

has been lowered 7 feet, and it is this lowering of the grades on three sides of the reservoir that accounts for the retaining walls that surround it, the earth on the inside of these walls representing the original level of the ground.

The amount of material in the reservoir proper required by the contract to be removed is 106,000,000 cubic yards; but the contract also includes the building of the foundations for the new library, the price for removing the reservoir being \$105,000, and for putting in the foundation \$273,000. As the structure now lies in the very heart of a great city and abuts on one of the most fashionable avenues in the world, the work of removal cannot be done in the wholesale, rough-and-ready methods that would be adopted if it were to be done in the open country. The walls have to be taken down with as little interference with street traffic and as little inconvenience to the residents in the neighborhood as possible. Accordingly, two openings, one into each basin, were cut through the outer walls at the entrances on Forty-second and Fortieth Streets, and through these the contractor's teams are carting out the clay banks and the stone with which the interior slopes and floor are paved. The walls are meanwhile being torn down on all sides, and such of the stone as is suitable is being stored for rebuilding into the structure of the new library. The contract time for removing the reservoir is six months, but it is already evident that the restricted conditions under which the work is being done will delay its completion many months beyond the contract date.

THE LAST ERUPTION OF MAUNA LOA.

BY ENOS BROWN.

After a rest of twelve years the great volcano Mauna Loa, on the morning of July 4, burst forth in magnificent eruption. Previous to this time earthquakes had been frequent, not only in the island of Hawaii, but in the neighboring islands as well. At sea seismic disturbances had been reported by returning vessels, and even as far distant as the western coast of the North American continent, earthquakes of considerable violence indicated a volcanic outbreak somewhere among the active craters in the islands of the Pacific.

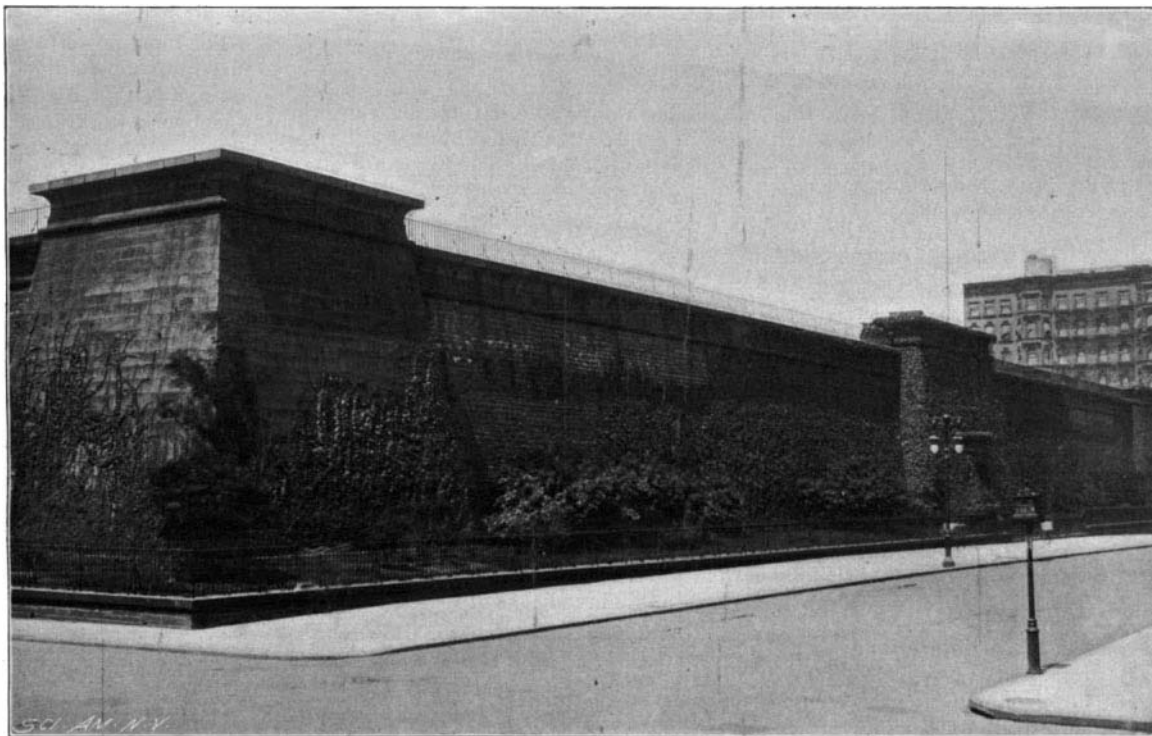
For some days previous to July 4, the craters of Maukua-wéo-wéo, which includes all those in the neighborhood of Mauna Loa, gave indications of an early eruption, and the Volcano House was unusually crowded in anticipation of a chance of witnessing the sublime spectacle. At two in the morning a tremendous explosion awoke the visitors, and looking toward the summit of Mauna Loa it was seen that a new crater, 5,000 feet below the top, had opened, from which great columns of smoke and fire were being ejected, while rivers of lava were flowing down the mountain side.

