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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are sharp, the articles short, and the facts authentic, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

STATE COMMISSION ON NEW YORK WATER SUPPLY.

According to its first annual report to the Legislature, the New York State Water Supply Commission has been occupied chiefly in considering the needs of New York city for an increased water supply. The application for permission to establish a water system in the Catskill region at a cost of \$160,000,000 is the most important problem of its kind yet proposed in this country. The report says that, judging from the statement of eminent engineers, it seems altogether probable that New York city must eventually utilize the waters of the Hudson River, either directly from its source in the Adirondacks, or possibly at less cost near Poughkeepsie, at a point on the Hudson about 75 miles distant from the city. Attention is drawn to the movement for the purification and protection of streams and rivers, which has been carried out with such success in Europe, that it seems likely to have the ultimate beneficial result of abolishing the barbarous plan of making scavengers of fresh-water streams.

The plan for establishing a water system in the Catskill regions has provoked the inevitable opposition, which occurs when any inhabited, and more or less cultivated, watershed is appropriated for city water supply. The formation of the extensive reservoirs will mean the absolute flooding out of inhabited districts, and the removal of buildings and abolition of farms from a belt of land bordering on each side of the tributaries to the main reservoir. That the occupation of a watershed in this way works positive hardship upon the population cannot be disputed, although we understand that it is the sincere purpose of the Commission to make adequate compensation to the residents and owners who will be affected. To many of these, no doubt, the loss of their ancestral homes, and the wiping out of all the associations with which the locality is enriched, will mean a sentimental loss that monetary compensation cannot meet. The case thus becomes one of conflicting interests; and if, in the present instance, the Catskill watershed is the only one that can properly meet the pressing needs of New York city, stern necessity will compel the sacrifice of the minority to the imperative needs of New York city's many million inhabitants.

Although the Catskill scheme has been recommended as, all things considered, presenting the best solution of the problem, it is not by any means the only one that has been under discussion, or has received eminent professional indorsement. As the report of the State Commission suggests, New York city must ultimately be driven to the Hudson River as its main source of water supply. One Engineering Commission has suggested that the Hudson River water should be used in preference to that of the Catskills, either by bringing it direct from its sources in an aqueduct, or by building a pumping plant on the river, and raising the water to a system of filtering beds, located on the hills back of the river, whence it would flow by gravity to the reservoirs within the city limits.

In this connection we publish on another page a letter from a correspondent, who offers the very novel and striking proposal to impound the waters of the Hudson River in various reservoirs located near its sources; build at each site a hydraulic-electric plant; and transmit the current to an electrical pumping station at Poughkeepsie, where the Hudson River water would be raised to the filtration beds and reservoirs on the hills above. The scheme, if based on the Burr, Hering, Freeman estimate, would involve the raising of 500,000,000 gallons daily through a vertical height of 400 feet. Our correspondent believes that his project could be carried through with a saving of thirty per cent, as compared with the scheme of providing a dam at Ashokan and an aqueduct for conveying the water from the dam to a reservoir on the Poughkeepsie side of the river. As regards the project suggested by our correspondent, it must be remembered that for the performance of this work by the hydraulic-electric

method, there must be provided, at the many power plants scattered through the Adirondacks, the energy represented by the fall of 500,000,000 gallons daily through a height of 400 feet, plus the power necessary to overcome the resistance in the pipe lines, in the turbines, in the generators, and in the step-up transformers. To this must be added the energy necessary to overcome the resistance in the hundreds of miles of transmission line between the Adirondack power stations and the pumping plant at Poughkeepsie, and also the resistance in the pumping plant itself due to the step-down transformers, the rotary converters, the motors, the pumps, and the pipe lines, from the intake at the Hudson to the outlet at the reservoir on the hills above. It would be an interesting problem, when the location of the power plants was established, to determine how many hundreds of millions of gallons must be delivered daily to the turbines, to cover the above-mentioned sources of loss, and still suffice for the stupendous and unending effort of lifting the 500,000,000 gallons daily to a height of 400 feet—this height being necessary to secure a flow to the high-level reservoirs within the city limit. The most sanguine estimate would demand, surely, that not less than 800,000,000 gallons daily should be available at the distant power plants. Yet we are informed by the Water Supply Department that a study of the flow of the Hudson in the driest seasons on record shows that it has fallen at Poughkeepsie as low as about 900,000,000 gallons per day. With all due recognition of the ingenuity of Mr. Parrott's proposal, we think that, if the Hudson water were used, considerations of security and permanence would lead to the selection of a steam pumping plant rather than one depending upon the variable flow of the upper Hudson.

THE DELAY OF THE MANHATTAN BRIDGE.

It will be within the memory of our readers that our last article on the Manhattan Bridge controversy was intended to close the discussion, as far as the columns of the SCIENTIFIC AMERICAN are concerned; but we have since received several letters from Mr. Hildenbrand, requesting us to re-open the subject to the extent of assuring the public that our criticism of his published letters was not intended to cast any doubt on his professional ability. We cheerfully comply, if only because of the opportunity it affords us to state, once and for all, the position of the SCIENTIFIC AMERICAN with reference to this matter. The point of view of this journal is that of the individual citizen, who, first and last, is the one that suffers from the inconvenience caused by the delay—the absolutely unnecessary delay as it seems to us—in the construction of this bridge. So long as the Manhattan Bridge be well designed and speedily built, the SCIENTIFIC AMERICAN cares not one iota what engineer writes his name at the bottom of the plans. Our strong advocacy of the design of the former Bridge Commissioner has been absolutely impersonal, and based entirely upon the merits of the case. The Editor formed a favorable impression, from the very first, of the plans for a chain-cable bridge—an impression which was deepened by the indorsement which these plans received from the Board of Engineers appointed by the Mayor to pass upon them.

