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Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 756.

For the Week Ending June 28, 1890.

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DISAPPEARANCE OF ENERGY.

A correspondent writes: "It is a well known law that energy is indestructible, but a case came to my notice a short time ago in which it is hard to tell in what form the energy appears. A metal spring is placed under tension, and while in this state is fastened and placed in acid until it is completely dissolved. What becomes of the energy stored up in the spring? Is it turned into heat, and if so, how?"

Perhaps some of our readers will give their views in reply to this interesting query.

GOOD DOCTRINE IN REGARD TO PATENTS.

In a recent case of appeal from the examiner to the Commissioner of Patents, the complaint of the inventor was that the examiner objected unnecessarily to the language used in the claims, and thus obstructed and delayed his application. The majority of the examining officers very properly interpret their duty as lying in the direction of facilitating the inventor in obtaining his patent, but in some of the rooms in the Patent Office a contrary theory sometimes seems to prevail, and occasionally the practice is such that it looks as if the examiner considered his special function to quibble over words, even to the extent of delaying or defeating the inventor.

In the case above referred to, *ex parte* Pacholder, Mr. Commissioner Mitchell lays down very clearly the rules which should govern the Patent Office. Among other rulings he holds as follows:

"No general rule can be laid down for governing the employment in the claims of patents of such words as 'means,' 'mechanism,' and 'appliances.' It is the object of the law, as it is the solicitude of this office, to protect inventors and guard their inventions. This object is best secured in the case of patents which represent the maturity of an art by taking care that claims shall be drawn with all reasonable restrictions, so that they shall be valid in spite of everything that is contained in existing patents and of everything previously known or used."

"In the case of patents which represent the infancy of an art or the stage of its earliest practical development, this office is solicitous that the inventor should be accorded a breadth of claim which is commensurate with the extent and importance of the invention which he desires and is entitled to protect. While the office will insist upon as much definiteness in the language of the claim as the statute calls for, it will also, if it properly discharge its function as the protector of the inventor, leave something to the salutary and benignant agency of construction in the courts."

"There is a permissible latitude of choice in the use of language which may be safely accorded to the inventor or his solicitor without violating the statute, and without detriment to that branch of the public service which has for its object not only to grant letters patent for new inventions, but to grant them at the earliest possible date."

POSITION OF THE PLANETS IN JULY.

JUPITER.

is morning star until the 30th, and then becomes evening star. He takes the lead in the planetary honors of the month, for just before it closes he reaches the epoch in his course when the culmination of his size and brilliancy occurs. This important event is his opposition with the sun, which takes place on the 30th, at 7 h. 34 m. A. M. Jupiter in opposition is superb, as with majestic mien he traverses his celestial pathway, being visible the entire night. The midsummer starlit nights will owe their chief attraction to the beaming presence of this regal planet, rising soon after sunset, reaching the meridian near midnight, and fading away in the light of the approaching sun.

Jupiter rises on the 1st at 9 h. 14 m. P. M. On the 31st he sets at 4 h. 45 m. A. M. His diameter on the 1st is 44".8, and he is in the constellation Capricornus.

VENUS

is evening star. She shines with increasing brilliancy for two hours after sunset. The two brightest stars in the firmament, Venus and Jupiter, are visible at the same time for about an hour on the last week of the month, the former holding her court in the west and the latter holding his court in the east. Venus and Saturn make a close conjunction on the 17th, at 11 h. 36 m. A. M., Venus being 6' south. The planets are invisible at conjunction, but will be near neighbors on the evening of the 17th. Their approach, meeting, and passing will be worthy of observation.

Venus sets on the 1st at 9 h. 29 m. P. M. On the 31st she sets at 8 h. 56 m. P. M. Her diameter on the 1st is 13".2, and she is in the constellation Cancer.

SATURN

is evening star. He will be about 5° east of Regulus when the month closes, the increasing distance between planet and star being plainly discernible. His vicinity to Venus is the most interesting feature of his course in July. His period of visibility closes after this month.

