SECTIONS OF THE CROTON AQUEDUCT.

Ancient and Modern Aqueducts.

We have, in former articles, gone very fully into the history of ancient aqueducts, as compared with those of modern erection; and we have therein shown that, if the work had been properly carried on, the Croton aqueduct would have been the most splendid affair of the kind in the world. But owing to the gross mismanagement that has prevailed in the office of the water commissioners, the expense of the work has been twice as much as it ought to have been, and after all it will be very defective in many of its most important points; and independent of the immense trouble and the large sums of money that will perpetually be required to keep the whole of it in repair, we have not the least doubt that, when the work comes to be proved by passing a large body of water through it, at least one-sixth part of it will have to be pulled down and rebuilt.

Such at least is the opinion of many of our most experienced architects on this head. But we will refer to these points of the work particularly hereafter, and shall not fail to show up all the follies and mismanagements from time to time, as long as they are continued, and until a reformation takes place. We shall today detail the manner of building the Croton aquedect, at various important points of it; but before doing so we shall describe the manner of building these structures as adopted by the Romans. Their system was worthy of all praise; their aqueducts were built so admirably, and such pains were taken with every portion of them, that up to this hour they are the most durable monuments of architecture that great people have left behind them.

The most of the ancient Roman aqueducts were built of brick, particularly those in the neighborhood of Rome; but the bricks employed by them were of a much better quality than those employed on the Croton aqueduct; and their Roman cement was also much better than any thing we have in the present day. These Ancient aqueducts consisted of nearly square piers running up to the same height, the necessary fall of the course being considered, and connected by semi-circular arches, over which the conduit ran. This conduit had a paved or tiled floor, and was enclosed laterally by walls of brick or stone, and covered with a transverse arch, or by a simple flat coping of stone. This species of conduit, however, sometimes involved a difficulty; for if the source of the water conveyed were much higher than the place at which it had to be delivered, and the distance too short to reduce the flow of water to a proper velocity, the stream had to be carried in a winding direction to expend the height in a greater length, otherwise the pressure of water from the head would burst or blow up the covering arch, or coping of the aqueduct, render the work useless, and inundate the country over which it was attempted to carry it. This accounts for the curious "zic zac" course, as Father Montfaucon terms it, of many or most of the Roman aqueducts. Per example—the source or head of the Aqua Alsietienai was only nine miles from its point of delivery, or principal castella; and yet the distance by the line of the aqueduct was at least twenty-two miles. Some, on the other hand, have supposed that this winding course was pursued on account of the Campagna all round Rome being split up and divided into small estates; and that the twenty noble aqueducts that stretched across that wide plain were carried in a crooked course merely to avoid infringing upon private property. But this we think not feasible, because they always carried their great roads and highways in a strait line, regardless of any thing, and they would have done the same with their aqueducts, had the plan been a feasible one. But they bent them into frequent angles, like a screen, not only to break the force of the current, and to cause a deposit of any sediment contained in the water, but also to give stability to the arcades which supported the aqueduct.

But it must not be supposed that these arcades were the only mode employed in constructing the Roman aqueduct. Great portions of the distance were, of course, in every case, occupied by artificial channels winding along the sides of hills and mountains: and long tunnels carried the streams through these natural barriers when occasion required; but nevertheless the arcaded ductled the streams across the deep valleys, and the acqueduct was in every case required to carry it onwards, from the hills over the wide plain to the doors of the eternal city. We have already mentioned that they were of various lengths, according to the direction in which they came; but in one of them the series of arches is calculated at nearly 7,000, the height of which were about 102 feet. And had our water commissioners not grossly mismanaged the whole business, from beginning to end, we should have had a series of 10,000 arches in a line upon Manhattan island, all 150 feet high, and at no more expense than the work will cost in its present mismanaged form.

We will take the above view of the section of the Croton aqueduct for an example. The upper portions of the above drawing, marked F F. F. represent sections 91, 92, 93 and 94, of the Croton aqueduct, the length and cost of each of which is as follows:—

	FEET.		
Section 91 is	6300	long, and will cost	$142 195
—— 92 "	2400	" "	80 205
—— 93 "	1900	" "	40,886
—— 94 "	1900	" "	336 714
	11500		$600,000

Here, then, is a distance of only 11 500 feet of the aqueduct, which is estimated to cost half a million, and will probably cost more than a million. And what shall we have to show for it? A long, continuous, unbroken magnificent line of arcades that will be a monument of our skill and enterprise 2000 years after their erection, as are the Roman aqueducts? No such such thing! nothing of the kind But all that will be visible to the public will be about 1400 feet in two detached portions, principally, however, at Clendenning Valley; a drawing of the aqueduct, at which place we gave last week A the rest is broken and hid from sight; part is to be a rock tunnel, part earth tunnel, part brick, part iron pipes, and, in short, a little of every thing, without the least uniformity or keeping whatever.

