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CHANGES IN UNITED STATES PATENT LAWS.

From notices published in the foreign press concerning the changes in United States patent law that will take effect on January 1, 1898, it is clear that the new conditions created by the amended law are not fully understood abroad. Thus we have seen several statements to the effect that an application for United States patent lodged after January 1, 1898, will be rejected in *all* cases if it is filed more than seven months after the filing of an application for a foreign patent for the same invention. This interpretation of the new law is erroneous. The actual meaning is this: If a foreign patent *issues* before the *issue* of the United States patent for the same invention, the United States patent, to be valid, must have been applied for within seven months after filing the application for the foreign patent; and as soon as a foreign patent issues, the United States Patent Office may reject an application covering the same invention if the United States application was filed more than seven months after the foreign application. It is, therefore, apparent that when the United States patent *issues* first, the interval between the dates of filing is of no moment whatever. Further, a rejection of the United States application under the seven months' clause of the new law can be declared only after the *issue* of a foreign patent for the same invention. Thus it will appear that even when the United States patent is applied for more than seven months after the filing of a foreign patent application relating to the same invention, a valid patent may be obtained in this country, provided the applicant succeeds in securing the issue of the United States patent before that of the foreign patent. This fact will be of particular importance in the case of inventions protected by British, German, Russian or Scandinavian applications, since the issue of patents upon such foreign applications can be delayed for a considerable time if the inventor desires.

The new law changes the requirements for novelty in other respects also, and after January 1, 1898, an application for United States patent may be rejected, inter alia, upon reference to any foreign patent issued (to another inventor) more than two years before the filing of the United States application. Another ground of rejection is the issue of a foreign patent antedating the applicant's invention. In regard to this provision, we would observe that the date of an invention made abroad can be established only by the issue of a foreign patent, or the issue of a printed publication describing the invention, or the communication of the invention (for instance, by letter) to a person residing in the United States.

After January 1, 1898, it will often be of vital importance that an application for United States patent should be filed before the required date. Informalities in application papers are liable to cause a refusal of the Patent Office to accept the application for filing until corrected, and the delay may prove fatal.

THE PROPOSED GOVERNMENT ARMOR PLANT.

The agitation of the question of a government armor plant will at least serve to enlighten Congress and the country at large as to the great cost and many risks and uncertainties involved in the manufacture of armor plate. The proposal that the government should build a plant and make its own armor was the outcome of the recent attempt to reduce and put a fixed limit upon the price that should be paid to private firms. The government had been paying as high as five hundred dollars per ton for armor plate, which, in the opinion of Congress, should be obtainable for between three and four hundred dollars per ton. The attempt to secure bids for the supply of armor for the three latest battleships at the reduced price failed to secure any satisfactory results, and a board of experts was appointed to inquire into the cost of building a government factory and determine whether it could turn out material at less cost than the price demanded by the private firms.

In considering the question of cost of armor plate, there is one fundamental fact which must be borne in mind if we are to reach a just conclusion, and this is that the cost of manufactured products, other things being equal, will depend upon the regularity of the demand. The factory that keeps its fires going and its hands employed from January to December will turn out cheaper work than one that works intermittently, as orders may chance to come in. This is true of the simplest manufactures, and the cost of interrupted and intermittent work will increase rapidly in plants which are expensive to build and employ difficult and costly processes. Now it is safe to say that there is no branch of the iron and steel industry in which the guarantee of steady employment is so necessary for economic results as in the manufacture of armor plate, and this fact is clearly set forth in the report of the armor plate board, which has just been made public.

It is estimated that a plant capable of making 5,000 tons of armor a year, this being the capacity of the existing private plants, could be built for $3,750,000; but the board considers that it would be inexpedient to erect such a plant unless Congress is prepared to provide enough ships each year to keep the plant in constant operation. It is pointed out that an armor factory includes special furnaces, tools and appliances which are not available for any other class of work, and a class of labor specially skilled in the art. Under our present system it is possible that Congress may fail to make any appropriation for a current year. This would involve laying off indefinitely a trained force of men, who would soon scatter in search of other work. When a new appropriation was made it would be necessary to engage men that were ignorant of the process and train them in the use of the special appliances.

