

REMOVAL OF A FAMOUS ENGINEERING LANDMARK.

There is now in course of removal one of the most famous engineering landmarks in New York city. The Murray Hill, or Forty-second Street, Reservoir, as it is more popularly known, was erected as part of an elaborate scheme of water supply which was inaugurated and successfully carried through some fifty years ago. At that time the population of New York was about 350,000 souls, and as the existing means of water supply was growing inadequate, it was resolved to build a system which should anticipate the future growth of the city and meet its ever-enlarging needs for many a decade to come. Accordingly, the engineers went some forty miles up the Hudson River, and turning eastward up the valley of the Croton River, selected the Croton watershed as the future source of water supply for the metropolis. At a point about six miles from the Hudson they threw across the valley the Croton Dam, thereby creating a reservoir with a capacity of 1,000,000,000 gallons. From the dam the water was led by the famous "old aqueduct," which when running full has a capacity of 90,000,000 gallons per day, and when filled to its ordinary level carries about 75,000,000 gallons. Upon the high land at Central Park a storage reservoir of 200,000,000 gallons capacity was constructed, and from this the water was led by two 36-inch mains through Fifth Avenue to the slight eminence known as Murray Hill, where the reservoir which forms the subject of this article was constructed, with a capacity of 21,000,000 gallons. From Murray Hill the water was conveyed in two 36-inch pipes down Fifth Avenue to Twenty-third Street and thence to Broadway. The two mains ran down Broadway to Fourteenth Street, where they separated, one continuing beneath Fourteenth Street to and down Avenue A and the other continuing down Broadway to the lower city. Such was the water system as laid out and built

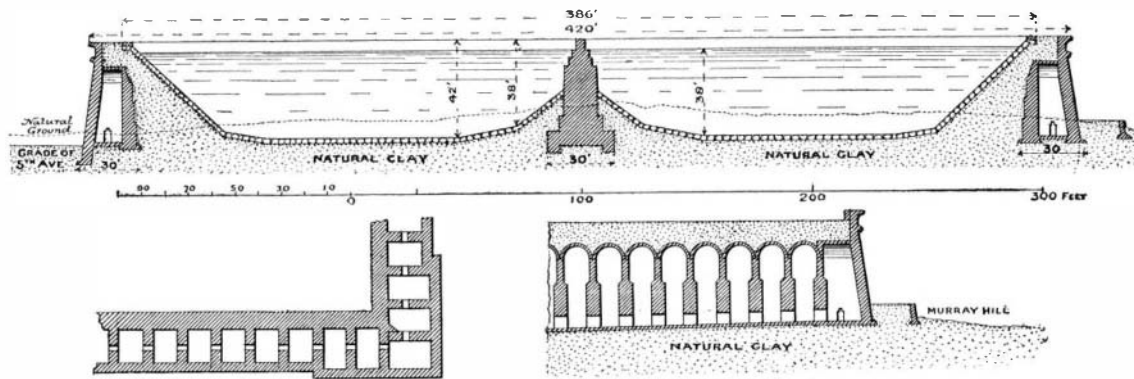
in the late thirties and early forties, and the excellent work that was put into every detail of the construction is witnessed by the unflinching service which the system has rendered to New York for half a century. The whole scheme is highly creditable both to the municipal administration of those days and to the skill and conscientious work of engineers and contractors.

The original waterworks have been supplemented by the construction of new reservoirs at Central Park,

double and hollow, and the basin is divided by a solid wall of masonry, which bisects it on a north and south line. Judged on grounds of construction, the summit of Murray Hill was an ideal site, for the reason that it was found to be covered to a depth of from 5 to 35 feet with an impervious clay that worked up into excellent puddle for backing up against the outer walls. By studying the sectional views, it will be seen that the main wall consisted of an outer inwardly sloping wall of 5 feet uniform thickness, an inner stepped wall 8 feet thick at its base, reducing to 2½ feet at the top, and a series of transverse walls, spaced 15 feet center to center and finishing at the top in a series of arched roofs. This is shown in the two sections, one taken in a horizontal and the other in a vertical plane through one angle of the main wall. The total width at the base of the wall is 30 feet, and it will be seen that it possesses great transverse strength and natural stability. The center wall is 30 feet wide at the foundation and

4 feet wide at the top, with a width of 15 feet for the major portion of its height. After the walls were built the clay was excavated from the center of each basin and banked and carefully rolled down against the inner face of the walls, being carried up over the arched roofs and finished off at the level of the coping, as shown in the sectional view. The whole interior of the reservoir was then paved with 15-inch blocks. The greatest depth from the floor to the coping is 42 feet, and the greatest depth of water is 38 feet, at which the combined capacity of the two basins is 21,000,000 gallons.

