Thus obtained, indium is a metal of an almost silver white color, apt to become faintly bismuth tinted. It tarnishes slowly on exposure to air, and thereby acquires very much the appearance of ordinary lead. Like lead, it is compact and seemingly devoid of crystalline structure. Moreover, like lead and thallium, it is exceedingly soft, and readily capable of furnishing wire, by the process of "squirting" or forcing. The specific gravity of indium, or 7·4, is very close to that of tin, or 7·2, and much above that of aluminium, 2·6, and below that of lead, 11·4, and that of thallium, 11·9. In the lowness of its melting point, namely, 176° C., indium occupies an extreme position among the metals permanent in air, the next most fusible of these metals, namely, tin and cadmium, melting at 228°; bismuth at 264°; thallium at 294°; and lead at 235°. Though so readily fusible, indium is not an especially volatile metal. It is appreciably less volatile than the zinc in which it occurs, and far less volatile than cadmium. Heated as far as practicable in a glass tube, it is incapable of being raised to a temperature sufficiently high to allow of its being vaporized, even in a current of hydrogen.

Indium resists oxidation up to a temperature somewhat beyond its melting point, but at much higher temperature it oxidizes freely; and at a red heat, it takes fire in the air, burning with a characteristic blue flame and abundant brownish smoke. It is readily attacked by nitric acid, and by strong sulphuric and muriatic acids. In diluted sulphuric and muriatic acids, however, it dissolves but slowly, with evolution of hydrogen. Oxide of indium is a pale yellow powder, becoming darker when heated, and dissolving in acids with evolution of heat. The hydrated oxide is thrown down from indium solutions by ammonia, as a white, gelatinous, alumina-like precipitate, drying up into a horny mass. The sulphide is thrown down by sulphuretted hydrogen as an orange yellow precipitate, insoluble in acetic but soluble in mineral acids. The hydrate and sulphide of indium, in their relations to fixed alkali solutions more particularly, seem to manifest a feebly marked acidulous character. Chloride of indium, obtained by combustion of the metal in chlorine gas, occurs as a white micaceous sublimate, and is volatile at a red heat, without previous fusion. The chloride itself undergoes decomposition when heated in free air, and the solution of the chloride does so upon brisk evaporation, with formation in both cases of an oxichloride.

But the chief point of chemical interest with regard to any newly discovered element, and consequently with regard to indium, is the establishment of its atomic weight; which, in the case of a metallic element, is based primarily upon the determination of the ratio in which it combines with oxygen and chlorine. In Cl_3, the atomic weight of indium is 113·5.—*Lecture by Professor Odling, in Mechanics' Magazine.*

The Eye.

There is no optical instrument maker who does not succeed in constructing an apparatus much more perfect in many points than the eye—that marvellous organ, which we are inclined to regard as the masterpiece of vital and organic architecture, on account of the great service it renders to man.

This sense of sight, which is so far reaching that it gives us the power to penetrate infinite space and apprehend the universe, at the same time makes us familiar with the minutest objects: this sense, which is the freest and most uncircumscribed in its actions—for our sense of touch is limited by the length of our arms, hearing to a few thousand feet, the senses of smell and taste having still greater limitations—this sense, I say, acts through an agent apparently so imperfectly adapted to its purpose, that recent investigations stand amazed at the idea how by it we receive any intelligible impressions. That we do is an evidence of the independence of the mind, and its power to make useful these necessary and imperfect means contact with the outer world, and proves the necessity of educating this sense to quick and precise perceptions in order to correct its faults and perfect the work which Nature has designedly left imperfect.

