ner, except in certain cases where upon elevated continents there appears to be a veritable defect of attraction instead of the excess which might be expected. Indeed, the observations are sufficiently striking to seem to point to the supposition that not only under every great mountain, but even under the whole of every large continent, there were enormous cavities. More than this, the attraction at the surface of all the great oceans appear too great to agree with the distribution presumed by Clairant's formula, which is exact enough for most purposes. Sir G. Airy's suggestion that the base of the Himalaya range reaches down into the denser liquid interior, and there displaces a certain amount of that liquid, so that the exterior attraction is thereby lessened, is one which, inherently improbable, fails to have any application in explaining why the attraction above the seas should be greater than over the continents. M. Faye propounds the following solution to the difficulty: *Under the oceans the globe cools more rapidly and to a greater depth than beneath the surface of the continents.* At a depth of 4,000 meters (13,000 feet) the ocean will still have a temperature not remote from 0° C., while at a similar depth beneath the earth's crust the temperature would be not far from 150° C. (allowing 108 feet in depth down for an increase of 1° in the internal temperature). If the earth had but one uniform rate of cooling all over it, it would be reasonable to assume that the solidified crust would have the same thickness and the same average density all over it. It is therefore argued that below the primitive oceans the earth's crust assumed a definite solid thickness before the continents, and that in contracting, these thicker portions exercised a pressure upon the fluid nucleus tending to elevate still further the continents. This hypothesis, M. Faye thinks, will, moreover, explain the unequal distribution of land and sea around the two poles, the general rise and fall of continents being determined by the excess of density of the crust below the oceans, and by the lines or points of least resistance to internal pressure being at the middle of continents or at the margin of oceans.

How the Pyramids were Built.

Brugsch Bey, the eminent Egyptologist, says, in his work on Egypt:

From the far distance you see the giant forms of the pyramids, as if they were regularly crystallized mountains, which the ever-creating nature has called forth from the rock, to lift themselves up toward the vault of heaven. And yet, they are but tombs, built by the hands of men, which have been the admiration and astonishment alike of the ancient and modern world. Perfectly adjusted to the cardinal points of the horizon, they differ in breadth and height, as is shown by the measurements of the three oldest, as follows: 1. The Pyramid of Khufa—height, 450·75 feet; breadth, 746 feet. 2. Pyramid of Khafra—height, 447·5 feet; breadth, 690·75 feet. 3. Pyramid of Menkara—height, 203 feet; breadth, 352·78 feet.

The construction of these enormous masses has long been an insoluble mystery, but later generations have succeeded in solving the problem. According to their ancient usages and customs, the Egyptians, while they still sojourned in health and spirits, were ever mindful to turn their looks to the region where the departing Ra took leave of life, where the door of the grave opened, where the body, well concealed, at length found rest, to rise again to a new existence, after an appointed time of long, long years, while the soul, though bound to the body, was at liberty to leave the grave and return to it during the daytime, in any form it chose. In such a belief, it was the custom betimes to dig the grave in the form of a deep shaft in the rock, and above this eternal dwelling to raise a superstructure of sacrificial chambers sometimes only a hall, sometimes several apartments, and to adorn them richly with colored writings and painted sculptures, as was becoming to a house of pleasure and joy. The king began his work from his accession. As soon as he mounted the throne, the sovereign gave orders to a nobleman, the master of all the buildings of his land, to plan the work and cut the stone. The kernel of the future edifice was raised on the limestone soil of the desert, in the form of a small pyramid built in steps, of which the well constructed and finished interior formed the king's eternal dwelling, with his stone sarcophagus lying on the rocky floor. Let us suppose that this first building was finished while the Pharaoh still lived in the bright sunlight. A second covering was added, stone by stone, on the outside of the kernel; a third to this second, and to this even a fourth; and the mass of the giant building grew greater the longer the king enjoyed existence. And then, at last, when it became almost impossible to extend the area of the pyramid further, a casing of hard stone, polished like glass, and fitted accurately into the angles of the steps, covered the vast mass of the sepulcher, presenting a gigantic triangle on each of its four faces.

More than seventy such pyramids once rose on the margin of the desert, each telling of a king of whom it was at once the tomb and monument. Had not the greater number of these sepulchers of the Pharaohs been destroyed almost to the foundation, and had the names of the builders of these which still stand been accurately preserved, it would have been easy for the inquirer to prove and make clear by calculation what was originally, and of necessity, the proportion between the masses of the pyramids and the years of the reigns of their respective builders.

