less than a "regulation," Sargent insists is manifest from the fact that it does not assume to decide any question of *right*, but merely relates to a matter of purely executive or administrative practice. That it is an order which must be made in every case where a defeated party in an interference files a bill in equity under said Section 4,915, for in this case not a single fact was even alleged in support of the motion, except the naked fact of the filing of the bill. It therefore amounts, in the strictest sense, to a rule or regulation applicable to all similar cases, and it therefore becomes the duty of the Secretary of the Interior, when his attention is called to it, either to approve or disapprove and annul it. This in brief is the argument of Sargent's counsel.

As the practice of the Patent Office has heretofore been to allow the successful contestant his patent immediately upon a final determination of the interference, the action of the Secretary of the Interior upon the order of the Commissioner will be awaited with great interest.

NEW PROCESS FOR ELECTRO-PLATING.

Professor A. W. Wright, of Yale College, New Haven, Conn., has discovered a new and brilliant method of electroplating, which promises to be of great utility. Taking advantage of the fact that the various metals may be volatilized by the electrical current, he provides a hollow vessel, from which the air is partially exhausted; within this vessel he arranges opposite to each other the two poles of an induction coil; the article to be electro plated, a bit of glass for example, is suspended between the poles; to the negative pole is attached a small piece of the metal that is to be deposited on the glass. From three to six pint Grove cells are employed, yielding, by means of the induction coil, an electrical spark from two to three inches in length. Under the influence of this spark a portion of the metal of the electrode is converted into gas or volatilized, and condenses upon the cooler surface of the suspended glass, forming a most brilliant and uniform deposit. The thickness of the plating thus produced may be regulated at will, by simply continuing the action of the electricity for a longer or shorter period. That the metal is actually volatilized is proven by examination with the spectroscope during the progress of the operation, the characteristic lines of whatever metal is used for the electrode being fully revealed. This may be classed as the discovery of a new art, and is certainly very interesting and remarkable. In brief, it consists in plating the surfaces of substances with metals, by exposing such surfaces to the hot vapors of whatever metal it is desired to plate with.

Professor Wright has already made a number of valuable practical applications of his discovery. He produces mirrors with silver, platinum, iron, and other metals, of the most pure and resplendent character. He deposits gold in a layer so thin that it is only 0·000183 mm. in thickness, or approximately only one fourth the wave length of a red ray of light. He obtains curious colors in the metals, varying with the thickness of the deposits, and opens up a new field for investigation into the nature of metals and other volatilizable substances, and perhaps of light. He shows that his electrically deposited metals have improved qualities; that telescopic and heliostatic mirrors, for example, of platinum deposited on silver, by his process, will be unalterable; and the promise is that we shall before long be able by this new art to produce telescopes and other scientific instruments of greatly improved character.

THE ELECTRO-SILICIC LIGHT.

M. Gaston Planté has recently called attention to the brilliant luminous effects obtained by causing one of the poles of a powerful secondary battery to touch the side of a glass vessel or porcelain vase containing a saline solution. In another experiment, by means of which he exhibited the aspiration produced by the electric current around a platinum wire traversing a capillary tube, it was also observed that, if the current exceeded a certain intensity, the limit of which depends on the nature of the saline solution used, the glass then fuses, even in the liquid, and gives forth a bright light. The extremity of the platinum wire, which is made in ball-shape, becomes enveloped in a mass of melted glass, and the light is maintained brilliant during the discharge of the secondary battery, until the glass, cooling around the electrode, completely isolates it from the liquid.

When a solution of rock salt is used in the voltameter, this luminous effect requires for its production the reunion of from 250 to 300 secondary couples; but if a nitrate of potash solution is employed, the light is obtained with 60 secondary couples, the intensity of which correspond nearly to that of 90 Bunsen couples. The manner in which saline solutions act, in connection with glass silex brought to a high temperature by the electric current, is varied, because of the greater or less degree of fusibility of the silicates formed, as M. Carré has noted, by combining various salts with the carbons used for the ordinary electric light. The vitreous light may be produced either at the positive electrode or at the negative one, placed successively in contact with a tube or glass surface. A greater energy is required for its manifestation at the positive pole ; but it is there less noisy than at the negative electrode, where it is attended by notable crepitation. At the moment when the light appears, a thick and abundant white vapor is disengaged, which gives a light alkaline reaction. At the same time the glass is strongly attacked and devitrified.

