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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 373,

For the Week ending February 24, 1883.

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PROJECTS FOR INCREASING THE WATER SUPPLY OF NEW YORK CITY.

A committee has been holding daily sessions to consider projects and receive suggestions relating to an increase in the water supply of this city. It is admitted that the need of such an increase is urgent. The largest capacity of the present Croton aqueduct is 100,000,000 gallons a day, and this at a pressure that seriously imperils the integrity of the structure. The engineers in charge agree that the aqueduct ought not to be made to carry more than 72,000,000 gallons a day. The present storage capacity is about 9,000,000,000 gallons. The Bronx River aqueduct, to be completed next year, will increase the supply about 20,000,000 gallons a day. A large proportion of the present supply is wasted. Mr. John C. Campbell, formerly chief engineer of the Croton aqueduct, estimates the waste at "about 50 per cent of the entire amount of the water furnished by the aqueduct"; this partly through the carelessness of consumers, but largely through leakage from the water-mains.

Could all the waste be prevented, the supply already provided might answer for the present, but it would soon become inadequate through the natural growth of the city. If the city increases during the next quarter century as it has during the past twenty-five years, there will be needed from 250,000,000 to 300,000,000 gallons of water a day. The question is, how can the requisite provision be made, not merely for the immediate future, but, if possible, for centuries to come?

The Department of Public Works is in favor of building a dam at Quaker Bridge, six miles below the Croton dam, to retain the water which now flows over the latter in seasons of abundance, with a new aqueduct to deliver the water thus saved. The supply of the Croton watershed, it is claimed, is sufficient for a population of 5,000,000.

To this plan it is objected that the proposed dam would have to be larger and higher than anything of the kind before attempted, and possibly hazardous, and that the Croton region is becoming so populous that the sources of contamination must soon become so numerous as to seriously injure the quality of the water supply from that valley.

Other plans for the better husbanding of the waters of the Croton region contemplate the damming of the east branch of the Croton, by which means, it is claimed, additional storage can be provided for 4,000,000,000 gallons. The amount of water flowing from the Croton watershed varies from 250,000,000 to 600,000 gallons a day.

To lessen the demand for Croton water, it is proposed to supplement the fresh water supply with salt water drawn from the adjacent rivers, for the use of the fire department, for flushing the streets and water-closets, for water power, and so on. This to be done either by direct pumping under the Holly system, or by a reservoir system. One engineer proposes a huge water tower in the middle part of the city below Central Park, the tower to be 100 feet in diameter and 350 feet high above tide water. On the top of this tower he would place a reservoir holding 2,000,000 gallons, to be pumped up from the river.

These methods would involve a new set of water mains and pipes, to cost, according to the estimates of Mr. Isaac Newton, chief engineer of the Croton aqueduct, more than would be required to furnish the city with the requisite additional supply of fresh water.

Another plan of drawing upon the Hudson River contemplates a pumping station above Poughkeepsie, the water to be brought in an open canal, or through pipes, to this city. This plan would necessitate the lifting of the water at both ends of the aqueduct, which would be expensive, and the propriety of drawing water from a river which has received the sewage of large cities like Troy, Albany, Hudson, and the rest, would be extremely questionable.

Other schemers propose to go still farther up the Hudson, to its upper reaches in the Adirondack region, or to Lake George, a distance of nearly two hundred miles, the water to be conveyed part of the way in an open channel, the rest in closed pipes. The supply is vast, the water of the highest purity, and all the cities along the Hudson River could be provided for in one scheme. The project is a gigantic one, and not likely to be seriously undertaken for many years, if ever.

Two other general sources of fresh water are under consideration. The Housatonic River might be dammed near Falls Village, Connecticut, and the water brought by open canal and tunnel into the Croton valley, a distance of forty miles. This is a project of Mr. Allen Campbell, formerly Commissioner of Public Works. The estimated cost of supplementing the Croton valley supply, in this way, is about $2,000,000. To this would have to be added the cost of a new aqueduct from Croton to the city, which might better be used in bringing to us the Croton water now allowed to run to waste.

The proposed sources west of the Hudson are the Hackensack, Ramapo, and Passaic rivers of New Jersey, and the lakes of Orange and Rockland counties, New York.

To draw from either of the New Jersey rivers would involve the passage of the Hudson, and either tunnels through the Palisades or costly pumping works to carry the water over them. These sources are open to the further objection that all the available water on that side of the Hudson will be needed, sooner or later, for the numerous populous cities growing there.