The first contract for the construction of the reservoir was let in 1839; it was finished in 1841 and opened in July of 1842. At the time of its completion it stood well out in the country, and Fifth Avenue was the only street that had been cut through immediately adjoining. Since that date the grade of Fifth Avenue



SECTIONAL VIEWS, SHOWING CONSTRUCTION OF FORTY-SECOND STREET RESERVOIR, NEW YORK.

and additional storage reservoirs in the Croton watershed, while the new Croton Aqueduct, with a daily capacity of 313,000,000 gallons, has been carried mostly in tunnel through the hills between the Croton Dam and the northern limits of the city. A vast storage reservoir of 2,000,000,000 gallons capacity is being built at Jerome Park, and a huge dam, the loftiest in the world, is being carried across the Croton Valley a few miles below old Croton Dam, which will create a lake of 30,000,000,000 gallons. These works and the various other dams of the Croton watershed will afford a total supply for New York city of about 75,000,000,000 gallons.

For many years the old Murray Hill Reservoir has lain idle, and now the site which it covers is being cleared to make way for the handsome building which is to form the future home of the New York Public Library. The structure is four-square and measures 420 feet from coping to coping. The outer walls are



BIRD'S EYE VIEW OF THE FORTY-SECOND STREET RESERVOIR, NOW IN COURSE OF REMOVAL.

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.

Automobile News.

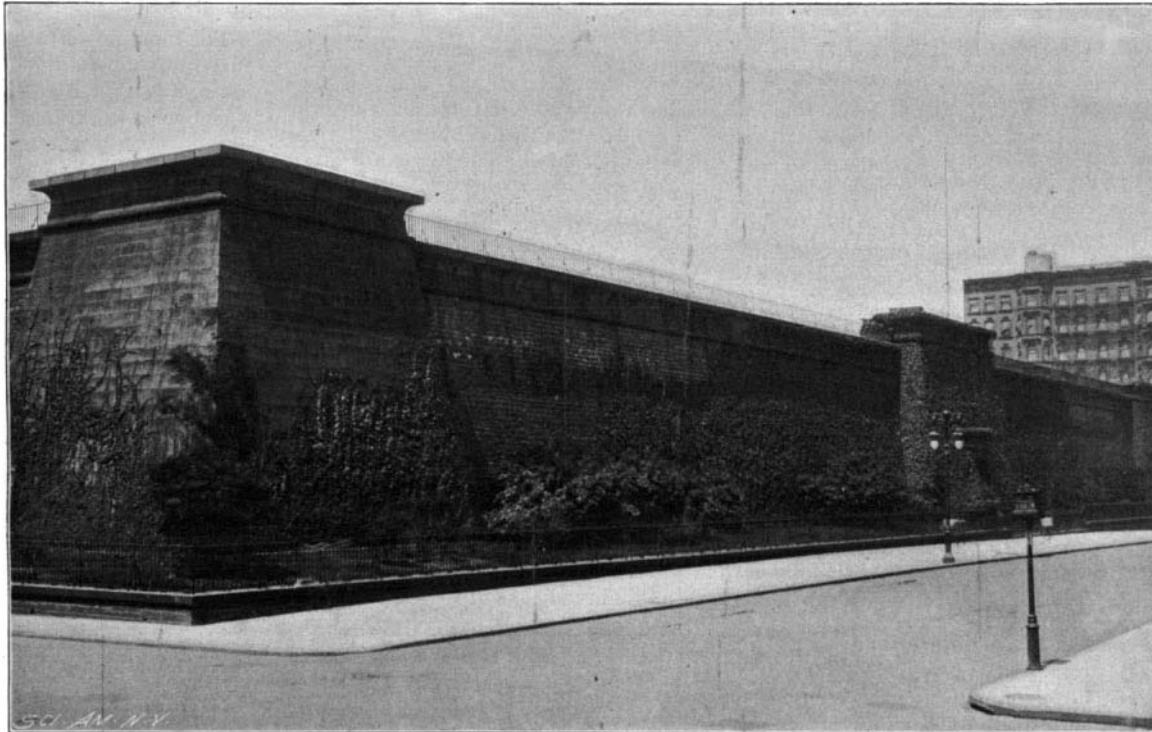
"The Automobile Club of America" has been incorporated. According to the articles, the objects of the organization are "to maintain a social club devoted to the spread of automobilism and to its development throughout the country; to arrange for through runs and to encourage road contests of all kinds 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.

