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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are sharp, the articles short, and the facts authentic, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

## RECENT FIRE LOSSES IN AMERICA.

Is it not strange that with our cities equipped with fire departments that are universally conceded to be the best in the world the fire losses should reach such enormous totals as they sometimes do? Thus, a compilation by The New York Journal of Commerce shows that during the month of February the fire loss of the United States and Canada reached the stupendous total of \$21,010,500. It is true, February was the month in which the great Waterbury and Paterson fires occurred; but even the loss by these two conflagrations combined, if deducted from the total, leaves a fire loss for a single month of \$15,000,000. It is evident that we must look elsewhere than to the equipment and efficiency of the fire departments for an explanation of these totals; and the explanation is to be found undoubtedly in the very lax building laws which have obtained in the past, especially in regard to fireproof construction. Only as adequate laws are drawn up and enforced can we expect the fire losses to be brought down until they bear a reasonable proportion to the property under insurance. An analysis of these losses would doubtless show that only a small percentage of them occurred in buildings that were built according to the accepted methods of fireproofing.

## EAST RIVER BRIDGE NO. 3.

The first important step in the actual work of construction of the new East River Bridge, which is to be built not far to the eastward of the present Brooklyn Bridge, and which has hitherto been known officially as Bridge No. 3, was recently taken when the first caisson was towed into position at the site of the pier off Washington Street. 'Like those which were sunk to carry the towers of the new East River Bridge, this caisson is built of timber; but while each of those towers is carried on two separate caissons the new towers will be founded upon single caissons. The one in question is a truly gigantic affair as caissons go, the largest in the world, in fact, being 78 feet wide by 144 feet in length and 60 feet in depth. It was constructed upon the shores of the East River in Harlem, and when it was afloat it drew no less than 14 feet of water. It took four tugs to tow the caisson down the river, and in some places, where the currents made navigation more difficult, as many as seven tugs were required. Now that the caisson is in place, the work of sinking it through the overlying material of the river until it rests everywhere on solid rock will go forward continuously night and day. It is expected that it will be down to grade in about ninety days' time.

## A HEALTHY DECADENCE.

The wave of pessimism which is passing over Great Britain as the result of her feeling the first phases of that stress of competition, which was bound ultimately to come upon her, does not seem to be warranted by the statistical facts of the last Board of Trade returns, according to which the foreign commerce of the United Kingdom during 1901 amounted to the enormous total of \$4,353,585,000. The foreign trade of Great Britain is \$750,000,000 greater than it was six years ago, and is now equal to \$105 per head of population. These figures suggest that the "anti-quated" British methods, of which we have heard so much recently in the public press, cannot be so altogether futile, especially when we consider that her foreign trade last year was more than double that of the United States. The total foreign commerce is made up as follows: Imports, \$2,611,195,000; exports, \$1,402,495,000; and re-exports, of foreign and colonial merchandise, \$338,233,000. If to these figures be added a vast sum of \$7,500,000,000, representing the total over-sea trade of the British Empire, we cannot but feel that the long-deferred decadence is at least a healthy and vigorous one.