Beginning at the left hand side of the above section, we have a chamber containing a small reservoir, a horizontal veiw of which is seen at E From this chamber, or small reservoir, proceed four iron pipes, which, almost immediately after leaving the same, begin to descend gradually until the greatest depression of pipe reaches 100 feet, which occurs exactly in the centre of the valley; and at this point there is another strange jumble made of the work; the commissioners seemed determined to do nothing uniform, and therefore they would not regularly build up a line of arches to the level of the high ground, neither would they carry their iron pipes to the lowest part of the valley; but they have run them part of the way in earth tunnel, part in open work—which will render them liable to suffer by exposure; part in hard rock tunnel—making the pressure any thing but uniform; part on brick work, built up to sustain them, which will, no doubt, yield considerably, and have to be replaced, and so on up the rise on the right hand side of the inverted syphon aqueduct pipes, until they enter a chamber and reservoir on the opposite side of the valley nearest to New York. The whole of this distance is about 4,100 feet, at least that is the length of pipe that is to be employed. And we have no doubt that a vast number of these pipes will burst upon the first pressure; because they have all, or nearly all, been cast already two or three years; and the only reasonable conclusion we can arrive at, as an excuse for the commissioners pursuing this scandalously blind course, is because they wanted to oblige some friend who was an iron founder, and to give him a fat contract, by which he could get rid of a quantity of old metal. Such is to be the nature of the work where the aqueduct crosses Manhattan valley.

After this, however, we shall see little or nothing of it, for the whole length of an entire section; for the instant it emerges from the last chamber, it enters a mixed earth, brick, and rock tunnel, 700 feet long, which terminates about the centre of section 92 After this, the only thing visible for about 1600 feet will be a low shapeless mound or ridge of earth, marking the course of the aqueduct, until we come to about the centre of section 93, where it again enters another tunnel, from which it emerges only to be seen in the raised work at crossing Clendenning valley, as depicted on the extreme right of the upper part of the above section. The raised arched work at this part of the aqueduct extends 1,900 feet, and crosses six streets, all of which will be graded unevenly—no two on the same level—again giving a grotesque appearance to the work.

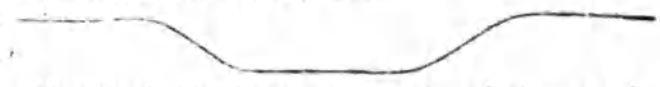
The syphon here intended to be employed will be the largest that ever was constructed in any part of the world. The only syphon at present in existence that can be compared with that of the Croton, is the one now in use near Genoa, which extends a distance of about 1800 feet, and has been built within the last 100 years. It has usually been supposed, and by some writers very confidently stated, that the Romans were totally ignorant of the mode of conveying water by means of syphons, or tunnels. That this is not true with respect to tunnels, we have already shown; and that they knew the use of syphons is proved by this passage in Pliny, 31, 6 s. 31: "Aqua in vel e plumbo subit altitudinem exortus sui." (Water in leaden pipes rises to the height of its source.) But the fact is, that although they made frequent use of pipes (fistutla) in conveying water, yet no pipes would have supported the weight of water conveyed to the city by the Roman aqueducts. But we have a still better proof than this. The Roman aqueduct that was built to carry water to Lyons, in France, (the ancient Lugdunum) had a syphon in part of its course. Near to St. Irenee on the heights, there was placed a large reservoir; hence the waters flowed in leaden pipes, which descended into the fosse of St. Irenee, and passing along the bottom of it, rose again, and emptied themselves into a reservoir, built near a spot which can be traced in the walls of the city at the Wall of Fourviere, above the gate of Trior, on the south side of a square tower. These pipes were not carried across this ditch and valley upon a bridge (as has been stated by some writers;) there are not the least vestiges of such a work; neither were they carried over in the patchwork manner in which the syphon at Manhattan Valley is constructed; but they were properly bedded on a solid course of masonry. The nine leaden pipes, through which the water flowed, had each 8 inches diameter in the clear; the thickness of the lead of which they were composed was about one inch. These syphon pipes after having descended about 75 feet, each divided itself into two branches, and thus the waters were carried the rest of the course in 18 pipes, until they arose again on the opposite side to a height of about 70 feet, at which point they again united, and the waters passed on and entered the receiving reservoir in only nine pipes.