The eye has the defect of what in physics is called the "aberration of sphericity:" that is, the rays that pass through the center of a lens have a common focus, but rays which pass a certain distance from the center do not converge at the same point, but pass beyond. The nearer they come to the circumference, the greater the focal distance, if the lens is rigorously spherical. In good optical instruments, this defect is scarcely perceptible, the rays being centralized by flattening the lens. Again, the eye is not spherical, but has an elliptical curve. This was for some time thought to be an advantage, but the contrary is the truth. And this curve is not even well "centered," that is, placed symmetrically to the visual axis like a lens, but is changed and twisted in every direction. From this results what has been called the "astigmatism" of the eye, which consists in not being able to see at the same distance a vertical line with the same distinctness as one that is horizontal. This recently discovered phenomenon has attracted the attention of all oculists, as it sometimes constitutes a real disease of the eye. Again, the retina of the eye has spots where it is entirely blind to impressions of light. But is this eye, which is unsymmetrical, badly centered, blind in spots, at least perfectly translucid? Not at all. The cornea and crystaline lens of the eye are are not absolutely limpid, as appears when examined through an intense blue or violet light, which renders it fluorescent. This phenomenon is due to the traces of a substance analogous to quinine, a body which possesses in the highest degree the property of fluorescence, that is, of emitting a light of its own, under the excitement of blue or violet lights. The crystaline lens, itself, is not of a homogeneous composition, but has a crystaline structure of six branches. This is the cause of the stars appearing to us with rays. All attempts to explain this phenomenon were vain, until it was found to be in the visual organ itself. It is for this reason that the crescent of the moon, when it is very thin, seems to be double or triple to some persons.

These facts are enough to show to any one how prone the untrained eye must be to error and self deception, and that seeing is not a physical but a mental act. In infancy, the eye is aided by the hands or touch to acquire experience of the nature and consistency of things; later in life, the eye asserts its superiority by instructing the hands to perform ingenious and cunning work. The two senses seem thus to continue mutually to assist and act upon each other. Touch lends to sight material aid and support. The eye refines and gives intelligence to the material sense of touch, so that, when sight is wanting, touch takes its place and performs its duties.

The eye in its direct and steady look embraces but a small compass of actual sight; in fact, we clearly see but a small point, which comes just in the focus of the eye; and it is owing to a quick vibratory movement of the eye that we are able to see large extents apparently at the same time.—*Professor John H. Niemeyer.*

PATENT INFRINGEMENT CASES.

United States Circuit Court—Southern District of New York.

Rubber Tip Pencil Company *vs.* S. D. Hovey *et al.*

This was a suit in equity brought for an alleged infringement of the patent granted to J. B. Blair, July 23, 1867, for rubber heads for pencils. The nature of the patent and the facts are fully set forth in the opinion of the court.

Benedict, Judge:

This action is founded upon a patent for rubber heads for lead pencils, issued to J. B. Blair, dated July 23, 1867, and numbered 66,938. The novelty of the invention and the validity of the patent are put in issue.

The proper construction of the patent is the question first presented. The description, as given in the specification and claim, is as follows: The specification states the invention to be a new and useful cap or rubber head to be applied to lead pencils for the purpose of rubbing out pencil marks. It then describes it as follows: "The nature of the invention is to be found in a new and useful improved rubber or erasive head for lead pencils, and consists in making the same head of any convenient external form, and forming a socket longitudinally in the same to receive one end of a lead pencil or a tenon extending from it. * * * * The said head may have a flat top surface, or its top may be of a semicircular or conical shape, or any other that may be desirable. Within one end of the same head, I form a cylindrical or other proper shaped cavity. This socket I usually make about two thirds through the head and axially thereof; but, if desirable, the socket or bore may extend entirely through the said head. The diameter of the socket should be a very little smaller than that of the pencil to be inserted in it. The elastic erasive head so made is to fit upon a lead pencil at or near one end thereof, and to be made so as to surround the part on which it is to be placed, and to be held thereon by the inherent elasticity of the material of which the head is to be composed."

"The head is to be composed of india rubber, or india rubber and some other material which will increase the erasive properties, such as powdered emery for instance."

The article is further described by drawings, which, the specification states, "exhibit the elastic head so made as to cover the end as well as to extend around the cylindrical sides of the pencil; but it is evident that the contour of the said head may be varied to suit the fancy or taste of an artist or other person, and I do not limit my invention to the precise forms shown in the drawings, as it may have such or any other convenient for the purpose, so long as it is made so as to encompass the pencil and present any erasive surface about the sides of the same." The specification further states that the elastic or rubber pencil head, made as above set forth, may be applied not only to lead pencils, but to ink erasers and other articles of like character.

