THE GRANT MONUMENT.

The accompanying picture is from a recent photograph, and illustrates the present condition of the work on this imposing structure, of which the corner stone was laid with so much state and solemnity in the spring of 1892. The magnificent location of the monument, at the north end of Riverside Park, on beautifully laid out grounds high above the river, renders it a conspicuous object from all parts of upper New York, as well as from Long Island Sound to the eastward, from far down the bay to the south, and over quite an area of the territory of New Jersey to the west, so that the progress of the work upon it has been, from the first, an interesting subject of general observation and concern.

The lower portion of the monument is 100 feet square, its four sides facing the points of the compass, and the main entrance being on the south side. Its height from the base line will be 160 feet, or nearly 300 feet from the water level of the Hudson River. Over four of the six Doric columns forming the entrance will be equestrian statues of four generals who commanded under Grant, and the monument is to be surmounted by an appropriate statue or group. In front of the monument will be a colossal equestrian statue of Gen. Grant, and in the entablature over the portico will be worked the coats of arms of the several States, designs of weapons and flags being worked into the cornices above. The pyramid at the top ascends by steps or terraces, and below it are windows through which visitors may look from the inside, an outer gallery being 130 feet above the ground line, and the extreme top being reached by steps above this gallery.

The design is the work of John H. Duncan, of New York City, who designed the Soldiers' and Sailors' Memorial Arch at the entrance of Prospect Park, Brooklyn. For the entire work velunteer subscriptions have been made by the public to the extent of about five hundred thousand dollars, the last three hundred and fifty thousand dollars having been raised by the energetic work of the Grant Monument Association, under the able direction of its president, Gen. Horace Porter.

THE GRANT MONUMENT APPROACHING COMPLETION.

Aerial Flights.

Elaborate experiments in aerial locomotion are in progress at Dune Park, Northern Indiana, near Lake Michigan, under the direction of Mr. Octave Chanute. The experiments began two months ago. Since then the machines have been reconstructed. Mr. A. M. Hering is assisting Mr. Chanute, and has invented a regulator, which is attached to the apparatus. Beginning September 1, a large number of flights have been made without a bruise or a break. A distance of 300 feet has been covered, at the height of say 30 feet from the ground, with less jar and shock than a ride in a rubber tired carriage. Two men carry the apparatus up the sand hill. At a height of 35 feet up the machine is lifted, and Mr. Hering fits himself under it and allows the wind to raise it. His arms fall over the bars provided. He makes two or three quick steps toward the lake, and the machine soars from the ground and darts through the air with a velocity described as rivaling that of an express train. The motion is horizontal, without any swaying motion. To stop the machine, the operator moves his body enough to tilt the apparatus slightly upward in front, when it coasts gradually and slowly to the ground. The experiments of September 10 were considered unusually favorable, because made under somewhat adverse conditions. In a strong wind the aeroplane soared suddenly and unexpectedly, carrying with it four operators who were holding the ropes, and lifting them 100 feet into the air. The combined weight of the four brought it down again soon, without accident; while the performance of the machine in this emergency was peculiarly gratifying to the inventor. The apparatus is modeled after the general form of an albatross, but has seven wings.

Fluorescent Screen for Roentgen Rays.

R. W. Buttemer gives the following instructions for making a fluorescent screen: Brush over a piece of black card with gum, and sift the salt over it. I have used this method with calcium tungstate (scheelite); but this salt, though brilliant, phosphoresces as well as fluoresces, thus giving a foggy image after a few consecutive trials. Or, mix the powdered salt with collodion (flexible, i. e., containing a percentage of castor oil), and coat the card or aluminum foil with it. I have found this method most successful with barium platino-cyanide on aluminum foil. Or coat the card or foil with dilute flexible collodion, and sift the salt over it. I have used this method with Melckebeke and Van Heurck's fluorescent salt, which appears to be an organic salt of uranium. But in all cases success depends on finely powdering and sifting the (carefully dried if necessary) salt. I use 120 to the inch.—Photography.

A Voice from Colorado.

