THE WATER SUPPLY OF NEW YORK CITY—THE NEW CARMEL DAM AND RESERVOIR.

We recently illustrated the new Croton dam, operations upon which are now progressing, and which, when finished, will give a storage reservoir for the water supply of New York of vastly increased capacity compared to the present Croton Lake. Owing to the great height of this dam the water in the Croton River will be backed up by it for miles to the northward, the northern limit being in the vicinity of the Croton Falls, almost on the boundary line between Westchester and Putnam Counties.

The Croton River and its tributaries and branches extend to the northward from this point, and we have already illustrated dams in process of construction for impounding water near the sources of the river. On the West Branch of the Croton, in Putnam County, is situated Boyd's Corners Reservoir. The West Branch flows hence to the southeast and joins the main stream at Croton Falls. A few miles up the stream from the falls and near the town of Carmel, in Putnam County, work is now rapidly approaching completion which involves the construction of two dams to impound the overflow of the West Branch of the Croton River, after it has left Boyd's Corners Reservoir. These dams will establish a reservoir of a very large capacity, and will create a most important addition to the supply of water, for while in some seasons water runs over the dam at Croton Lake and escapes into the Hudson, in spite of the great draft made upon it by the city aqueducts, yet at other seasons the water in Croton Lake falls below the crest of the spillway and the visible supply of water there decreases. For such service as this the reservoirs to the northward are utilized, and by opening the gates at the Boyd's Corners Reservoir, or any analogous one, such as Sodom or Carmel Reservoir, when completed, an increased flow of water is sent down the river bed into the Croton Lake. The Carmel Reservoir, with its approximate capacity of 9,000 millions of gallons, will soon be available for this use. The present Croton Lake has a capacity of only 2,000 millions of gallons.

The new Carmel dam is so far north that the waters of the new Croton Lake, as established by the Cornell site dam, will nowhere approach it, a distance of nearly five miles intervening between the northern limits of the future Croton Lake and the Carmel Reservoir. But long before the large lake will be in operation, the Carmel Reservoir will be filled and ready for use, so that its capacity will very soon be added to that of the existing Croton Lake and other storage reservoirs.

In the present paper we give some of the most impressive features of the main dam, for there are two; one an earthwork dam with no spillway, termed the auxiliary dam, and the other the main dam, which we illustrate. The main dam is a compound structure of masonry and earthwork. Its shape is peculiar. Starting with the northern end, a portion of it runs approximately southwest; it then bends so as to run nearly north and south, and on this portion the overflow is situated, which lies directly over the natural channel of the West Branch. Finally the dam bends sharply back to the west for a distance of a little more than 100 feet and terminates. The extreme length of the dam in its three sections is 1,800 feet. The masonry dam proper is about 300 feet long, 260 feet of which are devoted to the spillway. The surface of the water which it will impound will be 502 feet above tide water at New York City. This, of course, is without effect upon the head of water admitted to New York, as that is fixed by the reservoirs and other works in the immediate vicinity of the city. The foundation courses of the spillway of masonry are set for a depth of 10 to 15 feet, into a trench excavated in the rock; a smaller central trench excavated along the bottom of the large one receives a species of toe to increase the grip upon the rock. The extreme height of the spillway is 74 feet, the crest of the earthwork rising 15 feet higher. The outer slope of the spillway is divided into steps over which the water will flow in a series of cascades. The gate house stands upon one side of the spillway. For outlet, the gate house machinery controls two 48 inch iron pipes, which, running through the dam, partly in a pipe vault and partly in the earth, are carried to a point about 20 feet distant from the extreme base of the dam, where they empty upon the upper part of the apron. Thence the water runs some 15 miles through the river bed to the Croton Lake.

The upper cut shows the spillway with the gate house in the background. On the left is seen the new lake or reservoir full of water, while the two pipes are delivering water from the reservoir upon the apron. The lower right hand cut shows the spillway again, but in operation, water flowing over it and down its steps, and rushing over the apron. The left hand cut shows the interior of the dam and illustrates the progress of operations. The two outlet pipes at the gate house are also shown.

