

are swept up like straws, heavy wagons and machinery are crushed and carried for long distances, and the toughest trees are twisted off like reeds. The electrical action in connection with these murderous whirls is naturally excessive, but the immediate rainfall is apt to be slight.

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW, NEW YORK.

O. D. MUNN.

A. E. BEACH.

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VOL. XLI., No. 1. [NEW SERIES.] Thirty-fifth Year.

NEW YORK, SATURDAY, JULY 5, 1879.

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Price 10 cents. For sale by all newsdealers.

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A PATENT RIGHT DISCUSSION IN ENGLAND.

At a meeting of the Society of Arts, in London, May 7, a paper was read by a member reviewing the salient features of the government patent bill now before Parliament, and in the discussion that followed a number of prominent gentlemen took part. There was also read a long letter from a committee of Glasgow inventors, pointing out some of the more objectionable features of the proposed law, and approving the motion now on the notice paper of the House of Commons, to the effect that no measure or change in the patent laws would be satisfactory if it continued to treat inventors as public enemies, to be impeded and heavily taxed, instead of legislating so as to stimulate the inventive genius of the nation to bring improved machinery and labor-saving appliances to the aid of the depressed industries of the country.

The circumstance that several of the obnoxious features of the bill under criticism were those which would be reformers of the American patent system insist on our adopting, gave unusual interest to the discussion from an American point of view. Two points were especially noticeable: the emphasis laid upon the justice and sound policy of respecting the natural rights of inventors, and the general acknowledgment of the superiority of the American patent law in securing the end aimed at—namely, the encouragement of invention.

The chairman of the meeting, Mr. F. J. Bramwell, said that the grudging assent given to the necessity of a patent law by those who looked upon patentees as in some sense adversaries of the public at large, was altogether unreasonable. Dr. Siemens had put the matter most pithily in saying that if an invention should be found lying in the gutter, it would be better that an owner should be assigned it, rather than have it left as common property. With an owner it would probably become a public benefit; without an owner it would most likely be left unused. So far from its being the desire of persons engaged in manufacture to adopt new inventions, the truth was that such persons dreaded nothing more, and naturally. When they had their machinery set up to work a certain process, and their workmen trained to use it, they were not too ready to adopt any new idea that came before them. It simply placed them in the dilemma of either leaving it alone, which would be the easiest thing to do, or adopting it, perhaps at enormous expense. Of course they would be inclined to leave it if they could without risk of their rivals getting ahead of them. Except in the case of very enterprising men, who wish to push themselves forward, the tendency of manufacturers is to let inventions alone. An inventor is generally a man not engaged in the trade he improves, and such men are very unfavorably placed for carrying out their inventions. Without capital, business knowledge, or connections, they are incapable by themselves of developing their inventions; but protected by a patent, they can go to a capitalist and induce him to bring their invention forward by offering him special privileges for so doing. Mr. Bramwell happily sums up in one sentence the vital objection to the government bill, an objection which reminds us of the bill before Congress last winter: "There seemed to be a desire in the minds of the framers of the bill to take advantage of the invention without protecting the inventor, and the prevailing idea seemed to be that if the public could get something without giving an equivalent in the shape of protection to the inventor, it would be so much gain." The futility of expecting to gain by such a transparent swindle would seem to need no insisting on except to such statesmen as would expect a country to profit by the repudiation of its honest debts.

Mr. Anderson, Member of Parliament, insisted that there was really no difference between the interests of the public and of inventors in the matter, and that to stimulate the inventive genius of the country would be most beneficial to all. In fact, after considerable experience, he had come to the conclusion that two things were necessary to put English manufacturing industry in a satisfactory position, and they were technical education, as given on the Continent, and the conferring of liberal patent rights, so that inventive genius might be induced to come forward. An instance of the results of liberal patent laws was furnished, he said, by America. Most modern inventions came thence, not because people's brains were more inventive there, but on account of facilities and encouragement given by American patent regulations.

Admiral Selwyn said that if the English people desired to restore their country to her former proud position among the nations of the globe, it would be in vain to rely on free trade or anything else. Nobody could fail to see that if the patent fees were made as low as in America, ten times as many patents would be taken out. The opinion that three or four years were sufficient to determine the practicability of an invention was not well founded. The Bessemer process, for instance, was not accepted until twelve years after the invention was put forward, and such a fact as that should justify the endeavor to fence the inventor round with such protection as would induce capitalists to put inventions into operation. There were in the Patent Office hundreds of inventions which had been brought forward before the public were ready to adopt them, though calculated to be of the greatest benefit to humanity; but they now lie idle there because they cannot be repented. Inventors were the prophets of their day, pointing out the path to material progress, as the prophets of old showed the path in morals, and we treat our prophets exactly as our forefathers treated the prophets of their time.

