



The appearance of the World's Columbian Exposition on the 4th of July was most remarkable.

The number of paid admissions was 274,917, but in addition to this many thousand workmen and others who have passes went through the turnstiles, so it is safe to say that the total number of persons did not fall far short of 325,000. The crowd began to come at four in the morning. The gates were open to all comers at seven, and at seven-thirty there was a crowd at every gate. Cable cars, elevated, the Illinois Central and excursion trains poured in a solid crowd all day. The ticket sellers and turnstile men were powerless to prevent the congestion at some of the principal gates. In many cases it required half an hour to enter the grounds, but once inside there was room for all, and the people scattered among the buildings according to their individual taste. The grounds are closed at 11 o'clock at night, but the attractions were so many, and the crowd so great, that it was nearly one o'clock before the last remnant of the day's attendance had disappeared.

The first part exercises took place about midday in front of the Administration building, where a temporary platform has been erected. The programme was simple. Appropriate addresses were delivered by Mr. J. S. Norton, Vice President Stevenson, Mayor Harrison, and by Mr. H. L. Carson, of Philadelphia. An enormous concourse of people attended, the plaza facing the platform being crowded to its limits. While these exercises were being held, the day was being commemorated in Midway Plaisance in a manner most picturesque.

At noon representatives of the various concessions began to gather at the west end of the Plaisance. Many Bedouins dressed in their highly colored native costumes, and mounted on camels or spirited horses, seemed to take the lead. A large number of Turks with the Turkish and American colors intermingled followed after. The people from the Cairo street were fully represented in their native gala day dress. The actors, jugglers, and other people connected with the Chinese theater appeared in their richest robes. Natives from the Dahomey village and the Lapland village joined in the procession. By no means the least conspicuous feature in the gathering was a band of Pottawatomie Indians. All these and many others formed the center of a gathering of over 25,000 most curious-looking people that had gathered to commemorate the day. At a given signal the American flag was unfurled from a lofty pole, and in an instant there was a din of cheers and shouting from the assembled multitude, a salute from the British artillery, and a mixture of noises from fifes, tomtoms and a great variety of musical instruments from all parts of the world. As soon as silence once again reigned, the Mohammedan priest of the Plaisance, in his bright ecclesiastical raiment, offered prayer. The address at these exercises was delivered by Commissioner Burton. These exercises were carried out by the foreigners connected with the Plaisance, and Americans were interested in them only as spectators.

In addition to these special exercises, each concession observed the day in its own peculiar way. The German village was festooned with oak leaves. The Samoans sang "America" in their native tongue at the South Sea Island theater. The natives of the Javanese village bedecked themselves with American flags. The Chinese theater exhibited a flag upon which was written the Declaration of Independence in Chinese characters. The natives of the Dahomey village wore flags over their shoulders, and the American flag was conspicuous in the Street of Cairo, while in other concessions there was some special feature commemorative of the day. The Ferris wheel was decorated with bunting, and a brass band was stationed in one of the cars during the afternoon and evening, playing patriotic airs. This great wheel presented a magnificent sight at night, as the cars were illuminated and red fire burned at intervals, while the powerful rays of an enormous search light on the roof of the Manufactures and Liberal Arts building were thrown

upon it, bringing out in strong relief against the darkness the enormous proportions of the structure.

Elsewhere in the grounds the day was fittingly observed. In the Delaware building exercises were held in connection with the new Liberty bell, which, unfortunately, was not cast in time to be present, but it was rung in the bell foundry in Troy, N. Y., where it was cast. A signal was sent by the Western Union Telegraph Co. from the Exposition grounds to the foundry.

The original American flag floated by Paul Jones was run up at the exercises held in front of the Administration building, and was also a feature at the exercises in the Delaware building. At the close of the exercises the people marched over to the Pennsylvania building, and this original flag was there spread over the original Liberty bell, which forms a part of the Pennsylvania exhibit. No event of the day seemed so much to touch the hearts of the people as this incident in the Pennsylvania building.

Appropriate exercises were held in the New York State building, and in the evening this building was brightly illuminated. Special observance of the day was also made in the buildings of Ohio, Illinois, Washington, California, Michigan, Wisconsin, Indiana, Colorado, and other States.