Saturn sets on the 1st at 10 h. 15 m. P. M. On the 31st he sets at 8 h. 26 m. P. M. His diameter on the 1st is 15".8, and he is in the constellation Leo.

MARS

is evening star. He is stationary on the 4th, and then commences to move eastward, passing south of Beta Scorpii on the 30th, being at the same time about 5° west of Antares. Jupiter, Venus, Mars, and Saturn may be seen during the first half of the month shining in the evening sky, from the time when it is dark enough for the stars to appear until Venus sets.

Mars sets on the 1st at 1 h. 31 m. A. M. On the 31st he sets at 11 h. 47 m. P. M. His diameter on the 1st is 19", and he is in the constellation Scorpio.

MERCURY

is morning star until the 22d, and then evening star. He is in superior conjunction with the sun on the 22d, at 5 h. 19 m. P. M. He is in perihelion on the 15th, when, if Schiaparelli's theory that he turns only once on his axis during a revolution round the sun be confirmed, portions of his surface are subjected to a heat more than ten times greater than the earth receives at the summer solstice from a sun that never sets.

Mercury rises on the 1st at 3 h. 15 m. A. M. On the 31st he sets at 7 h. 43 m. P. M. His diameter on the 1st is 6".6, and he is in the constellation Taurus.

URANUS

is evening star. He is in quadrature with the sun on the 15th, at 1 h. A. M., may still be found northeast of Spica, and is favorably situated for observation.

Uranus sets on the 1st at 0 h. 12 m. A. M. On the 31st he sets at 10 h. 14 m. P. M. His diameter on the 1st is 3".6, and he is in the constellation Virgo.

NEPTUNE

is morning star. He rises on the 1st at 2 h. 18 m. A. M. On the 31st he rises at 0 h. 23 m. A. M. His diameter on the 1st is 2".5, and he is in the constellation Taurus.

Mercury, Saturn, Venus, Uranus, Mars, and Jupiter are evening stars at the close of the month. Neptune is morning star.

Curious Felting by Dermestids.

A correspondent of *Insect Life* writes to the editor of that journal as follows:

"I have in my possession a beautiful curiosity, and, as far as I can learn, the only one in existence. . . . It is an ordinary feather pillow tick, which was made of common bed ticking and filled with the domestic duck feathers about three years ago, and the pillow has been in general use about the house since that time. Of late the lady concluded to remove some of the feathers, as the pillow appeared too hard. Upon opening the tick, the feathers seemed to be ground up almost into a powder and unfit for further use; therefore they were emptied and the tick turned inside out, and instead of the goods being as when made, it was entirely covered with a fine growth of down, as evenly and thickly as the fur on a mole skin, which it very much resembles. It is firmly attached, the down breaking rather than pull off. Not a piece of the feather is attached to it, but as smooth as a piece of velvet, even the seams are covered by the growth. Not an insect can be found in the feathers, but the grinding process was supposed to be done by some insect. The lady made several pillows at the same time and of the same feathers, but when these pillows were opened nothing was found but feathers as when made. This was found about a month ago, and the ladies through the country have opened many pillows, some as much as fifty years old, but no such thing can be found. To look at it, one would think it the hide of some animal, and would never imagine it to be a pillow tick, except by close inspection."

Upon this Dr. C. V. Riley comments as follows:

"Pillows in which this felting of the ticking occurs have been infested by one of the Dermestid beetles (in all of the cases with which I am familiar it has been *Attagenus megatoma*) whose work has resulted in the comminution of the feathers, and the felting results from the subsequent mechanical action. The small feather particles are barbed, . . . and whenever caught in a cotton fabric by their bases, become anchored in such a way that every movement of the pillow anchors them still further. The frequent shaking which pillows receive results ultimately in the formation of this plush-like surface. A similar bit of ticking was exhibited at the Philadelphia Academy of Natural Sciences, April 5, 1883, and elicited the information that one of the members had, some years previously, examined a similar material known to have been formed from the fragments of gull feathers, and that a cloak had been made from it which wore well."

Deep Coal Mine.