After noting at length certain features of the American patent system as commendable and worthy of adoption—small fees, extended life, paid commissioners, payment for inventions adopted for government use, and so on—Admiral Selwyn said, that as representative of the British section of the International Congress of Paris, he could assure the society that the prevailing idea there was that the nation which gave the best protection to inventors would take its place in the fore-front of progress, and that by no other means than recognizing that an inventor was a benefactor of every state, could true progress be achieved.

These are a few of the points brought out in the discussion, points having a direct bearing on the patent question as it stands in this country. They are noteworthy as confirming the wisdom of the founders of the American patent system in making it first of all accessible to all men and a real encouragement to inventors. No other patent system has come so near doing exact justice to inventors, and none has approached it in the accomplishment of its grand purpose, the advancement of the useful arts. This the friends of industrial progress are recognizing more and more clearly everywhere; and in every civilized country the best informed statesmen are pointing to this country as an exemplar of the practical advantages of dealing justly and liberally with inventors. Yet we doubt not there will appear before Congress next winter, men calling themselves statesmen and friends of progress, who will insist that patents do not encourage invention, that the country is oppressed by patent monopolies, and that the only way to save our industries from stagnation and destruction is to tie up our inventors and let loose the infringer.

MAGNETIZING MOLTEN IRON.

In a letter to Dr. C. W. Siemens, and communicated by him to the British Society of Telegraphic Engineers, Mr. E. Chernoff records a very curious experiment. Believing that if it were possible to magnetize white cast iron a magnet of greater permanence than any made of steel would be obtained, Mr. Chernoff cast some white refined iron in a mould, surrounded by an electro-magnetic reel, along which a current was allowed to flow during the process of casting, so that the fluid metal became magnetic, and cooled under the influence of the magnetic current.

The result so far justified the expectation as to give a magnetized bar of white cast iron; but the form of the bar was unlike what was expected. While pouring the metal into the mould and until the metal set, Mr. Chernoff observed a singular agitation of the metal, which could not have proceeded from damp, as the mould was thoroughly dry. On cooling the bar proved to be hollow, the cavity being symmetrical and extending about two-thirds the length of the bar. The metal was thinnest just opposite the center of the reel, where it did not exceed the thickness of writing paper. The agitation of the metal in cooling is accounted for by the repulsion of the molten metal toward the poles of the magnet.

By casting under pressure it may be possible to obtain by this method extremely permanent and powerful magnets of white iron. Possibly also this experiment may lead to some useful modification of industrial processes for casting hollow cylinders without cores.

A NEW THEORY OF THE EARTH'S MAGNETIC POLES.

From a study of the movement of the compass-needle producing declination at London, Mr. B. G. Jenkins, of the Royal Astronomical Society, has become convinced that the various vicissitudes of the needle during the last 300 years can best be explained by the supposition of a strong magnetic pole above the earth's surface, and revolving around the geographic north pole in about 500 years. He finds four magnetic poles, as maintained by Halley and Handsteen, to be necessary to explain satisfactorily all the phenomena of terrestrial magnetism, but he places these not in the earth, but in the atmosphere. These poles he regards as the free ends of as many broad magnetic belts, two extending from the vicinity of the north pole to the equator, the other two coming up from the south pole to meet them, the boreal magnetism of the northern belts uniting with the austral magnetism of the southern belts along the magnetic equator. These bands he believes to revolve at slow and unequal rates round the poles of the earth, producing secular variations.

It will be observed that Mr. Jenkins describes the magnetism of the northern hemisphere as "boreal." Contrary to the current theory, he holds that the north end of the compass needle is a true north pole, and that the facts observed are, when properly understood, in full accord with the great magnetic truth that like poles repel and unlike poles attract.

After submitting the evidence in favor of this view, Mr. Jenkins argues in this wise: If the north end of the dipping needle is a south pole, its pointing to the ground in Boothia (where Sir James Ross located the earth's north magnetic pole) must be attributed to attraction. If it is attracted it is attracted by something either in the crust of the earth or at the center of the globe. If there is something in the earth's crust which attracts the needle in Boothia, it ought to attract the needle in London. But the needle in London is attracted neither to the crust at Boothia nor to the earth's center. The truth is, Mr. Jenkins believes, that the north pole of the needle pointed to the ground almost perpendicularly in Boothia because it was repelled by the true north

magnetic pole in the atmosphere above that region when Sir James Ross was there fifty years ago.