The claim is for "an elastic erasive pencil head made substantially in manner as described." In considering the effect of this language, it is to be noticed that the invention is not stated to be a combination, but a single article of manufacture—namely, an elastic erasive pencil head. The peculiarity in this article, by reason of which the inventor supposes himself entitled to secure it as his own, is not stated to consist in its elasticity; that is a quality of the material to be used, which is india rubber. Nor does it consist in erasive capacity; that, also, is solely due to the material out of which the article is manufactured.

An effort has been made to show that the erasive capacity of the Blair head is increased by means of certain swells or projections on the sides of the head, which are portrayed in the drawings and supposed to be indicated in the specification as a feature of the invention claimed; but I find no language which can fairly be said to convey the idea that such swells or projections form a part of this invention. On the contrary, the description states that the heads may be of any convenient external form, and expressly declares that the invention is not limited to the precise forms shown in the drawings, but may have any convenient form "so long as it is made to encompass the pencil and present an erasive surface about the sides of the same." The phrase last quoted from the specification discloses what is the real and only feature of the article in question upon which the right to it is based; and the characteristic is one of form, but not of what is called in the specification external form.

The characteristic form which the inventor claims to have invented is, broadly, any form which will enable the rubber to encompass a pencil, ink eraser, or other article of like character. The additional words "and present an erasive surface about the sides of the same" add nothing to the description, as it is impossible to have a piece of rubber encompass a pencil, ink eraser, or other article of similar character without presenting an erasive surface about the sides of the same. From this form which the inventor gives to a piece of rubber—otherwise to be of any convenient form—and from this form alone, does the article derive its value, as distinguished from rubber in any other form. By means of this form, any person is enabled easily to attach the rubber to a pencil, ink eraser, or other article of similar character, and the only useful result attained by the invention in question is that the head can be so easily attached to any pencil.

Now, what is it that accomplishes the useful result attained by the Blair pencil head? Simply the hole made in the rubber. There must be a piece of rubber with a cavity in it to constitute such a pencil head as Blair's specification describes, and there need be nothing more. The cavity may be round, square, or any other shape. It may go through or partly through the piece of rubber, and it may be of all sizes. The article sought to be secured by this patent, briefly and yet, as I think, fully described, consists, therefore, of a piece of india rubber with a hole in it. I am unable to fix any other limitation to the invention by any fair use of the language employed in the specification and claim.

Such an article cannot be the subject of a patent. The elastic and erasive properties of india rubber were known to all, and gave to that substance the names by which it is generally designated; and how to make a piece of rubber encompass and adhere to another article was known to every person who had ever seen a rubber shoe. No person knowing of the elastic quality of rubber could be wanting in the knowledge that a piece of rubber could be made to encompass and adhere to a pencil, ink eraser, or other article of similar character, by making a hole in it; nor could any one be deficient in the skill requisite to make such a hole.

I am of the opinion, therefore, that the patent in question cannot be upheld for want of invention.

This conviction, which I am unable to escape, renders it unnecessary for me to express any opinion upon the question of abandonment so largely discussed at the hearing, nor to determine whether the patent in question is for the same invention described by Joshua Gray in his application for a patent, and by others who have been relied on by the defence as showing prior invention.

A decree must be entered, dismissing the bill with costs.

United States Circuit Court—Northern District of New York.—Jacob E. Buerk *vs.* Dennis Valentine.

This was a suit in equity on two patents for watchmen's time detectors. Judge Woodruff decides that both complainant's patents are valid, and that both were infringed by defendant, who imported time detectors and sold them in this country. The patented improvements (sometimes called by the trade watch clocks and watch control), are largely used in factories and public buildings, and enable the officers to have a check on the watchman. The watchman carries the detector with him in his circuit to the rooms to be visited, and inserts a marking key fastened in the room, so as to mark a paper dial secured inside the detector. This is done at every room and station visited, a peculiar key being fastened at each place for that purpose. An inspection of the paper dial, at any time afterwards, will reveal the time and order of the visits.

Decree awarding an injunction and account, as prayed in the bill.

Insect Wax of China.

