Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

NEW YORK, SATURDAY, MAY 29, 1880.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF
THE SCIENTIFIC AMERICAN SUPPLEMENT
No. 230,
For the Week ending May 29, 1880.

Price 10 cents. For sale by all newsdealers.

PATENTS FOR NOT INVENTING.

The constitutional authority for the patent laws of the United States rests on Section 8 of Article 1 of the Constitution, which provides that Congress shall have power "to promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."

The section of the revised statutes which describes what inventions may be patented carefully limits them to such as are new and useful, and the patentee must in all cases be the inventor or his heirs at law. This has been the policy and practice of the Patent Office from the beginning; and it would seem to be the only one authorized by the Constitution.

The House Committee on Patents, however, appear to think differently, as they have just reported back favorably Mr. Casey Young's bill (H. R. No. 3,041) offering patents to such as are not inventors, for the introduction of inventions which are not new. The bill reads as follows:

"*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That any person or persons who introduce from a foreign country any secret art, invention, or process useful and important to the public, and not patented there, and at the time of application not understood in this country, may, upon payment of the fees required by law, and other due proceedings had as in the case of new inventions, obtain a patent therefor. And it is hereby declared that any secret art, invention, or process which has been used or practiced, unpatented, for the period of fifty years last past exclusively in the country where obtained, shall be deemed a secret in the meaning of this act."

As was pointed out in the SCIENTIFIC AMERICAN, January 31 last, this is a radical departure from the policy and purpose of all our patent legislation hitherto.

The propriety of granting such great privileges is as doubtful as is the authority of Congress to do it. And it would certainly be a strange way to encourage progress in the useful arts to place inventors of what is new on a level with the mere importer of what is at least fifty years old. Who it is that desires the enactment of such a law, or for what reason, does not appear.

THE PAGE PATENTS.

Undoubtedly some of the ablest decisions ever given in our courts have been those involving the validity of patents and questions of infringement. In such cases, the trials being in equity, and the proceedings never hastened, the lawyers generally have the most ample opportunity for thorough preparation, and the nicety with which they make hair-splitting distinctions often gives their arguments a most subtle flavor, provided their reasoning be equally close, and the reader or listener be not interested therein in the matter of dollars and cents. Speciousness and sophistry are nowhere else more cunningly introduced, and the courts need to exercise the utmost discrimination to hold the scales with so even a balance that exact justice will be done.

Among the closely reasoned decisions in patent cases which the records of our courts have shown in late years, several which have been rendered by Judge Samuel Blatchford, of the United States Circuit Court for the Southern District of New York, are particularly conspicuous for their keen analysis of the points in controversy, their close application of the law and the evidence, and the subtle reasoning by which conclusions have been reached that were oftentimes disappointing to all the parties concerned. The decision recently made by him relative to a petition for a rehearing in the Page patent case is a paper of this character. We have heretofore presented a pretty thorough exposition of the points originally at issue in the suit of the Western Union Telegraph Company against the Holmes Burglar Alarm Company, as well as the grounds on which were based the petition of the American Union Telegraph Company, and several railroad corporations, for a rehearing, after the decision in the original suit had been rendered, but before the filing of the interlocutory decree. The case in favor of the petitioners was presented by an imposing array of able counsel, but their prayer was denied by the court, in a decision filed on the 7th of May.

In the original decree the validity of the Page patent was sustained as respects its 11th, 12th, and 13th claims, for the retractile spring, armature, and set spring, found in electro-telegraphic machines, and the defendant was declared to infringe by "making and selling telegraphic burglar alarms in which a circuit breaker acts automatically to break the circuit, so that by the movement of an armature to and from an electro-magnet a bell is rapidly struck by a hammer, and which alarms contain the inventions covered by said three claims." Without going over all the points made by the petitioners, it will be sufficient to say that, although the defendant did not use the inventions named on long or main circuits, and their application by the defendant was somewhat different from the way in which they are used in general telegraphing, yet the petitioners feared a decree would be issued which would enable the plaintiff, the Western Union Telegraph Company, to enjoin them from the use of somewhat similar devices in a quite different way, and for other purposes. It is no unusual result of a long-contested patent suit to find a successful plaintiff applying for injunctions against a much wider field of alleged infringers than he had first contemplated as coming within the scope of his patent, and making it appear that the decision in his favor is far more general in its application than a strict legal construction of the language employed by the court would warrant. Looking at the matter in this light, the presentation of the petition, the offers to show proof on points not fully presented in the original trial, and the able arguments made, will undoubtedly serve a useful purpose, even though the prayer of the petitioners has been denied, for the manner in which the court suggests the limitations of the previous decree, defines the points upon which it was made, and refers to the record, will make it difficult for the plaintiffs to give it any wider application than in the matter of these burglar alarms, which the defendant has, except to a small extent, ceased to make in the way specified.