The lake region of Orange and Rockland counties is scarcely better fitted for the supplying of New York. In that territory are ten lakes, with a storage capacity of 8,500,000,000 gallons, available sites for ten artificial reservoirs, and adjacent lakes and watersheds capable of yielding 100,000,000 gallons a day, 300 feet above the tide level. But they are on the wrong side of the Hudson River.

TORSION TESTS OF CAST STEEL.

Some very careful tests have been recently made, to ascertain the relative resistance to torsion of tool cast steel in its unannealed form, as it comes from the manufacturer and is cut off the bar; in its annealed condition; and as hardened for tool purposes to be used on iron, as taps, reamers, drills, and similar tools that are worked by torsion.

It is not generally supposed that hardening and tempering cast steel increases its torsional resistance: on the contrary it is usually accepted that resistance to torsion depends mainly on toughness—the coherence of fibers when twisted—and that this toughness is much diminished by the process of hardening. But in the tests to which reference has been made, from a number of different manufacturers, the specimens that showed the least torsional strength, when hardened, were yet one and a half times stronger, or resistant to twisting, than unannealed specimens from the same brand. To be more exact, the figures for the unannealed were 5,114, the annealed 5,166, and the hardened 7,596, being an increase in torsional strength of the hardened and tempered specimens over the annealed and the unannealed of more than 33 per cent. Other specimens—those of different brands—showed a still wider difference between unannealed and hardened conditions: as of 5,010 unannealed, and 8,418 hardened; 5,346 against 8,814; 5,124 against 7,920; and of 5,100 against 8,232. These figures may represent pounds, as they actually did in the tests, the pieces tested being of round steel minus five-eighths of an inch diameter, with a distance between shoulders of two and three-eighths inches. The hardened specimens had been hardened and then drawn to a straw color, leaving them as hard as any tempered tool used for working metals, and inferior only to the file, which is not tempered, or drawn, at all.

One of the peculiarities of the tests was that so slight a difference existed between the torsional strength of unannealed steel and that which had been carefully annealed twenty-four hours, the results showing slightly in favor of the specimens tested as cut directly from the bar. The following shows the comparison:

Unannealed..	5,514	5,010	5,346	5,124	5,100
Annealed.....	5,166	4,572	4,864	4,128	4,552

From this it appears that no increase of toughness, or of resistance to torsion, comes from annealing cast steel. But annealing is valuable in rendering the steel more amenable to the action of the cutting tool.

PROGRESS OF MUSIC IN JAPAN.

An interesting reception was given at the New England Conservatory of Music, Boston, Feb. 6, to Prof. Luther Whiting Mason, on his return from a three years' absence in charge of the music in the public schools of the Japanese Empire

At the time of our Centennial Exhibition in 1876, the commissioner from Japan was impressed by the manner in which music was taught in the Boston public schools, and his recommendations led to the calling of Prof. Mason to take charge of the musical instruction given in the schools of the Empire. Prof. Mason had not only to introduce new methods of teaching, but a new order of music, and his success speaks well not only for his methods but for the tolerance and teachableness of the Japanese people, to whom he is about to return. At the reception he explained the development of his method of teaching Japanese children, and exhibited a number of beautiful gifts he had received from the Empress and other people of distinction in Japan. Professor Mason carries back with him as a personal gift to the Empress a handsome crystal vase on which is engraved her portrait. The engraving was done in Munich, and is a fine example of the highest style of the art.

SHALL FAILURE TO DEVELOP FORFEIT PATENT RIGHTS?

It is not an unfrequent occurrence for individuals and corporations having large sums invested in patented machines and processes to take out or purchase rival inventions for the purpose of preventing their development. Where a change of plant would entail a heavy loss, the manufacturer naturally prefers to go on in the old way. He does not want to risk making a bankrupt of himself to introduce improvements for the benefit of others. Accordingly, if he sees where a radical improvement can be made in his work he obtains a patent for it, if he can, and thus forestalls a possible rival. Or, if another man makes an invention which, if put into use, would compel the established manufacturer to adopt it to his temporary or permanent loss, or else retire from the competition, the manufacturer is bound to suppress the rising tyrant if he can. Probably three manufacturers out of every five are owners of patents which they have thus taken out or purchased for their own financial protection.

Occasionally the suppressed inventions are big with promise of benefit to the world, and it is something of a hardship to the public to see the dog-in-the-manger policy pursued with regard to them. Of this nature are some of the undeveloped patents for improvements in steel making controlled by the Bessemer Steel Organization.

To prevent such practices a bill has been prepared to be submitted to Congress, with a view to legislative action to