The eruption was accompanied by tremendous explosions, felt throughout the island of Hawaii. Far above the crater a column of fire, a thousand feet in height, was thrown by internal forces. White heat rocks were ejected and falling back to earth again shook the whole mountain to its base. In less than ten days the river of lava reached a point within a few hours' walk of the city of Hilo, causing immense alarm and dire foreboding. Another stream flowed in an opposite direction

Both were of immense dimensions and moved with great rapidity. Fortunately, after three weeks of the most magnificent demonstrations the violence of the eruptions sensibly abated, and thus a calamity which had every appearance of equaling that which afflicted Hawaii in 1887 was happily averted. Several parties, at great risk, approached the new crater during the eruption and describe the scene as one of sublime power and magnificence.

ejected. In 1855 a stream of lava 3 miles wide, sometimes expanding into broad lakes 8 miles wide, flowed for six months from the top of Mauna Loa, and approached within 6 miles of Hilo. This eruption lasted for 18 months, and 300 square miles were covered. In 1859 a great stream issued from Mauna Loa and flowed 60 miles in 8 days.

In 1868 Kilauea was in a state of violent eruption. One thousand earthquake shocks occurred in five days, and on April 2 a torrent of mud half a mile wide and a hundred feet deep flowed from the crater. The eruption of 1881 was of extraordinary violence, and the lava flow from Mauna Loa approached within fifteen minutes walk of Hilo. It was scientifically demonstrated that the flow of 1881 amounted to no less than 2,200,000,000 cubic feet of lava. Hilo was again threatened with destruction in 1887. It is believed that the volcanoes of Hawaii are diminishing in their power, as the records for half a century or more indicate both a decrease in duration and in violence as well. The view accompanying this article is from the studio of L. L. Williams, of Honolulu, who spent several days at the summit of Mauna Loa during the last eruption.



THE RESERVOIR, FROM JUNCTION OF FIFTH AVENUE AND FORTIETH STREET.

The lava was of about the consistency of oil, and in its course to the lower levels of the mountains flowed with great rapidity—a mountain torrent of fire falling down in blazing cataracts, covered by dense clouds of steam and sulphurous vapor. In places it passed through forests of timber, which ignited and fell into the fiery stream, where they were quickly consumed. Persons who have witnessed all the eruptions on the island for the past fifty years predicted, from the violence which this eruption maintained during its brief continuance, a greater disturbance than those of 1823, 1840, 1852, 1855, 1859, 1868, 1881 or 1887, which are historic.

The first record of Hawaiian volcanic action observed by white men was in 1789. In 1823 Kilauea continued in eruption for three years. In 1840 the bed of the crater of the same volcano sank 300 feet and another one opened lower down, from which flowed a lava stream 200 feet deep, 1 to 3 miles wide, and 30 miles long; and again, in 1852, for 20 days, a column of molten lava, 700 feet high and 300 feet in diameter, was

