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SCIENTIFIC AMERICAN SUPPLEMENT

No. 589.

For the Week Ending April 16, 1887.

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THE NEW COMMISSIONER OF PATENTS.

The President has appointed the Hon. Benton J. Hall, of Burlington, Iowa, to the Commissionership of Patents. The office recently became vacant by the resignation of the Hon. Martin V. Montgomery. The new official is a lawyer of standing and prominence. He was born in Mt. Vernon, Ohio, in 1835, and graduated at Miami University in 1855. His law practice began in the office of his father, Mr. J. C. Hall, of Burlington. This gentleman, in his day, was regarded as one of the leading and best lawyers of the State. His son is the second Commissioner from the State of Iowa. His predecessor from that State, Charles Mason, was appointed in 1852, his commission dating from the 24th of March of that year, and his term lasting five years.

We hope and believe that the State of Iowa will be as well represented now as it was by Mr. Mason, over thirty years ago. The position of Commissioner of Patents yields in importance to few government offices. In times of peace especially, when the inventive arts are exercising so many minds, and when the true conquests over nature are being won, the arbitrament of interests of the greatest magnitude rests in the hands of this official. The products of the thought and labor of some thirty thousand inventors have annually to be examined, and their claims adjudicated. To carry out this work systematically, the influence of the head of the department should be felt in every bureau. Consistency in his rulings will reduce the practice of the office to a uniform standard.

The industries of the country, on which its wealth and position among nations depend, pass in continual review through the Patent Office. Every modification of its practice, as dictated by court decisions or as inspired by the personal convictions of the Commissioner, is felt far and wide. Patent after patent could be cited whose value has gone up into the millions; and were it possible to arrive at the aggregate value of all patents issued, the interests represented would be enormous. The finances of the other departments of government, even of the Treasury itself, would yield in true importance to such statistics, as the value and profit of patents affects the personal interests of the people individually and directly.

Besides this aspect of the case, the influence of patents and the mode of granting them upon the prosperity of the country, not only in peace but in war, illustrates the importance of rightly filling the office of Commissioner of Patents. The recent legislation in the direction of building up a navy for this country will have a successful issue largely dependent upon patents. The successful gun, its powder, its projectiles, will probably involve many patents, while the ships of war will include in their construction still more. The industries of the nation, by which it lives, are based upon patents, and the defense of these interests in case of war will depend upon the same. It is only by American genius, fostered by our patent laws, that the manufacturers of America are able to compete with the low-priced labor of other countries, and this genius will be called on, if war occurs, to invent methods of defense. The effect of patents is felt upon the arts both of war and peace. The administrator of the office, in one sense, holds in his hands, or has a strong influence upon, the destinies of the country.

The Western judges have rendered some of the best and most enlightened decisions in patent cases. In receiving from one of these States a new Commissioner of Patents, we venture to augur good from the selection. The past record of Mr. Hall entitles us to hold this conviction. If he will continue the work of his predecessor, and gradually bring business up to date, so that less delay will intervene before the consideration of a case, he will be entitled to the thanks of the community of inventors, and he will do the entire country a great service. The coming year may see the delays done away with, and the work of the Patent Office on a regular business basis.

JUDGE MONTGOMERY.

On April 1 the President appointed Martin V. Montgomery an Associate Justice of the Supreme Court of the District of Columbia, to succeed Justice MacArthur, who has retired. The new incumbent is a resident of Lansing, Mich. He was born in 1840, in Eaton Rapids, Eaton County, Mich. He was admitted to the bar in the circuit court for that county in October, 1865. Since that time he has been admitted to practice in all the Federal courts, including the Supreme Court. His private practice in the State of Michigan was very extensive. His first active participation in politics dates back to 1870, when he was elected by the Democrats to the State Legislature. In 1876 he was a delegate to the National Convention at St. Louis. He was appointed Commissioner of Patents in the beginning of President Cleveland's administration, this being one of his first important appointments. The experience of his office as Commissioner should render him a peculiarly valuable addition to the bench of the court in question, before which so many patent cases are brought on appeal from the Commissioner of Patent's decisions.

NATURAL GAS IN INDIANA.

