

to keep rain, snow, wind, and cold from entering the opening in the door, and it will allow the name or number to be readily changed.

An improved book holder, which is simple, effective, and convenient, has been patented by Mr. Wilhelm F. Eppler, of Herrstein, Germany. It is formed of a box, for lunch or other articles, and of two boards, between which the books are placed. All the parts are held together by cords attached to a slate placed below the lunch box or to the box itself, and are wound upon the revolving handle of the book holder.

Mr. Benedict Beecher, of St. Louis, Mo., has patented a lumber polishing machine, which is more particularly intended for polishing thin lumber, such as is used for making cigar boxes, and for similar purposes. It consists in a novel arrangement of a stationary bed plate and a tightly-journaled cylinder, whereby provision is made for simultaneously polishing both sides of the work as it passes through the machine.

REASONABLE DILIGENCE.

A very recent decision of the Supreme Court, at Washington, strikingly illustrates the importance of an inventor's using reasonable diligence and promptness in prosecuting his application. It is well understood that delay in this respect does not necessarily forfeit one's rights. Inventors may, if they can, keep their inventions secret, and if they succeed in doing so, no postponement of the application for a patent will deprive them of their right to one. The delay may be satisfactorily explained or excused; as where poverty, sickness, absence from the country, or the like, hinders early action. But, generally speaking, whoever has sufficiently matured a valuable invention will do well to seek a patent without dallying, as Mr. Woodbury in the case now to be narrated, has learned.

In the fall of 1846 Woodbury completed an improvement in planing machines. The nature of it is not important to the story; it involved the introduction of a "yielding pressure bar" to keep the wood to be planed firmly in position, instead of the rollers employed in previous machines constructed on the "Woodworth" general plan. It was a real improvement; and, as developed in other hands, has now acquired value.

But in 1848, when Woodbury filed application for a patent, his invention seems not to have been appreciated. It was rejected (in 1849), and he was notified he might "withdraw or appeal." He did not appeal. In 1852 the attorney through whom the application was made withdrew it. This was done without authority, to be sure, but Woodbury made no attempt, when informed, to have the case reinstated. Meantime he took out other patents, showing that he was not prevented from acting in the matter by ill-health or want of money. At last, in 1870, he renewed the application, and a patent was (in 1873) granted. He organized a company, which commenced introducing the machine to profitable use. But meantime the principle of the invention had been adopted by other persons. The planing machine company sued these for infringement; and one of them resisted the suit on the ground that Woodbury's delay was an abandonment of his invention to the public.

The Supreme Court has sustained the defense. They say that there is no rule requiring intention to abandon to be declared in words. It is the unquestionable right of an inventor to confer his invention upon the public, and this he may do by his conduct, and may do it after applying for a patent as well as before. The patent law requires him to be vigilant and active in taking steps to procure a patent if he desires one. He cannot, without cause, hold his application pending during several years, leaving the public uncertain whether he intends to prosecute it, and yet keeping the field closed against other inventors. It is not unfair to one who has for many years neglected a claim, that the public and the courts should treat it as abandoned.

THE CAUSES OF TERRESTRIAL MAGNETISM.

In his memoir entitled "Theory of Electric Phenomena," Mr. Edlund has explained the galvanic effects by a current of ether in the circuit, and the electrostatic phenomena by condensations and rarefactions of this ether. If this explanation is correct, then it follows that an isolating body moving with a celerity similar to that of the ether in a galvanic current must produce the same phenomena. To verify this idea Mr. Selim Lemström has constructed a paper tube with two concentric walls, which can be rapidly moved round a cylinder of soft iron which is freely suspended in the direction of the vertical axis of rotation. In employing a pair of astatic needles furnished with a mirror and suspended on a very fine silver thread, this gentleman has succeeded in ascertaining that this double-walled paper tube acts like a galvanic current and magnetizes the soft iron cylinder in the one or the other sense according to the direction of the rotation.

According to the geologists, the crust of our earth has two per cent of iron, and supposing that all the magnetic molecules are concentrated in one layer forming the inside of this crust, then this crust of magnetic matter would have the thickness of about 1 kilom. (five-eighths of a mile). This magnetic layer, which is about 30 kilom. (18-75 miles) below the surface, having nearly the shape of a sphere, may be considered, as regards its magnetic effect, as a real sphere when influenced by a certain force.