One of the deepest coal mines in the world is at St. Andre du Poirier, France, and yearly produces 300,000 tons of coal. The mine is worked with two shafts, one 2,952 ft. deep and the other 3,083. The latter shaft is now being deepened, and will soon reach the 4,000 ft. level. The remarkable feature in this deep mine is the comparative low temperature experienced, which seldom rises above 75 deg. Fah.

Organic Synthesis.

BY S. G. JENKS.*

The history of chemistry might be styled "A Comedy of Errors," for not only have there been errors, but errors of such a kind as to constitute a true comedy. An error is not such a bad thing, however, as it is sometimes thought to be, for sooner or later some one finds it out and states the truth. Then follows a conflict between truth and error, in which truth is victorious. Thus truth is not only established, but emphasized.

The first error that affected the development of organic chemistry in a noticeable way was the search for the "philosopher's stone." At present we see the inorganic branch of the science far more fully developed than the organic, but this is not due to the greater age of the former. The ancients, naturally enough, I think, became acquainted with organic bodies first. They used acetic acid in the form of vinegar very early, while probably the earliest artificially prepared salts were the acetates of the alkalies. They were also acquainted with various gums, resins, oils, and sugar, and made wine from grapes, and beer from malted grain.

Why, then, did not the organic branch of the science keep ahead in the development? The answer is to be found in the fact that the search for the "philosopher's stone" led men to investigate inorganic substances to the almost total exclusion of organic bodies. However, after a time, the idea that there could be found an "elixir vitæ," a remedy for all the ills of the body, was joined to that of the "philosopher's stone," and this led to the investigation of organic bodies in their medicinal relations. This brings us to about the fifteenth century.

Still, in the next century those interested in the medicinal chemistry gave so large a portion of their time to mineral substances, that only a few organic compounds, as benzoic acid, wood vinegar, milk sugar, etc., can be found mentioned in writings of their times.

Another error just here served to separate the investigation of organic bodies from that of inorganic, and to give prominence to the latter. This was the belief that, while the composition of inorganic bodies could be determined by synthesis as well as by analysis, that of organic bodies could not. This belief was so enduring that Gmelin in the first edition of his "Hand book," published in 1817, states that organic bodies cannot be built up by laboratory means from their elements; and about the same time Berzelius enforced the statement by a sentence in the introduction to his "Treatise," of which the following is a somewhat free translation. He says: "In living nature the elements appear to obey very different laws from those in inorganic nature; the products which result from the action of these elements differ from those with which inorganic nature presents us."

The veil thus thrown over the study of organic bodies was not lifted until 1828, when Wohler accomplished the artificial production of urea. This memorable event opened a new era in the study of organic compounds. Do not think, however, that this one discovery completely removed the errors just noted. This was only the beginning of a scientific conflict, and was not considered conclusive, since the urea was produced from ammonium cyanate, and this substance had not been prepared from its elements. Then, too, urea was a substance very easily decomposed into carbon dioxide and ammonia, and was only excreted from animal bodies, and must therefore, at most, be only semi-organic. We see to what extremities men will go to maintain a position once taken.

This discovery served to attract the attention of chemists to the subject, and other preparations followed. Then there came up various theories as to structure. The substitution of chlorine and other elements, known only in inorganic chemistry, for hydrogen, narrowed the gulf between organic and inorganic chemistry.

This last was carried to an amusing extreme in one case. Dumas had published his opinion that not only the hydrogen, but the nitrogen and oxygen in compounds containing these elements could be substituted by chlorine and still have a substance retaining the special properties of the original. This was too much for Liebig, who satirically replied that in manganous acetate he had replaced all the hydrogen, oxygen, and manganese, and finally the carbon, by chlorine, and that the resulting substance, although containing nothing but chlorine, retained all the characteristic properties of manganous acetate.

Let us take the following as an example of complete organic synthesis. Vapor of sulphur passed over glowing coke yields carbon disulphide. A mixture of iron and sulphur heated yields ferrous sulphide, and this treated with hydrochloric acid, whose elements need only sunlight to unite directly, yields hydrosulphuric acid. Pass a mixture of hydrosulphuric acid and carbon disulphide over red hot copper, and we have marsh gas. Treat this with chlorine, giving chloroform, which, when heated with potassium hydrate, yields methyl alcohol easily oxidizable to formic acid. This gives the list of methyl compounds by synthesis, and others are as easily prepared.