In China, prior to the thirteenth century, beeswax was employed as a coating for candles; but about that period the white wax insect was discovered, since which time that article has been wholly superseded by the more costly but incomparably superior product of this insect. The animal feeds on an evergreen shrub or tree (*Ligustrum Unidum*) which is found throughout Central China, from the Pacific to Thibet.

Sometimes the husbandman finds a tree which the insects themselves have reached, but the usual practice is to stock them, which is effected in spring with the nests of the insect. These are about the size of a fowl's head, and are removed by cutting off a portion of the branch by which they are attached, leaving an inch each side of the nest. The sticks with the adhering nests are soaked in unhusked rice water for a quarter of an hour, when they may be separated. When the weather is damp or cool, they may be preserved for a week; but, if warm, they are to be tied to the branches of the tree to be stocked without delay, being first folded between leaves. By some, the nests are probed out of their seats in the bark of the tree without removing the branches. At this period they are particularly exposed to the attacks of birds, and require watching.

In a few days after being tied to the tree, the nests swell, and innumerable white insects the size of nits emerge and spread themselves on the branches of the tree, but soon with one accord descend towards the ground, where, if they find any grass, they take up their quarters. To prevent this, the ground beneath it is kept bare, care being taken also that their implacable enemies, the ants, have no access to the tree. Finding no congenial resting place below, they reascend and fix themselves to the lower surface of the leaves, where they remain several days, when they repair to the branches, perforating the bark to feed on the fluid within. From nits, they attain the size of lice; and having compared it to this, the most familiar to them of all insects, our Chinese authors deem further description superfluous. Early in June, they give to the trees the appearance of hoar frost, being changed into wax. Soon after this, they are scraped off, being previously sprinkled with water. If the gathering be deferred till August, they adhere too firmly to be easily removed. Those which are suffered to remain to stock trees the ensuing year secrete a purplish envelope about the last of August, which at first is no larger than a grain of rice; but, as incubation proceeds, it expands and becomes as large as a fowl's head, when the nests are transferred, in Spring, to other trees, one or more of each, according to their size and vigor, in the manner already described. In being scraped from the trees, the crude material is freed from its impurities, probably the skeletons of the insects, by spreading it on a strainer, covering a cylindrical vessel, which is placed in a cauldron of boiling water; the wax is retained in the former vessel, and, on congealing, is ready for market. The *pel-lah* or white wax, in its chemical properties, is analogous to purified beeswax and also spermaceti, but differing from both, being in my opinion an article perfectly *sui generis*. It is perfectly white, translucent, shining, not unctuous to the touch, inodorous, insipid, crumbles into a dry, inadhesive powder between the teeth, with a fibrous texture resembling felspar; melts at 100° Fahr.; insoluble in water; dissolves in essential oil, and is scarcely affected by boiling alcohol, the acids or alkalis.

The aid of analytical chemistry is needed for the proper elucidation of this most beautiful material. There can be no doubt it would prove altogether superior in the arts to purified beeswax. On extraordinary occasions, the Chinese employ it for candles and tapers. It has been supposed to be identical with the white wax of Madras; but as the Indian has been found useless in the manufacture of candles, it cannot be the same. It far excels. It far excels, also, the vegetable wax of the United States (*Myrica Conifera*).

Is this substance a secretion? There are Chinese who regard it as such—some representing it to be the saliva and others as the excrement of the insect. European writers take nearly the same view; but the best native authorities expressly say that this opinion is incorrect, and that the animal is changed into wax. I am inclined to think that the insect undergoes what may be styled auraceous degeneration, its whole body being permeated by the peculiar product, in the same manner as the *coccus cacti* is by carmine. It costs at Ningpo from 22 cents to 35 cents per pound. The annual product of this humble creature in China cannot be far from 400,000 pounds, worth more than $100,000.—*Dr. D. J. Macgowan.*

THE NEBULAR HYPOTHESIS.