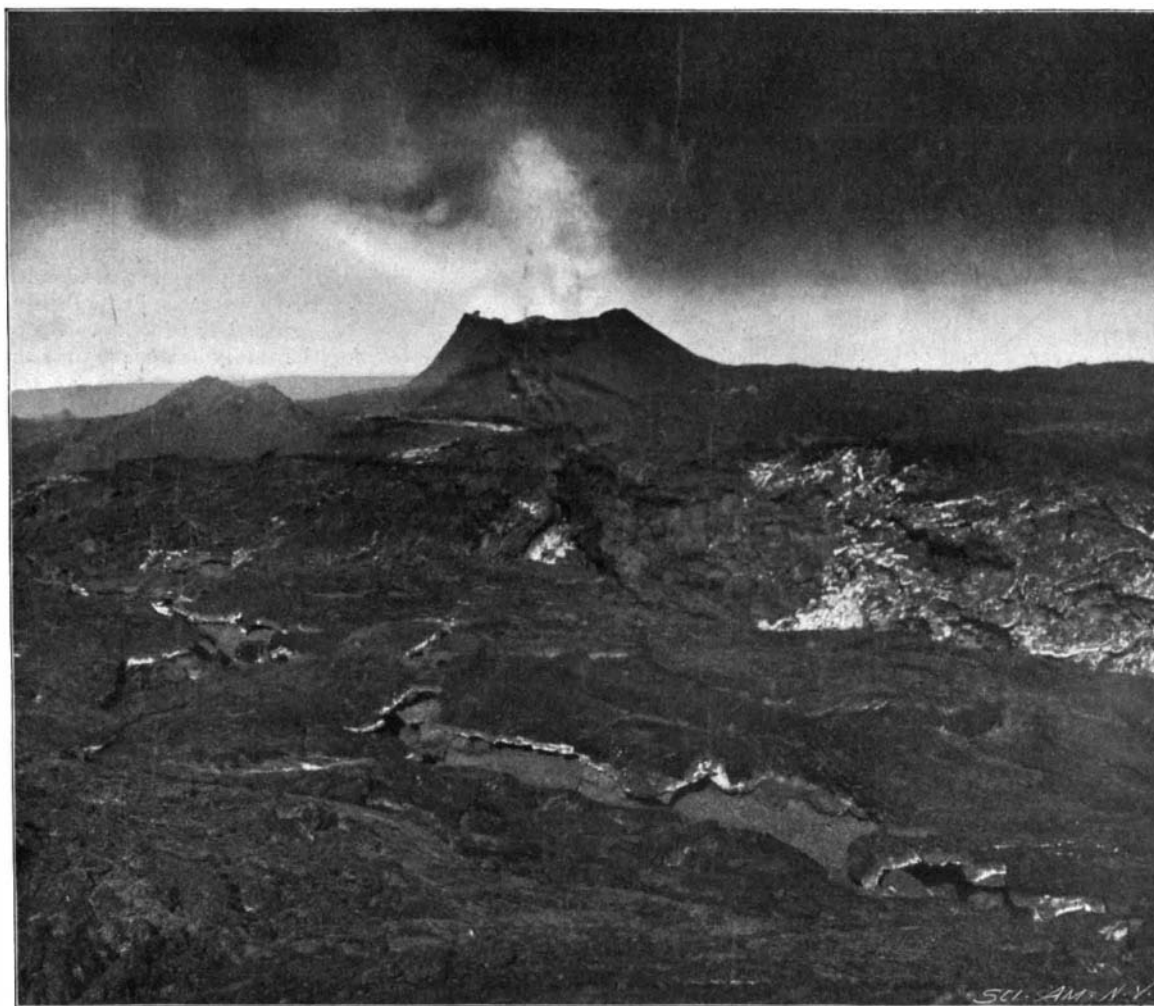
incorporated. According to the articles, the objects of the organization are "to maintain a social club devoted to the spread of automobilism and to its development throughout the country; to arrange for through runs and to encourage road contests of all kinds among owners of automobiles."

On August 19, Mr. and Mrs. John B. Davis reached Detroit. The number of breakdowns which they have had is stated to be twenty-five, and the trip has been abandoned. It would have been interesting to see, if the carriage had ever reached San Francisco, how much of the original machine would be left. So far, the trip has been not a particularly good brief for the American motor carriage. The natural inference is that our carriages are too light for the rough service which is entailed and the badness of many of our roads.

