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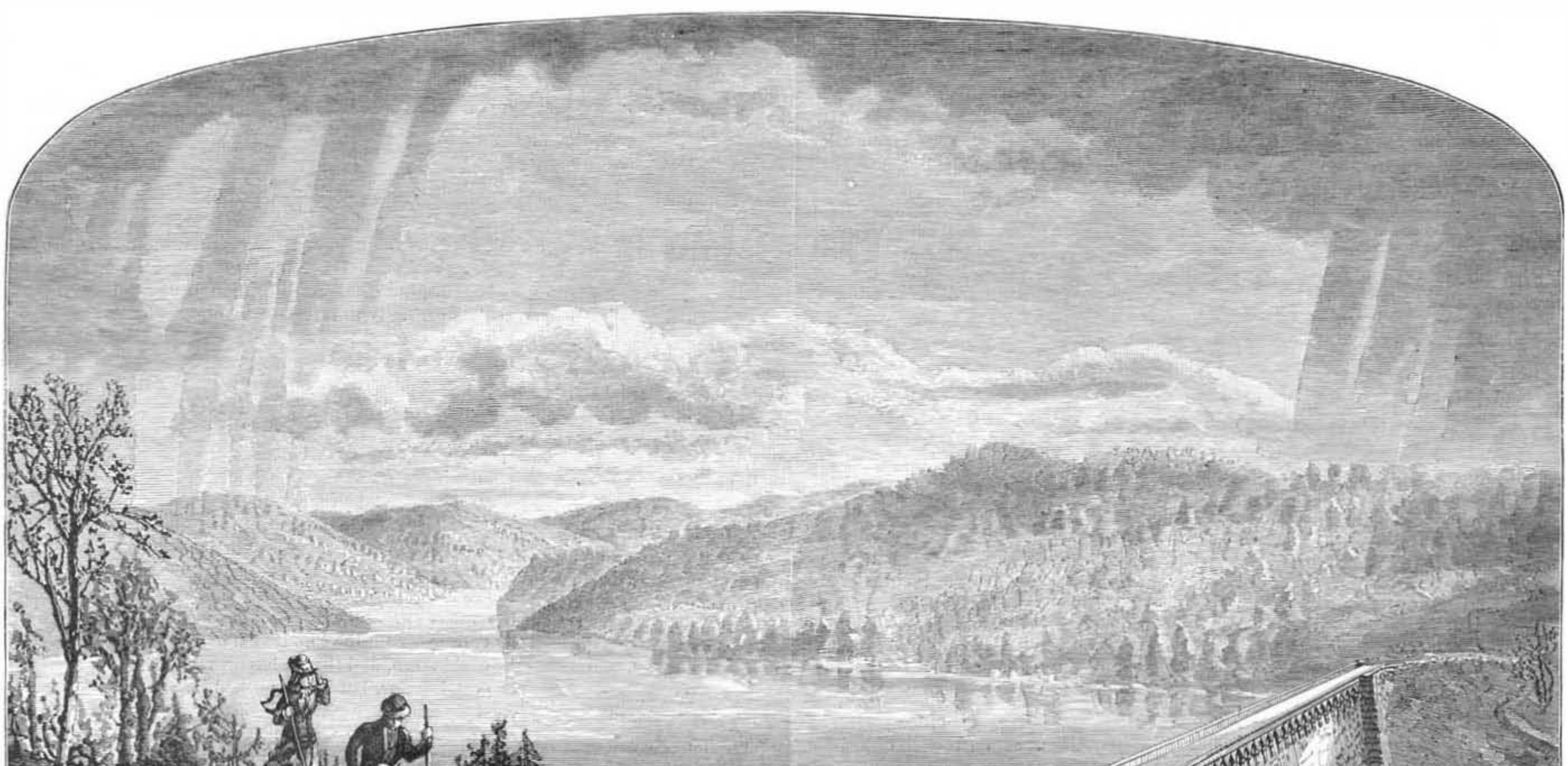
PLAN TO INCREASE THE WATER SUPPLY OF NEW YORK.