Another condition that has an important bearing upon the cost of armor plate is the rapidity with which new and improved methods of manufacture are being devised. Great as was the improvement introduced by the Harvey process, its results have been equaled, if not surpassed, by new processes employed at the Krupp works in Germany and in England; and the rapid progress of the art continually calls for radical and costly changes in the plant. These changes would cost considerably less if they were gradually introduced during the continuous working of the plant than they would if they were carried out hurriedly on the eve of an expected appropriation by Congress and after the plant had lain idle for twelve or twenty-four months.

The estimate for a government armor plant includes provision for building the necessary furnaces for a complete steel plant, for it is considered that the capacity to produce the steel ingots is important to the successful and economic administration of an armor factory. This policy is consistent with the practice of all the largest concerns in the steel industry, which consider that the best results can never be obtained when the ingots are obtained by purchase in the open market.

The tone of the report is unfavorable to the building or purchase of a government plant, and justly so. The facts as above outlined prove that the best policy under existing circumstances is to give a fair price, which will take account of the special risks involved in armor plate manufacture, and encourage private companies to continue in the business. This system has worked to good advantage in Europe, where the armor plate is manufactured almost entirely by private firms. At the same time it is evident that the real difficulty in the whole matter lies in the capricious methods adopted by Congress in the matter of naval appropriations. This could be removed by laying down a plan of naval construction which should extend over a lengthy period, in which a stated appropriation should be asked for each year, the number, style and design of the ships being determined by the requirements and naval developments of each current year. Such a fixed policy in the matter of appropriations would have an excellent effect in any case. If the government wished to build its own armor plant, it could do so with the expectation of running it on an economic basis, gathering within it a corps of skilled experts and workmen, and modifying the plant from time to time to meet the developments of the art. If, on the other hand, the armor were made by private firms, its price would unquestionably be favorably affected by the steady employment which the new policy would guarantee

SOME CURIOUS OLD PATENTS.

In our German contemporary Glaser's Annalen some interesting particulars are given as to early British patents. It will be seen that the idea, at least, of some of our modern inventions was anticipated by these curious old patents. We give below some interesting examples:

The first patent specification, accompanied by drawings, is that belonging to the British patent No. 169, of 1673, which describes a machine for grinding seeds and extracting oil; also a machine for cleaning and dredging rivers, harbors, etc. The second patent, with drawings, is the British patent No. 186, of 1675, relating to a mining pump.

Thomas Master, a Pennsylvania planter, secured a British patent, No. 401, of 1715, for a process for treating corn. This patent is remarkable in that it states that the invention was made by Mrs. Sibylla Masters. This is, perhaps, the first case of a patent granted for an invention made by a woman.

An English patent (making steel, etc.), granted May 6, 1671, to Prince Rupert, Duke of Cumberland, was assigned to King Charles II.

A patent granted to Prince Rupert, Duke of Cumberland, gave him the right to take oath from his workingmen that they would keep the invention secret.

The Marquis of Worcester, on November 15, 1661, secured a British patent, No. 131, covering the following inventions: A self-winding clock, rapid-firing guns and pistols, a device for detaching runaway horses, and, lastly, a ship constructed to sail against the wind and capable, when anchored, of use as a water motor or windmill.

The patent 183, of October 25, 1675, grants a London merchant, Justinian Angell, the right to erect two lighthouses at the mouth of the Humber, and to collect a duty from the skippers.

By letters patent No. 255, of August 23, 1687, the

Duke of Albemarle secured the sole right of erecting sawmills, driven by wind or by water, in some colonies (excluding New England).

A repeating rifle is described in the patent to Charles Cardiffe, No. 216, of February 16, 1682.

Patent No. 184, of 1675, shows how to convert foul water and salt water into palatable drinking water in large quantities and quickly.

