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THE UNITED STATES JOINS THE INDUSTRIAL UNION. By concurrence of the Senate on March 2 last, the government of the United States is about to become a member of the International Union for the Protection of Industrial Property. The official papers signifying the desire of this government to enter the Union are now being prepared by the State Department for exchange at Berne, Switzerland; and in a few weeks, probably, the inventors, merchants, and manufacturers of this country will be entitled to share in all the benefits the Union can yield.

The vast advantages which have accrued to the nations composing the International Postal Union are well understood. The Industrial Union is designed to confer equal benefits, but in another direction. One of its special objects is to secure better protection for patents, designs, models, inventions, trade marks, and trade names. For example, at the present time, when a patent is issued here to an American inventor, he loses the right to obtain a patent in most of the European countries. He is therefore obliged to secure his foreign patents before the American patent issues, and he aims to have all the patents issue on the same date; otherwise there is liability of invalidation of the foreign patents, while if the latter issue first, the term of the American patent is abridged. The American inventor is also subjected, at present, to the risk that outside parties may secure his invention in other countries in their own names, and deprive him of all right thereto. These and other difficulties will be removed when the United States enters the Industrial Union. One of the special provisions of the Union is that inventors, patentees, and proprietors of designs and trade marks shall have a prior right of registration in all countries or nations that are members of the Union. The term of this priority for Americans is seven months as respects patents, and four months for trade marks. This provision is likely to be of great importance to our inventive countrymen. The regulations of the Union will also apply in favor of its members in respect to protection against infringers.

Several other excellent provisions pertain to the Union, which extends the ægis of its protection to all kinds of industrial property and products, including agricultural productions, wine, corn, fruits, cattle, minerals, etc. We shall take occasion in future articles to explain more fully the nature and workings of the new institution.

ANT-EATER AND PENGUIN.

It is a long while since anything so curious has arrived at the port of New York as the two live specimens which are now safely caged in the Philadelphia Zoological Gardens. The first of these is a live ant-eater (Tachyglossus hystric), or echidna, an animal that lays eggs, and the other a penguin, a bird that cannot fly, belonging to a sub family of web-footed creatures living at sea, sometimes seen at a distance of 300 miles from shore, but usually found near rocky islands and headlands or ice floes and fields. The ant-eater, because of its peculiarities of structure, its restrictions as to diet, and the infrequency with which it brings forth young, has often been quoted, and not without reason, it would seem, as additional evidence in support of the theory of foreordination, the prearrangement of the universe to suit its occupants, or, what is quite the same thing, the nice adjustment of live forms to their surroundings.

Were the ant-eater as prolific as other animals, his race would long since have become extinct, because there is not enough food to go around of the kind he subsists on, or, if he came into existence where there were no collections of ants, and without the ability to get at the eggs of birds, nature could no longer be called an economizer.

Speaking of such live forms as the ant-eater and those curious insects and fishes which have a protective resemblance, the late Professor Agassiz said:

"The existence of a superior intelligence, whose power alone can establish and sustain such an order of things, I consider to have been established by rigid demonstration and on a truly scientific foundation. Species do not insensibly pass into one another, but each has its appointed period, and is not connected, except in the order of time, with its predecessor. An invisible thread, in all ages, runs through this immense diversity, exhibiting, as a general result, the fact that there is a continual progress in development, ending in man, the four classes of vertebrates presenting the intermediate steps, and the invertebrates the constant accessory accompaniment."

One young one is brought forth by the ant-eater at long intervals. The young one attaches itself to its mother's back, and does not quit this position for more than a year. Curiously enough, nature seems to have calculated that food suitable for this animal is scarce, and that, at times, it must endure prolonged fasts, because the ant-eater is capable of going without food for incredible periods.