## SAFE EXPLOSIVES.

The recent disastrous explosion on the Subway gives particular interest to the test of a new blasting agent, joveite, which has just been carried out in the presence of the Chief of the Fire Department, a representative of the Bureau of Combustibles, the General Superintendent of the Subway Construction Company, and other engineers and specialists. The test was carried out at the Jerome Park reservoir, which is now under construction by Mr. McDonald the contractor of the Subway. The powder is a picric acid compound, which is so treated in the process of manufacture as to render it insensitive to shock and only capable of being detonated by a fulminate. In the tests a box of the explosive, which latter is a yellow odorless substance resembling coarse corn meal in appearance, was tested by hammering a number of 6-inch spikes down into the material. In another test a mass of the blasting agent was shot at several times with a revolver. A 50-pound case was placed on an anvil, and a 250-pound weight dropped upon it from a height of 40 feet; though the friction of the impact set the joveite on fire, there was no detonation. On the other hand, the power of the explosive was shown by placing about twice the amount of an ordinary shotgun charge in a mortar beneath a 62-pound weight, and detonating the same, with the result that the projectile was thrown 300 feet into the air. Not many days later a test of Masurite (another blasting agent) was held, and we understand that the same feature of insensitiveness to shock was manifested. There is no question that this class of explosives is eminently suited to blasting operations in the heart of the city, such as are now being carried on at the Subway, provided, of course, that these compounds prove to be perfectly stable, or not liable to chemical decomposition. A so-called "safety" explosive in a decomposed condition would be about the most dangerous article in existence; for "familiarity always breeds contempt," and the decomposed explosive would receive a freedom of handling which dynamite, with its acknowledged greater sensitiveness, would never be subjected to. If a perfectly stable, insensitive blasting agent can be produced, one that will keep indefinitely, we think the Subway contractors should give it a thorough trial.

## THE WORK OF THE WEATHER BUREAU IN 1901.

The excellent service rendered by the Weather Bureau during the past year has been recorded by its chief in the report which he has just submitted to the Secretary of the Interior. The Bureau and its staff have time and time again demonstrated their usefulness, notably during the Galveston hurricane, one of the most destructive tornadoes that ever swept the country.

The work of the year has been more or less a continuation of that previously begun. Better means for obtaining ocean forecasts by international co-operation have been obtained. Three additional forecasting districts have been established. The last appropriation bill passed by Congress provides for three additional forecast officials, who are to take charge of these districts. The line of work pursued in previous years by the climate and crop service divisions was continued. Unfortunately, few persons realize how complete is the system adopted by the Bureau for the dissemination of information to the crop growers. Paid and skillful officials to the number of 1,200 outside of Washington report on all matters concerning weather, crops, climate, and statistics; at the central office in Washington 200 officials alone are employed; 180 fully equipped meteorological stations are centered over the United States and its dependencies, each conducted by trained officials; and in every State and Territory a central observatory is located, to which all subordinate officers in the State report, and to which all volunteers give their information. The telegraph circuits of the Bureau have been equipped with ingenious devices for the rapid distribution of daily meteorological reports. Temperature and rainfall reporters telegraph their data daily from the growing fields to certain cotton, corn and wheat centers. Storm-warning display men are stationed along the Atlantic, Gulf and Pacific coasts and in the lake region. A Weather Bureau man is to be found on the floor of every important board of trade or exchange in the country. He publishes weather and crop information, and chart, the weather report on a large map.

Particular attention has been given to the distribution of forecasts by means of the rural delivery. There are now 365 centers. Some 42,000 families in the farming districts are supplied with the latest weather protection. The rural free delivery places the frost and cold-wave warnings in the hands of those who can make the most valuable use of them.

In wireless telegraphy the Bureau has endeavored to secure a more powerful transmitter, a sensitive receiver, and a selective means whereby messages can be differentiated. The first of these problems has been successfully solved; the second is nearing a successful solution; and the third, although well demonstrated

theoretically, has not been fully tested in practice.

The experiments conducted by the grape growers in France and Italy for the purpose of preventing hailstorms, by the use of explosives fired from especially designed cannon, has attracted the attention of the Bureau. It is the opinion of scientists both in America and Europe that hailstorms cannot be prevented by such means. With the experience of a few years ago with our own rainmakers before it, the Weather Bureau sees no reason for expending thousands of dollars in uselessly cannonading the heavens.

Of the minor work conducted by the Bureau, mention should be made of the installation of sixty new storm-warning towers and of the inauguration of the study of meteorology in the schools and colleges of the country.