H. C. HOVEY.

At New Albany, Ind., there is a thin seam of bituminous shale whence little rills of petroleum trickle down into the Ohio River. In former days, before the geology of the region was understood, it was supposed that this indicated coal, but now it is known that the shale in question belongs to an older period than the carboniferous. Attempts to use it for fuel were not successful. Last summer, however, the idea occurred to the capitalist, Washington De Pauw, that boring for natural gas might meet with a better reward. He tried the experiment, hoping thus to facilitate the manufacture of glass, in which he is extensively engaged, so as to compete with Pittsburg and other points where fuel is cheaper than it is in southern Indiana. Mr. De Pauw was warned by Prof. Collett that in order to find gas he would have to "bore up instead of down" at that point, geologically speaking. He was finally convinced that his labor would be fruitless, and gave it up. But the rumor of his experiments went abroad, and others repeated them in different localities with varying success. I have taken some pains to collect the facts from authentic sources.

Early last fall a boring was drilled at Portland, near the Ohio line and about forty miles north of Richmond. The result was a small flow of gas, but not in quantity sufficient to be of commercial importance. After this failure matters stood still at Portland for a while, and then courage was revived by successes elsewhere, and now there are three good paying wells at Portland. Two years ago the Ft. Wayne, Cincinnati, and Louisville R.R. Co. prospected for coal at Eaton, a village ten miles north of the city of Muncie. They went down 600 feet, and then abandoned the works. Last October, in view of the experiments referred to above, they decided to sink their wells deeper in search of gas, and found it in a good, strong flow, which gradually increased, until now the discharge is known to be a million cubic feet in twenty-four hours.

The next well was drilled at Muncie (a city of 9,000 inhabitants) by the citizens of that place. Since then there have been six other wells drilled there, making seven in all, varying in capacity from 300,000 up to 2,000,000 cubic feet *per diem*. These wells are controlled by the "Natural Gas Company of Indiana," to the courtesy of whose manager, Mr. C. N. Wilcoxon, the writer is indebted for much of his information. Since then, three good wells have been drilled in Kokomo, three at Marion, and two at Noblesville, smaller and of less pressure than those farther east. The gas is used now in all these places both for purposes of heating and illumination, supplanting everything else.

All these gas wells are found in Trenton limestone, where the rock is porous and the strata have been free from disturbance. In localities where there have been upheavals, there are indications that gas once existed, but escaped through crevices, leaving the rocks barren. The strata vary in their depth below the surface from 850 to 950 feet. Their thickness varies from 30 to 75 feet, and with a very slight dip. The overlying formations are as follows: Soil and drift, varying from a few feet to 250 feet; Niagara limestone, about 250 feet more; then slates and shales till the Trenton limestone is reached.

The field as now developed covers an area of 20 miles wide by 60 long from east to west, and the strata run in a direction from northwest to southeast. The region has been prospected on all sides of this area, but thus far with no success. Borings have failed at Richmond, Shelbyville, Fort Wayne, Union City, and other points. At least fifty wells are now being drilled, besides those now flowing, and until these are completed there is no means of knowing positively whether gas will be found outside the area already indicated.

Expensive experiments are in progress at Indianapolis. A well was drilled there last fall to the depth of 2,100 feet without indications of gas. A number of test wells are now being sunk at Brightwood, a suburb of Indianapolis, but are not yet down to the level of the gas-bearing strata. Of course this development in Indiana, mostly within the last six months, has stimulated speculation. All the towns where gas has been struck are laying systems of mains for supplying domestic and manufacturing demands, and the supply promises to be as constant as it has proved to be elsewhere.

Artificial Whetstones.

The *Guide Scientifique* describes the following method of making artificial whetstones. Gelatine of good quality is dissolved in its own weight of water, the operation being conducted in a dark room. To the solution 1½ per cent of bichromate of potash is added, which has previously been dissolved in a little water. A quantity of very fine emery, equal to nine times the weight of the gelatine, is intimately mixed with the gelatine solution. Pulverized flint may be substituted for emery. The mass is moulded into any desired shape, and is then consolidated by heavy pressure. It is dried by exposure to strong sunlight for several hours.

The Bell Telephone Company.