The new arrival, unlike its cousin (Myrmecophaga jubata), or ant-bear, can climb trees, and thus secure the eggs of forest birds, which it readily gets to its mouth by means of its long cylindrical tongue. Before

it started for Philadelphia the other day, it was given the white of an egg mixed with condensed milk, and seemed to enjoy it immensely. The lightning-like quickness with which it thrusts in and out its long glutinous tongue would seem marvelous, did we not know that the tongue of the toad is still quicker.

The Philadelphia specimen is covered with quills like the porcupine, in this respect differing from the great ant-eater, which has long hair in place of quills, and, where the ground is ordinarily soft, can bury himself below the surface in an incredibly short space of time. Unlike most burrowing animals, he uses all four feet at the same time, and sinks into the ground in much the same fashion as a harlequin at the pantomime disappears through the stage on a descending trap. His spine curved, and the formidable quills standing out threateningly, like the retrenchment called in military parlance chevaux de frise—a piece of timber traversed with spikes, used to stop cavalry. He is slow and awkward of gait, indeed cumbersome, and, as his claws turn inward, he cannot bear the weight of his body upon the soles of his feet, but must needs walk upon the callous pads formed on the back of the claws, and which cover an entire phalanx, or the space between two joints. Besides the purely defensive quills, it has a sharp pointed spur on the inside of its right hind leg, similar to those worn by the fighting cock. This spur is hollow, like a serpent's fang, and resembles it again in having at its base a sack of venom, which, pressed against by the spur during attack, injects its poison into the wound made by the spur.

The newly arrived penguin is one of those curious birds only found in uninhabited and remote spots, and which, when out of the water, stands upright in long rows, silent and motionless, like sections of a great army in battle array, line upon line en echelon, that is to say, in the form of steps. Each line represents a distinct condition; the young being in one, those of perfect plumage in another, while the other lines are made up of those moulting and sitting upon eggs. The penguin can neither fly nor walk, and while moving over the rocks lies flat and propels itself along by means of its wings, which it uses like anterior limbs. In the water, however, it is at home, moving under the surface as actively as a fish.

How Wood is Made.

In many trees the annual layers are so regular, and seem to be placed so nicely, that one not a botanist might be pardoned for believing that the sap was changed to wood matter in the leaves, and the new formed matter sent down, sliding over the old layer like the section of a telescope; but, though the food was prepared by the leaves in a great measure, the actual growth was made by the germination of some of the cells along the whole outside wall of last year's wood beneath the inner bark. The germination of the cells takes place about the middle of June. Take a healthy cherry tree, and strip it entirely of its bark to any length desired. At that season a viscid liquid will be found covering the woody surface in abundance. The stripped part is covered with a cloth to prevent evaporation, and in a few days numerous dots, like needle points, will be seen about the sixteenth of an inch apart all over the surface. These are the young cells which have germinated from those of last year. They continue germinating, one from the other, until they meet, when they unite and form a complete surface.

In the autumn a layer of wood will be found just as thick as in the part of the tree not disbarked, and a single layer of liber, with its outer coat of cellular matter—perfect bark—will have been formed over the whole. The entire formation of wood and bark can thus be seen by the ordinary observer without the necessity of any nice microscopical work. Other people have tried the experiment with other trees. We have seen large apple trees that have had their bark peeled wholly off from their trunks, at the season named, make an entire new layer of bark and wood, not only with no injury to the tree, but to its manifest enjoyment; but our own experiments were confined exclusively to the cherry. By this experiment we learn that there is no difference primarily in any part of the annual covering. The same cell may become permanent tissue or generating tissue, and from the generative tissue may come, before the season of growth closes, every form of structure known to anatomists, from pure wood to the outermost cuticle of the bark. How these cells become differentiated may be passed over here. We know that cell growth is not always uniform in its operations. The law that changes the outermost series of newly made cells into liber need not necessarily operate so exactly as to make them perfect to this end—a few may be thrown off into the liber as generative tissue—and, granting this possibility, we see how the woody granules in the apple are formed.—The Garden.

In Russia, on the northern railways, the locomotives, hitherto burning wood or coal, are being adapted for peat burning, the saving being estimated at fifty per cent.

