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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 557.

For the Week Ending September 4, 1886.

Price 10 cents. For sale by all newsdealers.

THE WATER SUPPLY OF NEW YORK CITY.

In the SCIENTIFIC AMERICAN SUPPLEMENT of the present week (No. 557), we print an exhaustive review of the plans for the future water supply of this city, from the pen of Mr. R. D. A. Parrott. The Quaker Bridge dam project is discussed very fully on the basis of ascertained facts. The conclusions reached are anything but favorable to the city's prospects.

The Quaker Bridge dam valley seems, from the configuration of the land, quite unfit for the purpose of a reservoir. It has a very slight slope, only twelve feet to the mile. When the dam is overflowing, comparatively little harm may be anticipated from it. But, unfortunately, the records of the past ten years prove that overflowing will be an abnormal state of things, and will only occur during four months of the year. For the remaining eight months, the storage *plus* the flow into the reservoir will be drawn upon. This will occasion fluctuations in the level; and when it is remembered that twelve feet fall of water will expose a riparian area a mile in width of mud, the malaria-generating capacities will be obvious. It is quite within the possibilities that nearly three thousand acres of bottom may be exposed.

This injurious feature does not only affect the country inhabitants, the city is also threatened. Eventually, by its increase of 800 inhabitants a week, the region near the dam will be populated, and its evil influences may spread south and east over future thickly settled streets of the city. The recent injury to contiguous property, due to the lowering of the waters of Lake Mahopac, shows what harm exposed lake or pond bottoms may do.

For eight months, all the water of the shed will be impounded by the dam, and delivered to New York. All the filth of this area is to be drawn into a great pond, and without any purification by aeration is to be husbanded until delivered more or less diluted to the aqueduct. If sanitary science teaches anything, it does affirm that pond water is the worst of natural water supplies, and that a river by aeration due to its flow purifies itself. In the proposed reservoir, we have an exaggerated pond, in which no aeration is possible, and one that by its emanations threatens injury to those near it, and by its water may affect a whole city.

Pumping, as executed in this city by private individuals, represents a great deal of work, or its equivalent, money. But New Yorkers are proverbially patient, and now seem resigned to await the completion of the new dam to secure a flow of water in the upper floors of their buildings. But Mr. Parrott points out that the bottom of the Quaker Bridge dam is only seventy feet above tide water, and that little or no amelioration is to be expected from it. In the dry goods district, from one hundred to one hundred and fifty millions of dollars' worth of property are uninsured, as the risks will not be taken. When the Croton was originally introduced in 1842, rates fell 40 cents on the hundred dollars. Referring to this district alone, is it not public policy to spread the awful risk of a conflagration among insurance companies all over the world, rather than to center it upon a group of representative merchants, now unwillingly their own insurers?

It appears, then, that little amelioration in pressure is to be looked for, and that the supply will not much exceed 250,000,000 gallons a day. At the rate of 100 gallons per head per day, this supply will soon be grown up to. The policy of limiting the supply of water is directed against factories and health. Mr. Parrott advocates a possible supply of 400 million gallons a day at a head of 300 feet. Among the features to be disapproved of in the new structure, he includes the submerging of the Croton dam after its past and possible years of usefulness.

The indictment from chemical and engineering standpoints reads like a sound one, and if unaccompanied by any suggestion for a remedy, would be disheartening. But the feature of the paper lies in a very pregnant suggestion, the utilization of the Catskill Mountains as a watershed. The idea cannot be clearly explained without the map that is printed with the paper. A dam on Esopus Creek, within fifteen miles of the Hudson River, is the starting point. This is 500 feet above tide level, and includes 240 square miles of a mountainous watershed. A tunnel eight miles long will bring in 110 more square miles of watershed, through the Schohaire Creek; another three miles of tunnel will bring in 50 square miles of the Batavia Kill shed; and, finally, a third tunnel, eight miles long, would increase the total area to 530 square miles of the purest watershed this side of the Adirondacks. All this is little over a hundred miles from the city, is on the west side of the Hudson, and could be made tributary to the new aqueduct at comparatively small expense, in proportion to its features of good.

Mr. Parrott calculates that the water will be six degrees cooler than Croton. By the tunnels different sides of mountains will be utilized, so that local thunder storms will all contribute to the supply.