Besides the location of the line of the Croton aqueduct, from Manhattan Valley to Clendenning Valley the above drawing presents five different portions of the work, marked A B C D E. which may thus be explained. The drawing A is a section of the stone work supporting the aqueduct across Clendenning Valley, the height of the work to the top of the arch of the aqueduct, is about 88 feet; the width of the grade line at the base of the aqueduct arch, or the inverted arch, is 30 feet; from this point the stone point is formed, battering downwards on a scale of an inch to a foot. This work is formed of large pieces of stone laid together without cement, except on the outside, which presents the appearance of well hammered stone masonry; similar in its character to the external appearance of the church of the Messiah, only the blocks of stone are larger than those in that building. The view marked B. is a section of an earth tunnel, or description of work which frequently occurs along the line of the aqueduct. In this view the diameter of the conduit looks larger than that at A; but it is precisely the same size; about 8 feet in height, and 6 feet 4 inches in diameter at the span of the arch; the arch itself is all of simple brick, and therefore objectionable, and liable to spring considerably; the sides and spandrel backing are of stone, in some instances cemented, and in some not, the want of uniformity again prevailing. And along many parts of the line much of this brick work has given way, and has to be rebuilt.

The view marked C represents the outside of a protection wall (of which a great deal has been said by us in the course of our articles upon aqueducts.) This view represents the aqueduct crossing a dell or ravine, through the bottom of which runs a brook or water course. At the bottom of this foundation wall, in the centre, is seen a small orifice, called a culvert, which is made for the passage of the natural water courses of all the ravines, which if dammed back by a flush dead wall, would in a very short space of time sweep away the aqueduct On the top of this protection wall the sloped covering represents the position of the conduit or aqueduct tunnel; immediately under this, a little more than its extreme width, down to the bottom of the ravine, a foundation wall is built up solid to support the conduit, precisely similar in its character to the section marked A; with this exception, however, that in crossing ravines under ordinary circumstances the outside of the foundation wall is not finished so smoothly, because between it and the protection wall there is generally a mass of earth varying from 20 to 80 feet in width.

The view marked D represents a section of a tunnel in a rock cutting. This opening is about 9 feet high, (larger than most,) but of the same width as other tunnels; there is very little spandril backing required in this part of the work, although the sides are all built with an outer coat of large stone and an inner facing of brick, with an inverted arch (the size 9 inches) and two feet of concrete beneath this. The roofs in these tunnels are not formed of a brick arch, as in earth or open work tunnels, but is formed by the original body of the rock in which the tunnel is cut. But the sides are made and built up water tight above the water line of the aqueduct, and even up to a height of seven feet in the clear. The view marked E is properly termed a gate chamber, for receiving water from the common aqueduct; this chamber is 25 feet wide, and the main walls, to form a sort of reservoir, are ten feet high, from which rise high side walls, and over these will be placed a cupola roof. From such a chamber as this, the water will be carried straight across Harlem bridge, and in a syphon from across Manhattan Valley in four iron pipes of three feet in diameter, placed side by side, or as above represented.

Such are the details of the mode of building our modern aqueduct in various sections of the same; and an analytical mind will at once see that the whole arrangement is bad in its general effect, and defective in many of its details; a want of harmony and uniformity pervades the whole; and what is still more to be lamented, it is feared that when completed it will not be found (owing to shameful management on the part of the water commissioners) capable of answering the purposes for which it will have been erected, at least *not until* a large portion of it is taken down and rebuilt The defective mismanagement of the commissioners may be detected at various important points of the line; and although they have been exceedingly lavish in their expenditure of the money of the people entrusted to their care, in the purchase of landed property, yet the line of country chosen for the course of the aqueduct, is a very unfavorable one; and has rendered the construction more expensive by two or three millions of dollars, than it might have been by judicious management. Again the large receiving reservoir ought by all manner of means to have been located in the county of West Chester, close to the Harlem River; and not upon this island where land is so valuable; where in a few years, it will be very much in the way; and where immediately after it is completed, and in use, it will render the atmosphere damp, unhealthy, generate unwholesome and destructive *miasma*, and be the prolific source of all sorts of fevers, disease, and death. Again, the commissioners have committed a foolish error in making the bridge over the Harlem River depart from a strait line with the level of the aqueduct. It now has a descent of 10 feet, thus:—



Had the bridge been on a level and the aqueduct carried in a proper manner and course across this island, and not been buried in one place, sunk in syphon pipes in another, and constructed different in almost every section, we might have had a beautiful raised carriage way, perfectly level for a distance of 10 miles on Manhattan Island. But we presume the locofocos thought that such an arrangement would be too aristocratic, and therefore proposals spoilt it. But bad as are the arrangements, and defective as are the details, this work is nearly two-thirds completed; $6,000,000 or $7,000,000 have been already expended; we are in want of good water; disease is stalking abroad, the city is in a filthy state; we are in danger of another immense loss should a second devastating fire break out; and therefore every one must see the necessity of the work being completed as soon as possible And yet this poor gratification is denied us; for owing to the decayed state of our city finances there is no money to pay the workmen, and the work must stop almost immediately; and the sections we give above will show how severely the frost and rain of winter will damage and destroy the works in various places. Therefore let the rallying cry next election be—"The removal of the Water Commissioners!"