The Nature of Patent Rights.

In a recent jury trial for the infringement of a patent, Judge Carpenter, of the United States Circuit Court, Massachusetts, gave the following interesting explanations to the jury concerning patents and their nature:

"It may be useful for you to understand in a general way what is the nature of these rights that are called 'patent rights,' and of which this claim which is brought here is one. You know to how large an extent the progress of the country has depended upon new and useful inventions in the mechanical and other useful arts, and the attention of the Congress was early turned, in pursuance of the Constitution, to the consideration of what methods ought to be adopted, in the first place, to protect the rights of inventors, and, in the second place (which is equally important), to protect the rights of the public. In order to accomplish these two results, the patent laws have been enacted, which provide in general terms as follows: He who has invented a new and improved process or machine may, if he sees fit, retain within his own breast the knowledge of the thing, or if he constructs machinery for the purpose of illustrating his invention and puts it into use, or if he carries on the process which he has invented, he may choose to carry it on secretly, and if he is able to preserve the secret from the deceptions of others, he may thus retain a perpetual monopoly—a perpetual, exclusive use of the invention—and may thus, as it were, perpetually levy tribute upon the public for the use of it. The provision of the law, however, is that if he will make public the machine or the process which he has invented, if he will put down upon paper a clear, distinct, and intelligible description of it, then the government will give him the exclusive right for a definite number of years (under the present condition of the law, for seventeen years) to use that improvement, the consideration for that grant being, of course, that he has made it known to the public, so that when the seventeen years shall have expired, the public will not only have the right, but they will also be able, to exercise this art for their own profit and advantage. So that you see on one side a special grant, made by the government to the inventor, that he shall have the exclusive use of his invention for a certain time, and there is, on the other hand, a consideration given for it by the inventor—that is to say, the disclosure of his invention, so that the public may afterward have the benefit of it. Now, this grant which is thus made to an inventor constitutes property to which he is entitled, and, as in the case of all other property, the law forbids any encroachment or infringement upon this right—that is to say, just as the law forbids any man to take and carry off the physical property, as the book, or the knife, or the tool, employed by another in his work, so it prohibits any person from using or practicing the invention in respect of which this patent has been issued; and in case any such infraction of the law should occur, the patentee has a right to bring his action against the person who has so interfered with his rights, and recover from him such reasonable damages or such other relief as the forms of law permit. He is allowed, and for a long number of years in the past he has been allowed, to bring his action either on the law side, as it is phrased, or on the equity side, of the court—that is to say, he may cause his dispute to be brought for determination before a jury, as in this case, or before the court, as in an equity case; and he is allowed free liberty of choice between these different remedies, choosing, of course, that one which, according to his judgment and the best advice that he can get, will be the most advantageous to him. If the patent has expired, as in this case, he is compelled by the law to bring his action before a jury, and the attitude in which he stands is this: He has no longer an exclusive right to this invention—that is to say, it is competent for any person in the community, notwithstanding the patent which we have here produced, at this present time, and to-day, to make the machine described in his patent. During the period of time, however, when the patent was in force, it was not lawful for any person to make such a machine. Therefore, if during that time, as is here alleged, the defendants have made a machine which contains the invention patented by him, supposing you find that to be a practical and valid invention, then his right now to recover such damages as he may have suffered is perfect and complete.

"The provision of law that no person shall take, or use, or infringe the rights of a patentee does not depend upon the knowledge on the part of the public of the patent itself—that is to say, an actual knowledge. The patent is public, and is accessible to any person who may conceive that his business interests will be subserved by his finding out what his rights are and what they are not; but whether he reads the patent or not, he is nevertheless bound by it. He cannot excuse himself by alleging, or by proving even, if he can prove it, that he was not aware of the rights of the patentee. A patentee's rights are derived from the grant of the government, and are complete from the time when the patent is sealed and delivered to him, and it is the business of every person in the com-

munity to avoid infringements, at his own risk. Nor is it necessary, gentlemen, before bringing the action that the patentee should notify or inform the defendant that he conceives there is an infringement of his patent.