Further evidence as to the existence of the alleged magnetic belts above the earth's surface is promised. Meantime it is of the first importance, Mr. Jenkins thinks, that it should be clearly settled whether the magnetic pole remains in or above Boothia. According to his calculation it should now be in lat. 72°, long. 115°, in Prince Albert Land.

OBJECTIONS TO SELF-PROPELLING FIRE ENGINES.

Owing to the practical difficulties in the working of self-propelling fire engines and doubts as to their relative efficiency, the New York Fire Department lately called for reports from the battalion chiefs with regard to the engines in use here. An opinion was also asked from the chief of the department, Mr. Eli Bates, who states the main objections to them as follows:

"Ninety pounds of steam pressure is required to be kept on the boiler continually for the purpose of conveying them to a fire, the result of which is that the continual pressure weakens the boiler, and more repairs are required than to the boilers of horse engines. The engines and pumps are used in going to and returning from fires, thereby causing considerable wear and tear on the machinery. They cannot be conveyed to and from a fire (especially when there are snow and ice in the streets) as safely as a horse engine. The wear and tear on the running gear exceeds that of a horse engine on account of the additional weight and the sudden strain when the motion is reversed, and when there is deep snow on the ground it is not a certainty that they can reach a fire without horses. With horses attached to them and assisted by steam power in heavy wheeling they are the best. They cannot be used by the department generally (the same as horse engines), but only in companies where the officers and men have been specially trained to the handling of them, and this cannot be acquired without long experience, during which time they are liable to meet with serious accidents. I would further state that I consider them more liable to cause fires from cinders than the horse engines while going to and returning from fires, especially in localities where light and inflammable goods are hanging in front of stores or on awnings."

It would appear from the above that further invention is needed before the steam fire engine can be called a perfected machine.

THE PROSPECTS OF TEA CULTURE.

That it is possible to grow good tea in this country is beyond doubt. That by the cultivation of a few bushes in garden plats a great many American families may be able to secure a small quantity of finer tea than can be had in the market, without calling in outside help and without seriously increasing domestic care and labor, is quite probable. That it will ever pay for Americans to undertake tea growing as a business is altogether another matter. No doubt mechanical improvements in the processes of tea gathering and curing may greatly diminish the cost of labor; but the same improvements can be introduced elsewhere, and ultimately the American tea industry would have to compete on unequal terms with that of China, India, Japan, and other lands.

The question of future competition among existing tea growing countries is seriously considered by the *Indian Tea Gazette*, of Calcutta, in discussing the prospects of Indian tea. After reviewing hopefully the immediate prospects of tea culture in India, the *Gazette* insists that great caution is required in the extension of the tea industry.

"Doubtless the tea drinkers in the world are increasing greatly year by year, but, alas! so is the produce. It is not now a case of India versus China; it is India versus China, Java, Japan, Ceylon, etc. It is certainly quite on the cards that in a few years the supply will exceed the demand. No one can say that it will be so; equally can no one say that it will not be so. But so much we can and do say: that, with things as they are to-day, he is not a wise man who embarks in tea cultivation, or who extends the area he has at present, except all the conditions for success are pre-eminently to the fore. We think where these all exist tea will pay for ever and a day; but their existence, all combined, is quite exceptional. To give the sum of our advice in a few words: we would not ourselves, as things are, plant tea in any but the best tea climate and on any but perfectly flat land—not unless we could eventually look for more than 6 mds. (600 pounds troy) per acre—where the communication is not good, and where any difficulty does now or may hereafter exist as to labor."

At this rate the prospect of any great development of tea culture in this country is not alarmingly brilliant.

THE DISEASES OF BUILDING TIMBER.

In an article on this subject the *Building News* remarks that it seems an odd thing that timber trees should be almost as liable to disease as man is; but it is undoubtedly true, and the disease, in the case of trees as well as of man, arises from preventable causes. Dr. James Brown states that the principal diseases likely to be brought on forest trees by bad management are: (1) bark binding, (2) lichen growth on the bark, (3) stag-horn tops, (4) scale, (5) premature seeding, (6) dropsy, (7) ulcers, (8) wounds, and (9) stunted growth of the young wood. Now, in addition to these defects, we have in the manufactured timber such matters to contend with as floatiness and the excess of sap and weariness, concerning which so many complaints are made.