The court, it is true, refuses to indicate what would be its decision in case suit was brought relative to infringement in an apparatus used for telegraphing on long or main circuits, but, while pointing out that the petition is before the court from corporations not parties to the suit, who would have ample and proper opportunity to defend themselves when directly sued, when their new and additional evidence might be legitimately introduced, makes the following significant declaration: "It is quite sufficient to say that whenever the defendant shall use what is suggested in connection with a long or main circuit for telegraphing, and shall be proceeded against for doing so, an issue will be raised which it will be proper then to consider, but that *no such issue has* arisen." The court takes no cognizance of the proposed new evidence, and points out that it is in no way substantiated by oath whether there is any new evidence or not, or "what knowledge or information is had or not had," that was not before in possession of the court; the offer is only as to a solicitor's "best knowledge and belief," and "the best knowledge, information, and belief of the solicitor may be none at all." The matters of fact and of law sought to be raised by the petitioners are declared to be not in issue in the suit, and it would be a wrong to the plaintiff to consider them in any way to give such construction to the patent as does not legitimately arise from the record, and it is held that a new suit, where the petitioners are parties in interest, will afford the only opportunity to bring in these further issues.

HONORS TO AN INVENTOR.

The authorities of the city of Blois, France, have determined to erect a monument to Denis Papin, an ingenious inventor of the seventeenth century, for whom it is claimed the honor of having made the first useful application of steam power. Whether this claim can be substantiated or not is doubtful, for, besides uncertainty as to the stories about Papin's inventions, there are prior inventors with more or less vague claims of the same kind. The difficulty of determining who is first with inventions of our own day and generation is increased immeasurably when a question of priority is raised as to devices two hundred and more years old. However, whether Denis Papin made the first steamboat or not, he was certainly an ingenious and useful inventor, who, with others, paved the way for the many useful applications of steam to industrial work since devised, and it is conceded on all sides that he at least invented the lever safety valve. His story is that, being a victim of religious persecution, he left his native country, and, while living in Germany, about 1707, invented and constructed a steamboat, on which he and his family embarked, with the intention of exhibiting it on the Weser and then taking it to England. His invention was destroyed by the Mariners' Guild of the Weser, who had the monopoly of navigating that river; but his native town of Blois has now determined to erect a monument commemorating his inventive genius, and Mayor Chavigny writes to one of our daily newspapers asking the co-operation of America in honoring him. The *Public Ledger* properly adds: No injustice need be done Newcomen, Savery, Watt, Fitch, Oliver Evans, Fulton, Stevens, or others who, within the next hundred years, reinvented and improved engines and steamboats until really practicable and useful types of each were produced. Great inventions are almost always growths, the earlier stages of which can scarcely be recognized, but every one who helps them along is deserving of a fair share of the honor too often paid only to the man who gives them the finishing touch. Without going into questions of priority, Blois has abundant reasons to honor the memory of the almost forgotten Denis Papin.

THE ELECTRIC RAILWAY AN AMERICAN INVENTION.

On page 137, present volume of this paper, appeared illustrations and descriptions of Siemens' electrical railway motor, which was operated at the Berlin Exhibition in 1879. Since that publication our attention has been directed to a similar plan described in the SCIENTIFIC AMERICAN as long ago as September 25, 1847, which reads as follows:

Mr. Lilly and Dr. Colton, of Pittsburg, Pa., have invented a new method of railway propulsion, which is both novel and ingenious. The machine is a small locomotive, and is placed upon a circular railway, around which it is driven by electricity. The power is applied not to the locomotive, but to the *track*, in a very curious manner. Two currents of electricity, negative and positive, are applied to the rails, and by them communicate to the engine. The latter is provided with two magnets, which, by a process of alternate attraction and repulsion, drive the car over the track. A piece of lead is placed on the locomotive, making in all a weight of ten pounds, and on the application of the battery, the machine moved with astonishing rapidity up a plane inclined about five degrees. Heretofore the propelling power had been used on the car itself—in this instance, however, the power is placed on the rails, and an engineer

might remain in one town, and with his battery send a locomotive and train to any distance required.