The Paris-Rouen-Dieppe-Rouen race is announced for August 27, and a motor vehicle race organized by the Bavarian Automobile Club has just been run between Innsbruck and Munich, a distance of 173 kilometers. According to The Motor Car Journal, there were eleven starters. The winner, Baron de Dietrich, did the journey in five hours thirty-eight minutes. A motor car race between Berlin and Dresden is being organized in connection with the forthcoming automobile exhibition in Berlin. It will be run on September 18.

THE papyrus plant grows nowhere in Europe with the exception of the banks of the river Cyane in Syracuse, Sicily. It is generally believed that it was introduced from Egypt by the Syracusan rulers in the day of their intimate relations with the Ptolemies, but it has also been suggested that the Saracens introduced it from Syria. An illustration of this remarkable growth appears in the current issue of the SUPPLEMENT.

THE income from the war revenue taxes for the last fiscal year was \$102,617,763; over \$37,000,000 was obtained from stamp taxes.



MAUNA LOA IN ERUPTION.

Science Notes.

Miss Anna Klumke, of California, is a painter of note. Her sister is known all over the world as the holder of an important position in the astronomical observatory at Paris. Miss Anna Klumke inherits all of the property of the late Rosa Bonheur.

It is feared that over-indulgence in tobacco may have a prejudicial effect upon the Latin-American peoples, especially those in South America. According to Prometheus, not only do children of two or three years smoke all day long, but mothers have been seen trying to quiet their babies by putting cigars in their mouths.

In the annual report of Prof. Eliot, of Harvard University, it is stated that Dr. Alexander Agassiz never received any salary for his services to the Museum of Comparative Zoology of Harvard University, though his services have been most important. Between 1871-97 he has expended from his private means three quarters of a million dollars without making any communication on the subject to the President. In addition to this he has made considerable gifts to other University objects.

At the Paris Exposition there will be no lack of curious shows of all kinds. One of them will be a kind of "religious Tussaud's." It will be a retrospective history of the interesting phases of nineteen centuries of Christianity. There will be scenes of old convent and monastic life, and the squire's vigil in the castle chapel on the eve of his knighthood will be accurately portrayed in wax. There will also be missionaries from the Congo, with man-eating negroes and similar things. There will also be a collection of books, etc.

Statistics obtained by sunshine recorders are interesting. Some curious facts have been recently published by the French Meteorological Bureau at Paris. Spain has 3,000 hours of sunshine a year; Italy, 2,700; France, 2,600; Germany has 1,700, while England has but 1,400. The average fall of rain in the latter country is greater than that in any other European country. In the northern part and on the high plateaus of Scotland about 351 inches of rain fall a year, and London is said to have an average of 178 rainy days in the year and fully ten times the quantity of rain that falls on Paris.

Even works of art cannot escape from the psychologist and the medical man. Dr. C. H. Stratz points out some curious symptoms of disease in types represented in works of art. He finds that Botticelli's "Venus," in the Uffizi at Florence, is suffering from consumption and should not be riding across the sea in an open shell, without clothing. It is needless to state that nothing of this kind was ever attempted by the old masters; they selected types which appealed to them and painted them as they saw them, and it is practically time wasted to hunt up hidden meanings in works of art.

Prof. Dr. Emanuel Herrmann has proposed the introduction of a telegram-card, which will undoubtedly be used by the Austrian post office. The idea of Privy-Councilor Herrmann is to cheapen rapid communication by a combination letter and telegram, and special cards are to be used for the purpose. These cards are to be sent at half the price of the ordinary telegram. They may be dropped in letter boxes or may be handed into post offices, provided they are duly stamped. They are picked out at once and the contents, which is no longer than that in the ordinary telegram, is handed over to the telegraph operator, who sends it to its destination. The telegram is written on a special form and delivered by the letter carrier.

Athletes in training require special diet, and the athletic directors of Yale University have decided to make an important change in the system of conducting the training tables. Heretofore every branch of athletics had its own table, conducted separately from the others. This system has proved very expensive and unsatisfactory. Now all athletes will eat at the same table, or at least under the same roof. In the fall only the football players will go to the table. During the winter some of the oarsmen and trackmen will take their meals at it, and in the spring the base ball candidates will be taken to the table. It is probable that students who may not be actively engaged in university athletics may be allowed to attend if they so desire.