The earthwork portions of the dam, one of which appears in the background of the cut, vary in height. The width at the top of crest is 15 feet. Within it is a masonry core 10 feet thick at the bottom and diminishing at its upper portion to a width of 5 feet 6 inches at the top. This is within 4 feet of the crest of the dam, so that the core rises 9 feet above the water level. The earthwork dam was made in 6 inch layers, which, as fast as laid, were wetted down and rolled. Its inner surface, with a slope of 2 feet to 1, is faced with stone blocks; the outer slope, 2½ to 1, is covered with grass. The country in the vicinity of Carmel has long been a favorite summer resort. The new lake created by the dam will be an additional feature in the landscape. The auxiliary dam is of much the same construction as the earthwork portion of the main dam. It is provided with a single 36 inch blowoff pipe, delivering to a fountain, and which will force the circulation of the water throughout the surface of the reservoir.

In the lake a maximum depth of water of 43 feet is provided for.

Mail, Express, and Freight Service on Street Railway Cars.

The report of the committee on this subject was presented at the recent meeting of the American Street Railway Association at Atlanta by Mr. Richard McCulloch. In order to ascertain how much had already been done in this line a circular was sent to every street railway company in North America. From some of the States, notably Pennsylvania, Rhode Island and Massachusetts, it was reported that transportation of express and freight by street railways was prohibited by State law, and many of the roads stated that their franchises allowed only the transportation of passengers.

In regard to the mail service it was found that 62 street railways are now carrying mail, 58 of which have United States government contracts. Five roads operate special cars for this service.

The only method for handling a large mail service, where it is necessary to collect and distribute along the route, is an independent mail car in charge of a railway clerk. This system is already in use in St. Louis, Brooklyn, and several other places. The best example for such service is that on the St. Louis and Suburban Railway. This road begins in the business part of the city and runs through the best residence and suburban settlements of the town of Florissant, some 16 miles from the center of the city. The mail car makes three trips each day, two to the end of the line and one as far as the city limits. The railway company furnishes a conductor and motorman, while the post office department supplies the mail clerks. The car is specially built for the purpose. The mail is received from the general post office in pouches and delivered to carriers along the route, while mail which has come in too late to be sorted is distributed on the cars to the proper bags. In fact, the service is practically the same as that on steam railways. A light freight business is also done on the car; provisions, light furniture, milk, trunks, etc., are carried and charges collected by the conductor. The car has proved a source of profit to the railway company.

Where the mere carriage of mail in pouches from the main office to branches or from depots to post offices is undertaken, and no attempt is made at collection or distribution of mail along the route, there is no objection to carrying pouches on the front platform, if the number is not too great.

The question of whether or not mail service is called for depends entirely upon the local conditions. One of its advantages is that a fixed income can be assured, as the government contracts generally pay a certain sum per 100 pounds per mile. Another advantage, and one which is of considerable importance, is the prestige of the name of the United States government. The government will tolerate no interference with the distribution of mails, and this may prove a great advantage in the case of strikes and riots.

In regard to express and freight service, 35 roads are now engaged in the express business, while 55 are hauling freight. The distinction, however, between the two classes of service is so ill defined that it is perhaps best to consider both together.

The street railway in many respects is an almost ideal agent for the transportation of packages and light freight, and such a service may well be looked into by street railway managers as a source of profit. As an example of such a road operating express and freight service involving collection and a house to house delivery, the case of the Southern Railway of St. Louis may be stated. The railway begins in the heart of the city and runs a distance of about seven miles through a thickly settled territory. Three trips per day are made on schedule time by the express car. At the down town end is a receiving station where a clerk receives all the express parcels consigned to the company and keeps the books. The delivery is accomplished by means of wagons, two of which are kept at the down town end of the road and three meet the cars at certain points along the line. A charge of ten cents per package is made for this delivery and trunks are taken from houses to the Union Depot, checked and the checks returned for the sum of fifty cents. A corresponding charge, according to size, is made for the delivery of large boxes or bundles. The large dry goods and clothing houses have ceased to run delivery wagons into this part of the city, and now consign all their parcels to the railway company. Several large factories also consign all their freight to these expresses. The railway company assumes all the responsibility of a common carrier.