It would seem from the above that the idea of railway car propulsion by electricity was projected in this country more than thirty years before Mr. Siemens' motor was introduced to the public.

PROF. TICE'S THEORY OF CYCLONES.

In reporting the results of his observations along the track of the tornado which proved so fatally destructive at Marshfield, Missouri, Prof. Tice, of St. Louis, expresses the opinion that all such whirlwinds, so called, are electrical storms, not wind storms. There was, he says, no wind attending the Marshfield tornado. Among the evidence of the electrical nature of that storm he notes the fact that it destroyed every building which had a tin roof or which had any metal of any kind in its roof. In Marshfield, it passed directly over several buildings with shingle roofs, and tore to fragments others, not more exposed, which had metal roofs. A mill, situated over a quarter of a mile away from the center of the cyclone, had its iron chimney torn out and carried a long distance, while the mill itself suffered very little damage. The cupola of the public school building at Marshfield, which had a tin roof, was wrecked, but the building, which was roofed with shingles, was not injured to any extent.

Even more conclusive and remarkable, he thinks, were the phenomena manifested in connection with trees and shrubbery. The bark was stripped from the trees and bushes not alone on those sides exposed to the force of the cyclone, but on all sides. The ends of the branches were not only denuded of their leaves and bark, but were rifted into fine fibers, so that they presented the appearance of little brooms. The active agent in such cases, he insists, was not wind, but electricity. Under its influence the sap under the bark was instantly converted into vapor or gas, expanding two thousand times in volume, and, as by an explosion, threw off the bark, shattered the trunk, and split the green twigs into fibers. That this is what took place is, he says, conclusively proved "by the fact that the dead and dry limbs and twigs were not affected, and though in immediate contact with green ones, remained intact."

General evidence of the electrical character of all tornadoes is found by Prof. Tice in the circumstance that, as a rule, they follow railroads and water courses, and either begin or expend their greatest energy upon them.

This, however, may be only a matter of topography. Rivers and railways usually follow the easiest grades, and these would naturally be followed by wind rushes taking the same general direction. It is a noticeable fact, all the same, that the cyclone which destroyed Marshfield followed the St. Louis and San Francisco Railroad for a distance of 145 miles, and lapped up all the water in the ponds and rivers in its course from where it commenced in Arkansas to where it terminated in Missouri.

NEW ATLANTIC SEAPORT IN FRANCE.

BY GEORGE L. CATLIN, LATE U. S. COMMERCIAL AGENT, LA ROCHELLE.

Prominent among the great public works projected by the French government, with a view to the commercial regeneration of France, is the construction of a new seaport at La Rochelle, at an estimated cost of 15,000,000 francs.

Owing to the building of a dike across the present harbor of that city by Cardinal Richelieu, during the famous siege of 1628, the accumulation of two centuries and a half's deposits of mud and sediment have so choked up the port that, with the exception of a channel twenty or thirty feet wide, it is bare at low water, necessitating a system of locks and basins constructed and maintained at great expense.

La Rochelle has from her earliest days (she dates from the 12th century) been renowned as an enterprising maritime city, and for two centuries previous to the war of secession her commerce with the United States, especially in wines and brandies, was active and important. Even with the above mentioned and continually increasing disadvantages to contend with, she has continued to maintain extensive commercial relations with the principal ports of Western and Northern Europe. Two lines of steamers keep up regular and frequent communication with Bilbao and the Spanish iron mines in the Cantabrian Pyrenees; there are lines of steamers to Bordeaux, to Cardiff, to Newcastle, and large annual importations are also made from North Germany, Norway, and Newfoundland. With this spirit of commercial enterprise still struggling for recognition, it was not to be supposed that the Rochellais would remain inactive in face of the renewed impulse which the present spirit of French institutions imparts.

After long consultation and careful scientific inquiry, it has been determined that but one sure method exists for obviating the present evil and restoring La Rochelle to her former maritime prestige, namely, the creation of a new port of entry within easy distance of the city, yet entirely independent of the harbor which Richelieu so effectually blocked.