The American Bell Telephone Company's annual directors' meeting was held in Boston, Mass., on March 29, 1887. It was called to order by William H. Forbes, President, at 11 A.M. The following are the principal figures, interesting to the public, contained in the annual report read at the meeting. In the year 1886, 9,318 new subscribers were enrolled, as against 2,969 in 1885. The company's wires have a mileage of 14,185; of these, 2,613 miles are underground. The average connections for the year are 312,605,710. Among the improvements promised for the ensuing year are further extension of underground wires, and terminal facilities between New York and Boston and Philadelphia. The Philadelphia line will soon be open to the public, and the Boston line will be completed during the present year. The Canadian company's earnings have increased from $158,000 in 1885 to $190,565 in 1886.

Telephones	$597,749.84
Stock	22,605,925.03
Merchandise, machinery	14,159.71
Cash, deposits, etc	1,691,499.30
Capital stock	9,802,100.00
Bills payable	638,344.67
Patent account	9,373,836.07
Profit and loss	3,352,445.72
Reserves	251,227.24
Surplus	1,491,380.18

Giving a total of $24,909,333.08. The gross earnings for 1886 were $3,097,000, against $2,765,884 in 1885; net earnings for same periods, $1,947,283 and $1,793,196. The dividends paid in 1886 came to $1,176,252 regular, and $392,084 extra dividends.

The above remarkable array of figures is a good illustration of what a patent may be worth. This immense business is built upon a single claim of the single 1876 patent of Alexander G. Bell. All others in the present aspect of things, such as his later patents, and the many other patents owned by the company, are of quite secondary importance. Eventually, their value will appear. A striking item is the patent account of over nine millions of dollars, an amount very nearly equal to the capital stock. The company has acquired such financial strength that whatever the decision of the Supreme Court may be, it can view the limitation or even extinction of the Bell patent with equanimity.

Stomach Digestion.

Opportunities for studying gastric digestion through fistulous openings into the stomach are, thanks to modern surgery, more frequent than formerly. This is important, as the physiology of digestion, as understood at the present day, requires more than the classical instance of Alexis St. Martin to place it on a sound experimental basis. Such a case with experiments *ad hoc* is recorded in the *Revue Scientifique* by Von Herzen, of Lausanne. The subject was a man, æt. 28, on whom gastrostomy had been performed for occlusion of the œsophagus. The observations made were as follows: Bile always appears in the stomach during digestion, but generally only in the later stages. The amount of HCl amounts to 1·8 to 1·9 grm. pro liter; it increases during digestion, and reaches its maximum in the third hour. Sodium chloride appears rather to diminish the amount of acid. When the stomach was empty in the morning but little pepsin was found, and a large amount of propepsin; peptogen accelerated digestion. In the first hour, of a quantity of albumen introduced, two per cent was digested without peptogen, twelve per cent with it. In the second hour, twenty-three per cent was digested without, forty-five per cent with peptogen. In the third hour, fifty-one per cent without, seventy-six per cent with peptogen. These results agree with those obtained by Schiff. Chloral, quinine sulphate, and above all potassic iodide, retard digestion. The author would forbid red wine in disturbances of digestion, but would recommend bouillon and dextrin; blood fibrin is also indicated in many cases.—*Medical Press.*

The Position Taken During Sleep.

A very large number of adults form the habit of sleeping in one particular position, such as lying upon their right or left side. A smaller number sleep upon the back. Some persons sleep with the head greatly extended; more often it is flexed considerably upon the trunk. Many must have the head greatly elevated; others can only sleep with the head very low. Some observations made by Dr. G. Nosovitch (*Wratsch*) upon 235 soldiers showed that 37·5 per cent slept upon the right side, 23 per cent on the left, and 6·5 per cent on the back.

It has yet to be determined whether any particular harm can come from sleeping in a certain position which the individual unconsciously assumes. A popular belief exists to the effect that the liver, being a heavy organ, tends to press upon the other abdominal viscera when a person lies on the left side. At any rate, more persons, probably, sleep on the right side than on the left, as experience and Nosovitch's statistics show. The author in question believes, also, that the posture in sleep influences the extension of a bronchitis. He found, for example, that in the 235 cases referred to, all of whom had this disorder, in 97 it was left-sided, in 72 right-sided, and in 66 on both sides. He thinks that the preponderance of the bronchitis on the left side was due to the fact that there was a greater expansion of this side during sleep, and, consequently, a greater ingress of cold air or of the morbific particles causing the disease.