The idea of catching fish by the aid of lamps is found in the patent No. 295, of April 22, 1692.

The first patent for a burglar alarm is the British patent No. 331, of January 11, 1694.

Patent No. 314, of January 31, 1693, covers a process for utilizing the heat generated when slaking lime.

The first English patent containing a mention of coffee is that granted to Richard Bull, No. 373, of December 22, 1704, for a coffee roasting machine.

The first patent containing a reference to potatoes is No. 413, of May 17, 1717, for a process of making starch from potatoes.

A chemical fire extinguisher is described in patent No. 458, of November 12, 1723.

Thomas Savery's patent for his steam engine is numbered 356 and dated July 25, 1698.

A wave motor is described in patent No. 315, of 1693.

The use of the hydraulic jet for the propulsion of vessels is described in the British patent No. 132, of May 16, 1661, granted to Thomas Toogood and James Hayes.

The British patent No. 236, of 1684, granted to John Cliquet, relates to a carriagelike machine adapted for use as a conveyance for one or two persons. The inventor apparently had a motor carriage in view.

The first patent relating to street lighting is that granted in England to Vernatty, No. 227, of 1683.

The first patent relating to street cleaning is a British patent granted February 21, 1674, to Thomas Toogood.

On June 20, 1699, Edmund Heming secured a British patent, No. 364, for a street sweeping machine.

The British patent of Edmund Heming, No. 282, of October 17, 1691, is for the "making of iron plates tinned over, commonly called tinned plates, as good as those brought from and made in Germany." The use of the words "made in Germany" at such an early period is significant.

COSTLY BUTTERFLIES.

BY GEORGE E. WALSH.

The Museum of Natural History, New York, recently obtained one of the finest collections of butterflies in the world, and visitors interested in things beautiful or matters scientific may soon examine at their pleasure and convenience the gaudy wings and plumages of butterflies that have been gathered at the risk of life and health from every quarter of the globe. Owing to the delicate hues and colorings on the wings of some of these giddy creatures, they cannot be exposed to the bright light of the exhibition halls without losing something of their charm and beauty, and they will be mounted and kept in rooms where the light is artificially shaded to suit the exhibits.

The general public gains an insight into the work of the entomologist in viewing this collection of butterflies, especially if such additional information is given which will enliven the subject with popular descriptions of the odd creatures and their habits. One hardly realizes the extent to which collectors have carried their hobby, and how many risks and dangers have been braved in order to capture rare specimens in odd corners of the earth. To make a collection of value to science, the butterflies from all regions of the earth must be represented—those from the jungles of India, from the Cannibal Islands of the South Pacific, and from the cold plateaus of our great northern regions where only a few living forms can exist. One man could hardly capture specimens of all the butterflies in existence, even though he spent a lifetime at the work and lived to be twice threescore and ten. A large collection consequently means the work of dozens or even scores of men scattered throughout the world, but brought together and arranged by one or two enthusiastic entomologists of rare skill and knowledge in identifying and classifying the creatures.

The high prices paid for rare specimens of butterflies has had the effect of inducing dishonest collectors to impose upon the innocent. Recently the entomologist of the London Natural History Museum received an apparently new and beautiful butterfly from India; but upon a microscopical examination it proved to be an ordinary variety, artfully and skillfully dyed. This was the first time that this trick had been performed; but it was getting to be quite an old story at the museum to receive consignments of butterflies of a composite nature; that is, the wings of several different species would be removed and composite butterflies of unique appearance would then be manufactured from them.