In the evening a grand display of fireworks was given from floats on the lake opposite the broad open space before the Manufactures Palace. This entire space, from the model battleship Illinois to Music Hall at the Peristyle, a distance of half a mile, was a mass of surging humanity. It was one of the finest pyrotechnic displays ever seen in Chicago. It began with a balloon, which sailed from the top of the Manufactures and Liberal Arts building out over the lake with what appeared to be a ball of fire hanging from

are driving along the ground to a place in the interior where they are killed. Almost every country in the world sends samples of the boats and the vast variety of appliances used to catch fish, besides pictures of fishing scenes and an infinite number of fish products. Norway is to the front in fisheries. In the exhibit of that country are models of the boats and the weapons used in assailing the walrus, the seal, and the polar bear. The Lofoden fisheries are especially well illustrated. No fewer than 30,000 men, with between 7,000 and 8,000 boats, come annually to fish for cod at the Lofoden Islands. Strange to say that among so many men there is no crime or disorder of any kind. Thirty million cod are taken each year. Gloucester, the American Lofoden, is nobly represented. A large model of the harbor shows warehouses and the fish docks with all the usual accessories. That great fishing center has now 400 schooners, of about 81 tons burden each. There is an interesting model of a fishing scene in Boston Bay. The water on which the boats float is well counterfeited. Down in the depths the nets may be seen, and on the floor of the bay there are the fragments of wrecks, the debris of a roadstead, and marine plants peculiar to the locality.

In the same building are models of whales, sharks, devil fish, mammoth lobsters, sword fish, sturgeon, etc. A novel way of advertising a fish glue may here be observed. Two pieces of belting, glued together, suspend an old rusty cannon taken from a British frigate that had been sunk in the St. Lawrence nearly two centuries ago. To add interest and variety to this part of the show there are introduced eeltraps, lobster pots, machines which automatically remove the scales from fish, and a model of the menhaden fisheries which illustrates how these little fish are captured in nets,

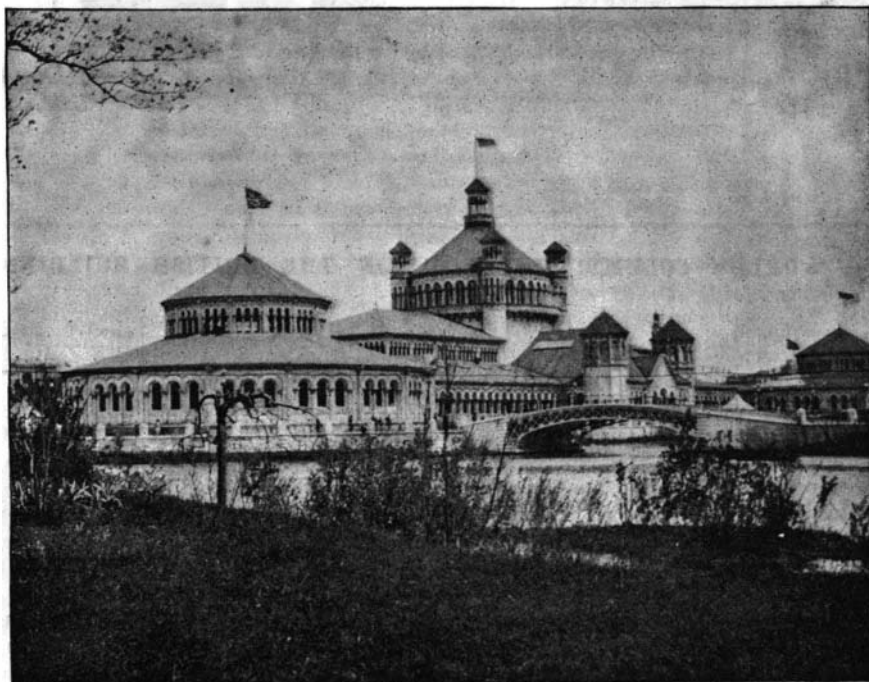
loaded in bulk in the holds of vessels, discharged like grain by means of elevators, and in brief the whole method of "handling" these profitable products of the deep. It is needless to say that in the department dealing with angling there is no other country in the world but America that could make an exhibit of anything like equal merit. Everywhere one turns, models are seen which compel admiration on account of the novelty, ingenuity, and evident efficiency of the various angling contrivances which originate in this country, are first employed here, and soon find their way to every civilized land where fish forms part of the natural resources. There is an American-made sportsman's canoe which invites attention. It is very strong and stable; it can carry three men with perfect safety; and yet it weighs only fifty-seven pounds.