"The plaintiff may produce his patent, which is the evidence of his right, and if he shows that it has in point of fact been infringed, then it will be no defense to his action if the defendant either prove that he did not know of the existence of the patent or that the plaintiff neglected to notify him. He was bound to know, and the plaintiff was not bound to assist his information or knowledge by notifying him."

The Future of Our Boys.

Mr. Noah Brooks, whom all boys will recognize as one of their best friends, and as one of the most interesting writers for the young people of this country, comments in a forcible way on a question of ever pressing importance in the current issue of the *Epoch*. It is, "What shall be done with our boys?" He finds the learned professions full, and many avenues of work either crowded or closed. The sea, which formerly gave occupation to thousands of brave American boys, is now sailed by vessels manned by foreigners. The employments once wholly filled by male youth are now largely occupied by women. These include clerical positions, private secretaryships, and the like. It is true that the new order of things makes competition sharper, and gives boys fewer chances; but this country is so large, and its interests and demands so multifarious, that there is always something for every one to do. It stands to reason that all boys cannot achieve wealth and fame; but as the years go, by the proportion of the fortunate ones will constantly grow larger. What is needed more than anything else to add to the usefulness and honor of coming generations is a higher and fuller appreciation of the dignity of labor.

We have in mind the experience of a Maryland boy who was left several thousand dollars by his father. He did not squander it, as many boys would have done, but he determined to spend it all, and he did it in such a way that it became the very best investment that he could have made. He went into one of the railway shops of the city at nominal wages, and paid the rest of his expenses out of his little fortune. He learned all he could in a practical way there, and then entered a first class school of technology. By the time he graduated his money was all gone, but he was able to earn his way. He kept on learning, and the consequence was that he soon rose to an excellent position, and to-day he is in receipt of a splendid salary, and is considered one of the best men in his profession in the country.

Mr. Roberts, the wonderfully able and astute president of the great Pennsylvania Railroad, started out as a chain carrier in a surveying party. Mr. Frank Thomson, the vice-president of the same road, was an apprentice in the Altoona shops. Mr. Samuel Spencer, of the B. & O., and one of the best railroad men in the country, was a clerk not many years ago at Camden Station. Instances innumerable could be cited, and the moral of them all would be to learn a trade, and to trust to industry and application for promotion. The future of our boys is the future of our country. We have not the slightest doubt that it will be brilliant and substantial; but the individual cases of marked success must always depend upon the capacity and industry of the individuals. Boys who look upon life as a serious problem, that must be worked out and not played out, are able to take care of themselves. The idlers, who expect to live on money which they do not earn, are the drones in the great national hive of industry.

Chrome Steel Projectiles.

The first lot of 12 inch chrome steel armor-piercing projectiles, manufactured by Messrs. Holtzer, have been received at Woolwich, and the trial took place on March 26, at Shoeburyness. The conditions of test upon which their acceptance depended, and which were much more severe than the specification of either the Russian or French governments for these shots, were more than complied with. Two selected projectiles were fired at 16 inch compound armor plates, manufactured by Sir John Brown & Co., Limited, and these passed through the targets, being found entire at the back. The plates were exceedingly good, being some of the hardest made by Messrs. Brown & Co., but the shells completely shattered them. This settles the question as to the value of these projectiles in the destruction of armor-plated vessels, since there is not an ironclad afloat which could not be riddled by these shots when once within range. As these are the first shots manufactured for the English government, we are glad of such a satisfactory result, and we understand that the whole lot were delivered at Woolwich in good condition without any cracks or damage.

Whatever soundness there may be in a somewhat widely accepted belief, in official circles, that our standard types of heavy shell are thoroughly efficient because they can destroy the unarmored portions of hos-

tile ironclads, it is evident that in any future naval campaign we shall be opposed to ships furnished with true armor-piercing projectiles, and the Ordnance Committee have shown a wise appreciation of the necessities of the situation by commencing to provide for the supply of *materiel*, which every first class power, except ourselves, already possesses.—*Engineering*.