The brilliancy of the light may at first be attributed to the lime combined with the silex in the glass; but if the spectrum be examined, it will be seen to present few appreciable rays, except some traces of those of sodium. On the other hand, a fragment of calcareous spath placed in the same conditions, while also giving a very brilliant light, has a continuous spectrum which shows the characteristic rays of calcium.

In both cases the spark, formed at the negative pole above the nitrate of potash solution goes, gives, before the contact of the electrode with the glass or spath, the potassium lines; but these lines disappear as soon as the most brilliant light from either glass or spath is produced. The silicium lines, according to M. Kirchoff's investigations, being faint, it is evident that they do not appear because of the luminous intensity of the spectrum formed, just as the carbon lines are not perceptible in the spectrum of the incandescent carbons of the voltaic are.

The silicic origin of this light is also proved by the fact that it is manifested on contact of the electrode with pure silex in the state of crystals of hyaline quartz. In this case, however, about 100 secondary couples are necessary for its production. As the silex itself may be decomposed by currents of great tension, the luminous effect probably, says M. Planté, results from the incandescence of the silicium, between which and diamond and graphite, MM. Déville and Woehler have shown remarkable analogies to exist. In order to distinguish the light from that produced between the carbon points, M. Planté designates it as the electro-silicic light.

PROGRESS OF HARDENED GLASS MAKING.

About two years ago M. Royer de la Bastie produced his tempered glass. It will be remembered that the Bastie process consists in heating the glass object to a red heat in a furnace, and plunging it while in this state into a cooling bath. This method, in common with some others of later date, and based on the same principle, requires that the object shall be completely formed before the hardening operation, and this, besides producing other disadvantages, tends to enhance the cost of manufacture. The glass, when heated to the necessary temperature, becomes so softened that it is almost impossible to transport the object from furnace to bath without some deformation taking place, and to this cause are due the irregularities so often noticeable in tempered glass articles, and notably the departure of window panes from a true plane. There are other disadvantages due to the bath, which is composed of oil or other greasy material heated to a temperature varying between 392° and 572° Fah., according to the quality of glass to be tempered. When the red hot article is plunged in, the oil easily takes fire. This can, of course, be avoided by proper precaution, but it is obviously a source of danger. There are, besides, the disagreeable odor arising from the bath, the large expenditure of oil, which decomposes on contact with the hot glass, and finally the fact that each special composition of glass requires a different temperature of the bath, and it is very difficult to maintain exactly this temperature during the operation. It will thus be clear that in the bath is the weak point of M. de la Bastie's process.

Herr F. Siemens, who has devoted considerable attention to the Bastie plan with the hope of overcoming some of its practical difficulties, appears to have become convinced that the invention is inapplicable to the fabrication of certain forms of glass, among which are included window panes. To these last any hardening process probably finds its most important application. After some experiment Herr Siemens reached the conclusion that solid bodies, or rather molds, could be substituted for the cooling bath. His first attempts, made with the object of hardening small squares of glass between plates of baked earth, showed clearly that the idea was practicable. This was eighteen months ago, and during the subsequent interval up to the present Herr Siemens has achieved constantly improving and successful results.

The *Deutsche Industrie Zeitung*, whence we take our facts, states that the method of fabrication of the compressed glass is not merely a glass-hardening process. It constitutes at the same time a veritable method of glass making. Tempering, blowing, and molding are all accomplished in one and the same operation.

It will be perceived, however, that all objects in glass cannot be made by this process, and that its application is restricted to such as can be pressed between two simple forms. To this category, however, belong window panes, to which at present Herr Siemens proposes to restrict his manufacture. In brief, the Bastie and Siemens methods may justly be regarded as each having its peculiar sphere. Bastie's plan is especially suited for cylinders, hollow glass, and other articles of complicated form, while Siemens' system, as already stated, is best applied to simple figures. The resistance of the Siemens glass to shock is stated to be ten times that of common glass, but its cost is about 50 per cent higher, except in case of curved window panes, when it is the cheaper. It is said to be harder than other tempered glass, and to present a fibrous instead of a crystalline fracture. It may be polished or pierced without the rupture which occurs in the Bastie glass. Herr Siemens is engaged upon still further improvements, which it is believed will tend to decrease the cost.

At the Lyons Industrial Society, recently, M. Leger proposed tempering bottles and similar glass objects by steam. The tensile resistance of the glass thus prepared, he states, is about equal to that of cast iron. No details of the process are given.