No one can doubt the popularity of the aquarium in the Fisheries building. From the time that visitors are permitted to enter in the morning until late at night the corridors are crowded. Not only does every one seem to be pleased, but, without exception, all visitors appear to banish

whatever might distract the attention from the instructive, beautiful, or curious exhibits. Those who have lived all their lives remote from the sea are anxious to make an acquaintance with living specimens of such fish as they have read about or have eaten with more or less satisfaction. On the other hand, the visitor who has had the music of the salt sea waves in his ears, and who has had the misfortune to be acquainted with streams and lakes that had been depleted utterly of their finny inhabitants, are just as curious to know all that can be known of the fresh water fish. It cost about \$20,000 to place the fresh water varieties on exhibition, and at least \$10,000 to perform the same service for the public with the denizens of the ocean. There is a hospital attached to the aquarium. There Dr. S. P. Bartlett, of Quincy, Illinois, ministers to such as disease has marked. Funus gives him a good deal of trouble. It is just as contagious as smallpox, and only the most careful measures can save the victims or prevent them being the means of communicating the fatal growths to their healthy neighbors. The favorite remedy is to bathe the parts affected with a solution of carbolic acid. Notwithstanding all the care, the mortality from this ailment is considerable, being estimated at one-half of one per cent a day. To keep the water in a healthy condition all foreign matter is carefully removed, and fresh air is introduced by a system of pipes laid along the bottom of the tanks.

Sometimes Dr. Bartlett gives an exhibition of the tameness and playfulness of brook trout. He twirls his index finger in the water, and the fish rise in a body to make a rush at the finger and attempt to bite it, pushing one another aside without ceremony in their eagerness to reach the object of attraction. Lake trout are surprisingly fearless. They permit them-

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THE PALACE OF FISHERIES.

it. When over the heads of the multitude, this ball of fire burst and there was spread out to view an American flag, with all of its stars and stripes and colors. The success of this display was greeted with great enthusiasm by the spectators. The set piece of the evening was a portrait of Washington wreathed in laurel and adjoining the words "The first in war, the first in peace, the first in the hearts of his countrymen."

Sunday, July 2, was observed at the Exposition as Patriotic Sunday. The exercises were largely attended by representatives of the army and navy, both retired and active, and many foreigners, connected with the Exposition in one capacity or another, were present. In one part of the exercises a bugler sounded the call "Taps," and, as the strains of the call died away, two sailors removed a large American flag which hung in the rear of the platform. The removal of this flag displayed the American naval colors, across the banner being inscribed the words "In Memoriam H. M. S. Victoria." One of the sailors placed a laurel wreath on the colors. The incident was carried out with such tenderness that tears came to the eyes of nearly everybody in the audience who recalled the tragic death of the crew of this British vessel.

In the main portion of the Fisheries building specimens of most of those things which industry and science have brought from lake, river, and sea are shown. Very interesting also is the exhibit of the United States Fish Commission, which gives a clear idea of the methods employed by it in deep sea work and in propagating fish to stock rivers and lakes. There is a large model of the seal fisheries at Alaska, etc. Professor Elliott, of the Smithsonian, the greatest authority in the world on seal life, superintended the construction of the models. One shows a "drive," and includes hundreds of mimic seals which the natives

## WORLD'S FAIR NOTES.

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selves to be fondled very freely and do not appear to dread any harm, even when the hand is thrust in among them with some violence. Rare beef and sea lettuce are much relished by fiddler crabs. The human-like action of the claws displayed by these animals when selecting certain morsels and conveying them to the mouth is at first very interesting to note, and a strange impression is produced when an identity of process in effecting the same end is observable in creatures so far removed in the scale of creation as a human being and a crab. Visitors make, apparently, an endless number of discoveries for themselves in their inspection of the tanks. No one leaves with an appearance of weariness, and many persons can be seen day after day, whatever other attractions there may be elsewhere, hastening to have a glimpse, however brief, at the contents of the aquarium.

The Scenic theater, which has a seating capacity of one hundred, is lighted and cooled by electricity, and the performance is entirely electrical. The performance is called "A Day in the Alps." A perfect Swiss view is shown, with snow-covered peaks and valleys, while in the foreground are pleasant Swiss chalets. The opening scene is just before daybreak; after a faint glimmering of stars the sun begins to gild the snow-capped peaks, the mist is dispelled, and you can hear in the distance the peasants singing the "Jodel." A storm then comes up. This is a very realistic performance—thunder, lightning, and rain follow each other in quick succession. The sunset follows with the never-to-be forgotten after-glow, the moon comes creeping up behind Mont Blanc, and the stars shine brightly. The effects are very wonderful, and the audiences are delighted.