That Mr. Hildenbrand's name appeared in the columns of the SCIENTIFIC AMERICAN was due entirely to his own act in sending us his letters for publication. We did not approve of his method of argument, and said so. We do not approve of it now. But he is quite in error if he thinks that our criticism was prompted by any motive of disparaging his professional ability. Mr. Hildenbrand may well be content to let his reputation stand upon the fact that he was mainly responsible (if we are not mistaken) for the design of the Brooklyn Bridge. His strong advocacy of the wire cable is consistent, and, we have no doubt, sincere; but in the present controversy we think that he has unwittingly allowed his zeal to get the better of his logic.

It seems to us that what is needed in a discussion of this matter is a broader point of view. Would it not be well for everyone concerned in the agitation that has already deprived New York city of this greatly-needed improvement for a period of nearly three years, to try to look at the question more from the standpoint of the good of the public, and less from the standpoint of personal predilection for any particular type of bridge. We seriously doubt if any of the engineers who opposed the design for a chain bridge believed that it would have failed, if built, to prove perfectly serviceable and safe. Even Mr. Hildenbrand, in his letter published in the SCIENTIFIC AMERICAN of November 4, 1905, says: "They" (the Board of Engineers that approved the rejected design) "were merely engaged for giving their opinion whether the design submitted to them was practical, whether the bridge, after being finished, would be fireproof, durable, and serviceable, and whether it would have sufficient capacity and strength. These questions were answered with 'Yes,' and if I had been a member of the committee, I would, with strict adherence to the

same questions, have given the same verdict." Now, that the bridge would have been heavier than a wire bridge (with all that this involves) no one has ever disputed; yet, in their strong preference for the construction of a wire bridge, the Bridge Department, in spite of the delay which a change necessarily involved, threw aside the plans for a chain bridge, which Mr. Hildenbrand himself believes would have been, though heavier, "serviceable," and of "sufficient capacity and strength," and thereby subjected the city to the present intolerable delay, the extent of which no one can foretell. Herein lies the true burden of responsibility. The result of the agitation against the chain-bridge design has been to cause the city of New York enormous inconvenience, by delaying a most urgently-needed link in its system of transportation.

Mr. Hildenbrand claims that the responsibility for delay dates back to 1902, when the original design for a wire-cable bridge was thrown out. We believe, however, that the original design was both incomplete and inadequate to the increasing traffic, and that, whether a wire-cable or a chain-cable were used, new plans were in any case necessary. We may be wrong; but even if it be granted that the delay in 1902 was unnecessary, that is no justification for the further delay in 1904. Two blacks never yet made a white.

In the present dilemma the Merchants' Association of this city has made to the Mayor a recommendation which we cordially indorse. As matters now stand there are, in the Bridge Department, two complete sets of plans for the Manhattan Bridge. One of these, calling for a chain cable, has been passed upon and approved by a Board of Engineers; the other, which has never been offered for approval by an independent board, has been bid upon, but the bids have been thrown out by the courts. The Merchants' Association suggests that, as the Department is now in possession of two sets of plans, they should both be submitted to an independent board of engineers, and that fresh bids should be asked upon the plans which this board may approve. We sincerely hope that the Mayor will adopt a suggestion which is so sensible, and offers such a simple and quick way out of the present deadlock.

ON A TOUR OF THE SHOPS.

Shop methods have changed greatly in recent years, and school and college trained mechanics are making their influence felt more and more, but the old-time mechanic, with a mind accustomed to dealing with emergencies and able to turn his hand to almost anything, still survives in many of the shops. His training is very different from the younger generation. He knows less about mathematics and accurate drawing to scale, but his intimate knowledge of the practical working of machinery makes him an invaluable factor in every shop. He knows his machinery by heart, and any heart throb that is not natural attracts his attention. He can usually tell by the "feel" what ails a complaining machine. He knows every "cranky" engine or machine in the shop, and he understands how to favor each one to get the greatest amount of work out of it.

But it is in the repairing of machinery that the old-time shop hand is at his best. Here he is in his element. He was brought up in the school which made every machine shop an independent entity. It was impossible in those early days to order duplicates of machinery by telegraph, and expect them to be delivered within twenty-four hours. Consequently, every shop had its resourceful mechanics, who were capable of repairing any machine so that it could continue its work for several weeks until the new parts could be forged or made in some distant factory. It was this very training which made the old-time mechanics such men of inventive genius. If an engine rod broke or a steam box fractured, the mechanic of the shop could repair it so that work would not have to be shut down for long. The breaking of a huge flywheel only meant temporary delay. An old-time shop mechanic recently told me how he had rigged up a wooden flywheel within twenty-four hours after an iron one had broken, and the temporary one worked successfully until the order for a permanent wheel could be filled.

In the modern, up-to-date shop, where nearly every part of the machinery is supplied in duplicate, so that the breaking of any piece merely causes a little shut-down, the tendency has in recent years been to depend less and less upon the old-time all-round, ingenious shop mechanic. The feeling has grown that the human element will be more and more eliminated from the shop as an important skilled factor. It is the machinery which holds sway, and which does the work, and the man who operates it merely holds an inferior position. Yet there are some shops which take the opposite view of this. A visit to one of them a short time ago revealed quite a unique condition of affairs. It was filled with old-time mechanics and shop workers. Very few of the new school were present. Was this an accident or intentional?

"Partly both," replied the superintendent. "I brought most of these men back with me from Mexico, and I shall keep them as long as they care to stay