MEMOIRS

OF THE

MOST EMINENT

AMERICAN MECHANICS:

ALSO,

LIVES OF DISTINGUISHED EUROPEAN MECHANICS;

TOGETHER WITH A COLLECTION OF

ANECDOTES, DESCRIPTIONS, &c. &c.

RELATING TO THE MECHANIC ARTS.

ILLUSTRATED BY FIFTY ENGRAVINGS.

BY HENRY HOWE.

"The due cultivation of practical manual arts in a nation, has a greater tendency to polish and humanize mankind, than mere speculative science, however refined and sublime it may be."

NEW YORK:

PUBLISHED BY ALEXANDER V. BLAKE,

No. 54 Gold, corner of Fulton-street.

STEREOTYPED BY R. C. VALENTINE, 45 GOLD-STREET.

1842.

of Queen Mary; the laboring people wore them of copper; other persons had them of silver, or copper gilt; not long after, shoe roses came in. Buckles revived before the revolution of 1689, remained fashionable till after the French revolution in 1789, and finally became extinct before the close of the eighteenth century.

The Croton Aqueduct.

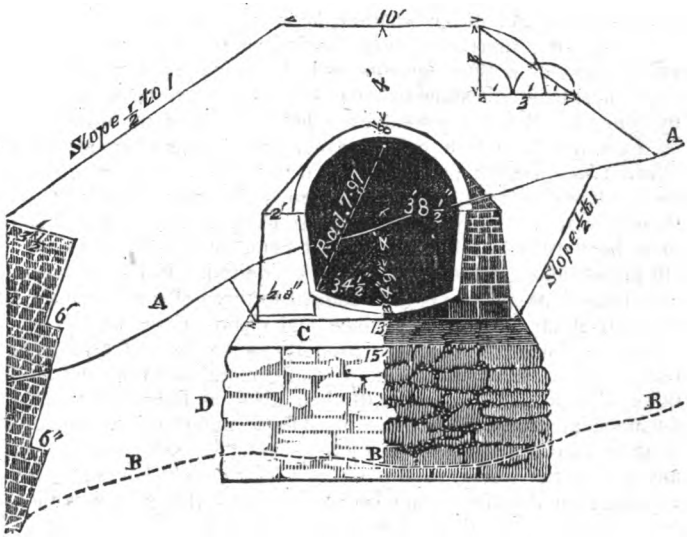
Some of our readers may have had their curiosity excited with respect to the great aqueduct now in construction for the supply of New York with water. The following description of the manner in which the work is performed, with the illustrative cut connected with it, will prove acceptable. We have been indebted for them to Mr. Miner, editor of the Railroad Journal, from whom we have before received several similar favors.

The ground on which New York stands consists chiefly of loose sand, intermixed in many places with coarse gravel and boulders, or roundish stones of different sizes, apparently brought by a flood of water from some primitive region. Hornblend rock predominates. Granite and gneiss rocks are found in original masses in some parts. Long Island consists of sand and loose stones, without a trace of any fixed rock, except at Hurlgate, and perhaps at one or two other places.

Primitive rocks and soils generally furnish good water; and the springs of this city, though few and public, are abundant, and many of them were originally good. The increase of population, however, has caused the deterioration of the water: for where the rain once fell on fields of grass or groves of wood, it now meets with crowded streets or narrow lots occupied by crowded habitations, and contracts impurities which it carries with it far down into the sands where the springs flow. Some of the wells in the middle and upper parts of the city, which yielded excellent water within the memory of living inhabitants, have become so much affected in later years, that many of the people purchase drinking water at a penny a pailful, of men who bring it in carts from springs yet untainted by the encroaching city. As the water of the wells is unfit for washing as well as for drinking, every family requires a cistern; and thus it has been thought desirable, for many years, that an abundant supply of good water should be obtained for the city.

The Water Works in Chambers street, under the direction of the Manhattan Company, have furnished, for some years, water of an inferior quality to the inhabitants of many streets in the lower

parts of the city, at certain prices; and water for the use of fire-engines has since been provided, in a large reservoir on the height of ground, from which it is distributed in hydrants to different districts. It was proposed, some years ago, to obtain a supply from several ponds in the town of Rye: but, after an examination, the Croton river was preferred, although the distance was great, the route obstructed by serious impediments, and the work tedious and very expensive. The friends of the enterprise, however, rightly judged, that nothing could be so expensive to the health and convenience of the inhabitants, and therefore in fact so great a pecuniary loss to the city treasury, as the longer neglect of the great work. It was therefore commenced; and about five thousand men have sometimes been employed on it at one time.—*Family Visiter.*



Section of the Croton Aqueduct.