The icebergs of the south differ from those of the north as the Antarctic summer differs from the Arctic. This is caused by the difference in temperature between the summer of the Antarctic and the Arctic. This is due to the fact that while the latter region is a polar basin surrounded by vast tracts of land which retain the summer heat, the former is a comparatively small tract of land in a tremendous expanse of water which parts from its heat very quickly. An interesting article upon Antarctic icebergs is to be found in the current SUPPLEMENT, as is also an interesting article on West Indian Hurricanes, written by an eye witness, and no one who has not seen the indescribably relentless fury of a West Indian hurricane can understand what it means.

Engineering Notes.

A railway will be built up the Rax Alp, which is 6,400 feet high.

The statement that a serious accident had happened in a recent test of the Brown wire gun is false. The test was, on the contrary, a great success.

The Baldwin Locomotive Works have shipped 409 locomotives abroad in the year ending August 1, 1899. There are now 6,700 men employed in the works.

The Glasgow Tramway Company has accepted the tender of the Edward P. Allis Company, of Milwaukee, for the engines for its new power plant. The order amounts to about \$570,000.

Aneroid barometers may be used to measure the depth of shafts in mines, provided a number of trips are made and the average taken. The car is not stopped at intermediate points.

The League Island dry dock, which was built only some eight years ago, is now being repaired. The workmen found on examination that the Southern yellow pine in the part below high tide was even more decayed than was expected.

The figures given in the London Coal and Iron Trades Review show that of the world's pig iron product of 1898, 78½ per cent was converted into steel. In 1868 only 4 per cent of the world's pig iron product was applied to the manufacture of steel.

A test has been made with glasses which were intended to detect the presence of smokeless powder. The test was made under the direction of Col. Phipps. If the glasses had proved successful it would have been one of the most valuable inventions of recent years.

In his annual report Naval Constructor Bowles recommends the erection of a new stone and concrete dock at the New York navy yard. He strongly urges the removal of a part of the Cob Dock, and the construction of eleven piers extending out into Wallabout Channel.

Many of our readers are doubtless troubled with the waste of oil in the ordinary oil can. The Clay Record recently published an interesting wrinkle for avoiding this which, while not new, may not be generally known. File the end of the oil can spout off at a bevel. You can then slip it under the lids of the journals without touching them with the hands, and the stream of oil can be carefully directed.

Members of the Engineering Corps of the United States Army have cleared the Pasig River of a number of stone-laden canoes which were sunk to close the channel. The total value of the property recovered by the engineers is estimated at \$750,000. Maps and topographical sketches of the country around Manila were made for the use of the army commanders, and the surveys were frequently made under fire.

The Holland submarine torpedo boat has been again tested in Little Peconic Bay. Torpedo trials were made as well as a test for speed and submergence. The torpedo was a dummy of the small Whitehead type and was blown from the tube by air pressure and was taken in a straight line for about 75 feet. There was hardly any disturbance in the water from the discharge of the torpedo, only a few air bubbles showing on the surface near the bow of the boat.

A Southern railway company is preparing to convert all of its dining cars into combination cafe and table d'hote compartments. It is thought that this plan will be popular, as some people prefer table d'hote, while others only wish a light repast and care to pay for only what they eat. On some Eastern roads it is almost impossible to obtain anything to eat on a long journey without taking a dinner in the regular dining car, and while the service is nearly always excellent, the food is sometimes indifferent.

The engineer who has charge of the survey for the proposed ship canal from the Great Lakes to the Atlantic Ocean has completed his preliminary work. The project is to cut a canal 30 feet deep and 340 feet wide from Lake Erie to Lake Ontario around Niagara Falls; then leaving Lake Ontario at Oswego, the canal will take the course of the Oswego River to Oneida Lake, and then through the Mohawk River to the Hudson River. The locks will be 1,000 feet long with walls 50 feet high. The most important problem connected with this project is to find storage for water to feed the great canal and not injure the water supply of manufacturing concerns.

Dr. Cleveland Abbe, in a recent lecture before the Franklin Institute, in speaking of the evolution of invention, said: "It is not science, or study, or art, it is simply a happy accident that brings to someone's mind two thoughts that are suddenly seen by the inventor to have an important relation to each other hitherto unsuspected. Those nations and individuals who are unfortunate as to climate, soil, vegetation, minerals, water power, etc.—those who have neither stimuli nor opportunities—did little. In proportion as we today associate ourselves with the highest science we bring forth the best inventions and manufactures. Prof. Abbe's interesting and scholarly lecture is given in full in the current SUPPLEMENT.