The second spun glass dress ever made is now the property of the Infanta Eulalia, the first being made for an actress. The glass was spun at the great Exposition in the Libbey building in the Midway Plaisance. From a glass cylinder half an inch in diameter and a yard in length, over 12,000,000 feet of filmy thread was spun, and this, it is said, was woven into twelve yards of material, which was made up into a dress for the Infanta by a New York modiste. The wheel on which the glass was reeled is 18 feet in diameter, and revolves 350 times per minute, or at the rate of about 70 miles per hour. The extremity of the glass rod, from which the thread is drawn, is heated to a high degree, so as to melt the glass, which is then drawn out by the wheel into a fine thread and wound on the periphery of the wheel as fast as it is formed. The fabric looks like heavy white satin, but has a most beautiful sheen. Such dresses may do to look at, if kept in a glass case, but their use would be rather dangerous, owing to the small bits of fine glass that break off in handling, and are likely to float in the air and enter the eyes and nose.

## The Blackening of Incandescent Lamp Bulbs.

A recent paragraph in the *Digest*, referring to one of the theories of the blackening of lamp bulbs, namely, that it is due to the evaporation of carbon, recalls a paper by Prof. Elihu Thomson, published in a recent number of the *Lehigh Quarterly*, which shows that he has held this view for many years, his experience since then having tended to confirm his views. The paper is entitled "The Life of Incandescent Lamps," and contains a number of points of interest, some of which may not be generally known.

In answer to the question, Can a filament be made which will not deteriorate and therefore not blacken the interior of the bulb? he is inclined to think that it cannot, if carbon is adhered to, and carbon as yet seems to be the best material in existence; it is so on account of its infusibility and its apparent volatility. It actually does soften at extremely high temperatures, and will bend readily when so softened. It does not melt at the highest known temperature, but it readily vaporizes in the arc lamp. It is very probable that carbon, infusible as it seems, could be fused at arc temperatures while under pressure. Thus, an electric arc in an inert gas at high pressure would probably drip melted carbon, which would form graphite in masses or crystals.

The deterioration of incandescent lamps has often been laid to the bombardment of gas molecules, but Prof. Thomson has long been convinced that in a well exhausted lamp it is due almost entirely to evaporation by high temperature. Just as ice evaporates in vacuo, so carbon acquires in vacuo a certain volatility at an increasing rate of the temperature. He assumes, of course, that the vacuum is so good that none of the bluing or visible discharge of current takes place, which of course wears the filament by actual carriage of carbon. He thinks that it would be very strange if carbon maintained at so high a temperature in a vacuum did not evaporate at all, as it is well known that almost all substances raised to a sufficiently high temperature do give off insensible vapors, and that melted metals frequently behave as mercury does at the ordinary temperature; the presence of foreign substances and gases will in some

instances accelerate the action or perhaps in other cases retard it. In a lamp a certain evaporation takes place which is independent of the size of the bulb, from which it follows that the age coating will become much less as the bulb is greater in size, for the same deposit will yield a much thinner coating of carbon over a large surface than over a small one. If one lamp were made with the smallest possible bulb and another with a large bulb, the former might be rendered opaque, while the latter would only be slightly darkened, other conditions being the same. He puts great stress on the uniformity of the filament, and gives the reasons. It appears to be true, he says, that the limit of practical improvement in the efficiency of incandescent lamps is to be found in the properties of the element carbon, and particularly its volatility. It is fairly safe to say that no other less volatile substance has yet been found, and that carbon, as pure and perfect in structure as possible, is likely to hold its place, at least for some time to come, as the material for incandescent lamp filaments.

## Family Life Among the Tibetans.

Some very interesting sketches have been given in *Leisure Hour* by Miss Isabella Bishop, descriptive of her journeyings in Tibet, that inaccessible and rarely visited corner of Asia.

Family life, she says, presents some curious features. In the disposal in marriage of a girl, her eldest brother has more "say" than the parents. The eldest son brings home the bride to his father's house, but at a given age the old people are "shelved," i. e., they retire to a small house, which may be termed a "jointure house," and the eldest son assumes the patrimony and the rule of affairs. I have not met with a similar custom anywhere in the East. It is difficult to speak of Tibetan life, with all its affection and jollity, as "family life" for Buddhism, which enjoins monastic life, and usually celibacy along with it, on eleven thousand out of a total population of a hundred and twenty thousand, farther restrains the increase of population within the limits of sustenance by inculcating and rigidly upholding the system of polyandry, permitting marriage only to the eldest son, the heir of the land, while the bride accepts all his brothers as inferior or subordinate husbands, thus attaching the whole family to the soil and family roof-tree, the children being regarded legally as the property of the eldest son, who is addressed by them as "Big Father," his brothers receiving the title of "Little Father."