The disease called "bark bound" is caused by the bark

being girdled or bound about the wood of the tree, thereby preventing the proper flow of the sap, and also arresting the descent of woody matter between the wood and bark. If the cause of this disease be not remedied in time, the vital fluids become gradually checked, till at length the passages become entirely closed, and, as a natural consequence, the tree dies.

The appearance of lichens on the bark of trees is not always a symptom of disease, but may be occasioned by a temporary derangement of the outer bark, and if observed in time, diseases may be arrested by removing the cause before it has had time to become decidedly fixed in the constitution of the trees affected.

Willows and poplars, which luxuriate in a soil rather damp than otherwise, generally become stag-horn-topped when grown in a soil too dry for their healthy development. Elm, oak, ash, plane, etc., generally become in the same condition when the soil in which they are grown is too damp to maintain them in a healthy state.

"Scale" is a small white insect found clinging to the bark of some species. In forest trees it is usually found upon the ash while in a young state. These insects appear like very numerous small white spots, like those on the bark of the birch.

As to premature seed-bearing, it may be said that trees in a healthy, rapid growing state are seldom found to produce seed till they have arrived at a considerable age and size. Generally speaking, any forest tree under forty years of age bearing much seed is not likely to arrive at a valuable size. When a young tree produces a profusion of seed there can be no doubt that it is in a state of premature decay, and we may be assured that it will not become valuable as timber.

Dropsy generally takes place in forest trees either where the soil is too rich for them, or where there is an excess of moisture about the roots. The cause appears to be that the roots absorb into the system of the tree an excess of juice, which the leaves and bark cannot assimilate. In this disease unnatural swellings are observed on some part of the stem, and which begin to rot and throw off the bark. It is incurable, and the only thing to do is to prevent it by proper draining of the ground and seeing that it be not over rich.

An ulcer much resembles dropsy, but it is mostly confined to the larch and others of the coniferous tribe. Its appearance is that of a running sore upon the side of the stem, where the natural juices escape in the form of a hard resinous matter. This disease is mostly found upon young trees of this order, and is frequently occasioned by insects lodging their eggs in the inner bark, where the young live for a time and destroy the albumen.

Wounds are often caused by the trees receiving damage on their stems by having the bark peeled off by accident in some way or other, and may not only prove injurious to their health, but also be a frequent cause of death. But any simple wound made upon a healthy tree is seldom or never found injurious, but soon heals up.

The stunted growth of young wood is at once apparent by the very short annual growth of young wood upon all the lateral branches, and may be in general the natural result of any of the diseases already described. Every tree, when it has attained its full size and development of its nature, however healthy it may have hitherto been, gradually begins to fail in making young wood. This is the work of time, doing to the old tree what the disease does to the young.

"SCIENTIFIC CREDULITY."

A striking illustration of the anti-scientific bias which prevails in certain spheres of culture is afforded in an article in the *London Spectator*, wherein that clever journal moralizes at great length over what it calls scientific credulity. The occasion is an ingenious hoax perpetrated last winter by an Australian newspaper and widely circulated since. The *Spectator* says:

"The story having appeared in the *Times* without comment has, of course, been republished everywhere, and it is amusing to see that in many instances those who republish it think it necessary to be cautious and repudiate total disbelief. So many wonderful things, they say, and in especial one *London* journal says, have turned out true that it would be rash to declare this one certainly invented. There is a disposition perceptible to think there may be something in it, though not all that is alleged, and that as Mr. Edison has bottled sound, so Signor Rotura—an Italian name was probably chosen because an Italian has made the most recent and successful experiments in embalming—may have bottled life; that as sound may be re-echoed weeks after it was first heard, so a lamb may skip about after it has been some weeks frozen. As there is an electric telegraph why should not death be baffled? That is a very curious instance of a new form of credulity which is growing up among us, a credulity which is not faith, but rather disbelief, so far-reaching that it causes a certain powerlessness of mind, an inability to reject at once and decidedly anything that even puts on the appearance of 'science.' The incapacity to weigh evidence—to see, for example, that for this story there is absolutely as yet no evidence at all, any more than there is evidence for the authenticity of Bulwer Lytton's 'Strange Story,' that there is no witness produced, or promised, or named, nothing but an unauthenticated narrative—is a phenomenon we are all well acquainted with; but this sort of credulity differs in kind from that. It would almost seem as if the advance of science had in some minds decreased the capacity for using the scientific method, as if their confidence in the usual data for reasoning had been