Description of the mode of constructing the Croton Aqueduct, from the American Railroad Journal.—The materials used are good building-stone, of the proper degree of hardness and durability, free from all metals, particularly iron. Gneiss is preferred to any other, both because it is more plentiful and more easily worked. Some limestone is also used, but not until it has the

express permit of the Resident Engineer. Brick is the next material; it is required to be from the centre of the kiln, such as is thoroughly burnt, free from lime or any other impurity, and to possess a clear ringing sound when struck. The worst accepted are such as cost from five to seven dollars a thousand. Next is the cement, from which the concrete and masonry generally are formed. The commissioners' specifications are very explicit relative to the manufacture of this article, requiring that the name of the manufacturer should be known; that the cement shall not have been made more than six months before being used; that it shall be transported from the factory in water-tight casks; and, in addition to all this, that each parcel or cargo received shall be thoroughly tested, either by officers appointed for the purpose, or by the Resident Engineer himself. These are the principal materials, stone, brick, and cement. The stone is required to be always clean, and in hot weather, kept wet, and when laid in the wall requiring mortar, it must "swim" in the cement—that is, when the stone is lifted up from its bed, no point or surface of the stone must touch the stone below it, each stone must be surrounded by cement. When the weather is hot, the top of the wall must be kept moist, and in cold weather all the masonry must be covered so effectually, as to protect it perfectly. The brick must be laid true and even, allowing three-eighths of an inch joint, or thereabouts. In hot weather, they are to be soaked in water, and to be kept wet while being laid. The cement is mixed in different proportions, according to the work required. For stone work, the proportions are one part of cement to three of sand, (the sand to be medium size, sharp grained and clean—river sand is accepted.) For brick work, the proportions are one of cement to two of sand; for concrete, one part of cement, three of sand, and three of clean building-stone, broken about as fine as that used for Macadamizing. Concrete is used for forming artificial foundations, is mixed with as little water as possible, and when laid in any part of the work, is left undisturbed forty-eight hours; at the expiration of this time it has become so hard, that a blow with a pickaxe will not break it: it becomes quite a rock.

The aqueduct, maintaining a uniform descent, requires that in places the earth should be cut away, and in crossing valleys, that they should be filled up. In the former case, the sides of the cut are left standing at a slope of one half to one; that is, if the perpendicular height of the side of the cut be six feet, it will fall from directly above its base three feet. It is one-half horizontal to one vertical. The base of the cut is always thirteen feet wide. Pegs, showing the bottom of the side walls, and of the reversed arch in

brick, are given by the engineers, who, at the same time, determine the centres, if necessary, from these data. The builder lays a small layer of concrete, at least three inches, whose top shall be as high as the top of the peg just set. On the concrete he proceeds to build the side walls of the aqueduct. You may see the dimensions by the plan better than I could tell you. The side walls being done, they are filled in behind them, up to the top, with earth, to prevent strain or damage, also to act as a support, and cover up the work as fast as possible. Then the concrete is laid for the bottom of the reversed arch in brick, by means of moulds placed every ten feet apart. When thoroughly set, the brick work is commenced. Selecting the best brick (and it has all been most thoroughly inspected,) the reversed arch is laid, and then the "brick-facing"—that is, facing the inside of the wall with brick, when carried up to the top of the wall. The upper arch, consisting of two ring courses (with occasional headers,) is thrown; the arch is covered with a thick coating of plaster, and the angle made by the top of the wall and arch filled with the same kind of masonry as the side walls; and then the aqueduct is done.

You will perceive it to be a long brick vault stretching from New York to Croton, ascending at the rate of thirteen inches in a mile. The earth removed in the excavation is then "back filled" over the aqueduct until it is four feet deep over the crown of the arch, level on top, and ten or eight feet wide, and the sides slope one and a half to one, (as you see in the figure.) When the ground is too steep, a "protection wall" is introduced, (see drawing;) this is laid dry, i. e., without mortar, and made to slope one half to one, as in the drawing, or one to one, at an angle of forty-five degrees. So much for the aqueduct "in open cutting in earth." When a valley is crossed, a heavy wall fifteen feet wide on top, with sides sloping one-twelfth to one, must be built. They are large stones firmly imbedded in small broken ones. On the top of this wall, a foot of concrete is placed; the aqueduct, as usual, is built on that. As water passes through valleys, a stone passage way, called "a culvert," is made of suitable dimensions.

Cugnot's Steam Carriage.

The improvements of the mechanism of the steam engine, stimulated many projects for adapting its agency to other purposes besides that of raising water; and the scheme of John Theophilus Cugnot, a native of Void, in Lorraine, is meritorious for its novelty and its successful practical development. In his youth, Cugnot served in Germany as an engineer. Passing after-