In 1774, when New York city had a population of 22,000, Christopher Colles built a reservoir on the east side of Broadway about one and one-half miles from the Battery, and sunk a well on the bank of the Collect. This was the first attempt to supply the city with water, and its completion was prevented by the Revolution. Twenty-five years later the Manhattan Company built a well near the Collect, 25 feet in diameter and 30 feet deep; from this water was pumped by two steam engines of 18 horse power each into a reservoir on Chambers Street. The distributing pipes were bored logs, 25 miles of which had been laid in 1823, supplying some 2,000 houses in addition to manufactories. In 1830–32, the same company sunk a well, corner of Broadway and Bleecker Street, 8 inches in diameter and 442 feet deep; a 6 horse power engine got 44,000 gallons daily. During the same year the city built for the Fire Department a well on Thirteenth Street near Broadway, 16 feet in diameter, and 112 feet deep, nearly 100 feet of which was through rock. Twelve feet from the bottom two galleries, each 4 by 6 feet, were run out for a distance of 75 feet; a branch 25 feet long was extended from one of these. The water rose to a height of 50 feet above tide, and was pumped by a 12 horse power engine into an iron tank 20 feet high by 44 feet across, and placed at an elevation of 84 feet above tide. There was laid in connection with the reservoir a line of 12-inch cast iron pipe to William Street, with 6 and 10-inch branches—a total of 34,700 feet. The pipe cost $70,950, and in January, 1833, the works had cost $42,233.

At that time the supply was so small that some 600 hogsheads of water were brought in daily from the country and sold for about $1.25 each. In 1834, the Thirteenth Street well was increased 100 feet in depth by a 2½ inch bore, which added 20,000 gallons to the daily supply. Water was also forced into the reservoir from a well near Jefferson Market, 30 feet deep and 16 feet diameter. Eighty thousand feet of cast iron pipe had been laid from the reservoir for the use of the Fire Department up to 1835 at a total cost of $182,852.

A plan to take water from Croton River was adopted by the Common Council in 1835. Across the river was built a dam having an overfall of 90 feet long in masonry, the balance being earth embankment. This was washed away by a freshet early in 1841, and when reconstructed the overfall was made 180 feet in length. In 1866–72 a dam 78 feet high from the rock foundation, 670 feet long on top, and 8¾ feet wide, was built for a storage reservoir at a point 23 miles from Croton dam. Another storage dam was built on the middle branch of the Croton in 1874–78. Plans are now being carried out for a dam at Kensico, on the Bronx River, for another storage reservoir. The total capacity of the storage is 9,000,000 gallons.

(*Continued on page* 277.)



VIEW SHOWING THE CONTEMPLATED QUAKER DAM ACROSS CROTON RIVER—NEW YORK WATER SUPPLY.

PLAN TO INCREASE THE WATER SUPPLY OF NEW YORK.

(Continued from first page.)

The aqueduct from Croton dam is of masonry lined with brick, and has a sectional area of 53·34 square feet. The Harlem River is crossed by the famous High Bridge, built of granite masonry, and having 8 spans of 80 feet and 7 spans of 50 feet, its length being 1,393 feet between the gate houses. The height is 100 feet in the clear above tide water. The water was first carried across in two 36-inch pipes, but in 1860 the capacity was enlarged by the addition of a wrought iron pipe 7 feet 6½ inches in diameter. This makes the pipes equal in capacity to the aqueduct.

Before 1840 a rectangular reservoir 836 feet wide, 1,826 feet long, and 20 feet deep, holding 150,000,000 gallons, was built about six miles from the Battery. Twenty years later a receiving reservoir having a capacity of 1,200,000,000 gallons was built next to this one. The distributing reservoir at Forty-second Street is 400 feet square, and holds 24,000,000 gallons. A high service reservoir holding 10,800,000 gallons was built in 1866 at the west end of High Bridge. Engines supply an iron stand pipe and tank, the flow line from which is 324 feet above tide level.