The SCIENTIFIC AMERICAN of October 10 contains a very interesting and finely illustrated article on "Tall Buildings of New York." Besides giving reasons for their erection, and much additional matter concerning their use and cost, it presents a table of acreage covered by them, from which we glean that there are over 87 acres of floor space above the seventh story, 1¼ acres above the twenty-third story, and 0·02 acre on the twenty-ninth floor in that city. The tallest building is in Park Row—387 feet; six stories above the pinnacle of the spire of Trinity Church. The SCIENTIFIC AMERICAN, by the way, is one of the most entertaining, as well as instructive, papers in the United States.—The Herald, Eaton, Colorado.

Curious Inventions.

Take out inventive genius, says the American Artisan, and this would be a sorry world. A mere enumeration of some of even the lesser wonders that a wave of the magician's wand of Yankee ingenuity has given the word is full of suggestion. Here is a little wrinkle of invention that is simplicity itself. The larvæ of nocturnal moths have always been a bete noir to apiarists, as they have a great predilection for honey and young bees. Automatic machinery run by clockwork for opening and closing these hives would be quite expensive. Inventive genius tackles this problem and finds a ridiculously sinple solution. When the hens go to roost, their weight on the perch may be utilized for actuating a mechanism which shuts the doors of the beehives. When the shrill chanticleer welcomes the dawn of another day with his cock-a-doodle-do and the hens fly down to go worm grubbing, the doors of the beehives open again.

The two little strips of cork on the nose pieces of eyeglasses make them vastly more comfortable, as many of us can personally testify, yet optical science had shaken off her swaddling clothes for quite a number of years before the cork strip came forward.

Other inventions that we have noted from a perusal of that most interesting volume, the Patent Report, are artificial hens' eggs, where shells are made by a blowpipe from a moist composition of lime and gypsum. The whites are made of sulphur, carbon and beef fat, and the yelks of beef blood and magnesia colored with chrome yellow. May we be delivered, exclaims the Artisan editor, adding, the good old-fashioned hen egg is good enough for us.

A month or two ago a patent was issued to a man who had a hat-raising contrivance. By contracting the brows your hat would be automatically lifted in case you met a lady acquaintance. For armless men this might be a good thing. Another inventor wants to go the Takamine process one better and give us a seaweed whisky. If that would not make us see sea serpents, I don't know what would.

If another patented scheme works all right Oklahoma gentlemen won't make work for the St. Louis and Chicago coroners any more by blowing out the gas, as the breath tilts a delicately balanced electrode and gives an alarm in the office of the hotel. There is a pneumatic sole for shoes to lessen the jar of walking, and a process has been patented for weaving textile fabrics from thread spun from peat. A talking watch contains a miniature phonograph and cries out the hour when the stem is pressed. The idea of punching pin holes in eggs to keep them fresh by supplying the contents with fresh air has been patented. A washable paper, from which writing in ink may be removed after the lapse of any time, is made of rag pulp, glue and asbestos. The manufacture of it has been forbidden in Germany, because it might help fraud. Another patent is for making gold leaf so thin that four million sheets are required for an inch thickness. This sort of gold leaf is deposited by electricity on sheets of copper and is quite transparent.

MR. C. A. MITCHELL reports in the Analyst the results of an analysis of human fat, according to which it consists of about seventy per cent of liquid acids, principally oleic acid, thirty per cent of solid acids, probably palmitic, with small amounts of stearic and myristic acids, and traces of lower volatile acids.

How to Prolong Life.*

As the question of food enters so largely into the subject of long and healthy life, some suggestions seem called for in regard to what may be considered most suitable for persons of sixty and upward. It has been urged that a return to nature, or to the food which primitive man nourished his body upon, would be the right thing to do. Fruits and nuts appear to have been his dietary, and not flesh and vegetables. Oranges, apples, grapes, figs, bananas, dates, prunes, peaches, and, in fact, all kinds of sweet fruits and tomatoes are good, because they are deficient in nitrogen and free from the earth salts of other kinds of food. Starchy foods are more difficult to digest than fruits and meats. Nuts, such as almonds, Brazil nuts, filberts, walnuts, hickory nuts, and similar products abound in nourishment and furnish the necessary heat for the body. Eggs, fish, cheese, milk, especially buttermilk, and poultry of all kinds supply variety. Starch foods are clogging to the system, producing constipation. Invalids are always put upon toasted bread, because the heat acting upon the starchy portions turns it into dextrine; this, being changed to glucose by the action of the stomach, is easily disposed of. Glucose is the sugar of nature as found in ripe sweet apples and in honey.