## COMING AUTOMOBILE ENDURANCE TESTS.

With the advent of spring, the automobilist feels the blood astir in his veins, and is seized with the desire to be out on the roads, testing and enjoying his new means of locomotion. As a result of this, there are to be several endurance runs. The first of them will take place on Long Island on the 26th of this month, under the direction of the Long Island Automobile Club. Steam vehicles, which were last year barred from this run on account of the non-stop conditions, will this year be permitted to enter, since they will be allowed to stop every 20 miles to take on water and fuel. Electric vehicles may be entered under similar conditions. Gasoline machines will be expected to make the 100 miles without a stop, including the climbing of a long hill at Roslyn. Carriages that go through successfully, without a penalized stop, at an average speed of between 8 and 15 miles an hour, will be awarded first-class certificates. The speed must be reduced to 8 miles an hour in passing through towns and villages, and stops made in compliance with the requirements of public safety will not be charged against a vehicle. The maximum speed limit of 15 miles an hour must at no time be exceeded. All gasoline and steam vehicles will have their fuel consumption accurately measured.

The Automobile Club of America will make a 100-mile endurance run from New York to Southport, Ct., and return, on May 30. The contest will be open to steam, gasoline and electric vehicles. The steam carriages will be allowed three stops for supplies. The electric vehicles will be divided into three classes, viz., carriages making the entire 100 miles without a change of battery, carriages in which a change of battery is made at the 50-mile point, and carriages in which batteries are changed twice at one-third and two-thirds of the distance. These are the first endurance runs in which there has been a class for electric vehicles, and it is to be hoped that the manufacturers will take advantage of it to show what their machines can do on long-distance work; for although American-made electrics are the finest in the world, no attempt has yet been made to show what they can do in long cross-country runs. England and France, thus far, hold the record in this respect. To obtain a first-class certificate, vehicles must not fall below an average speed of 8 miles an hour, or at any time exceed the speed limit, which is 15 miles an hour.

A motor bicycle endurance run from Boston to New York will be made by the Metropole Cycle Club of the former city. It is intended to take two days to cover the 200 miles, and the start will be made from Boston on the morning of July 4. The bicycles will be graded in classes according to the horse power of the machines, and they will be run under practically the same rules that obtain in automobile endurance tests. This will be a very interesting event, and will do much toward advancing the motor bicycle in popular favor and showing what it is capable of accomplishing in making a long-distance journey over roads that are not of the best.

Many of the other automobile clubs are planning race meets for Decoration Day. Among others, the newly-formed Hartford Club will have races at Charter Oak Park, in which Fournier is expected to contest. The Springfield, Mass., and the Indianapolis, Ind., clubs are also actively engaged in perfecting their plans for similar meets.

The Automobile Club of America expects to have another 500-mile endurance run in the autumn. The route followed this time will be from New York to Boston and return.

The series of events which are to be held in France this season at Nice promise to be of unusual interest. The principal event is the Nice-Abbazia race. As the necessary permission could not be obtained from the French authorities this year it was decided to hold the annual race in Italy, starting from Nice as tourists until the frontier is reached. The terminal point, Abbazia, is in fact in Austria. Accordingly the Austrian as well as the Italian clubs are greatly interested in the affair, and the King of Roumania, the Grand Duke of Luxemburg, the Prince of Austria, and other persons of eminence who are stopping at the seaside re-

sort of Abbazia will give the chauffeurs a cordial reception. The route will be covered in several stages. Starting on the 8th of April, a run will be made from Nice to Turin, and during the following days from Turin to Padua, and Padua to Abbazia, from where the chauffeurs will have an opportunity to visit Venice, which is not far off. Venice cannot be conveniently reached by automobile on account of the routes. A nautical fête will be held at Fiume, and another at Abbazia. The same route will be followed on the return trip, and at Nice an exposition will be held in which the racers will figure. Another feature is the touring race. A caravan of chauffeurs started from Paris about the first of April to travel via Dijon and Lyons to Marseilles and thence to Nice, where it will join the racers and follow them as tourists over the same route. The touring vehicles will in general be the standard types of automobiles, but a De Dietrich omnibus which holds eight persons has been entered and is expected to cover the whole Paris-Nice-Abbazia and return route.