Elevations greater than this aqueduct are supplied by the two steam engines at High Bridge, which have a combined daily capacity of 10,000,000 gallons. In 1879-80 another high service supply was obtained from two engines pumping into a stand pipe 170 feet high located at Ninety-eighth Street. All of the water mains are of cast iron.

For several years the supply furnished by the present works has been insufficient; the population and manufacturing interests have grown more rapidly than was dreamed of, and, judging by the past, will continue to increase in a yearly greater proportion. That the case is urgent and demands quick and effective measures is not disputed. Two plans present themselves: one is to build so as to meet immediate wants, the other is to build to meet future wants—in other words, to build for ourselves only, or to build for our children's children. Nothing can show the fallacy of the first method better than the brief sketch above given of New York's water system, which has been only a succession of patches added every few years, each addition being probably made in the vain hope that the city would stop outgrowing its water supply. The alternative is to so build that we shall be prepared to supply an ample quantity of water for all the wants of all the people of New York city for all time.

Purity of the source of supply is the first and most important consideration. It would be hazardous to utilize a watershed which would require a system of drainage to remove material that might contaminate the water. It would be extremely foolish to take a water supply from a built upon section of country, every foot of which would have to be rigidly, carefully, and constantly guarded to keep away impurities. In deciding upon a plan to provide water for a city of the size and importance of New York, it is false economy to let the question of cost prevent the adoption of that scheme which will best meet all the requirements.

Several plans are now being considered by a commission appointed about a year ago to select a plan for obtaining an adequate supply. One of these is shown in our frontispiece. It contemplates damming the Croton River at Quaker Bridge, a point about four and one-half miles below the present Croton dam. This would catch all the water from the small tributaries of the Croton, the total watershed of which amounts to 362 square miles. The dam will measure about 192·5 feet from the top to the top of the foundation; and in the deepest part the foundation will be 69 feet high. The width at the base will be about 200 feet, and at the top 22 feet, on which will be a roadway. The length at coping will be 1,350 feet; length at datum level will be 510 feet; width at that level, 172 feet. Along the top of the face of the dam will be a line of arches forming a cornice. The outline drawings show a cross section and plan. The foundation will be concrete, and the main dam rubble masonry faced with stone work. The estimated cost of the dam is $5,000,000.

At the north end of the dam will be two spillways, formed between two knolls placed in a line, making an angle (down stream) with the dam. The waste water will run down a ravine, entering Croton River some distance below.

At a distance of six miles above Croton dam will be placed Muscoot dam, a subsidiary one designed purely for sanitary purposes; it will be the same height as the spillways of Quaker dam. The duty of this dam will be to keep the country constantly flooded, even if the water should be drawn off from both the Croton and Quaker ponds. The Quaker dam would raise the water level 34 feet above the top of the present Croton dam.

The present aqueduct will be connected with Quaker Pond at three levels, thereby permitting the selection of the purest water in the pond to be sent to the city. The old gate house at Croton dam will be enlarged and connected with both the Croton and Quaker ponds at different levels, to allow the drawing of water from either source. A new aqueduct will lead from here to the city. An aqueduct will connect Muscoot with Quaker Pond, in order to allow Croton Pond to be emptied without interfering with the supply. Openings will be made through Quaker dam, in order that the water may be drawn off if necessary.

It is calculated that Quaker dam will impound thirty-two billions of gallons of water, which would be sufficient for a 160 days' supply of 200,000,000 gallons each.

If carried out, this scheme, only the main points of which we have mentioned, would furnish a storage reservoir of ample size, and in a good locality if at any future time it became necessary to take water from a source further north. This idea is by no means a visionary one when we remember how our small streams are drying up.

Correspondence.

A Good Suggestion.

To the Editor of the Scientific American:

I have followed the advice of the SCIENTIFIC AMERICAN, and done what I could to defeat the proposed patent laws in Congress. In addition I have asked our Senator to amend section 4,900 of Revised Statutes so as to *require* manufacturers, when practicable, to affix to their patented goods the numbers and dates of their patents, and secondly, in all cases to furnish the numbers, dates, and title or subject of patents involved.