gradually so upset that they did not trust them any longer, and did not see why, a far off locality being granted, parallel lines should not meet, or the whole be smaller than the part. That would not, they think, be much more surprising than the phonograph. We observed only a little while ago a statement going the rounds of the newspapers that a certain Texan had eaten his own weight in meat at one sitting, no one apparently perceiving that if that were true then a pint bottle could hold a quart, and reasoning of any kind, even the reasoning necessary for arithmetic or mensuration, was entirely useless and unmeaning. The great truth that if two plus two can be five, counting is nonsense, and that the terms of any conceivable sum in arithmetic would all shift, seems to have lost some of its hold, to the indefinite injury, if the want of gripe became general, of human reasoning power. That is at all events a strange result of the progress of scientific discovery, and it is all the stranger because the new credulity is almost confined to the action of 'science' itself. People are not generally more credulous. They do not believe in each other more than they did, or in unusual events more than they did, and they believe in the supernatural a great deal less than they did. If the Archbishop of Canterbury and Lord Houghton and Professor Tyndall all declared that they saw and spoke with a sentient being possessing a body clearly not human, all journalists would at once accuse them either of falsehood or hoaxing or a very suspicious condition of brain and eyesight; but if they all declared they had seen a man swallow a drug which turned him all over both yellow and blue at the same time, the statement would be printed everywhere as the last 'medical marvel.' Yet the former assertion, though requiring, of course, unusually complete evidence, would involve no greater impossibility than the existence of any supernatural being does—which existence half the incredulous accept—while the latter is a contradiction in terms, and no more capable of proof than the assertion that on one occasion and in the usual conditions of the world, water being still water did outweigh mercury, which was nevertheless still mercury. There is the greatest reluctance even to consider any statement involving an acceptance of the supernatural combined with the most childlike readiness to swallow anything which can be described as a mechanical, medical, or mental marvel."

The *Spectator* goes on, at greater length than we have space for, to illustrate the various phases of this "new form of credulity," which is indirectly charged to the progress of science. Science has done so much that its disciples are half inclined to believe it can do anything, the *Spectator* would have us think. But this credulity as to the power of science is very far from being the state of mind which prevails among the scientifically minded. Over credulousness as to the possibilities of science is the weakness of those who know least of the real character of scientific achievements. In other words, credulity is a condition of ignorance and the lack of rational culture. And the success of scientific hoaxes, so-called, only measures the wide and varied unacquaintance with scientific truths among reputedly intelligent people. To blame science for this is about as absurd as it would be to blame civilization for the unreasonable beliefs with regard to the powers of civilized men current among certain savages. It is the absence of civilization or science in either case that makes the false idea tenable.

The circumstance that many who are very skeptical with regard to alleged supernatural occurrences unsupported by sufficient evidence, are yet over-ready to accept scientific marvels, simply proves that their education is not half completed. They know too little of science, and have had no real training in scientific habits of thought. The *Spectator* says that men are as credulous now as ever; that the popular appetite for the marvelous has not been diminished by the progress of science, though its direction has been changed; so that men now look to scientific instead of supernatural agencies for its gratification.

"The process of god making, so often repeated by humanity, is going on again, and Nature is being endowed with attributes which imply an absence of conditions and enveloped in the very atmosphere of awe which once surrounded the supernatural," which is true only so far as men have not yet been brought directly under the influence of scientific culture. Just so far as men are ready to accept without evidence any assertion made in the name of science we may be sure that they are ignorant of the first great lesson that science has to teach, and that their minds have lacked the training which comes through the acquisition of knowledge by scientific methods. "Scientific credulity" is a contradiction in terms. Credulity is essentially unscientific.

A Large Block of Stone.

One of the largest blocks of granite ever cut in the United States has recently been taken from the quarry at Vinalhaven. It is 59 feet long, 5½ feet square at the base, and 3½ feet square at the top. It weighs from 75 to 100 tons. It cost \$1,700 to quarry it and move it to the shed where it is to be finished. It is to foot the shaft of the monument to General Wool, to be erected at Troy, N. Y. The shaft, with the base stones, will form a structure of about 75 feet high.

PROTECTING LEAD PIPE.—The *Revue Industrielle* says that the interior of a lead pipe can be covered with an incrustation of sulphide of lead by making a warm concentrated solution of sulphide of potash flow through it for ten or fifteen minutes. Pipes thus treated seem to be covered with grayish varnish, which prevents the water flowing through them from acting upon the lead.