ALUM and plaster of Paris, well mixed in water and used in the liquid state, form a hard composition and also a useful cement.

Correspondence.

Protection from Lightning.

To the Editor of the Scientific American:

In your paper of August 28 is an article written by Professor Kirchoff, on connecting lightning rods with gas and water mains, in which, after citing a case of lightning destroying several lengths of cast iron water pipe in Basch, he proceeds to state that if the said pipes had been joined with *lead* instead of pitch, no mechanical effects could have been produced.

That the assumption of Professor K. is not justified by the facts is proved by the following cases:

A church in Terre Haute, Indiana, was struck by lightning, the rod knocked down, after which the electricity followed the gas pipes in the church to the mains in the street, and melted the *lead* joints for upwards of one thousand feet.

Another church in Iowa City, Iowa, received a heavy discharge, which damaged the rod, ran on the gas pipes, and thence to the main, and for a distance of several hundred feet every particle of the *lead* joints was burned out.

Other cases might be cited, but these are sufficient to prove that *lead joints* do not prevent mechanical effects when lightning passes over gas pipes.

Another correspondent, in the same issue of your paper, J. C. M., of Bradford, Pa., writing on the subject of protecting oil tanks from damage by lightning, says:

"We would only be too glad to learn of some method other than the old theory, by which we could protect our property from lightning, as that has been demonstrated beyond a doubt to be a failure. We want information on the subject."

J. C. M. is only one of many thousands seeking such information, and it certainly should be forthcoming from some of our scientists. Of what practical value to the human family has been the vast amount of knowledge accumulated on the subject of atmospheric electricity within the last forty or fifty years? Our scientists have studied its modes of action until all agree upon the laws which govern it; yet, so far as protection from lightning is concerned, this knowledge has not helped us forward one single step. The scientific world has demonstrated clearly, and have taught us by their writings for half a century, that what is known as *electric induction* is a universal mode of electric action.

Scientists have also clearly proved that Franklin knew nothing of this law of electric induction, hence that his theory regarding the action of atmospheric electricity was erroneous. Is it not strange, then, that our scientists should to this day countenance a system of lightning protection (so-called) suggested and recommended by Franklin, and which, by him, was based upon what has been so clearly proved to have been an erroneous theory? Is it reasonable or logical to expect protection from a system founded upon such a basis? Had the great Franklin understood electric induction, his wonderful intuition would have enabled him, without doubt, to suggest the proper method of constructing apparatus for protecting our property from lightning.

Electric induction is theoretically acknowledged and taught by all scientific authorities, yet when the subject of devising some practical system of protection from lightning is under consideration, these same authorities as completely ignore this law of electric induction as did Franklin, who, they prove, knew nothing about it.

Before we can hope for any efficient system of protecting our property from the dire effects of the lightning stroke, it must be clear to inquiring minds that we must no longer ignore this wonderful law of electric action known as electric induction, but must keep it ever before us and recognize it as an all-important and indispensable factor in our investigations. Any other course must result in the future, as it has in the past, in total failure. J. H. A.

Cleves, Ohio, September, 1880.

REMARKS.—Our correspondent's letter is chiefly valuable in reporting the two churches that were struck, the rods of which were connected with the underground gas pipes. It is undoubtedly true that lead is a poor conductor, and that when a heavy discharge of electricity passes along leaded pipe joints, mechanical effects will sometimes be produced. The object in connecting the rods with the gas pipes is to enlarge the connection of the rods with the earth, and thus to protect life and property in the building. If this is accomplished (and it seems to have been done in the cases cited by our correspondent) then the temporary mischief resulting to the lead joints is of no importance, as it may be readily repaired. The connection of the rod with water or gas pipes is recommended, although lead joints are known to be electrically bad, because such pipes usually form the best available means of connecting the rods with the ground.

Our correspondent assumes that Franklin was an ignoramus in respect to atmospheric electricity, and that his system of protection by lightning rods is good for nothing, not being based, as he supposes, on the "wonderful law of electric induction."

We think the probable difficulty is with our correspondent and not with Franklin, who was not, as our correspondent assumes, ignorant concerning atmospheric electricity. Franklin's original instructions relative to lightning rods have been proven by experience to be substantially correct; furthermore, they agree with the theory of "electric induction," and are as sound and good in practice to-day as they were when first published by the illustrious inventor in 1753. Franklin taught that in order to protect buildings the rod should be carried down into moist earth; and the proper inference from his instructions is that he considered it essential that the bottom of the rod should always be well grounded in the earth. All experience with rods since Franklin's time proves the correctness of this idea; and in almost every case where rods are used and damage is done, it is found that the earth connection of the rod was bad, and that Franklin's directions were not followed.