Electrical Notes.

A few of the relics of Volta were saved from the disastrous fire at the Como Exposition. These include the original Voltaic pile, some letters, a few books from his library, and about fifty drawings, paintings, and medals.

The destruction of the Como Exposition has created a strong feeling among most of the scientists of Europe that hereafter important documents and apparatus relating to the history of science or to one man should not be placed under one roof.

The most powerful incandescent lamp ever manufactured was shown at a recent electrical exhibition. The lamp has two filaments in parallel. The lamp bulb was over two feet long, and it succumbed after three nights' work to the heat of the filament, which is said to have softened the glass at the neck.

Philadelphia will present the city of Paris with a statue of Benjamin Franklin, for the exposition. This will be a duplicate of the one in Philadelphia, which we illustrated a few weeks ago on the front page of the SUPPLEMENT. It is intended to place the statue in Passy, where Franklin resided when he was Minister to France from the United States.

An American electric manufacturing company has been awarded the entire contract for the equipment of numerous electrical plants which will be installed along the line of the Eastern Chinese Railroad. It will consist largely of temporary lighting plants. It is thought that ultimately \$200,000 will be involved in the contract.

Niagara Falls is to be illuminated by electricity during the coming Buffalo Exposition. The idea is to erect a series of tall poles on both the American and Canadian sides of the river. On top of them will be placed search lights, and the colors of the lights which are thrown on the Falls will be constantly changed. Arc lights will also be placed in the Cave of the Winds, which will give to the water which falls in front of it a weird phosphorescent color. The current is to be obtained from the Falls itself.

Prof. J. E. Woodland, of the University of Worcester, Ohio, sends us an interesting account of the removal of a broken steel drill from the bottom of a well on a farm. An electro-magnet was constructed in the university laboratory and 600 feet of insulated wire was secured for the connection. The magnet was constructed of soft steel rod 1¼ inches in diameter and 3 feet long. It was wound with four layers of No. 12 wire leaving 4 inches of the end of the rod bare. A current of 6 amperes was maintained while the magnet was in the well and a voltage of 25 was obtained from storage battery cells. The pieces of the broken drill were satisfactorily removed.

In Germany the theft of electricity is evidently not considered a crime, for in a recent appeal which reached the Supreme Court, the court held that those properties are wanting in electricity which would be necessary to constitute it a movable object in the sense of the law, and electricity must be reckoned as one of the energies of nature, like light, sound, and heat. The laws relating to larceny provide only against the theft of movable bodies, and therefore would be considered inapplicable in this case. Three mechanics secretly attached wires to the circuit in the house where they lodged, and thus had their room lighted without expense. They were sentenced, and the case was brought to the Supreme Court, with the result which we have noted.

French barbers are very progressive. According to Electricity, a Paris barber shop has recently been equipped with a most elaborate electric plant. The water is heated electrically by means of a German silver tube in a soapstone case. The tubing is electrically heated, so that the water is nearly boiling when it passes out of the faucet. The curling irons, which often used to burn the hair, are no longer used for curling. The electric curling irons which take their place can be brought to any temperature, which they retain indefinitely. The hair is cut by clipping machines actuated by electricity; electrical devices are also used to singe the hair, which are much better than the time-honored taper. For singeing the comb a platinum wire is used.

The western half of the underground trolley system of New York city was tied up for several hours on August 23, owing to a bad storm. The subway at Canal Street and West Broadway, through which runs the wires feeding the section of the line below Canal Street, became flooded, the wires burned out owing to their immersion, and left the cars without power to operate them. When the trolley system was first constructed the engineers had great difficulty at this point on account of a sewer which the lines had to pass at this point. The subway lies below the sewer and the stagnant water has been collecting since the construction of the subway. It did not make its presence felt until the date noted, when it obtained a sufficient depth to cover the feed wires and burn out the fuse. Horse cars were put on to enable passengers to make the rest of the trip. Men at once began to drain the conduit.