This is the general result of the conclusions derived from the paper we have considered. The subject of expense is taken full cognizance of, but should be the last thing thought of. The health and safety of New York, and the encouragement of its manufacturing interests, rise paramount to any possible expenditure.

SCORING OF GRINDSTONES.

The following item is a recent one, but it is not a new fact:

"An improvement in the driving of grindstones and emery wheels is that by which the wheel is given a reciprocating lateral motion in addition to its rotation. Every one has noticed the advantage of moving a tool from side to side on a grindstone, so as to equalize the attrition on the different parts of the edge. It has now been found that by making the grindstone move laterally, and keeping the tool still, a more perfect result is attained, while the detached particles of steel have an opportunity to drop off the grindstone instead of being crushed into it, and the wear of the stone and the heating of the tool are both greatly diminished."

In file-making establishments the lateral movement of the grindstone is a necessity, else the file blanks would speedily cut the stone into annular channels. In some machine shops, also, provision is made for the same movement. But if this sideways movement is absolutely reciprocal, the stone will be scored as surely as though there was no movement sideways, only the scores will be curved instead of straight. For instance, suppose the shaft of the grindstone has end play enough on its journals to allow of a lateral motion of one inch, and a cam is fixed on the shaft with that amount of throw, a stationary guide on which the cam works to be secured to the frame. It is evident that, when the stone has made one revolution, its periphery will be, in relation to a fixed line on the frame, in exactly the same place as when it started; and, in consequence, if a scoring point was held against the face of the stone, it would make a cut one inch sideways out of a direct line, but meeting, to make a continuous ring, precisely as though the stone had no sideway motion.

In order to prevent this continuous and uniform action, the lateral movement, in relation to the revolution of the stone, must be continually changing. For this purpose, the driving belt should be on a pulley on a short countershaft, on which is also a gear wheel that meshes with another on the shaft of the grindstone. This countershaft is to be attached by boxes to the grindstone frame. The gear on the grindstone shaft should be wide enough on the face to allow the lateral movement of the stone without unmeshing the teeth of the gears. The cam is fixed to the grindstone shaft, and may have its throw either as a raised strip or as a score, to be guided by a holder fixed to the frame; but if the gears have even numbers of teeth—numbers divisible by each other—the uniform scoring cannot be avoided. So, one gear should have an odd tooth—"a hunting tooth," as it is sometimes called—which will insure perpetual change. Thus, if the two gears had respectively 40 teeth and 80 teeth, there would be uniformity of throw; but with 39 teeth and 80 teeth, or with 41 teeth and 80 teeth, uniformity would be impossible. Half an inch is enough of lateral movement to the stone, and the relative sizes of gears are immaterial, so long as their disproportion in number of teeth is observed.

PHOTOGRAPHIC NOTES.

A Miniature Paper Camera.—We have several times alluded to the fact that it was possible to obtain fair negatives by arranging a sensitive dry plate in one end of a suitable box, while in the center of the opposite end was a fine needle hole through a thin piece of metal attached to the outer surface of the box. Practically this idea has just been carried out in a small camera recently put upon the market, which, for its compactness, simplicity, and novelty, will be likely to lead a great many, young and old, into taking up photography as a pastime.

The camera bellows is nothing more than a heavy brown-black paper box made in two folds, the whole when fully extended measuring about three inches. The front portion of the paper bellows is pasted over the edges of a rigid sheet of straw board, cut to the size of the sensitive plate, thereby forming the camera front, and in the center of this is an aperture about a quarter of an inch diameter, covered by a film of ruby and green colored isinglass, pasted on the inner face of the front. A minute needle hole is punctured through the center of the thin isinglass which forms the lens. The aperture is closed on the outside by a gummed paper flap. Cemented to another straw board, forming the back of the camera, is the sensitive dry plate. The back portion of the paper bellows is then pasted over the back of the camera the same as the front. We then have a light-tight paper box, the front provided with a pin hole and the back with a sensitive plate.

When the folds of the paper bellows are pressed inward, making the front and back come together, the thickness of the package does not exceed half an inch, and measures 3¼ by 4¼. An angle of 100° is included in the picture, and the focus is 3 inches. It will be seen that its compactness makes it very handy to