The resolute determination, on economic as well as religious grounds, not to abandon this ancient custom, is the most formidable obstacle in the way of the reception of Christianity by the Tibetans. The women cling to it. They say, "We have three or four men to help us instead of one," and sneer at the dullness and monotony of European monogamous life! A woman said to me, "If I had only one husband, and he died, I should be a widow; if I have two or three, I am never a widow!" The word "widow" is with them a term of reproach, and is applied abusively to animals and men. Children are brought up to be very obedient to fathers and mother, and to take great care of little ones and cattle. Parental affection is strong. Husbands and wives beat each other, but separation usually follows a violent outbreak of this kind.

It is the custom for the men and women of a village to assemble when a bride enters the house of her husbands, each of them presenting her with three rupees. The Tibetan wife, far from spending these gifts on personal adornment, looks ahead, contemplating possible contingencies, and immediately hires a field, the produce of which is her own, and which accumulates year after year in a separate granary, so that she may not be portionless in case she leaves her husband!

THE long distance transmission plant of the San Antonio Light and Power Company, Pomona, Cal., has now been in successful operation for the past six months, transmitting a distance of twenty-eight miles. The hydraulic part of this plant, the *Electrical Engineer* says, was installed by the Pelton Water Wheel Company, and one of the principal attributes to the successful operation of the plant is their new regulating apparatus, which, it is stated, controls the speed of the wheel perfectly under the most exacting conditions as to variation in load on the generators.

With this new system of regulation which has been developed by this company, the successful operation of any plant which they install is now assured. The regulating appliances heretofore used in connection with water power plants gave but indifferent results.

Perhaps the most severe test that a water wheel governor was ever subjected to is in the case of a Pelton wheel running a set of circular saws at the mill of the Red Cross Lumber Company, in the northern part of California. The wheel is operated under a vertical pressure of 485 feet. The saws require to drive them through the log at full feed 125 H. P. They take about seven cuts per minute, thus varying from full load, namely, 125 H. P., to only what is required to drive the saws running free. During this operation the variation in speed is not perceptible.

One of the most valuable features of the regulator is that it is positive in movement, and there is no danger whatever of its racing, thus admitting of its being geared so as to be extremely sensitive and to meet the requirements of electric railroad work, in which the changes are tremendous.

## Magnetism is Without Effect on the Human Body.

Mr. A. E. Kennelly, of the Edison laboratory, and Dr. Frederick Peterson, of the College of Physicians and Surgeons, have reported to the American Electro-Therapeutic Association the result of their experiments on the effect of magnets on the human body. Experiments were tried on cats, frogs, boys, and themselves. Human and frogs' blood failed to show any traces of polarization, movement, or vibration. In the case of live frogs, no influence of the magnet on the blood cells or the movement of the blood could be found.

To test the German theorists' claims that magnetism increases the resistance to conduction in motor nerves and causes paralysis, a small dog was placed in a cylinder between large field magnets and kept there for five hours under the influence of a strong magnetic current. The exposure seemed to have no effect on the dog, and he came out as lively as he went in. Then a boy was placed between the magnets and a magnetic current was turned on. There was no effect upon the boy. The magnetic current was strong enough to balance a heavy bolt in the air and to contract wires of iron and to hold iron chains so strongly that it required the efforts of several men to detach them. Then the experimenters themselves and their men took turns in lying down on a board placed between the poles of a huge magnet with the current alternately turned on and off. One observer would hold the wrists of the subject and take sphygmographic tracings of the pulse. The second observer would observe the respiration, and the operator would turn the current on and off. No changes were observed in the tracings, or in the respiration, or in any other way. One subject held a steel screw in his hands, while he could tell from its attraction whether the current was on in the magnets. He had no sensations of any other kind. The observers concluded that the human organism is in no manner affected by the most powerful magnets known, and that the brain and the nerves get no sensations or impulses from the magnets. They say that it may be possible that some day magnets may be invented where the number of reversals to the second is high enough and the force strong enough to produce effects on the nervous system, but that so far as the experiments show, electromagnetism seems to have no influence whatever on the human body.