It may even be advisable to establish an express or freight service as an auxiliary to the passenger traffic, regardless of whether it pays or not; the increased passenger receipts and the advertising given the company may more than counterbalance any loss.

As stated above, the use of a separate car is strongly advocated. A single box car equipped with motors of its own will handle the light freight or express of quite a territory, without interference with the regular running cars. A 25-foot car, equipped with double trucks, supplied with the most approved form of motors and controllers, and fitted up either as a mail car, express car, or a combination of both, may now be obtained for from $2,000 to $2,500, and a smaller car mounted on a single truck can be obtained for less money. If heavy freight is to be hauled, it should be carried in trailer cars built especially for the purpose.

One interesting variation of such a service is that soon to be introduced upon the Union Depot Railroad of St. Louis, for which is now being built a hospital car. This is a 25-foot body double truck car, having a double floor filled with asbestos to deaden sound, and fitted with stretchers, apparatus for heating water by electricity, an emergency drug store, instruments and all necessary apparatus for caring for the sick and injured. A surgeon is to be in charge of the car.

The discussion of the whole question may be briefly summed up in the following conclusions:

1. That a mail service involving collection and distribution is best handled on a separate car, operated on the same plan as a United States railway mail car. 2. That it is supposed that a great advantage arising from the transportation of the mails comes from the fact that the road is under the protection of the government, and is thus secure from riots, strikes, and blockades. 3. That the most promising opening for an express or freight service is a road running between two towns, or a city road running through well populated suburbs. 4. That the question whether or not such a service will pay is entirely a local question, and must be estimated for each road separately, under existing conditions. 5. That there are cases when it would be advisable to operate such a service, independent of the profits, in order to accommodate the patrons of the road and to induce building along the line of the road. 6. That such a service operated upon the ordinary street railway must not be allowed to interfere in the least with the passenger traffic. 7. That in States having laws prohibiting this service, associations of railway managers should be formed to secure favorable legislation.

The Inventor of Phosphorus Matches.

Romer, Preschel, and Irinyi are variously named as inventors of phosphorus matches. From the testimony of a still living college friend, it appears that the real inventor is the Hungarian, Janos Irinyi. It was in 1835 when the latter, then 19 years old and a student at the Polytechnic School in Vienna, attended Professor Meissner's lectures on chemistry. He became greatly impressed by a demonstration of the reaction produced on rubbing together peroxide of lead and sulphur. It struck him straightway that the reaction may be greatly intensified when substituting phosphorus for sulphur. Irinyi was not to be seen at the college for the next few days. His friend wishing to see him called at his rooms, but found the door locked, and on giving his name, received the unmistakable answer: "Geh' weg, Schwab,' ich mach' eine Erfindung." On joining his friends, Irinyi had his pockets full of matches which he struck on the walls, all of them taking fire. He prepared them by melting phosphorus in a concentrated solution of glue, and shaking until the mass became cold and all the phosphorus assumed a finely divided state. This emulsion was mixed with brown peroxide of lead, and sticks previously dipped in molten sulphur were immersed in the mixture. He sold his invention to a merchant named Romer for about 700*l*. Irinyi is said to be still living in the south of Hungary.—E. Jensch, Zeits. angew. Chem.

The Hiccup Nut.

The fruit of this South African plant is locally known as the "hiccup" nut, and by the natives as "Umtandawa." The plant is a climbing shrub with ovate leaves and terminal spikes of dull red flowers. The fruit is an oblong nut with a pleasant flavor, but causes violent hiccough if only a few are eaten. At one time Mr. Wood tried them on himself, and did not care to repeat the experiment. An allied species, C. erythrophyllum, Sond., known as "Umduba," distinguished by its papery, four-winged fruits, and its leaves turning almost white before flowering, but reddish in the autumn, is stated by Mr. J. Kirkman to be used as a medicine by the natives in the dose of one-half ounce or less, but an overdose causes death.