Fortunately, nature, seeming to have foreseen and provided for this need, offers remarkable facilities for the construction of such a port about three-quarters of a mile north of the entrance to the present harbor, and at a point where communication with the city and the railroad system converging to it is easy and simple. At the point in question, known as the *Mare* (pond) *à La Besse*, there exists a natural inlet or depression which, by comparatively little labor, may be dug to the requisite depth and walled in by quays. This inlet opens upon a deep roadstead, known as the Pallice, completely sheltered from the sea by the islands of Ré and Oleron, between which vessels must pass to enter it. When, on the one hand, one considers the facilities which this point, above all others on the French coast, offers for direct communication in a straight unbroken course with New York and the other American seaports, without any of the dangers incident to channel navigation; and, on the other hand, the fact that from La Rochelle direct lines of railway radiate to Paris, to the interior and east of France, to Bordeaux, and to all points along the coast, both north and south, it will be seen at a glance that this grand undertaking promises to prove prolific in results to the commercial world. The work will be begun in June, 1880.

LEGISLATING ON COLOR BLINDNESS.

The Legislature of the State of Connecticut has passed an act authorizing the State Board of Health to prepare rules and regulations for the examination and re-examination of railroad employes in respect to color blindness and visual power, and prescribes the method in which and the intervals at which such examinations shall be made. The act further makes provision for inflicting penalties on any railway company employing persons who are not in possession of a certificate from the examining board of their freedom from color blindness. The examiners may revoke the certificate at any time. The State Board is, in the month of May, to recommend two or more medical experts to make the necessary examinations, and the Governor is to appoint two of these gentlemen on the following first of July. It is to be hoped that other States will adopt similar measures for protecting the traveling public against the dangers incident to the visual defect of railroad employes.

NEW YORK ACADEMY OF SCIENCES.

[*Continued from page* 321.]

The paper on the theory of cloud bursts, by Mr. William Ferrel, of the United States Coast Survey, has an especial interest at this season of excessive meteorological disturbance in the West. Cloud bursts, Mr. Ferrel said, always occur in the interior of a tornado. The primary cause of a tornado is difference of density arising from difference of temperature between the internal central part and the surrounding parts of the atmosphere. This only occurs on an unstable state of the air, in which the temperature of the surrounding air decreases more rapidly with altitude than the interior ascending column. Since the interior ascending column diminishes with altitude less rapidly than the surrounding quiescent air, this interior part is much warmer, and, consequently, ascends very rapidly, and the air from surrounding parts flows in below to supply the ascending current, as in the case of a chimney when the interior once becomes warmer than the surrounding air without. In addition to this difference of temperature and density, the air must have an initial gyratory motion, almost imperceptible, it may be, at a short distance from the center, but as it is drawn in it runs into rapid gyrations near the center, just as in the case of water running through a small hole in the bottom of a basin of water. If the gyrations above and below had the same velocity, the violence of the gyrations and the pressure toward the center below would depend upon differences of temperature only between the interior and exterior parts. But on account of the great friction near the earth's surface, the gyrations are much retarded there, and, consequently, the centrifugal force which prevents the rush of the air, in some measure, toward the center. If the difference of barometric pressure between the central and external parts were 30 millimeters, and no centrifugal force below or friction to resist this pressure, according to the laws of spouting fluids the ascending current in the interior would be about 80 meters per second. If the gyrating velocity below were only one-half as much as above, the centrifugal force would be only one-quarter as much, and supposing that this and friction were to resist one-half of the pressure below toward the center, we should still have residual pressure which would cause an ascending velocity of about 56 meters per second.

This theoretical velocity is obtained upon no extravagant assumptions, and that such velocities do exist in tornadoes is confirmed by observations of their mechanical effects. It will only be necessary to refer to one well authenticated case of this sort, given in the Signal Service report, at Mount Carmel, Ill., 1877. The ascending currents of a tornado carried a church steeple, gilded ball, and vane, 15 miles. This must have been kept suspended in the air by the ascending currents 20 or 30 minutes. If saturated air at a temperature of 30° at surface ascends with a velocity of 50 meters per second, rain to the amount of 1·2 millimeters per second falls from the first 2,000 meters of altitude—equivalent to 0·3 inch per minute, or 18 inches per hour. At such a rate, if the tornado could be kept over the same spot for a short time from any cause, it would be called a cloud burst.