IS LIFE A MODE OF MOTION?

It can be demonstrated that motion is all-pervading; that absolute rest is inconceivable and that, in whatever form motion may appear, whether as motion or as light, heat, chemical affinity, magnetism or electricity, all are but phases of but one and the same great force. Science however does not stop with the enunciation of this truth, but following the same pathway onward is now brought face to face with the greatest problem within the ken of human conception, the question of the nature of life itself. There is something startling and overwhelming in the recognition of the fact that perhaps the greatest scientific minds on earth are keenly pressing forward toward the resolution of the mystery, not as speculators or dogmatists, nor as metaphysical advancers of abstract hypotheses; but progressing step by step, proving and reproving, leaving no by-path unexplored, no thread loose or weak in the wonderful fabric of facts which are slowly being interwoven. If Bastian and the believers in spontaneous generation are right, then life is the legitimate consequence of chemical affinity, for they claim to have substantiated by the clearest experimental proof that organisms in certain solutions previously free from life are due wholly to the proper chemical composition of such solutions. If this be true, then life must stand in the same category as heat and light and other sequences of chemical affinity—it is a mode of motion into which other modes of motion are convertible, and reciprocally it would follow that life itself is transformable into other phases of the all-pervading force.

THE TORPEDO DEFENSE QUESTION.

Despite the fact that the attention of inventors the world over is now directed to the problem of defending ironclads against torpedo attacks, progress toward its solution is slow. Captain Morton Singer, R. N., has been carrying on a series of experiments in the capacious repairing basin at Portsmouth, in order to find out the best form of netting to oppose to the Whitehead torpedo. It is now generally conceded that the netting system, although it in some measure acts as an impediment to the vessel's movements, is better than the proposed plan of fast small launches to be kept outside the vessel to head off torpedoes. Captain Singer has found that a chain net $\frac{5}{8}$ inch thick is easily perforated by the Whitehead torpedo, and he has obtained the best results from a wire grummet matting composed of wire strands about $\frac{1}{2}$ inch in thickness rove into open meshes. This yields gradually when struck and on recoiling throws off the torpedo.

A new submarine armor for vessels has been submitted to the Admiralty, and is intended to resist torpedoes. It is said to be so constructed that, while normally carried on the vessel's side out of the way of the guns, it may be drawn down over her bottom in five minutes. It is difficult to see how any device of this sort can be efficacious, as the explosion of a torpedo occurs along the line of least resistance, and it is hardly to be conceived that a vessel can be rendered so strong as to oppose more resistance than several feet of water tamping.

DR. THOMSON ON EMBRYOLOGY AND EVOLUTION.

The address of Dr. Allen Thomson, President of the British Association, which recently convened at Plymouth, Eng. and, is not one to excite the attention which scientific men, the world over, are wont to bestow on the discourse which yearly emanates from the chair he occupies. It is lengthy and technical—perhaps the latter was to be expected from so eminent a specialist—but the technicalities of biology are fully comprehensible to so limited a class that, without derogating from the scientific excellence of the address, we can scarcely think their introduction happy, especially as the discourse is usually understood to partake somewhat of the nature of a popular exposition.

The general tenor of the more important part was to set forth the parallel between the development of kinds, as conceived by the Darwinian naturalist, and the embryonic development of the individual as exhibited in any of the higher animals from the microscopic ovum upward. According to the evolution hypothesis, every such stage is the record of a condition once present in adult ancestors of remote generations—whence an explanation of the phenomena of embryonic life otherwise unaccountable. Dr. Thomson pronounced his opinion that the evidence of embryology in favor of the continuous development of species is conclusive; and considered that no theory which does not include the leading ideas of evolution, namely, variability, adaptation, and hereditary transmission, can bring the facts of embryology within a general law. The student of Haeckel will find the same argument brought forward by that writer with a wealth of illustration, so that the address was rather an endorsement of theories already formulated than a means of placing before the world any original hypotheses.

JOHN C. GRAHAM, of Grandville, Mich., contributes the following rule for estimating shingles for roofs: Divide 3,600 by the number of inches to be laid to the weather, and multiply this quotient by the number of squares to be shingled, and the product will be the number required.

VERY little is known of the first introduction of toothed wheels and toothed gearing. Two centuries before the Christian era, Hero, of Alexandria, spoke of toothed wheels in a manner that would indicate that he was conversant with this mode of transmitting motion.