Some writers have thought that the position in sleeping has an influence upon the passage of fæces through the colon, the position on the right side being especially unfavorable to emptying the colon. Repose on the left side, on the other hand, favors the gravitation of fæces from the transverse into the descending colon, and is therefore to be preferred by those suffering from habitual constipation (J. S. Jewell).

A recent writer has argued strongly for the view that the head should be lower than the feet during sleep, and he claims that more perfect health and greater longevity will result from such approximate topsy-turviness. The contrary position, with the head and trunk considerably raised, sometimes relieves cramps in the legs. It is well known that some chronic nervous affections, more particularly nocturnal epilepsy and some forms of insomnia, are sometimes benefited by sleeping in a partially erect posture.

It appears, therefore, that the posture during sleep is a matter deserving of some attention from physicians, and that some actual therapeutic results may be obtained by looking after its details.—*Med. Record.*

The Largest Powder Charge ever Fired.

The final proof experiment with the first of the 111 ton guns for the Benbow took place at the Woolwich Arsenal Butts on Wednesday, March 9. When it was announced that 1,000 lb. of gunpowder would be discharged, with a projectile weighing 1,800 lb., serious doubts were expressed as to the possibility of the gun surviving the ordeal. The loading of the gun, which will be performed on board ship by hydraulic power, was a difficult and tedious process, but at length the shot was driven forward of the powder chamber, and eight octagonal cartridges were packed in behind it, each weighing 125 lb., or an aggregate of exactly 1,000 lb. The powder was of a slow burning description known as "S. B. L.," and the grains or segments were prisms of about one inch diameter. Most of the rounds in preceding experiments have been fired with Westphalian brown powder, and the velocities have varied with the weight of charge from 1,699 ft. per second, with a pressure of 9·65 tons, to 2,078 ft., with 18·7 tons pressure. The gun, it may be said, is guaranteed to bear a strain of 25 tons and more upon the square inch, a test which in the days of the old and "brutal" powders has often been realized, but is not likely to be ever again applied. The spectators, warned by the alarm bell, got under cover or repaired to a safe distance to see the gun fired, the electric spark was transmitted from the instrument room, and, with a tremendous sound, the gun recoiled at an easy rate up the railed incline on which it stood. The projectile had achieved a velocity of 2,128 ft. per second with the remarkably low pressure of 16·1 tons, and the gun was apparently none the worse for the shock, but a second round was deemed necessary to show that it was uninjured. The only adverse consequences were a few broken windows.—*Admiralty Gazette.*

The Comparative Effects of Heat and of Solar Light.

All the actions of combustion which heat can produce may be also produced by light, but the converse does not hold good. There are many reactions which light alone seems able to set up. All these reactions may be summed up as a disturbance of the primitive molecule which is decomposed into simpler elements. These elements are few in number; they are, if we limit ourselves to volatile bodies, formic, acetic, and butyric acids, methylic and ethylic alcohols, and ethylic aldehyd. These stable groups are generally found the same with one and the same body, whatever the source from which it derives its oxygen. But this is not always the case. Thus lactic acid, if burnt by means of atmospheric oxygen, yields acetic acid, but produces butyric acid if it obtains its oxygen from the salts of mercury. These stable residues of combustion do not pre-exist as groups in the original molecule, but result from a new arrangement of the molecules during combustion. This is proved by the fact that they are found identical in bodies of different types, and are not always the same with one and the same body. These products contain a smaller number of molecules of hydrogen and carbon than the bodies whence they are derived. The sole exceptions to this rule, the formation of formic acid at the expense of oxalic acid, and that of butyric acid from lactic acid, disappear if we double the formulæ of oxalic and lactic acids. Potassium permanganate, which often acts in the cold and in darkness, does not yield other products than those resulting from the action of the sun and of heat. The bodies which it attacks best are those which are found least stable under other oxidizing conditions. But if it does not occasion any novel facts, we may study with it very conveniently the circumstances of the experiment and the conditions of initial and final acidity or alkalinity which determine the result. These last conditions play a great part in the combustions made at the expense of oxygen, free or combined.—*E. Duclaux.*

John Mercer's Process of Alkalization and Oxidation.