Professor John Fiske, of Harvard University, recently delivered a very interesting lecture on the above subject at the Cooper Institute in this city, from which we derive the following:

The lecturer began by mentioning the planetary revolutions which have become so familiar to us that we commonly overlook them altogether through sheer inattentiveness, failing to realize their significance, though their harmonious relations, as Laplace has shown, prove that the various members of the solar system have had a common origin. The clue to that common origin may be sought in facts which are daily occurring before our very eyes. Every member of our planetary system is constantly parting with molecular motion in the shape of heat. Our earth is incessantly pouring out heat into surrounding space; and, although the loss is temporarily made good by solar radiation, it is not permanently made good, as is proved by the fact that during many millions of years the earth has been slowly cooling. The evidence is overwhelming which shows that the earth's surface was once hotter than the flame of an oxyhydrogen blow pipe. The moon also is cooler than formerly, as is shown by the fact that the stupendous forces which once upheaved its great volcanoes are now quiescent. The sun, too, is pouring away heat at such a rate that—according to Herschel—if a cylinder of ice 184,000 miles in length and 45 miles in diameter were darted into the sun every second, it would be melted as fast as it came.

PLANETARY GENESIS.

There is every reason for believing that sun, moon, and Earth, as well as the other members of our system, have been from time immemorial losing more heat than they have received in exchange. As in losing heat all bodies contract, it follows that the various members of the solar system must all be much smaller than they were at the outset. Though they have increased in mass by appropriating large quantities of meteoric dust, they must at the same time have greatly decreased in volume. Obviously, therefore, if we were to go back far enough, we should find the Earth filling the moon's orbit, so that the matter now composing the moon would then have formed a part of the equatorial region of the earth. At a period still more remote, the earth itself must have formed a tiny portion of the equatorial region of the sun, which then filled the Earth's orbit. At a still earlier date the solar system must have consisted simply of the sun, which, more than filling Neptune's orbit and consisting of widely diffused vapors, merited the name of nebula rather than of star. In the slow concentration of this solar nebula, the present peculiarities of the solar system may find their explanation. The incessant loss of heat radiated into the surrounding space caused a steady contraction of the solar mass; while, on the other hand, the increasing rapidity of its rotation impressed upon those parts of it nearest the surface a tendency to fly off into space, or at least to remain behind instead of accompanying the central portion of the body in its contraction. As in every rotating spheroid, this centrifugal force is greatest where the velocity is greatest—at the equator—a time came in the history of our vaporous sun when the bulging equatorial portion, no longer able to keep pace with the rest in its contraction, was left behind as a detached ring surrounding the central mass; which ring soon broke up into many fragments of unequal dimensions. At this stage, then, we have a host of satellites surrounding the solar equator, revolving in the direction of the solar rotation, following each other in the same orbit, and gradually becoming agglomerated, by gravitative force, into a spheroidal body, having a velocity compounded of the several velocities of the fragments, and a rotation made up of their several rotations. Meanwhile the central mass of the sun, cooling and contracting, left behind a second equatorial belt, which, breaking and consolidating after the same manner, became the planet Uranus. In like manner were formed all the planets and their satellites. Such is the grand theory of nebular genesis, in which, as Mill reminds us, "is no unknown substance, introduced on supposition, nor any unknown property or law ascribed to a known substance." It involves none but established mechanical and dynamical principles.

THE PHENOMENA OF PLANETARY HEAT.