When our correspondent can produce an authentic example of a properly-rodded building, having its rods and metals thoroughly connected with the earth, that has been seriously damaged by lightning, then it will be time enough for him to assume that Franklin knew nothing about the subject, and that his lightning rods are of no account.—EDS. SCI. AM.]

COUNT LOUIS FRANCOIS DE POURTALES.

Science has recently met with a heavy loss in the death of Count Louis François de Pourtales, which occurred at Cambridge, Mass., July 18. His strong frame and temperate mode of life gave hope of a long period of usefulness, for he was only fifty-seven, and in the prime of his powers; but, stricken by an obscure internal disease, he succumbed after some weeks of suffering, and thus followed his teacher and companion, Louis Agassiz, after seven short years. Count Pourtales was a Swiss representative of an old family, which had branches also in France, Prussia, and Bohemia. He was educated as an engineer, and in early manhood emigrated to the United States at nearly the same time as his subsequent fellow worker, Agassiz, to whom he was warmly attached. He entered the government service in the department of the Coast Survey, and continued in it many years. Almost from the beginning of his duties therein he deeply interested himself in deep sea questions, and some of the earliest observations on the nature of the deep sea bottom and of Globigerina mud were made by him. By the death of his father, Pourtales succeeded to the title and received a fortune which enabled him to devote himself entirely to his favorite studies, and to do much in continuing the great work of Louis Agassiz. Receiving the appointment of Keeper of the Museum of Comparative Zoology, he devoted himself untiringly to carrying out the arrangement planned by his friend and master. Dividing the task with the curator, Alexander Agassiz, he pushed forward his part of the work with the easy power of a strong and highly trained intellect, and was the very model of an administrative officer. In 1871 he published (in Catal. Mus. Comp. Zoology, iv.) what is probably his best known work—"Deep Sea Corals"—a memoir containing valuable disquisitions on the affinities of various genera, notes on the distribution of species, and the nature of the bottom on which the dredgings were made. A second memoir on the same subject was contributed by him to the account of the zoological results of the Hassler expedition, and many others in this and other zoological subjects are to be found in the Bulletin of the Harvard Museum of Comparative Zoology. His last work is a description of the plates of corals in the Report on the Florida Reefs by the late Professor Agassiz, which has just been published by Alexander Agassiz, through the permission of the Superintendent of the Coast Survey. These plates are the most perfect and beautiful representations of corals that have as yet been published anywhere, and were drawn under the immediate direction of Professor Agassiz. Count Pourtales' name is indissolubly connected with deep sea zoology by means of the genus *Pourtalesia*, which was dedicated to him. The *Pourtalesia*—a sea urchin allied to *Ananchytes*—was found by the Challenger expedition to be one of the most ubiquitous and characteristic of deep sea animals, and numerous species new to science were obtained by the expedition.

Pourtales' range of learning was very extensive, and his command of it perfect. Nor was it confined to mathematics, physics, and zoology. He did not scorn to read novels and light poetry, and was knowing in family anecdotes and local history. It was a common saying in the museum that if Count Pourtales did not know a thing it was useless to ask any one else.

RECENT INVENTIONS.

An improvement in hoppers in which grain or middlings, etc., are placed to be fed to crushing rolls, purifiers, or other milling machinery, has been patented by Mr. John T. Cook, of Jordan, Minn. One side of the hopper is hinged and movable, and the invention consists in the combination, with the hinged part, of devices, which allow it to yield to the pressure of the grain or middlings and swing outward, but restrict its movement within certain limits, so that the grain shall not discharge too rapidly.

An improved thread case, which exhibits the thread to the greatest advantage, and permits of getting any desired kind of thread instantly and easily, has been patented by Mr. Eugene L. Fitch, of Breda, Iowa. The invention consists in a case with a glass front and top, and with a floor inclined from front to rear, and provided with a series of drawers, each containing a number of spools of thread which are held by spring catches at the end of the drawer, so that if a button on the drawer is pulled a corresponding spool will drop from the drawer and roll down the inclined floor toward the salesman.

A combined door plate and letter receiver, patented by Mr. Henry Free, of Lewiston, Me., is so constructed as 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 Beehler, 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 heliotrope 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. Cocoanut 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, cocoanut, breadfruit, banana, cane, corn stalk, or yam vine has been left. The coffee bushes are torn and stripped of their berries. Thousands of cocoanut 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 Yallatis 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 foundering 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.