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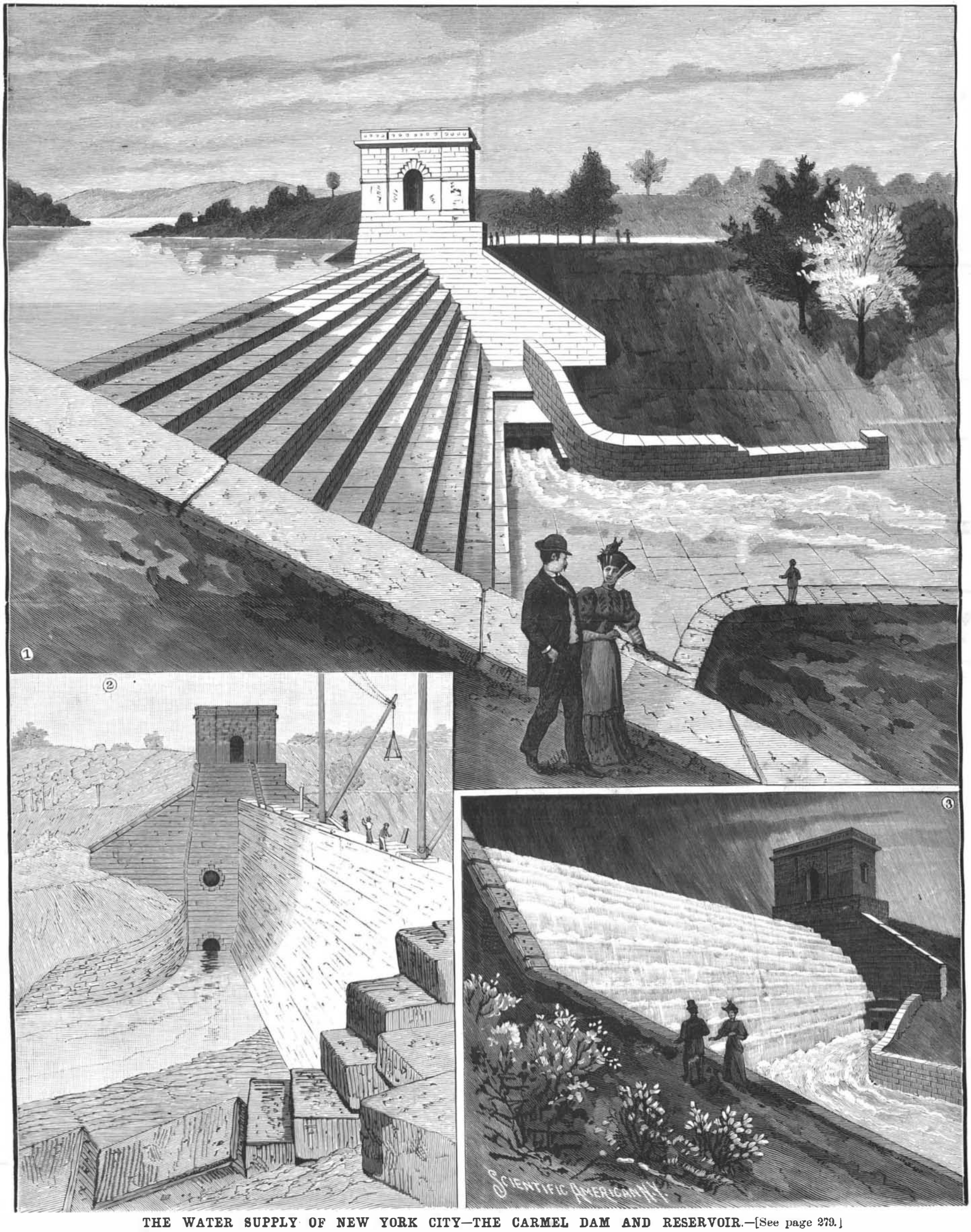

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