Further evidence of the correctness of the theory is found in the present physical condition of the various planets. The theory assumed that all the planets, having successively originated from the same nebulous mass of vapor, must be composed in the main of the same chemical elements; and this inference has been uniformly corroborated by the results of spectroscopic observation wherever there has been a chance to employ it. The contracting process through which the Earth has passed to its present dimensions has been or will be, under proper conditions, repeated to a certain extent upon all the other planets. Upon any planet there must eventually occur a solidification of the outer surface, and extensive evaporation and precipitation of water, an upheaval of mountains, an excavation of river beds, and a deposit of alluvium resulting in sedimentary strata. But obviously the time at which these phenomena occur must depend upon the rate at which the planet parts with its heat, as well as upon the age of the planet, and upon the stock of heat with which it started. Against the facts that the outer planets are immensely older than the inner ones, and have received during recent ages much less solar radiance, must be offset the consideration that they must have started with a much greater amount of heat than the inner ones. Manifestly when the solar mass filled the entire Neptunian orbit, it must have contained the heat of which the subsequent loss has shrunk the sun to his present dimensions. The earliest planets must therefore have possessed relatively enormous quantities of molecular motion; and the ratios of their volumes to their masses must have been very much greater than in the case of the inferior planets since formed from a cooler and denser sun. Just as the hot water in the boiler may remain warm through a winter's night, while the hot water in the tea kettle cools off in an hour, so a great planet like Jupiter may remain in a liquid molten condition long after a small planet like the Earth, though formed ages later, has acquired a thick, solid crust and a cool temperature. Hence we may expect to find the largest planets still showing signs of a heat like that which formerly kept the Earth molten, and the smallest planets in some cases showing signs of a cold more intense than any which has been known on the Earth. This series of inferences, constituting simply an elaborate corollary from the nebular theory, is fully confirmed by observation in the cases of Saturn, Jupiter, Mars, and the moon—the only planets whose surfaces have been studied with any considerable success. According to the nebular theory, Jupiter and Saturn ought to be prodigiously hot; and so they appear to be when carefully examined. The absence of any atmosphere from the surface of the moon, with the absence of any signs of liquid oceans and running water, shows a discrepancy which, however, disappears when we inquire into its past history as revealed by the present condition of its surface. That surface is almost entirely made up of huge masses of igneous rock, through which, at short intervals, there yawn enormous volcanic craters whose fires seem to be totally extinguished. This implies that the moon is a dead planet—that the tremendous forces which produced this state of things are radiated off into space. In the later ages of a planet's history, when the heat is nearly all radiated away, and the expansive force of the nucleus is consequently reduced to a minimum, the ever thickening and hardening envelope will have shrunk in upon the nucleus in such a way as to leave vast abysses capable of ingulfing all the air and water which the planet possesses. Thus it is that in the chasms of the moon, all its oceans and atmosphere have disappeared. Mars, with his oceans, his atmosphere, his clouds and polar snows, is another strong supporter of our theory.

Facts which, on a superficial view, appear as obstacles to the nebular theory, turn out, on a closer examination, to be powerful arguments in its favor. The vexed question of "irresoluble nebulæ" has been settled forever in favor of the theory, by the discovery of the bright lines, which are sure evidence of a gaseous condition. Henceforward, we add the weighty argument that masses of matter still exist in space in the very condition in which our system must be supposed to have originally existed. The distribution of nebulæ is yet another significant argument. The parallelism between the positions of the planets and nebulæ indicates a common mode of evolution of the whole starry system, and points to a gigantic process of concentration going on throughout the galaxy, analogous to the local process of concentration which has gone on in our own little planetary group.

Singular Break Down of an Engine.

A few mornings ago, the residents of the vicinity of Front street, Brooklyn, N. Y., were suddenly alarmed by a report like that of a cannon. It seems that a steam engine, which is located on the first floor of the Brooklyn Brass and Copper Foundery, was working as usual just before the accident occurred. There was no unusual strain upon it, when suddenly, and without any previous noise or signs of anything amiss, the trace at the bottom of the walking beam snapped, and although the engineer was on the spot, the whole engine was wrecked before he could shut off the steam. About one hundred and fifty hands are employed in the works. The damage cannot be fully estimated until the whole machinery has been examined, but it will amount to several thousand dollars, and the repairs will require probably three weeks time. Fortunately no person was injured.

MARVELS OF THE MICROSCOPE.—A beautiful and easily produced exhibition of crystal formation may be seen under the microscope as follows: Upon a slip of glass, place a drop of liquid chloride of gold or nitrate of silver, with a particle of zinc in the gold and copper in the silver. A growth of exquisite gold or silver ferns will vegetate under the observer's delighted eye.

Edge Tools.

Shear steel began to be made in Sheffield in 1800. The inventions of Mushet and Lucas in 1800 and 1804 further extended the manufacture. Forks and scissors were made by rolling in 1805. From this time, immense cutlery works sprang up in England, France, and Germany, and the competition between the three countries has been highly beneficial, for while England stands undoubtedly foremost, yet both France and Germany possess their own peculiar excellences. Amongst the imports connected with cutlery, there is in Sheffield an annual consumption of more than seventy tons of ivory for the handles of knives and forks, and about 3,000 operatives are employed in forging and grinding the blades. An equal number of workpeople are engaged on pen and pocket knives, made annually to the value of $500,000. Very many are occupied in fabricating razors and scissors.