My reason for so doing is this: I have found in some makers of machinery, claimed by them to be patented, a disposition to make a secret of such numbers and dates. In some cases have been met by an impudent inquiry as to my motives in making such a request. Now, if I understand the spirit of the patent law, it is the right of every one to inquire fully into any patent he sees fit, and makers of patented goods should be compelled to give any inquirer the numbers, dates, and titles of their patents, if they offer goods, claimed to be patented, for sale.

I add the word title, because some machines have so many patents that it would be a great hardship to compel a person to buy copies of the whole lot in order to investigate one particular point.

W. S. PROSSER.

Anbury, Cal., April, 1884.

[The suggestions of our correspondent are good, and doubtless the public convenience would be promoted if patentees were required to stamp their goods as above indicated.—EDS.]

A Trip on a Fast Locomotive.

To the Editor of the Scientific American:

Having occasion lately to pass over some branches of the Pennsylvania and Reading Railroad, a permit to ride upon the locomotives gave me opportunity to observe some striking points as to their work and wear.

At Bound Brook the Pennsylvania and Reading Railroad joins the Central of New Jersey, forming the Bound Brook line between Philadelphia and New York. South of that point Wootten locomotives are used on fast trains. North of it, standard Baldwins. The train leaving Philadelphia at 7:30 A.M., engine 364, makes the run to Jersey City in one hour and fifty minutes, schedule time, including some eight or ten stops and "slow ups." A stretch of seventeen miles between Princeton Junction and Bound Brook, including two slow ups and one stop, was run in exactly seventeen minutes. Of these seventeen miles, eleven in succession were run in nine minutes and ten seconds, being a rate of seventy-two miles per hour. And of these eleven, two successive miles were run in forty-seven seconds each, being a rate of 76·6 miles per hour. This was the regular daily run; we were not behind nor making up time.

Even at these high speeds the engine ran about as smoothly as a first class car. I have many times experienced severer vertical and lateral oscillations in such a car on reputable roads at forty-five miles per hour. So smooth, indeed, was the run that instead of any nervousness as to the safety of such speeds, the query constantly suggested was: Why may not a higher speed be obtained with entire safety? Or is there anything to prevent it but the problem of making the requisite steam?

In fact, safety at high speeds is aimed at in these engines, oddly enough, by placing the center of gravity very high—perilously high it at first appears; but when it is considered that the higher the inclination of the lines from the center to the rails, within the limit of safety from capsizing, the more lateral shocks will be eased by the springs, then it ceases to be a wonder that lateral oscillations are so little felt, for the reason that as *sudden* shocks they cease to exist. And take away the *sudden* heavy impact of the flange of the wheel laterally against the rail, and the danger of the wheel climbing the rail is taken away.

The firing and steaming of these engines is to be noted also, as they are the prime condition of the high speeds. The fire box is placed above the level of the top of the drivers, and extending out the full width of the engine overhangs them. An immense grate surface is thus obtained. Water tubes traverse the mass of fuel fore and aft, promoting circulation. The crown sheet is separated from the fire box by a wall of firebrick rising above the level of the fuel, and by a hot air or flame chamber between it and the fire brick. The crown sheets hold the largest number of the smallest brass tubes I ever saw in a locomotive boiler.

The force of the blast being expended through so broad an area of fuel the velocity of the air current through it is reduced, and as a result but very little cinder, and that the very finest, is ever drawn through the tubes. True, a spark arrester is placed in the smoke box—to comply with the law—but it arrests nothing, for nothing coarse enough to be arrested by it passes through the tubes, in other words, the stuff is all burned up in the fire box. The fact that these boilers are able to utilize what is known as "buckwheat" size coal, making steam very freely with it, is a strong point in their favor.