The Paris-Vienna race, which it was hoped could be run off this summer, has had to be abandoned owing to the failure to obtain permission to run through Bavaria. When the Swiss authorities forbade the race to be run through their country, it was hoped the route could be planned through Bavaria; but since this was the only other way, and as permission could not be obtained, and the race has of necessity been called off. It is hoped that next year a Paris-St. Petersburg race can be arranged.

#### SCIENTIFIC NOMENCLATURE.

A scientist who discovers a new chemical element, a planet that has managed to elude the searching telescope, or a plant or animal unknown to the world, has the right to name the object discovered. To be sure the privilege is merited, but what racking of brains it often entails was recently proven by the difficulty which Charlois of Nice experienced in baptizing the thirty-four planetoids which he had discovered. When Piazzini on New Year's day of the nineteenth century saw the first of these small planets, it was easy enough to follow the old rule of giving to celestial bodies the names of the Greek and Roman deities. For a long time the catalogue of mythological personages was quite capable of supplying the necessary names. But when celestial photography relieved the astronomer of much of the labor of telescopic observation, and the planetoids began to be numbered by hundreds, the list of mythological names was soon exhausted. Following the example of the Romans, Charlois personified the virtues, and thus created Amicitia, Fiducia, Modestia, Gratia, and Patientia. When he had no more virtues to fall back upon, he started with the city gods of those towns in which observatories are located, and was finally compelled to adopt proper names such as Ursula, Cornelia, Malusina. Charlois did not even shrink from giving some of his astronomical children the names of Charybdis, Industria, and Geometria. Not so long ago, Dr. Schwassmann, of Heidelberg, who in conjunction with Prof. Wolf discovered six planets, used the names Ella, Patricia, Photographia, Aeternitas, Hamburga, and Mathesis.

At one time it was suggested that the planetoids be simply designated by number. Had that suggestion been followed, every one would immediately know the order of discovery.

When the spectroscope revealed the existence of a host of new chemical elements, some patriotic but ill-advised chemist found it necessary to nationalize the new bodies, with the result that our chemical nomenclature has been enlarged by the names Gallium, Germanium, Skandium, and Polonium.

When we enter the field of botany, the baptismal task becomes positively appalling. The efforts expended by Linnaeus or Ehrenburg in finding names for thousands of new organisms must have been enormous. Even Haeckel had to coin names for a few thousand organisms which he was the first to describe.

When it becomes necessary to rechristen a botanical species which has been divided into several new species because later research proves it to be heterogeneous, and which bears the name of its discoverer, baptizing becomes a rather puzzling matter. Out of scientific piety the later investigator must give the first discoverer credit, and yet he must do himself justice. In such a case anagrams are sometimes formed. From the species *Hermannia*, for example, discovered by Paul Hermann, a small group is separated and called *Mahernia*; and the species *Malpighi*, named for a famous old botanist, supplied the species *Galphimia*—a name which would deceive the most skilled etymologist who tried to trace its derivation without knowing its antecedents. Often by some capricious accident an anagram receives a Greek tone. Urobenus, for example, conceals the name of the botanist Bourne (Bournerus).

Cassini used the anagrammatic method, not for reasons of scientific piety, but merely because he liked it. From the old species *Filago* he created four new species which he called *Logfia*, *Gifola*, *Iglofa*, and *Ogilfa*. Adanson is said to have resorted to the method

of throwing dice to coin a new name. No doubt each die bore at least two vowels; otherwise the names would have been charged with consonants to such an extent that only a Russian or Hungarian could pronounce them.

#### A BRIEF HISTORY OF STREET GAS.

The beginning of the last century was marked by an invention which, although of no apparent promise at first, did much to change our methods of illumination. The invention in question was the industrial production of gas from vegetable and mineral fuels, and was the culmination of a series of investigations instituted by the French engineer Philippe Lebon d'Hambersin, whose name is now almost forgotten.