THE COURSE OF THE GALE.—It commenced operations in Charleston on Wednesday evening, and swept along the coast in a north easterly direction The wind blew with great violence at every place it touched, driving vessels ashore, blowing down houses, and sweeping destruction over fields and through forests. We have already chronicled many wrecks, but not one half that must have occurred. From correct data we have compiled the following statement, showing the route of the gale, the time it broke forth in each place, and when ended. It is a curious table, and should be preserved. By these means we can soon prove whether Espy's theory is humbug or not.

Places	*Aug.*	*begun wind*	*Aug.*	*changed wind*	*Aug.*	*ended*
Charleston,	28,	7 P.M. N.E.	29,	6 A.M N.W.	29,	4 P.M.
Wilming., N.C.	"	11 " "		" N.E.	29,	11 "
Norfolk,	29,	— " "		"	30,	— "
New York,	30,	2 A.M. "		"	"	10 "
Providence,	"	10 " "		"	31,	4 AM
New Bedford,	"	2 P.M. "		"	"	— "
Boston,	"	9 " "		"	"	— "
Gloucester,	"	11 " "		"	"	— "
Portland,	"	— " "		"	"	— P.M.

To give some idea of the violence of the hurricane, we have obtained from the U. S. R. cutter Jackson, Captain Bicker, who arrived here on Monday night from a cruize of eight days, in search of the slaver, L'Armistad, the following:—

"On Thursday last Block Island bearing N.N.E. dis. about 50 miles experienced a severe gale from N.E., which lasted 30 hours. On Friday at 3 P.M., while laying too under a double reefed foresail, and the yards on deck were knocked down, hammock rail under water, filling the lee quarter boat. Shipped a sea which stove in the ports, and carried away head rails, and to right her, we were obliged to cut the boat away, and launch the lee guns. Lay in that situation three hours when the gale abated, and we bore up for New York."

☞ The Philadelphia National Gazette of Monday had an article on the Bank of England, professedly derived from "Quin's Trade of Banking," which is said to embrace the substance of the report of the secret committee of the House of Commons, appointed in 1832, to enquire into the expediency of renewing the charter of the Bank of England. The original report we have in our possession, together with the reports of all the secret committees on Joint stock Banks, including the last made in the fall of 1838. These reports contain the evidence of all the leading Bankers in England on the operations of the Baking system. They form a concentration of financial knowledge the most complete, and are probably the only volumes of the kind in this country. These combined with our personal observation in England, will enable us to give the most perfect view of the operation of English banking on American affairs—a matter of vast and growing importance at this time. See our money articles.

A NEW CATHOLIC COLLEGE.—A highly important movement has just commenced in that portion of the religious world termed Roman Catholics. This is no other than to establish an excellent college and theological seminary, for pious young Roman Catholics, on a plan similar to many of those magnificent institutions in Europe. Three public meetings have already been held upon this subject, at which Bishop Hughes has fully and satisfactorily explained the principles upon which this institution is to be founded, at the Cathedral on Sunday, at St. Peter's on Monday, and last night at St. Mary's. Tonight there is to be a similar meeting at St. James's, tomorrow at St. Joseph s, and on Friday at the Transfiguration; at all of which Bishop Hughes is announced to appear and explain the whole subject. A desirable building has already been secured about 12 miles from the city, and three miles from Harlem, with 106 acres of excellent land, and buildings sufficient for every necessary purpose connected with the institution. It is a most desirable movement, in the present advancing state of religion and morals amongst all classes, and will be most liberally supported. It is the nucleus of a new and enlightened order of things amongst a highly intelligent and influential body of Christians.

☞ Will Mr. Bennett be kind enough to say what relation Mons. Taglioni, now here, is to Madame Taglioni, the celebrated English *danseuse*?

ANSWER.—A brother—"I may be mistaken, but that is my opinion."

YELLOW FEVER.—Annexed is an extract from a letter received yesterday from Augusta, Geo., dated August 27. It presents a gloomy picture in a few words:—

"Great excitement prevails here. The yellow fever is now violently raging in this city. There is not a word mentioned in the papers, for they are afraid to mention it. It has been, and is likely to be, still more destructive."

WHALES WRECKED.—Sixty four whales, some of them twenty-four feet long, were cast ashore at Reedish, New Brunswick, on Sunday the 17th ult It is not known how they run aground, for there had been no storm. No sea serpent has been seen since, and it is supposed that these sixty-four have been cruising about in Indian file and thus presented the appearance of a marine monster of great length Very probable.

☞ Lemuel Sawyer, of Grand Gulf, Mississippi. was recently killed by being thrown from his gig.