Tea, coffee, wine, and beer, as well as all alcoholic drinks, are to be taken in extreme moderation, as they are mere stimulants and have no nutriment, or at least very little. Milk is a better drink. As every one knows, if you eat slowly, you do not need to drink at all. And that is one of the great advantages of a fruit diet. You get enough of the best quality of water distilled by nature in the fruit, which is also aperient and cooling to the blood, already too much heated by starchy foods. Exclusive vegetarianism seems to be injurious to the human system. But people who advocate a diet of fruits and nuts, omitting starch foods and too much bread, are not vegetarians; for they get the heat and strength necessary for health from nuts, lean meats, lamb, veal, and young animals whose systems have not had time to get clogged with the objectionable earth salts. If fresh fruit cannot be obtained at all times, dried figs, raisins, and dates can be steeped in hot water and thus brought to an almost fresh condition. As for whole meal or Graham bread, the merit that it may have is offset by its irritating effects upon the stomach and intestines, produced by the indigestible bran particles. Sugar furnished by nature in the form of glucose is ready for assimilation; on the contrary, sugar from cane, beets, maple, and sorghum is insoluble by the system until it has undergone the process of digestion, both in the stomach and the intestines. Now, as salt, pepper, and all irritants, as well as stimulants, are goads to the nervous system, the human body, if treated naturally, does not require them. Animal instinct indicates the law of nature. Since Cuvier's time zoologists have been telling us that man belongs to the frugivorous animals. He is allied to the manlike apes, which live entirely on nuts and fruits, never eating other animals or cereals.

Dr. DeLacy Evans in his book "How to Prolong Life" gives over twenty pages to tables of analyses of foods. As compared with the nourishment they give, fruits and nuts have the least proportion of earthy salts. Animal flesh comes next, then vegetables, and fourth in rank we have cereals and pulses, which are shown to have the largest amount of the earthy matters. From the analysis we see that fruits as distinct from vegetables have the least amount of earth salts. We also notice that they are to a great extent free from the oxidized albumens — glutinous and fibrinous substances; and many of them contain acids—citric, tartaric, malic, etc.—which when taken into the system act directly upon the blood by increasing its solubility, by thinning it; the process of circulation is more easily carried on and the blood flows more easily in the capillaries—which become lessened in caliber as age advances—than it would if of a thicker nature. These acids lower the temperature of the body and thus prevent the wasting process of oxidation or combustion in the system. Rice is easily digested and an excellent food, except that it abounds in earth salts. Fruits are not only digested in the first stomach, but they have a large part of their nourishment already in a condition to be absorbed and assimilated as soon as eaten. The food elements in bread and cereals have to undergo a process of digestion in the stomach, and then be passed on to the intestines for a still farther chemical change before they are of use to the human system. This is the great advantage of a diet of lean meats and fruits.

Overwork is not expected from a stomach already jaded, and the nervous wear and tear of the organs of life are avoided. Distilled water should always be used both for drinking and cooking, if it can be obtained. Rain water, if filtered, is perhaps the next best, though not free from objections. Grapes, say numerous authorities, act very much like mineral waters on the human system. But they are better, because at the same time they nourish the body. Nutrition is increased, secretion promoted, action of the liver, kidneys, and other excretory organs improved, and the phosphoric acid, of which they contain a considerable amount, acts favorably on all the bodily functions, especially on the brain. As is well known, the sugar of the grape requires no digestion, but is taken almost at once into the blood. Dextrine from the grape promotes the secretion of pepsin and thus favors digestion. Most of the vegetarians eat grapes, though they may prefer pease. Stimulants often assist digestion, but that digestion is best which does not need them.

* William Kinnear, in the North American Review, August. Condensed for Public Opinion, from whence our copy.