There are a number of wealthy entomologists in England who own private collections of butterflies valued all the way from $100,000 to $150,000. The most costly, and probably the most perfect, collection in the world, private or public, is owned by the Hon. Walter Rothschild and is kept in his private museum of Tring, in Hertfordshire. The collection has probably cost its owner several hundred thousand dollars—the exact sum can only be guessed at. It is the accession of these wealthy collectors to the ranks of the professional entomologists that makes it possible for butterfly hunters to secure the high prices that rare specimens command to-day. There is no regular table or set list of prices; but it may be said in a general way that they vary from a few cents apiece for common insects up to one hundred or more dollars for very rare creatures. The African Papilio antimachus, a very rare butterfly, is quoted high in the London market, and a beautiful pair recently sold for $130 at auction. New Guinea butterflies were exceedingly high priced a few years ago, and some of them brought as much as $250 apiece; but to-day they are more plentiful and sell at about half this price. Papilio caunus, one of the mimic butterflies, will generally bring $50 in the market to-day. When the hunters first began to penetrate into the wilds of the unexplored regions of the earth for butterflies, exorbitant prices were offered for the few rare specimens brought back. The wealthy collectors then paid prices that were out of all proportion to the real value of the insects, report having it that an American collector offered $1,000 for a single rare specimen, and one of the Rothschilds paid half this sum for a Papilio that is quite common to-day.

In the Denton collection, recently placed on view in this city at the American Art Galleries, there were 1,300 varieties represented, and their value has been variously estimated at $10,000 to $30,000. Most of the specimens were caught and mounted by the two owners of the collection, William and Skelly W. Denton; but others were gathered by private hunters in different parts of the earth, or purchased outright in the London market. There are several London firms engaged in butterfly collecting, and most of the rare specimens find their way, sooner or later, to them. They have traveling entomologists in every part of the earth who collect for them such specimens as they need. These authorized agents for the firms are supplemented by free lances and general collectors of everything queer and unique that can be found in the out-of-way corners of the earth. They unite butterfly collecting to orchid and lizard hunting in such a way that they are pretty sure of good rewards. They go forth into the great tropical woods and swamps armed with three sets of hunting implements; one is for gathering orchids, another for shooting wild beasts and human enemies, and a third for corraling and preserving rare butterflies.

The latter work is not the least interesting of the three and one that is probably known the least about. The hunters carry with them all the modern outfits necessary to preserve the butterflies in a perfect state; but in many cases they fail to secure their booty entire. So delicate are many of the filmy wings and legs that it is rare to find more than ten per cent of the hunter's collection in a perfect condition when he finally reaches civilization. There are rare butterflies of tropical Africa and America which are found in several large collections; but not a single specimen has ever yet been perfectly mounted.

The butterflies are collected in two ways: they are either caught in a net or in the larval or chrysalid form. Those captured in the latter condition can be developed into perfect specimens in captivity; but hunters in the wild swamps and jungles do not have the facilities for transporting the larvæ to civilization, and they rarely attempt to bring back specimens in this condition. They depend entirely upon the net for capturing them. The net is mounted on a jointed pole, so that the entomologist can make a sweep ten feet or more up in the air. When the insects are caught they are dropped into a bottle of cyanide, which quickly and painlessly kills them.

The common butterflies which we see flitting about in our gardens and fields may be easy enough to capture, but in the tropics the rare specimens frequently flutter among the treetops where the beautiful orchids and trailing vines bloom. In order to capture them it is consequently necessary to climb the trees and take up a precarious and uncertain position among the branches, fifty or a hundred feet high. Then when the butterflies hover near the tree a skillful sweep of the net may imprison one or two. There are some odd varieties which refuse to be captured even in this difficult manner, and decoys have to be set for them. Curiosity seems to be born in butterflies as well as in human beings, and some varieties have a great predilection for rich and unusual colors. Thus a red, blue, or white piece of cloth tied among the trees will sometimes attract the wild insects, and they will exhibit curiosity to approach close enough to the object to satisfy the hunter. Mounted specimens of butterflies pinned in conspicuous places have been known to attract others of a like nature. Sweets will also bring the butterflies swarming around a given point. Molasses mixed with rum, spread upon tree trunks, has been the means of capturing rare specimens. The insects would eat of the sweet mixture, and then apparently lose their heads under the effects of the liquor and permit themselves to be caught in the hunter's net.