Many years ago, John Mercer, the famous old Lancashire calico printer, discovered that, if a piece of calico is steeped for a few minutes in a strong solution (sp. gr. 1·252, or 29° Be., 50·4 Tw.) of caustic potash or soda, it becomes quite gelatinous and translucent in appearance; and after washing out the alkali, it was found to have considerably contracted, so as to render it much closer in texture, stronger, and better adapted to dyeing and printing, having acquired a greater attraction for dyestuffs. He largely utilized this action of caustic alkalies upon the cotton fiber, and took letters patent for the alkalizing process, which is generally known as "mercerization." The microscopical examination of a mercerized cotton fiber shows it to have lost all its original characteristics; it has lost its surfacial markings, its flat shape, and spiral twistings, but appears thick, roundish as if inflated, straight and transparent. A cross section shows that in fact the cell walls have become thicker from the outside toward the center, giving the fiber a cylindrical form and narrowing the interior channel down to an irregular puncture or slit.

A parallel discovery as regards wool was made by Mercer when the French had begun to make their "mousselines de laines," or simply "de laines," the article now plainly denominated as "half woolens," or "cotton worsteds," consisting in woolen warp and cotton weft. This stuff was at a time much in vogue as a fine "French woolen" article, though it cannot be said that it was generally intended as a fraud (at first it may have been) to pass off a mixed stuff for all wool, because the name of "mousseline" (muslin) could be interpreted as referring to the cotton contained in the tissue. When these colors were to be dyed and printed with steam colors, a great difference was found between the two fibers in their capacity to attract the dyestuffs. The cotton threads were distinctly set off by their deep, full color against the much lighter and imperfectly colored woolen threads; the goods were "thready," as it is called. This fault was particularly conspicuous in the blues (Prussian blue) and greens produced with ferrocyanide (also with ferricyanide) of potash and iron salts. Mercer hit upon the idea that wool possessed a deoxidizing property which might be counterbalanced and neutralized by some process the reverse of the mercerization process, and he found that by a passage in an acid bath of bleaching powder the object was perfectly accomplished, the wool fiber being deanimalized as it were, that is, oxidized by the mixture of acid and bleaching powder, which was known to possess great oxidizing power. He tried chromic acid, or in its place a mixture of bichromate of potash and sulphuric acid, and hydrochloric acid with bleaching powder, but retained the latter, because the former two, although effecting the desired oxidation, gave the wool a yellow color, while the chlorine left it perfectly white.—*Textile Colorist.*

Turkey Red from Castor Beans.

A. Braunstein has taken a German patent for the direct production of Turkey red oil from oleaginous seeds, as follows: The oil seeds, castor beans preferably, are first freed from their shells by passing them through horizontal rollers, then washed, and treated with strong sulphuric acid of at least 66° Be. The acid may be mixed with the seeds, and the mass ground up together; or the seeds are ground to a fine meal and treated with the acid in a suitable vessel with a stirrer, and which can be kept cool. After 40 to 60 per cent acid has been gradually added and stirred together with the meal, the mass is allowed to rest for several hours, when the sulphated oil, which has separated out at the top, is drawn off. The sediment is then washed out with two waters, to extract from it the remaining oil, and the washing waters being added to the first product, the whole is again allowed to stand for several hours, when some common salt is added to completely separate the sulphated oil, which is then neutralized with ammonia or caustic soda in the ordinary manner.

Remarkable Tunnel Work.

For some time past there has been much friendly rivalry between the foremen and their men in the several headings of the new aqueduct for supplying this city with water, concerning the amount of work that could be done in a certain time. The best record, so far, is for the week ending February 26, during which time the south heading of shaft 15 was driven 102 feet, the section removed measuring 9 by 17 feet. The men worked but thirteen shifts, so that the time was not quite a full week. Three Rand Slugger drills, No. 13, were employed, and rackarock powder was used. No time was lost by the use of this explosive, as there was no delay required in order to permit the gases generated by the explosion to escape, as would have been necessary had dynamite been used.