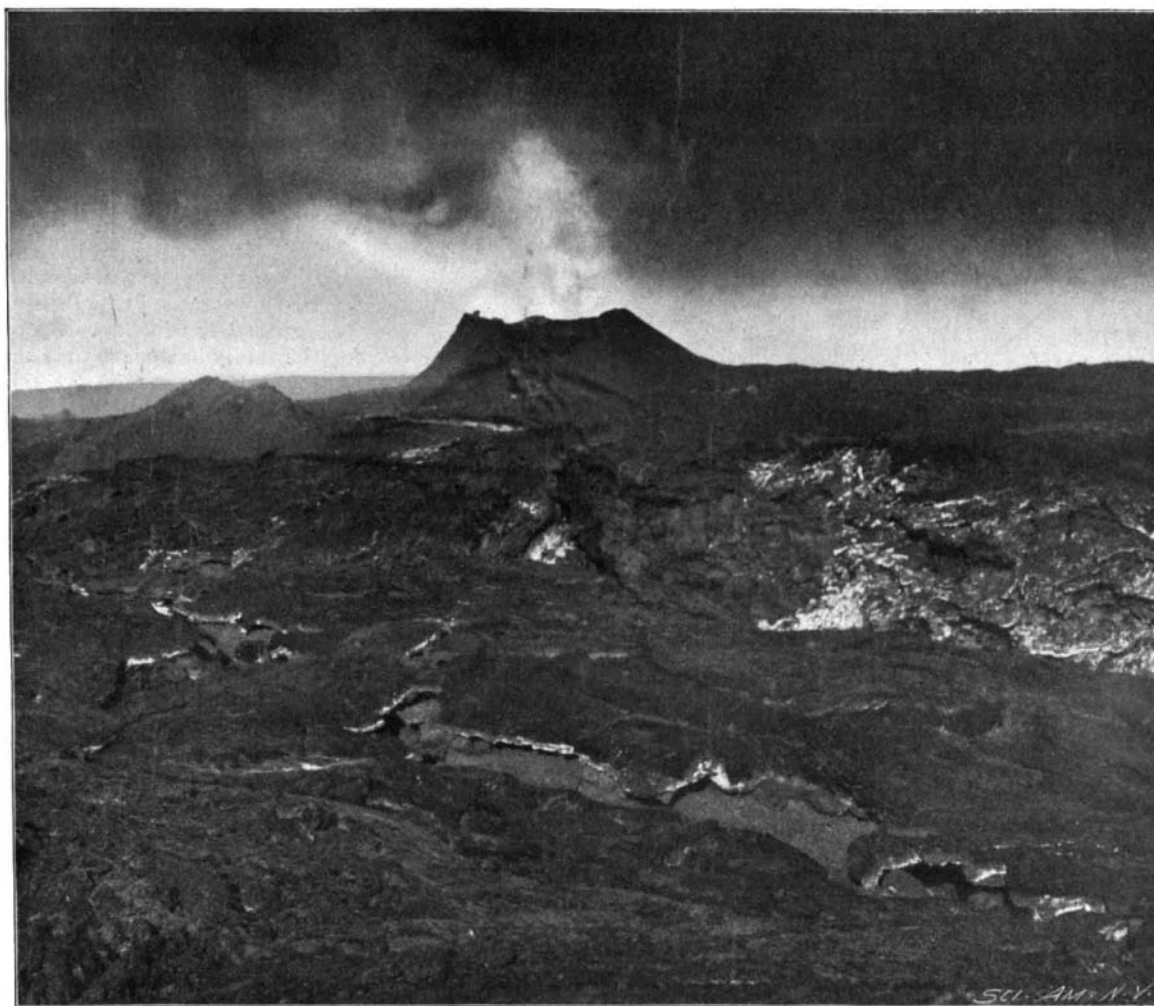
THE income from the war revenue taxes for the last fiscal year was \$102,617,763; over \$37,000,000 was obtained from stamp taxes.



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



MAUNA LOA IN ERUPTION.