Combustible gases were known before Lebon's day. The existence of gaseous fluids was known, even to the ancients, notably atmospheric air. Other gases were recognized by their effects upon various bodies. Carbon dioxide, for example, was a familiar gas by reason of its destructive effects; combustible marsh gas was also known. Coal-mining, with which mankind has been more or less familiar for thousands of years, undoubtedly revealed combustible gases; but since there were no means of ascertaining the chemical nature of these gases, they were simply regarded as modifications of ordinary air, which had acquired new properties.

Van Helmont was the first who discovered the existence of gaseous fluids of constant chemical composition—fluids which were to be sharply distinguished from ordinary air, and which he called "gases." The name applied by Van Helmont to these fluids is still used to-day in modern chemistry. In the Philosophical Transactions of 1667, a spring in the vicinity of Wigan, Lancashire, is described from which inflammable air arose. In the volume of the Transactions for 1733 a gas is mentioned, which was produced in a coal mine in Cumberland, and which was collected in a vessel in such a manner that it could be ignited by means of a burner-pipe.

Nothing more was done to ascertain the nature of these combustible gases until Dr. John Clayton distilled hard coal in a closed vessel and obtained a black oil and a constant gas, which latter he collected separately in a closed vessel, from which burner-tubes led. An account of these experiments may be found in the Philosophical Transactions for 1739.

After a series of experiments with vegetable material, Dr. Hales found that fully a third of a distillate of oil was lost in the form of an inflammable vapor.

Watson, Bishop of Llandaff in 1767, studied the nature of this vapor and of the gaseous products of the distillation of coal. He found that the volatile product could be ignited, not only as it was discharged from the distilling apparatus, but that the inflammable properties were preserved even after the gas passed through water and through two long coils of pipe. Watson's constant products were obtained from ammoniacal fluids, from a viscid, tar-like oil, and a spongy coal which we now call coke. These were only laboratory experiments, for the purpose of determining the constituents of the oil. No one dreamed of practically using the volatile inflammable products.

The first investigator who laid claim to the discovery of illuminating gas was undoubtedly Philippe Lebon. The idea of using carbureted hydrogen gas for illuminating purposes seems to have had its birth in Paris in 1786. But the laboratory experiments made in England and France up to the year 1799 yielded no practical results. In the year VIII. of the Republic (1799) Philippe Lebon, who at that time was well known for his improvements in steam engines, described an invention for the utilization of inflammable gas as an illuminant. Lebon generated his carbureted hydrogen gas by distilling wood, obtaining as a by-product tar, wood alcohol and all the other substances found in a retort after the destructive distillation of vegetable material. The first carbureted hydrogen apparatus was installed at Havre for the illumination of the lighthouse. In the same year Lebon took out a patent on his invention. He exhibited his apparatus at his house between 1799 and 1802. The odor of illuminating gas, when it first comes out of the retort, is by no means agreeable. Frenchmen, therefore, immediately condemned the new system of illumination.

In order to overcome this objection as well as others, and to make the invention of Lebon more practicable, it was necessary to wash the gas. Had Lebon not died in the midst of his labors, he would undoubtedly have devised a method of ridding the vapors of some of their impurities. His widow in the year X of the Republic received a patent on an improved process. She died soon after her husband.

Lebon's memorial was published in 1801, and bore the title "Thermo Lamps or Stoves, which Heat and Light Cheaply and which generate Power, useful for all Machines." Lebon's invention was developed in England, and was first practically utilized in that country by an engineer named Murdoch, in Soho, near Birmingham, at the large factory of James Watt, the inventor of the steam engine. In 1802 the entire façade of this large building was illuminated by gas

in honor of the peace of Amiens. Shortly after this event a German named Winsor, who had translated Lebon's memorial into German, came to London, collaborated with Murdoch, and received from King George the exclusive privilege of lighting London by gas. On July 16, 1816, his privilege was confirmed by Parliament; and by 1823 England had adopted gas.