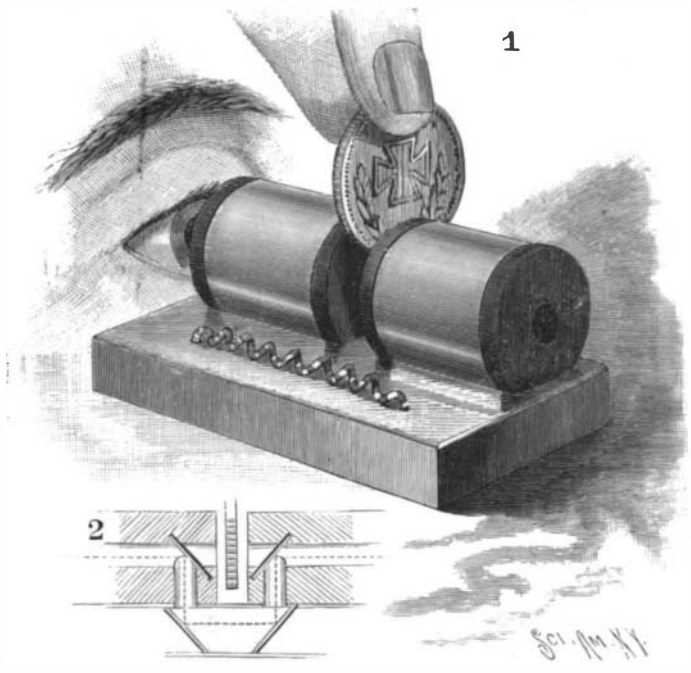
BULLETS FUSED BY IMPACT.

Mr. H. L. Bridwell, of Cincinnati, sends us an interesting photograph, which we reproduce. He says: "This is a ball from a Springfield rifle pierced by a ball from a Krag-Jorgensen rifle (the new army magazine gun), and was picked up by Lieut. B. W. Atkinson, 6th U. S. Infantry, on the army rifle range near Ft. Thomas, Ky. (near Cincinnati). The large ball was buried in the turf during rifle practice about three years ago, and has been struck and pierced by the steel-jacketed nickel-plated bullet of the new rifle, which has fused the two together by the heat.

AN OPTICAL ILLUSION.

The simple toy illustrated in the engraving has printed on the underside the rather high sounding title "X Ray Machine. Wonder of the age!" But it is neither an X ray machine nor a wonder. It is simply a reduced copy of an ancient trick. The two cylinders mounted on the base with a space between them are perforated axially and are supposed to represent coils. When the eye is applied to the end of one of these cylinders, objects may be clearly seen through them, and when a coin is slipped between the ends of the cylinders as shown in the cut, it offers no obstruction to the light. Objects can apparently be seen through the coin. Fig. 2 affords an explanation. The hole in each cylinder is intercepted by a mirror arranged at an angle of 45° with the axis of the cylinder, and in the base are two mirrors arranged parallel with the first two as shown. A hole extends downward from the central hole of each cylinder, so that light entering at one end of the machine is reflected downward at right angles by the first mirror, thence forward by the second mirror to the third, which throws it up to the fourth mirror, by which it is reflected to the eye. It will thus be seen that the light never passes entirely through the cylinders, and the observer does not see through but around the coin.

The old device which preceded this was on a much larger scale, and was generally used in connection with a brick, which, of course, had the same transparency as the coin.



X RAY MACHINE WITH NO X RAY.

Street Railway Association.

The fifteenth annual meeting of the American Street Railway Association began at St. Louis, Mo., October 20. The Auditorium was used for the convention, and all of the space not needed for the seating of delegates and visitors was filled with a display of street cars and appliances. Everything pertaining to the business was on exhibition. Necessarily the electrical appliances formed the greatest part of the exhibition, the latest and most novel developments in that line being shown. While electricity dominated everything within the building, the cable men had an exhibit outside which attracted much attention, a mammoth cable being the chief attraction. The papers were of great interest.

The Ocean Mail Service.

Capt. Brooks, superintendent of the foreign mails service, has prepared a statement showing the number of trips made a year by the transatlantic steamers, the average time occupied in each trip and the quickest time made in conveying the United States mails from New York to London and to Paris during the year ending July 1. The number of hours stated does not indicate the time consumed in the voyage only, but the period elapsing between the actual receipt of the mails at the post office in New York and their delivery at the post office in London or Paris.

