 130 cycles per second, and the lamps were connected in parallel to the secondary circuits of half a dozen transformers. The ratio of transformation was 1,000 to 50. This was the first instance, in America at least, in which alternating current was used in transmitting electric energy beyond laboratory distances for the supply of translating devices connected in multiple arc. In the history of American industrial progress the Lawrenceville test, as it has been called, was an event of no little importance. Prior to the Lawrenceville test, distribution of electric energy to lamps or motors had been accomplished by continuous-current systems operating at potentials of 110 to 220 volts. The commercial significance of the Lawrenceville test is strikingly illustrated—although the impression conveyed by the illustration is a somewhat exaggerated one—by the story of the manager of a gold mine in Colorado, who, in 1896, was able to operate a stamp mill located at a distance of about three miles from his water power by alternating current transmitted to the motor over a circuit consisting of iron telephone wire of ordinary size. This was accomplished by using a high-potential single-phase alternating current. The cost of the telephone wire was about sixty dollars. It is stated that an estimate for a continuous-current plant to do the same work had been submitted by a manufacturer of continuous-current machinery, and that these plans called for the installation of copper circuits costing more than sixty thousand dollars.—L. B. Stillwell, in Cassier's Mag.

The British Admiralty seems to have met with some success in the utilization of liquid fuel upon war vessels. The torpedo-boat destroyer "Spiteful" has been passed into the Portsmouth Fleet Reserve, after satisfactorily undergoing her power trials. This vessel is only fitted for oil fuel, and is the first warship to be so equipped. The one great difficulty that has confronted the experimenters is the excessive smoke emitted by the consumption of oil, but this drawback has now been successfully overcome. No more smoke is emitted than with steam coal. One of the greatest advantages accruing from the use of liquid fuel is the economy in men. The number of stokers required for the vessel is decreased by ten or more. As the method adopted upon the "Spiteful" has proved so completely successful, the furnaces of two battleships are to be converted to burning liquid fuel immediately.

Correspondence.

The Colorado Cañon.

To the Editor of the Scientific American:

Your article last week on the Colorado Cañon was very interesting; but the Hance trail, while it may be the shortest, is not considered the safest and easiest. My daughters, two young ladies, were there in the summer of 1902, and went down the Bright Angel trail, a good portion of the way with horses, and the rest of the way on their own feet, without any ropes, and entirely without the assistance of the guide, except to show them the way, and scrambled up again, also without assistance, to their horses, and while the way was rough, at no point was it absolutely dangerous if proper caution is exercised. The horses were thoroughly trained, and went the whole distance without any guidance except to follow the guide's horse. My daughters let them take their own way, as instructed to do by the guide. S. S. Myers.

Philadelphia, June 29, 1904.

Narrow-Gage Railroads.

To the Editor of the Scientific American:

I have read with interest the articles on narrow-gage railroads in your issues of May 21 and June 11.

I am well acquainted with the D. & R. G. R. R. of Colorado, and its construction was a wonderful achievement at the time it was built, some twenty-five years ago.

In 1899 I, as general manager of the E. P. & N. E. Railway, constructed the branch line known as the Alamogordo & Sacramento Mountain Railway in New Mexico. The distance from Alamogordo to Cloudcroft is 26 miles. The altitude of Alamogordo is 4,300, and of Cloudcroft 9,000 feet. The road is standard gage, 30 deg. curvature and 5.2 per cent gradient at its maximums. This road equals the D. & R. G. R. R. in its maximum of curvature, and exceeds it by 1.2 per cent in gradient, and has been in thoroughly successful operation ever since its completion. J. A. Eddy.

El Paso, Tex., June 21, 1904.

The New Element Europium.

In 1892 De Boisbaudran observed a spectrum in the case of certain solutions containing samarium which was characterized by three rays lying near together $\lambda = 466.2$, 462.7, and 459.3. These he supposed to belong to a new element and he designated it by the letters $Z\varepsilon$. In another case he observed with several similar products a fluorescent band which was included between the rays $\lambda = 622$ and 611. This element he designated by $Z\xi$. Later on, Demarçay succeeded in isolating a new earth from the oxides of this group and he called the new element *europium*. This latter element has the spectral characteristics of $Z\varepsilon$ and $Z\xi$. The solutions also have a slight absorption spectrum for which he determined the wave-length. The new element exists in a very small quantity as compared with samarium and gadolinum. It lies between these two in the series of rare earths. Demarçay obtained it by eighteen fractional operations.

More recently this work has been taken up by Messrs. Urbani and Lacombe, and they have separated the europium in sufficient quantity to determine the atomic weight. They used 610 grammes of oxides which represented the portion containing europium, coming from the treatment of one ton or more of monazite sands. These oxides contain samarium and gadolinum for the greater part. The europium was separated by a series of fractional operations which required three thousand crystallizations in all. The monazite sands are found to contain about 0.00002 of europium oxide. They also formed the sulphate of europium. After precipitating by alcohol, the neutral sulphate is crystallized from an aqueous solution and this salt has the formula $Eu_2(SO_4)_3.8H_2O$. It forms well-defined crystals of a slightly pinkish hue. It is not altered in the air, but takes the anhydrous form about 375 deg. C. The anhydrous sulphate is calcined at 1,600 deg. C., and becomes transformed into oxide. When thus prepared the oxide has a well-defined rose color, the oxide which is formed at a low tempera by calcining the oxalates is almost white. The atomic weight of europium has been calculated very closely by three different methods and the results are almost identical, fixing the atomic weight at 151.79, within a small percentage.

The Current Supplement.

The current Supplement, No. 1488, opens with a very exhaustive and fully illustrated article on the Willamette Meteorite by Henry A. Ward. In an article by William J. S. Lockyer, "A New Epoch in Solar Physics" is described. Herbert G. Wells, whose scientific phantasies have earned for him an international reputation, discusses the discovery of the future. Mr. P. L. Sclater of the Royal Society tells much that is interesting of the Tasmanian wolf. The Zoelly steam turbine is fully described. The article by Messrs. Stromeyer and Baron on "Water Softeners" is continued.