The earth being a magnetic body, suspended in the ether and turning around its own axis, will, from a magnetic point

of view, be magnetized in the same way as if it were itself at rest, while the ether would move around it in an opposite direction. Going out from this theory, after finding by calculation the force which guides this molecular magnet following the axis of the earth, and after ascertaining the magnetic momentum, we have mathematical values which, corresponding to the formula of Gauss, explain the position of the magnetic axis of the earth, as well as its secular, annual, and daily variations, and which are in perfect accordance with the accidental phenomena, such as magnetic tempests and the aurora borealis.

THE LOCATION OF THE LICK OBSERVATORY.

In his report to the trustees of the James Lick Trust, with reference to his observations on Mount Hamilton, California, to determine the suitability of the summit of that mountain for the site of the proposed observatory, Mr. S. W. Burnham concludes that it offers advantages superior to those found at any point where a permanent observatory has been established.

Mount Hamilton is thirteen miles due east (in an air line) from San José, Cal., the latter place being fifty miles south of San Francisco. The summit of the mountain is reached by a well-constructed highway, carried up by a circuitous route twenty-six miles long, and nowhere exceeding a grade of six feet in the hundred. The sides of the mountain, in most directions, are very steep, and form an acute angle at the summit, which is 4,250 feet above the level of the sea. The view from the peak is unobstructed, there being no higher ground within a radius of 100 miles. The atmosphere of the region is marvelously clear; indeed Professor Davidson, of the U. S. Coast Survey, in his work in the Sierra Nevada, at an altitude of 10,000 feet, was able to see with the naked eye the five-inch mirror of a heliotope 175 miles distant.

Mr. Burnham had at his temporary observatory a six-inch refractor by Alvan Clark & Sons, with eyepieces giving powers up to 400; also a full set of meteorological instruments. He remained on the mountain from August 17 to October 16, with an absence of three nights in September. During these sixty days there were forty-two nights that were first-class for astronomical purposes, seven medium nights, and eleven that were cloudy and foggy. There was not one clear night when the "seeing" was not good. In the opinion of Professor Davidson, based on the observations and experiences of the members of the Coast Survey, good seeing may be expected 250 nights every year, and 150 of those nights will be such as are rarely experienced in the east. Though his telescope was a small one, and his positive micrometer (made to order for double star work by a prominent London optician) "combined more features which should be avoided in an instrument of the kind intended for actual service than were ever found in any other micrometer," Mr. Burnham was able during his short stay on the mountain to discover forty-two new double stars, and to make micrometer measures of ninety. Five wide pairs previously catalogued by Herschel, Struve, and South, were found to be close groups of three; and six of the new double stars are prominent well-known stars visible to the naked eye.

These discoveries, Mr. Burnham justly observes, show better than anything else can what may be done at Mount Hamilton. "Remembering," he continues, "that they were discovered with what, in these days of great refractors, would be considered as a very inferior instrument in point of size, we may form some conception of what might be done with an instrument of the power of that at the Naval Observatory, having a light power about nineteen times as great, or with the proposed Pulkowa glass of twenty-five times the power."

Two Disastrous Hurricanes.

A furious hurricane ravaged the Island of Jamaica on the afternoon and night of August 18, causing a vast amount of damage. The storm struck the northern side of the island, shifted to the northeastern side, then to the southeastern coast, whence it traveled westward. In two hours the wind increased from two miles an hour to eighty miles, and during the day the barometer fell a full inch.

Forty-three of the forty-five vessels lying in Kingston harbor when the storm broke were destroyed, and most of the shipping along the coast was wrecked. Scarcely anything material was able to withstand the force of the wind. Public buildings were demolished in an instant. The debris was whirled high into the air and conveyed to a great distance from the structure to which it originally belonged. At Raetown, for instance, a sheet of iron roofing, weighing upward of half a ton, was lifted to a height of fifty feet, rolled up like a stick of cinnamon, and was carried a distance of 130 feet from the building which it had covered. Coconut groves were entirely swept away, and the fruit crops in the places visited by the storm were entirely destroyed.

Wherever the cyclone struck the plantations were completely desolated. Looking inland from Port Antonio, it is said, a man can see for a distance of fifteen or twenty miles; and in the whole of that space not a growing plant, coconut, breadfruit, banana, cane, corn stalk, or yam vine has been left. The coffee bushes are torn and stripped of their berries. Thousands of coconut trees have been blown down on single plantations. The cyclone leveled hundreds of houses and churches. The reports show that in St. George District, Portland, 131 houses were wrecked, at Yallats fifty-nine houses; in Bath District fifty houses; in

the Parish of St. Catherine every church and many houses; at Newcastle twenty houses; and so on along about 200 miles of the coast. At Kingston the damage done is estimated at \$600,000, and the sum total of loss by the cyclone is appalling.