After Winsor had assured himself of the success of gas illumination in England, he went to France in 1815, rented an establishment in the Passage des Panoramas, and in a short time had the whole Passage lit by gas as well as the Palais Royal. After these successes, Winsor succeeded in founding a company, which was, however, by no means successful. Other companies soon followed, and in a short time gas became one of the most widely used illuminants.

Lebon was born in Brachay (Departement Haute Marne) in May, 1767. He studied in Paris, and graduated from the Ecole des Ponts et Chaussées. As we have already remarked, his first scientific successes were achieved in the field of steam engineering. His improved steam engine received a prize of 2,000 livres in 1792. Lebon was murdered on December 2, 1804, under circumstances that have never been cleared up.

#### SCIENCE NOTES.

The firm of E. I. Du Pont de Nemours & Co. is celebrating the centennial anniversary of the establishment of its powder industry in the valley of the Brandywine near Wilmington, Del., where it is still in operation. In recognition of the event the firm is issuing a brochure giving a sketch of the works' very interesting history.

The University of Pennsylvania recently came into possession of what is regarded as the oldest piece of writing in the world. It is not a manuscript, but a fragment of a vase which was broken in the raid on the ancient city of Nippur. The inscription is in picture writing, and indicates that the piece dates back to forty-five hundred years before the Christian era.

Dr. J. H. T. Stempel, of New York, who has lived in Manila for a considerable period of time during Spanish rule, has prepared the first Tagalog grammar and a complete English-Tagalog and Tagalog-English dictionary. The manuscript is about ready for the press. Dr. Stempel has embodied in his work not only the Malayan roots of the various Philippine dialects, but also Spanish derivatives that have been adopted by the natives during the Spanish rule of three centuries. The book will probably be very useful to American officials and military men whom duty calls to the Philippine Islands.

MM. Berthelot and André state that the intensity of the acid reaction of the sap is not a certain test for the amount of acid present, the proportion which exists in the form of neutral salts being very variable. The sap of plants has most commonly an acid reaction. According to M. Astruc the maximum amount of acid is always found in the youngest part of the plant; it is connected with the vigor of growth and the activity of cell division. Thus the acidity of the stem increases toward the apex. The leaves contain more acid than the stem, and the largest amount is near the zone of most active growth. The acidity of the flower decreases from the bud-condition up to the period of complete expansion.—Comptes Rendus.

The stunted trees and shrubs of the Japanese have been the wonder and envy of gardeners the world over. But a German chemist now comes along and does something which even the Japanese could hardly be expected to do. He has prepared a fluid that has the power, when injected into the tissues of a plant, near its roots, of anesthizing the plant. As a result of this injection, the plant does not die, but stops growing, maintaining its fresh, green appearance, though its vitality is apparently suspended. Changes in temperature seem in nowise to affect the foliage, for the plant blooms in the open as well as in the most carefully constructed hothouse. As might be expected, the composition of the fluid is shrouded in the greatest mystery.

While M. Santos-Dumont was inflating the balloon of his No. 6 airship at Monaco, he was commanded by the authorities to cease immediately the process of hydrogen making, on account of the extraordinary effect that the drainage of refuse acids and chemicals into the bay was having on the water, which had turned a brilliant orange, and which it was feared might have an injurious effect on residents near the sea front, besides poisoning the fish. Subsequent investigations of the curious phenomenon, however, proved that the refuse sulphates running from the Dumont gashouse into the sea had, on contact with the chloride of sodium or common salt of the ocean, precipitated enormous quantities of oxide of iron. This pure rust had dyed the waters and the shore a most brilliant orange carmine, but except for this no harm was done. Beyond acting as a tonic for the fish, the rust was absolutely innocuous, and the work of inflation was forthwith resumed.