Notwithstanding the rapid evaporation effected—as high as forty-seven gallons per minute—they are not flighty. In the entire run above referred to the gauge did not vary three pounds from 135, due in part, perhaps, to an occasional blow-off, while slowing into the water tank.

Let any one who is in love with a swift, easy motion, like being borne through the sunlight on the thigh of a big angel, get a ride on one of these machines.

On the return from New York, I rode to Bound Brook on a Baldwin engine, No. 165, having a remarkable record, viz., that of having run 119,360 miles consecutively, without any general repairs, her weight having not once been lifted from her drivers in that period.

On the following day a run up the valley of the Schuylkill to Pottsville and back, gliding along fair interval lands, sweeping around bold mountain bases, rushing through those roaring hives of iron industry, and even making the descent, 1,300 feet, of Pleasanton's coal shaft, all could not divert attention from the fact that a small angel may make a very swift flight, the little Ariel, the manager's private engine, elegantly fitted to carry six persons, at our service, with little cylinders of ten inch stroke and drivers of three and a half feet, making a speed often of forty-five miles per hour.

The present advanced condition of railway service, however, has vastly more in it suggestive of advancement yet to be made than of perfection reached; and he is a bold prophet who undertakes to tell what the railway of the future shall *not* be.

B. W. P.

An Illinois Inventor to Illinois Senators.

Mr. Eric U. Norberg, of Toulon, Ill., has written to the Senators from Illinois, concerning the hostile patent bills, as follows:

"If such stupid and unjust bills should become law, it would not only be a gross violation of the rights already granted to inventors, but would also have a tendency to stop at once all inventions hereafter. It would be a legislation in support of the bad principles advocated by the socialists and communists, denying individual or separate rights in property; and if, in the start, one class of property is by law declared to be common property, owned by no one particularly, how long would it take till such a fanatical and wild doctrine would include all other property?

"There is already considerable excitement over these hostile patent bills, and many are more or less uneasy for fear they may become law, and this excitement may lead to a political organization for the protection of this interest.

"The superior wisdom of the Senate cannot overlook the fact that a large part of the productive industry of the country is the direct result of useful inventions, and that the successful development of our vast resources, our future prosperity and progress, if not civilization itself, depends to a great extent not only on inventions already made, but also on such that skill and ingenuity may hereafter bring forth.

"For these reasons herein set forth, I respectfully ask that you will use all your influence to prevent the concurrence by the Senate in, or passing, any of the bills referred to above."

The Milling World Says:

"The patent bills offer a fruitful field of discussion to all trade journals at the present time. If public opinion has anything to do with the formulation of laws, surely the advocates of the pending new patent regulations must have found out by this time that the large majority is against them, for all journals are most unanimous in condemning the bills as well as their advocates. A correspondent of the SCIENTIFIC AMERICAN touches a key note by the proposal that all inventors, and those interested in the progress of the country, should obtain as many signatures as possible to a pledge, that no advocate of any of the present new bills shall ever receive their vote at any election. Such pledges pouring in on these wise law makers from all parts of the country would beyond doubt have the desired effect upon the legislators, and demonstrate to them in what direction they must look for political support. The *Milling World* cordially indorses such a proposition, with the firm conviction that our existing patent laws, because far from perfect, should be made more efficient for the protection of the interests of both inventor and public, but not changed in any other manner. If we cannot improve them for the benefit of everybody, do not let us try to alter them to the detriment of many and to the advantage of a few mercenary individuals, but rather let 'well alone' and leave them in the present form."

Training Dogs to Patrol Mines.

A Zanesville, O., correspondent writes us that dogs may not only be made profitable workers in mines, by being taught to draw small coal cars, but it is entirely feasible to teach them to patrol mines, as detecters of the presence of fire damp or natural gas. A dog of 16 or 20 inches high is recommended as likely to be most serviceable in the work, but he should be so trained by the watchman as to be always ready to rapidly make the rounds of the mine before the latter starts. The plan is to send the dog through the mine. If he returns, it will be known that the mine is safe. Failure of doggy to come back indicates danger from gas.