Famine is feared in the districts devastated, so general was the destruction of the coffee, fruit, and food crops.

A hurricane, said to have exceeded in destructive violence the historical hurricane of 1839, swept over the islands of Bermuda, August 29 and 30. Many houses were wrecked and the entire fruit crop was destroyed. Great damage was also done to the public works, including the causeways. Many vessels in the path of the storm were wrecked, both around the islands and along the Florida coast, where the hurricane raged with great violence. The greatest loss of life attended the founding of the passenger steamship City of Vera Cruz, of the New York and Havana line. Of seventy passengers and crew but 13 were washed ashore alive, after battling with the sea for 24 hours or more.

Antimony in California.

Hitherto no workable ores of antimony have been known in this country, the chief source of the metal being the Sarawak Mine in the Island of Borneo. Ten years ago, while prospecting in Kern County, California, Mr. E. J. Weston discovered the sulphuret of antimony in an old mine worked long ago by a Jesuit society for gold. The property has since been purchased by Mr. S. Boushey and his two sons. The ore thus far taken out has been sent to France to be refined, and recently Mr. Boushey passed through this city on his way to California, having just returned from Paris, whither he had been to make arrangements for the erection of reduction works at the site of the mine. As described by Mr. Boushey to the *Sun*, the mine lies in Kern County, as above stated, thirty-five miles south of Bakersfield, near Sumner Station, on the Southern Pacific Railroad. Between the head-waters of the San Emidio and the Pleito Cañons there is a mountain face which for four miles consists of granite and porphyry covered with fertile earth and heavily timbered with pine. The ledges of granite and porphyry run parallel with the face of the mountain and slant with it at an angle of nearly forty-five degrees. The antimony is found in a true fissure, of which there are only three other instances in the world. There is one in Freiberg, one in Chili, and one in Mexico. This fissure is the result of the upheaval of what may be called one end of the mountain, or of the depression of its center. It strikes directly through the mountain at right angles with the granite and porphyry ledges. The ores with which it is filled were thrust up into it from below. At the top it is from thirty to one hundred feet wide, but it widens as it descends. The fissure has been traced across the top of the mountain five thousand feet, and antimony has been found at every point.

Mr. Boushey says that he has pushed four tunnels into his mine, one of them seventy-eight feet long. The rock is not hard, and one man is able to get out half a ton of it a day, carrying from thirty to sixty-five per cent of antimony.

A Great Bridge Reconstructed.

The great work of reconstructing the famous railway suspension bridge across the Niagara river has just been completed without interruption of traffic. The task was undertaken some months ago by Engineer E. A. Buck, and, though many prominent engineers doubted the feasibility of the plan, he has carried it out, making an iron and steel bridge out of a wooden bridge by a process of substitution which has not occasioned the slightest interruption of trains. The casual observer would never have suspected that anything more than a little repairing was going on.

The Bradford and Buffalo Pipe Line.

The United Pipe Line Company has recently completed an oil pipe line between Bradford and Buffalo. The pipe is 3 inches in diameter, and will transmit 125 barrels an hour. There are pumping stations at Cattaraugus and North Collins. Extensive refining works are being put up in Buffalo. A system of racks for loading tank cars and capacious tanks have been erected in East Buffalo. The racks are built along the railroad tracks a distance of about 500 feet, and there are 24 spill pipes for discharging oil into the cars.

The Long Bridge over the Volga.

The long bridge over the Volga, on the Syoran and Orenberg Railway, Russia, has just been finished. The river at the point is nearly a mile wide and fifty feet deep, and is subject to very heavy floods. Accordingly the fourteen piers carrying the bridge had to be built one hundred feet above the mean level of the water. The girders, three hundred and sixty-four feet long and twenty feet wide, were put together on the bank of the river and floated to their position. The cost of the bridge was 7,000,000 rubles, or \$5,590,000.

The First Chinese Steamer to Cross the Pacific.

The Chinese steamer Hochung arrived at San Francisco August 30. The report that the Hochung was built in China, and sailed under Chinese command, with Chinese sailors and engineers, was not true. The vessel was built on the Clyde; the captain and three other officers were Danes, and the rest Englishmen. The seamen were mostly Chinese. Nevertheless, the arrival of the Hochung, under the Chinese flag, marks an important date in the history of navigation on the Pacific Ocean, as well as in the history of Chinese commerce.