The statement of the quickest time made by the respective lines is as follows:

Cunard (New York to London, via Queenstown).—Lucania, 11 trips, 157·1 hours; Campania, 12 trips, 158·1 hours; Etruria, 12 trips, 169·5 hours; Umbria, 13 trips, 174 hours; Servia, 2 trips, 201 hours; Aurania, 7 trips, 201·9 hours.

Hamburg-American (New York to London, via Southampton).—Fuerst Bismarck, 7 trips, 170·3 hours; Normannia, 7 trips, 144·7 hours; Augusta Victoria, 7 trips, 178·1 hours; Columbia, 6 trips, 177·1 hours.

White Star (New York to London, via Queenstown).—Teutonic, 13 trips, 170·2 hours; Majestic, 12 trips, 173·6 hours; Germanic, 11 trips, 197 hours; Britannic, 13 trips, 210·4 hours; Adriatic, 2 trips, 232·3 hours.

American (New York to London, via Queenstown and via Southampton).—New York, 15 trips, 172·1 hours; St. Louis, 13 trips, 168·6 hours; St. Paul, 10 trips, 169·7 hours; Paris, 12 trips, 179·2 hours; Berlin, 3 trips, 218·4 hours.

North German Lloyd (New York to London, via Southampton).—Havel, 12 trips, 184·6 hours; Lahn, 10 trips, 183·1 hours; Aller, 9 trips, 190·5 hours; Spree, 12 trips, 186·1 hours; Trave, 8 trips, 191·5 hours; Saale, 9 trips, 196·3 hours; Ems, 5 trips, 199·7 hours; Fulda, 4 trips, 201·2 hours; Kaiser Wilhelm II, 1 trip, 219 hours; Werra, 1 trip, 226·7 hours.

General Transatlantic (New York to Paris, via Havre)—La Touraine, 10 trips, 186·3 hours; La Bretagne, 6 trips, 194·1 hours; La Bourgogne, 12 trips, 199·5 hours; La Champagne, 7 trips, 196·9 hours; La Gascogne, 10 trips, 200 hours; La Normandie, 7 trips, 201·6 hours.

Tidal and Seismic Waves.

Alluding to the recent disastrous storm on the Atlantic coast, the New York Tribune remarks, in relation to what are termed tidal waves in connection with these storms, that they were merely very high and stormy tides, swelled to unusual height and fury by the wind. They inundated low-lying coast towns and swept away some buildings. They differed in no respect save degree from the ordinary tides that daily flow and ebb. Strictly speaking, every flowing tide is a tidal wave, and a mighty wave it is too, as it is seen in such places as the Bay of Fundy, or, still more notably, in the bore that rushes up the Amazon, the Hoogly and other rivers.

The same name has sometimes been applied, with less propriety, to the most dreadful of all ocean phenomena, namely, the waves caused by earthquakes or submarine eruptions. Such was that at Lisbon, in 1755, which rolled up the Tagus forty feet high, and that on the coast of Peru in 1868, which carried the United States warship Wateree a mile and a half inland and left her there, stranded high and dry, and that on the coasts of Java and Sumatra in 1883, when the Krakatoa eruption turned day into night and reddened sunsets all over the world for weeks and months. Such a wave has this year raged upon the coast of Japan with a devastating fury compared with which the "tidal wave" on the Florida coast seems but a gentle summer surf.

According to the official report of the Japanese government, there was no warning of this catastrophe. The barometer gave no indication of trouble. The weather was fair, the sea was calm. A slight earthquake shock was felt, a common enough thing in that part of the world. Then a booming noise was heard a little distance out at sea, swiftly increasing until it was like the roar of a dozen batteries of artillery. Then, in a moment, three waves rolled in, each from thirty to fifty feet high, one close behind the other. Within two minutes all was over. The coast was ravaged for more than 200 miles. A score of ships were stranded far inland; as many towns and villages were wholly swept away, 12,000 buildings were destroyed, and 20,000 lives were lost. Scientists call that a seismic wave, as it truly was, having absolutely nothing to do with the tides, and being caused directly and entirely by seismic disturbance of the ocean bed. From such our coasts are, happily, exempt.