New Remedy for the Sleepless.

Now, what is it that disturbs sleep? Noise? Not altogether, for the inhabitants of besieged towns have been known to sleep through the roar of bombardment, and to waken suddenly when the firing ceased. Millers will sometimes start up from sleep, awakened by the mere stopping of the mill wheel. The rattle of a train in motion will induce sleep, as all travelers know. And last, not least, the sleep of infants, the sweetest and soundest sleep of all, is promoted by sound. The popular view, then, that noise disturbs sleep, like most popular views, only touches the truth, but does not grasp it. The true cause of disturbance is interruption. Any sudden cessation of the continuity of silence or of sound awakens the sleeper; for sound, provided it be monotonous, has precisely the same effect on the brain as silence. That simple piece of mechanism, the alarm clock, is based on the theory of interruption—it interrupts silence.

Now, might not, suggests the *English Medical Journal*, an equally simple contrivance be made on the same mechanical principles, but with the reverse object, viz., that of insuring sleep by sound? Its utility, to delicate persons especially, would be undoubted. Call it the morphimeter, the somniferant, or give it a French title, and christen it in the garde-somme, or sleep-preserver—a name, by the way, that would truly designate its object, for its real object would not be so much to promote sleep as to insure the sleeper against disturbance (and vulnerable side of light sleepers) by placing a bulwark of sound between him and the sudden shocks of extraneous noise. Let your sleep-preserver produce the drowsy, monotonous buzz of the humming top, not so loud as to be heard in an adjoining room, but loud enough to drown distinct noises when placed close to the bedside or hung over the pillow.

Polarization of Resistance Coils.

During the last twelve months several instances of this phenomenon have been chronicled, enough to make it probable that a large proportion of coils are thus affected. Prof. Mendenhall was one of the first to notice it. At the Buffalo meeting of the American Association, last fall, a paper was read on the subject by him. On discovering the fact that a deflection of the galvanometer might be produced by a coil directly connected thereto, and not in a battery circuit, the most natural conclusion was reached that it had become charged, and that its electrostatic discharge produced the effect. This was at once disproved by the fact that the current lasted for some time, in one instance for many hours. Electrolytic action was then suspected.

The coils were examined, and those which showed polarization most strongly proved to be most affected as regards their insulation. Some were baked at 150° C., when polarization disappeared, only to reappear when a drop of water was placed upon them. In another case, a coil which had been restored by baking again, showed polarization after ten days' standing. The suggestion is made either to fill the entire space in the box surrounding the coils with melted paraffine or to use a tight box filled with petroleum oil of proper quality. An important source of error is here pointed out, which all electricians should guard against.

Cataract Induced by the Vibrations of Tuning Forks.

Dr. S. Th. Stein, in order to examine the functions of the cochlea, acted on the eyes of very young porpoises, both in the unutilized state and after the ears had been destroyed, by means of the vibrations of tuning forks of different pitches. Cataract was produced in both classes of experiments. In the entire animals continuous subjection to the action of a high-pitched tuning fork induced cataract in from eighteen to twenty-four hours, while a tuning fork vibrating 100 to the minute produced the same effect in twelve hours. In animals whose ears were destroyed, the cataract was much more quickly induced by the tuning fork, some two or three hours being then sufficient. Dr. Stein's theory is that the condition of the lens is affected by the giving off of heat from the body, and that this is altered by the vibrations, the perception of sound again tending to retard the development of cataract. The members of the Moscow Medical Congress, before whom Dr. Stein related his experiments, did not appear inclined to accept his theories, and Professor Khodin remarked that it was not an uncommon thing for young porpoises to be born with cataract. To this, however, Dr. Stein replied that the cataract produced by his tuning forks passed off after a time, and could then be reinduced by the same method.