French cutlery is chiefly fabricated at St. Etienne and Thiers, where many hands are employed. Table cutlery is here produced at a rate almost incredibly cheap.

Germany, despite the superior natural advantages of England, exports knives and edged tools to a considerable amount. Solingen has received the appellation of the Sheffield of Germany, and has, since the middle ages, been celebrated for its cutlery, being especially famous for its swords, the blades of which sometimes sell for $500.

In Austria, scythes, sickles, and table knives are made annually by millions, at an exceedingly small cost of production. It is computed that 80,000 Bavarian grindstones are consumed annually in the preparation of these implements.

With the rapid development of the mechanical arts, the manufacture of tools has correspondingly grown. At one time England possessed a monopoly, and the English trade mark was a guarantee of quality throughout the world. The efforts of European States, however, have been rewarded with a share in the manufacture, while the demand for cheaper tools has extended British trade, and yet allowed a considerable portion to fall to foreign cutlers. Operatives in wood work, as carpenters, joiners, builders, turners, and cabinet makers, employ a great variety of cutlery tools; sculptors, modellers, and pattern makers require steel tools of many kinds, and all their branches of industry and art are much increased. The demand, therefore, for planes, augers, chisels, saws, and gravers is continually increasing. In some instances, the French and Germans claim to have outstripped the English. English planes, however, are as yet unequalled. Paris, on the other hand, since the period when Dubois and Dupuytren advanced practical surgery to the high scientific position it now holds, has prepared the finest surgical instruments, particularly for dentistry. The most perfect steel work has now been enlisted in the service of science, and delicate balances and other philosophical apparatus have contributed to the investigations made by our chemists and astronomers.

Luminous Electrical Tubes.

At a recent *séance* of the *Société d'Encouragement*, M. Alvergnat, maker of physical instruments, exhibited several apparatus of his invention worthy of notice. They consist of rarefied tubes which can be easily rendered luminous by electricity. The tension of the vapor in the tubes is measured by a hight of mercury varying from ·196 to ·314 of an inch. The vapor is the chloride or bromide of silicium, and by rubbing the outside of the tubes with any substance developing electricity, a bright light is produced within the tubes, formed of different colored filaments—rose colored for the chloride and yellowish green for the bromide. The tension of the vapor necessary to produce this phenomenon is greater than that for the Geissler tubes, and the electricity which illuminates these latter tubes does not pass through the new apparatus of M. Alvergnat. The ingenious arrangement which permits of the easy production of these phenomena is capable of application in the arts and sciences, and the *Comité des Arts Economiques* consider it well worthy of attention.

Antiquity of Birds.

Those most competent to give an opinion, supported by the disclosures of the rocks, which are records in the great volume of Nature more enduring than public libraries, are satisfied that the first birds on earth were waders, and not organized for flying. They were very large, too, and their legs long, fitting them for searching for food on the margins of muddy lakes and lacustrine shores. This is inferred from the foot marks of those monster bipeds found on the red sandstone in the Connecticut valley. The stride from one step to another shows they were tall, and known to geological science as *ornithichnites*. There may have been others on a smaller scale of construction. But they were extinct, probably, or disappearing with the advent of birds with wings. The ostrich, etc., are tolerable representatives of the non-flying birds of old red sandstone ages, both in their stilted legs, toes, resembling ornithichnite tracks, and their undeveloped pectoral stumps, which are merely the anatomical beginning of the wings exhibited in higher families, their successors.

When birds appeared that could soar in the air, an internal modification of structure came with expanded wings, and the weight and exterior form were essentially changed and diminished in size. The condor is probably a type of the most gigantic of flying birds whose appearance belongs to the tertiary formation of the globe.

AT a late meeting of the Polytechnic Association of the American Institute, Professor Vander Weyde exhibited artificial musk, made by treating blood in a peculiar manner. By adding little hairs, such as are found in genuine musk, the deception is so complete that it cannot be detected even by the microscope.