When the butterflies are killed with the cyanide they are laid carefully in the collecting box, or folded in a paper cocked hat prepared for the purpose. When properly folded a great number can be carried in a small box in this way. When taken back to camp, or upon reaching civilization, the dried mummies are placed in a relaxing box. This is a small wooden receptacle lined with damp flannel. They are kept in the relaxing box for about twelve hours, during which time they absorb the moisture from the flannel like a sponge. The dried, mummified bodies, wings, and legs then gradually swell out and assume their normal appearance. They become so soft and limp that any rough handling would soon destroy them. The operator picks them up with a tiny pair of forceps, and pins them on cork-covered boards and arranges their wings in a lifelike attitude. The wings are usually spread out at right angles to the body, so that one can get a perfect view of their colorings. In this position they are allowed to remain for a week or more until thoroughly dried. Then they are arranged and classified, and properly remounted with appropriate surroundings.

THE DIETARY OF CYCLISTS.

Dr. Lucas-Championniere, of Paris, who has devoted a good deal of attention to the medical aspects of cycling, expresses his opinion that 600 kilometers in twenty hours, the time in the Paris-Bordeaux contest, was not too much for a healthy and well trained rider. Dr. Championniere gives the following details of Rivierre and Cordang's methods during the Bordeaux-Paris race:

"They did not eat nitrogenous food, and they were right. But though they did not eat, they drank enormous quantities of liquid to replace the liquid or weight lost by perspiration. They drank tea, beef tea and milk. It is useless to eat during violent exercise, but it is important to drink, and if the body is in good working order, the only result of the effort is a decrease in weight. The effect on animals is similar. M. Paillard, the sportsman, who rode 1,200 kilometers in sixteen days last year on his two mares Pomponne and Merveilleuse, did not increase their ration of oats, but gave them large quantities of green fodder and water. It is the same with our cyclists, who race on fruit and a deal of liquid." This is right as regards the quality of food required on a long distance contest. Whether such a race be harmful to an exceptional rider, properly trained or not, we do not yet know. Mills, Shorland, Holbein, Bidlake, among English, and Rivierre, Huret, Stephane, Dubois, among French riders, with many others who have frequently competed in such races, are still well and healthy, including D. Stanton, who raced about 1874 and 1875 in six day races. We must watch their careers in future before we can lay down any rule. Our own opinion is that it does no harm to the one man of exceptional physique, but is most harmful to the many who are improperly trained.—British Medical Journal.

INVOLUNTARY MOVEMENTS AS CONTROLLED BY IDEAS.

This subject, which has already received considerable attention, has been investigated further by M. A. Tucker, of Stanford University, who describes his experiments in The American Journal of Psychology. According to a brief abstract in The American Naturalist, "the object of Mr. Tucker's investigation was to determine, first, any general tendencies to motion in the hand, apart from the spatial influence of thought; and second, the comparative value of these involuntary movements in adults and children. The apparatus used was similar in its essential features to Jastrow's automatograph. To prevent the attention taking a directional character, in the experiments where this was to be avoided, the subject recited the multiplication table, conjugated French verbs, etc. As regards the first point of investigation, there was found to be a 'tendency for the hands and arms resting in front of the body to move inward toward the median plane of the body.' There did not appear to be any necessary tendency for the hands to move toward a visible object to which the attention was directed, if that object was thought of simply as at rest; but the sight of moving objects, or the remembrance of them, caused an involuntary imitation of the direction of the moving stimuli, not only by the hands, but also by the whole body; this tendency manifested itself in a distinctly observable swaying of the head. As to the second point, the investigation brought out the general fact that 'children are governed by and subject to the same laws as adults, but to a less extent.' Individual variations were wider in them than in adults. No differences were found in children due to age or sex. These experiments seem to substantiate the views of Féré and Lehmann while they disagree with those of Jastrow, who reported a tendency of the bands to move toward stationary objects whenever the attention was directed toward their locality."