## Fighting the Gypsy Moth.

The Massachusetts Agricultural Society employs one hundred men in fighting the gypsy moth. Each man has charge of a district about a mile square. Whenever moth clusters and nests are found, they are collected by the wagon load and burned. Paris green in large quantities has been used in spraying the infected trees and grass. The work of extermination has been going on for the last five years, and until this year the results were far from encouraging. The pests had spread over 200 square miles in the northeastern part of the State, causing desolation equal to that by fire or flood, and \$275,000 had been appropriated by the State legislature for their destruction. The moths are said to have been introduced in this way: M. Trouvellot came to this country from France about twenty years ago, and, settling at Medford, studied the cultivation of the silkworm. One day he placed half a dozen eggs on the window ledge of his home. During a brief absence the eggs were blown off and scattered through the yard, so that their recovery was impossible. From these eggs were produced the army of moths that have done much to depopulate a large part of Massachusetts. Professor Lintner has suggested the discovery and introduction of a parasite that would feed upon and so destroy the moth.

## A New Prepared Paper.

The *Droguisten Zeitung* is responsible for the statement that in Germany a patent has been refused, and the manufacture and sale have been prohibited, of a paper so prepared that any ink-writing upon its surface could be erased by the simple application of a moist sponge. The paper was made of the ordinary ingredients, with the addition of asbestos and parchment-glue. The paper pulp, after rolling, was immersed for a short time (from six to thirty-five seconds, according to the thickness of the paper to be prepared from it) in concentrated sulphuric acid at 20°, diluted with 10 to 15 per cent of water. It was then pressed between glass rollers, passed successively through water, ammonia solution, and a second time through water, strongly pressed between rollers and dried on felt rollers, and, finally, on polished and heated metal rollers. The finished article is said to be precisely like ordinary paper. Its sale has been prohibited on account of the misuse to which it can be put.



## The History of Patents.

To the *Practical Engineer* (London) we are indebted for the following facts and anecdotes relative to early patents, the names of many discoverers, and the date of the inventions: While the lawyers and the treasury were wrangling over who could consume the greatest amount of seed corn wrung from inventors, about the year 1775 the treasury made one of its fiscal errors (so costly to the nation), which had an important bearing on patents of invention. Just as it shamefully overtaxed impoverished inventors now, without rhyme or reason, on a fiscal error which has lost it (or rather the public) £50,000,000 since 1852, so in the year 1775 it tried taxing the American colonies in the matter of tea entering Boston harbor. The colonies would not pay its exaction, and, fortunately, were far enough off to resist. A war followed, lasting many years, until on September 3, 1783, we had to acknowledge the independence of the colonies, and swallow the unpleasant fact that the fiscal error of the treasury had lost us America. One effect of this separation of the colonies was that all the old "£4 16s. 6d. extra fee" colonial patents running in America were, of course, canceled thereby. New patent laws were required in America in place of the old law, deceased, and the outcome was the creation, in 1790—1793, under George Washington, by Jefferson, of the best patent law that has ever existed—a law which has not only scattered untold benefits throughout America, but from which we in this country are also receiving reflected benefits. The fundamental principle of the American act is that "inventors and authors have equal and similar claims to the protection of the legislature"—in other words, that protection to inventors should be valid, and not a sham, and that lawyers and the treasury should not be allowed to plunder them. It is not difficult to realize why America took such care to cut absolutely clear from our chancery system. It would result from the fine object lesson chancery had previously given the world in their treatment of James Watt. If our patent system had been anything but a delusion and a snare, it would have protected an inventor such as James Watt, who gave the world the steam engine. It did nothing of the kind, but let him in for ruinous lawsuits, that ate up the whole of his profits for the natural term of his patent. What likelihood could there possibly be of protection for any humbler inventor, after such treatment of Watt? None whatever. The protection sold by the British Patent Office was evidently a farce, a very costly farce, too, at about £400 per patent for the United Kingdom. To such a miserable strait had the wrangling lawyers brought our patent laws at this period.

The establishment of the American patent system in 1790 was the protest of business men against the violation of all the true interests of invention by lawyers, who could not appreciate them. The movement was to invention what Luther's movement was to the abuses of the old Catholic Church: the spirit of invention was preserved, but the mummery was thrown aside. Inventors should remember that date—1790—as that when invention asserted its freedom. To avoid the old chancery trickery over worthless titles, leading to endless lawsuits, the American system introduced the preliminary examination system, and granted only patents which were as valid and safe from lawsuits as they could possibly be made. It gave these valid titles with business dispatch, instead of with endless legal delay, it printed its specifications in English, on paper, so that they could easily be consulted by inventors, instead of "engrossing them on skins, in black hand, in the Latin language," which was only fooling with invention. It gave 17 instead of 14 years for the duration of a patent, or 21 per cent more time. It charged only £7, instead of £400 for a United Kingdom patent, or only one fifty-seventh part of the lawyer's price. Here was abuse done away with at a stroke, but the effect on the fee hunters of chancery and the treasury would make them hate the American patent system as the Pope hated Luther. First, they would hate it because they would feel that for 167 years they had betrayed their trust, and been plundering instead of encouraging invention. Secondly, they would hate it because the business men at the head of the American Patent Office would be no party to the issue of worthless titles to patents out of which the lawyers could make "six or twelve fold law costs" in subsequent trials. Third, they would hate it because, if America issued patents at one fifty-seventh of their charges, it demonstrated beyond question that fifty-six parts out of the 57 charged had never been other than shameless extortion. Fourth, above all they would hate it from the fiscal error of the treasury having lost the American colonies, so that nothing coming from America could possibly have any merit in it whatever. The effect of this deep hatred of all things American 100 years ago has blinded us to the intrinsic merit of America's patent system, and withheld from the English people that which in their own interest they ought to have had from the very first.