Thus it is proved that the indefinable agency which we call life does not supersede chemical force, but that the latter operates in the presence as in the absence of the former. This statement does not argue that there is no such agency as life, but rather that the author of both vital and chemical forces does not allow one to usurp the dominion of the others.

* A class essay read in the course in organic chemistry in the University of Michigan, October 30, 1889.—*Pharm. Era.*

Directions for Working Aluminum.

The following directions are given by the Scovill Mfg. Co., Waterbury, Conn.:

A cubic inch of pure aluminum weighs approximately one-tenth of a pound avoirdupois, being about one-fourth the weight of an equal bulk of pure silver.

Pure aluminum can be rolled, drawn, spun, stamped, engraved, burnished, polished, and soldered to the same extent and by the same processes as used on brass, with the following exceptions:

Annealing.—A very low and even temperature should be maintained in the muffle. Aluminum melts at about 1,300 deg. Fahrenheit—a very dark red. The inexperienced, therefore, cannot judge the proper annealing temperature by the eye alone, without danger of fusing the metal. When the metal has been heated enough to char the end of a pine stick, thus leaving a black mark in the wake of the stick as it is drawn across the metal, it is sufficiently annealed. The metal should then be withdrawn from the furnace and allowed to cool slowly in the air. For some work, such as stamping and drawing, it is sometimes better not to heat the metal so hot as to leave a dead black mark with the stick, but just enough to show a dark brown mark instead. Very thin sheets or wire can be annealed sufficiently for some purposes in boiling water.

Dipping and Pickling.—Remove the grease and dirt by dipping in benzine. To whiten aluminum, leaving on the surface a beautiful white matte, dip first in a strong, hot solution of potash, then rinse in water, and dip in undiluted nitric acid, 42 deg. Then wash in water, and dry as usual in hot sawdust.

Polishing.—Use fine white polishing composition or rouge, and a rag buff.

Burnishing.—Use a bloodstone or steel burnisher. For hand burnishing use either kerosene oil or a solution composed of two tablespoonfuls of ground borax dissolved in about a quart of hot water, with a few drops of ammonia added.

For lathe work the burnisher should wear upon the finger of his left hand a piece of Canton flannel, keeping it soaked with kerosene, and bringing it in contact with the metal, supplying a constant lubricant.

Very fine effects can be produced by first burnishing or polishing the metal and then stamping it in polished dies, showing unpolished figures in relief.

Scratch Brushing.—Polish or burnish the surface, and then use a fine steel scratch brush.

Soldering.—A special solder is necessary. Cleanse the metal from grease and dirt. Use for soldering fluid Venetian turpentine. Place the solder upon the metal with the Venetian turpentine, and heat gently in a blowpipe until the solder is melted. It will then be found to have fixed itself firmly to the aluminum.

Sand Castings.—Use open but very fine sand, and bake the mould. Large feeding gates should be provided, and the mould should be well vented. Pour the metal quickly, at a temperature but little above the melting point. Use either Taylor's or Dixon's plumbago crucibles.

Milling, Planing, and Turning.—Use plenty of oil to prevent the clogging of the tool and to make it cut smooth.

The Copyright Bill.

Recently the House of Representatives at Washington, by a decided negative, consigned to defeat the bill to provide for international copyright. Since that disastrous event; the sponsors of the bill have plucked up new courage, and are advancing once more to the attack, with drums beating, fifes shrilling, and flags floating, in the energies of the onward march.

We have received a large envelope containing an assortment of arguments in favor of the resuscitated measure, and we infer that we are expected to shoulder a musket and enlist for the war. That we certainly shall not do, because our convictions are with the opposition. Reasons are plenty as blackberries for defense of the position we have taken.