At higher altitudes than 2,000 meters it may be supposed that the vapor and rain is scattered out from the center and falls over a larger area. But rain may not only fall from clouds at this enormous rate, but an immense amount may be kept suspended in the air. Drops of 0·1 inch may be kept suspended in the air by a current of about 23 feet per second. Of course, the amount of rain kept so suspended increases the pressure in the center, and so much diminishes the force and energy of the tornado. Our assumed velocity of 50 meters per second arises from a difference of pressure of less than 15 millimeters. Suppose, now, rain enough was contained in the cloud to reduce this difference to 5 millimeters. This would require rain to the depth of 136 millimeters, more than 5 inches. The difference of pressure of 5 millimeters yet remaining would give an ascending current of about 32 meters per second, which is four times more than is necessary to keep the rain suspended in the air. If, now, for any reason, the whole system should be suddenly broken up, as, for instance, when the tornado strikes against a mountain side, and the ascending current by which the 5 inches of rain is kept suspended is suddenly cut off, of course, the whole amount would drop to the earth in a short time.

Lieutenant-Commander A. A. Michelson described some novel and interesting observations on sunlight seen through a narrow slit. As the width of the slit is diminished the diffraction bands spread out and separate, until finally nothing is seen but the central bright space. At this stage the width of the slit is about one or two hundredths of a millimeter. It will be observed that the light has acquired a faint bluish tint. If a Nicol prism be placed between the slit and the eye, and the prism be rotated, it will also be found that the light shows traces of polarization. Further, when the light is faintest, the bluish tint is most decided. On still further diminishing the width of the slit, the bluish tint becomes more apparent, and on applying the Nicol prism the polarization is quite decided, the tint when the light is faintest being deep blue. When the width of the slit has been reduced to about 0·001 millimeter, the tint changes to violet, the polarization appears to be complete, and on turning the prism the tint becomes a more decided violet, until finally the light disappears. If the prism and the slit be interchanged, the same results follow in the same order as before. The material of which the edges of the slit are composed does not seem to affect the result. Slits made of iron, brass, and obsidian were employed. With the latter more perfect results were obtained than with the others, probably, however, because the edges were more perfect.

This experiment, Mr. Michelson said, may be varied, and the results shown in a very striking manner, by using a double image prism, when the two images may be compared side by side. The experiments are trying to the eyes on account of the faintness of the light. The conditions under which the phenomena may be best observed are: 1. The sun to be observed directly, holding the slit as close as possible to the eye. 2. A double prism is to be employed, so that the faint and the bright images may be observed side by side. 3. The width of the slit should be between the one hundredth and one thousandth of a millimeter. 4. The edges of the slit should be as nearly perfect as possible The explanation has suggested itself that the polarization may be accounted for by considering that the greater part of the light which reaches the eye has been reflected from the edges of the slit.

The fact that the plane of polarization is at right angles to the length of the slit would seem to confirm this. The objections to this explanation are: First, that there should then be a difference in the behavior of different materials. Second, the polarization should be exhibited when the slit is wide as well as when it is narrow. These experiments seem to prove, first, that light in passing through a very narrow slit is partly or completely polarized in a plane at right angles to the slit; second, that such a slit allows the shorter waves of light to pass more freely than the longer ones.

It is proper here to express our indebtedness, in making these gleanings, to the ample reports of the papers read, published by the New York *Times*, the only one of our great dailies that paid any attention to the meeting of the Academy.

The Berlin Fish Show.

The International Fishery Exhibition, which opened in Berlin April 20, has proved a splendid success; and it is gratifying to read in the German and English reports that the exhibits sent out by the United States form in every respect the most remarkable collection in the Exhibition. The floating hatchery "Fish Hawk" attracts especial attention.

In his opening address, the German Minister of Agriculture, Dr. Lucius, said that the Fisheries Society, through whose efforts the holding of the Exhibition was due, had met with the most obliging support, not only in Germany itself, but in nearly all the neighboring countries, and even in the furthermost zones of the earth. From the Baltic and the German Ocean, the ice bound seas of the north, from the coasts of Holland and England, from the Switzer lakes, from the exhaustless riches of the Mediterranean, from the Volga and the Black Sea, from North and South America, from the coasts of the far East, from India, China, Japan, and the Malay Archipelago—the fauna of the waters had been brought in rare and wonderful profusion, with an endless variety of pearls, shells, and corals.

A Metallic Shower.

For several hours, on the night of March 29, a fall of rain mingled with meteoric dust occurred at Catania, Sicily. The dust contained fragments of iron, either in a pure metallic state or in metallic particles surrounded by an oxidized crust. The fragments were of many shapes and sizes, and were readily attracted by the magnet. They only differed in size from a shower of aerolites.

Such shows of meteoric dust are probably not infrequent, though it is seldom that they are so clearly indicated in southern lands. In high latitudes they are shown by frequent and well marked discolorations of the earth's snowy mantle in places where terrestrial dust is a practical impossibility.