The American patent system, working in the interest of the public, demonstrated to them its commercial value in the first few years. In 1791 Fitch, and

in 1793 Fulton, invented practical steamboats. In 1794 Whitney invented the cotton gin. Cotton planting at that time was languishing, and Whitney's invention made it exceedingly prosperous. Congress voted sums to assist invention, and at Washington a fine museum was erected, containing models and records of considerable public interest. When General Ross took Washington, in 1812, and burnt the Capitol, it was proposed to treat the Patent Museum after the same fashion. "A loaded cannon was trained upon it, when its director, Dr. Thornton, put himself before the gun, and in a frenzy of excitement exclaimed, 'Are you Englishmen, or only Goths and Vandals? This is the Patent Office, the depository of the ingenuity and inventiveness of the American nation, in which the whole world is interested. Would you destroy it? If so, fire away, and let the charge go through my body.' The effect is said to have been magical upon the soldiers, and to have saved the Patent Office from destruction." Our soldiers would report this incident when they returned home to England; news would be constantly reaching our persecuted inventors of the success of friends and relatives in America, under its patent system; many of our ablest inventors would leave this country for America in consequence, while a general feeling of unrest under our vicious, lawyer-ridden system would spread far and wide in this country. The knowledge among inventors that justice is granted them in America, and withheld them here, has led to the frequent forcing of the patent question on Parliament during the century. The 1790 prejudice against the American system has, however, always been sufficient to continue gross abuses in our patent system down to the present day. We have seen what came of a fiscal error of the treasury in 1775. Is it not about time it dropped the present one paralyzing invention?

During the 167 years from 1623 to 1790, the discouragement of the chancery system was such that only one useful invention appeared at an average of  $3\frac{1}{4}$  years interval.

The best list of useful inventions that can be made out for this period only gives 14 of such for the first 100 years, and 37 for the remaining 67 years, up to 1790. Many of these inventions were not patented under chancery at all. They are as follows:

- 1623. Mannsell's glass patent.
- 1630. Ramsey's fire engine patent.
- 1643. Torricelli's barometre.
- 1649. Pascal's hydraulic press.
- 1650. Otto Guericke's air pump.
- 1657. Huygen's pendulum clock.
- 1664. Hill's breechloader.
- 1672. Wooden railroads.
- 1676. Barlow's repeaters.
- 1688. Papin's steam engine patent.
- 1698. Savary's steam engine patent.
- 1716. Floating docks.
- 1721. Halley's diving apparatus.
- 1723. Streets lighted with hydrogen gas.
- 1727. Leupold's high pressure engine.
- 1732. Ledemour's pump.
- 1736. Hull's steam tug.
- 1738. Iron rails nailed to wooden sleepers.
- 1739. Emerton's wood preserving patent.
- 1747. Watson's electric telegraph.
- 1748. Paul's carding patent.
- 1752. Franklin's lightning rod.
- 1756. Strutt's stocking frame.
- 1758. Dolland's achromatic telescope.
- 1762. Wedgewood ware patented.
- 1764. Blackley's tubular boilers.
- 1765. Spedding's gas light.
- 1767. Hargraves' spinning jeuny.
- 1768. Lace machinery.
- 1769. Watt's steam engine patent.
- 1769. Arkwright's spinning frame patent.
- 1771. Crompton's mule patent.
- 1774. Lesargis telegraph.
- 1776. De Jouffroy's steamboat trial.
- 1777. Bushnell's torpedo.
- 1780. Pickard's crank patent.
- 1780. Leblanc's artificial soda.
- 1780. Burgand's argand burners.
- 1783-4. Cort's iron patents.
- 1784. Bramah's lock patent.
- 1784. Montgolfier's balloon.
- 1784. Watt's locomotive patent.
- 1785. Cartwright's locomotive patent.
- 1785. Arkwright's power loom patent.
- 1786. Lebon's gas light.
- 1787. Betancourt's electric telegraph.
- 1787. Hamer's wool shearing.
- 1787. Symington's steam engine patent.
- 1788. Miller's steamboat trial.
- 1789. Galvani's batteries, etc.
- 1789. Present rails and wheels invented.