All through the controversy, the writings of an author for publication have been argued upon precisely as if they were property like "a house, a mine, a farm, or a ship," and the author's claim to compensation for its use as a natural right. According to that view, Shakespeare's plays were as much his property as his real estate, capable of being transferred, for an agreed upon consideration, from ownership to ownership, in endless repetition, down to our own day, the last owner farming out the right of publication for a royalty, and obtaining exemplary damages against any audacious publisher who should fail to respect that right. Such absurdity is a logical conclusion from the postulate that every literary production is property like bricks and horses.

In its article on copyright, the "Encyclopædia Britannica" says: "As a recognized form of property it is, compared with others, of very recent origin, being, in fact, the result of the facility for multiplying copies created by the discovery of printing and kindred arts. Whether it was recognized at all by the common law of England was long a question of the first magnitude; and the reasons for recognizing it, and the extent of the right itself, are not quite clear from controversy even now." Blackstone, in his long famous and standard "Commentaries," speaks doubtingly of the existence of such a right, and contents himself with mentioning the opposing views. All that groundwork constitutes a miserably poor basis for dogmatic assertions about an author's natural right in the publication of his writings.

In fact, nearly all those entities called rights are conventional creations. What may be right in one community may be wrong in another. In Louisiana, it is a legal right to conduct a lottery; in Illinois, it is a violation of statute law. In Turkey a man has a right to a number of wives; in the United States he is liable to be heavily punished for having more than one wife. Still further, every man's possession of what are termed natural rights, as to live, to speak, to walk, is under limitation. He may lose his right to live by committing murder. His right to utter his thoughts is complicated with his duty to obey the law against libel. His right to move about is restricted by his obligation not to go where his presence will be an invasion of somebody else's right of a different kind. Whatever right an author may have to the publication of his writings is circumscribed by similar metes and bounds. His right, like a multitude of others, is the creature of conventional agreement. In that way Congress acquired the power "to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." Before that provision had been adopted, copyright did not have any national existence in the United States. Even now copyright is regarded in law as only a privilege granted—a right arising from concession, and to be enforced by the courts only so long as the concession lasts. Natural right has no foundation anywhere in the language of the Constitution for the idea of natural or inherent property right.

Long ago Henry C. Carey characterized the issue now made as "the important case of authors *versus* readers—makers of books *versus* consumers of facts and ideas." He ridiculed the idea that an extension of a monopoly privilege would result in cheaper books for the people. The predominant question to be considered is one of public policy, not of authors' rights. This is the day of monopolistic tendencies and of alluring artifices under the disguise of seeking the general welfare. It is time to look after that welfare through the eyes of justice. Authors at present are secure in a copyright for forty-two years, among a population of sixty-five millions or more, likely to be one hundred millions within two decades, and affording the best market in the whole world for books. We repeat here what Henry C. Carey wrote nearly forty years ago: "The discoverers of principles receive nothing, but those who apply them enjoy a monopoly created by law for their use. Everybody uses chloroform, but nobody pays its discoverer. The man who taught us how to convert India rubber into clothing has not been allowed even fame, while our courts are incessantly occupied with the men who make the clothing. Patentees and producers of books are incessantly pressing upon Congress with claims for enlargement of their privileges, and are thus producing the effect of inducing an inquiry into the validity of their claim to what they now enjoy. Be content, my friends; do not risk the loss of a part of what you have in the effort to obtain more."—*Industrial World.*

Rope Transmission of Power.

The utility of wire rope transmission has become widely recognized. Not only among the rugged hills and mountains of the East and far West where streams go rushing down through caverns and rocky steeps, where no locations for mills or factories are afforded, is this means of transmission of precious power appreciated, but it is so convenient to use it that we find on the prairies of the West mills being operated at a long distance from water powers by the wire rope. A few days ago, on a trip through Nebraska, we noticed a rope stretching for nearly a mile from a water power to a mill that had recently been built adjoining a railroad, the owners finding it much more to their advantage to have it there, with the switching privileges afforded, than at the dam. The expense of hauling the flour which is thus saved to them will very soon pay for the system of power transmission.—*Modern Miller.*

A DISCOVERY of a large deposit of magnetite of fine quality has been made on the Antler River, about one hundred miles northwest of Port Arthur.