THREE new torpedo boats have been ordered of Yarrow & Co. by the British naval authorities. They are to be 140 feet long by 14 feet 6 inches beam, and to have a guaranteed speed of 27 knots, which is equal to a little over 31 miles per hour.

## Correspondence.

## Scald the Scoundrels.

To the Editor of the *Scientific American*:

I see in some of late newspapers that five masked men halted and boarded a locomotive of the California express, June 10, 1893, and forced the engineer to take a sledge, batter in the door of the express car, wounded the messenger, and robbed the express. Now, I am an old engineer—too old to do good service, nearly 73 years old—and it grieves my soul to read of an engineer being forced to compliance to such devils as those. I think every locomotive that travels on those long, lonesome roads should be furnished with a hot steam jet, one on the fireman's side and one on the engineer's side, with elastic pipes that they can point the jet in any direction and blow a masked man's eyes out with steam before he had time to use a revolver, or any other suspicious character that comes within 20 feet of the locomotive. Now, please make this idea known to the master mechanics or superintendents of locomotives everywhere, and I know they can furnish them and extend a steam jet into the express car, so that they can turn steam into the car and scald train robbers to death before they could get out of the car, and put a mark on them that they could be distinguished for a month after. I am too nervous to write much. Please scatter the idea as broad and as quick as you can, and oblige an old man that loves his fellow man that is honest and hates a dishonest person.

THOMAS R. ALLEN.

Lucas, Lucas County, Iowa, June 17, 1893.

## Shapes of Eggs.

Various attempts have been made to account for the diversity in shape seen in eggs. A recent study convinces Dr. Nicolsky that the differences may be all traced to gravity, and he finds his idea confirmed by all the eggs in the zoological collection of the St. Petersburg University. He supposes that pressure by the sides of the ovary tends to elongate the egg before the shell has hardened. In birds which keep a vertical position while at rest, as do the falcon and the owl, the soft egg is made short by the action of the weight of the body against the ovarian pressure; while in birds that, like the grebe, are nearly always swimming, the egg is lengthened because the bird's weight acts with the compression by the ovary. The egg is made more pointed at one end than at the other in birds that, like the guillemot, are frequently changing their position—sometimes swimming and diving, sometimes perching on the rocks, etc.

## Soapsuds as a Lubricator.

I had a curious lubricating experience a few years ago that I would like to put on record, observes Gulf in *Railway Appliances*. The machine that gave me the trouble was for experimental purposes, for what purpose it matters not. The trouble lay in the lubrication of a shaft that had to make 4,000 revolutions per minute. It was about four and a quarter inches in diameter, with journals from eight to nine inches long, and carried a weight of 1,800 pounds. The thing simply wouldn't run cool. We cut oil grooves in the boxes; we scraped them; we used every kind of metal that we could think of; we hitched on a pump and pumped gallons of oil through those bearings; and yet, in from five to ten minutes, they would commence to heat, and nothing seemed to be able to stop it but the stoppage of the machine.

One day, in a fit of despair, we put soapsuds in the tank instead of oil and started to pump that in. Presto! The bearing had found the food for which it was craving, and proceeded to do its work with the cheerfulness of an old campaigner. It seemed that it was not so much the quantity of lubricant that was needed as a regular and continuous supply. The oils that we were able to use had a consistency that unfitted them for reaching the remote points under the rapidly revolving bearings, so it heated, while the soapy water was thin enough to be forced over the entire surface and keep everything all right. I presume that there are oils that would have done the same thing, only we did not happen to get hold of them. But if you ever attempt to use water, remember that you will need it all the time and in large quantities.—*Railway Review*.

## Use of Compressed Air to Cool Journal Bearings.

In any place where air compressors are used steadily, or where an air supply is convenient, it is quite convenient to conduct a pipe so as to blow air upon the heated bearings, and thus cool their heated brows, as the air will conduct heat away nearly as well as water. Air has an additional advantage in the fact that it cools in expanding so as to still further aid in the cooling of boxes where this scheme is applied. We are inclined to agree with an exchange that it may seem visionary, but if you have a good chance try it, and see if it don't help keep them cool, the help depending upon the flow of air and the pressure from which it expands, as expanding air cools very rapidly.—*Railway Review*.