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Scientific American Supplement

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FAMOUS ENGINEERING LANDMARK TO BE REMOVED.

The laying of the new 48 inch water mains on Fifth Avenue, New York, has reached a point where it is possible to dispense with the distributing reservoir at Forty-second Street, and this famous engineering work will now be torn down to make way for the noble pile which is to form the home of the New York Public Library. The reservoir was built over half a century ago to provide a terminal for the Croton Aqueduct, in common with which it forms the most monumental engineering work of the first half of the century in America. The cost of this water supply was more than $12,000,000, and the enterprise with which the city of only a quarter of a million souls faced so great a financial burden was only equaled by the skill and good taste with which the engineers of that day, Jervis, Allen and Davis, carried out the engineering and architectural features of the work.

The reservoir, which crowns the summit of Murray Hill, stood well out in the country at the date of its erection. Fault has been found with its architectural design; though it has always seemed to us that the simple and massive Egyptian style in which it is built is singularly adapted to express the purpose of the inclosing walls of the structure. The reservoir covers four acres and is built entirely above ground. The walls are carried up high enough to give a maximum depth of 36 feet of water and a total capacity of 24,000,000 gallons. The walls are double, with a space between them, varying from 9 feet 9 inches to 14 feet in width, and they are tied together at intervals with cross walls. The outer wall, 4 feet thick throughout, has a batter of 1 in 6. The inner wall varies from 6 to 4 feet in thickness and is vertical. A puddled embankment is laid against the inside of the inner wall and the bottom is covered with 2 feet of puddled earth, above which is 12 inches of concrete.

The work was carried out with that conscientious care which marks the whole of the Croton water scheme, and testifies to the skill of the engineers and the thoroughness of the contractors of an earlier day.

THE POSSIBILITIES OF HIGH SPEED ELECTRIC TRACTION.

In view of the many impossible schemes for air-line electric roads with speeds of from 100 to 200 miles an hour which from time to time find their way into the press, it is a relief to find the subject taken up and discussed in a scientific way by professional men who have no other object than to place the actual possibilities and limitations of high speed electric travel before the reader. In a recent series of articles in the Engineering Magazine the authors discuss the engineering and financial features of an electric road between New York and Philadelphia which would carry passengers between the two cities in thirty-six minutes, or at the rate of one hundred and fifty miles per hour. It is the opinion of the authors that the scheme would present no civil or electrical engineering difficulties which could not be overcome. The cost, however, as figured out, would be $190,000,000. The estimate is made on the basis of a road on the third rail system, with trains running at three-minute intervals. Three-phase 10,000 volt current would be used for transmission lines, and 1,000 volt direct current on feeders. Each station would have an economical capacity of 30,000 horse power and each substation a capacity of 20,000 horse power. The travel, estimated on the basis of several existing elevated and suburban roads, is put down at 187,040 passengers both ways per day. This is more than four times the traffic of all the existing roads between these cities. It is considered, however, that the reduced time and the low fare, assumed at twenty cents, would greatly increase the travel. It is evident that, in the opinion of the authors, Messrs. C. H. Davis and F. S. Williamson, the difficulties would be rather of a financial than electrical nature, and their study of the question of high speed travel shows once more that the limits to engineering performance are set by financial rather than technical considerations.

PROBABLE SOLUTION OF THE ARMOR PLATE QUESTION.

There is some prospect of a settlement of the armor plate controversy between the government and the firms engaged in armor plate manufacture, by the latter offering to supply a much superior plate at the price fixed upon by the Secretary of the Navy. It is well understood in naval circles that the great Krupp factory is turning out nickel plates treated with its new gas process which have shown better ballistic results than the nickel-steel Harvey plates which have won such world-wide celebrity. It now appears that the Carnegie and Bethlehem Companies have acquired the rights to the Krupp process in this country, and two experimental plates are being made which will shortly be tested at the naval proving station at Indian Head. The Krupp plates have shown all the hardness of the Harvey plates, with a remarkable toughness which renders it practically impossible to break them. Extreme toughness and extreme hardness seemed to be incompatible in the same plate, until Harvey combined the two by the use of nickel and face hardening. The hardness, however, is always present in greater degree than the toughness in Harvey plates. The new Krupp process seems to render the plate absolutely proof against fracture.

If the two experimental plates show all the good qualities expected of them, the obvious course for the government would be to fix a fair price and close a contract for the supply of the much needed armor for the new battleships.

A YEAR OF PLENTY IN KANSAS.

It is a commonplace truth that the source of the prosperity of this country lies in the soil—that good crops mean good times; but it is only when we have before us such astonishing figures as are furnished this year by the Kansas State Board of Agriculture that we appreciate the supreme importance of agriculture. Omitting the odd thousands, we find that the yield of winter wheat in that State is fifty million bushels, worth thirty-four million dollars, or 160 per cent more than last year. The corn crop totals one hundred and fifty-two million bushels, and the yield of oats is twenty-three million bushels, the two together bringing in thirty-two million dollars. The total value of winter and spring wheat, corn and oats is sixty-six million dollars.

This is the record of a year of plenty. Compare it with the crops of the previous year, when the combined winter and spring wheat, corn and oats brought only fifteen million dollars to the farmers.

The table of the yields and values of the crops and products of all kinds, including, in addition to the cereals already mentioned, potatoes, flax, sorghum, dairy products, etc., is one hundred and thirty-six million dollars. The total value of crops and live stock is two hundred and thirty million dollars, and the total net increase of all agricultural products is over forty million dollars. In the presence of such figures one is prepared to believe there may be more truth than jest in the statement that Kansas will "forward a car load of canceled mortgages" to the forthcoming exposition at Omaha as a token of her returning prosperity.

ECONOMY IN DETAILS.

There is a good story told in a Philadelphia paper of a French officer of engineers who, during a visit to one of the large machine shops in that city, regarded with comparative indifference the massive tools and "show" features of the establishment but paid close attention to a little tool-sharpening machine—a type of those numerous ingenious labor-saving appliances with which an American shop abounds. At the close of his inspection he stated that he had visited all the most notable engineering undertakings and establishments in America, and that he should report to his government that the biggest things in America are the little things. He was struck with the fact that in some establishments which he had visited the profits were mainly realized in the saving of materials and labor by close attention to details which in Europe are unconsidered trifles, and as an instance of this he quoted the little grindstone which he had noticed in the shops.

The criticism of the French engineer went direct to the mark, for while we have engineering works as great as any in the world, it is in our genius for invention of labor-saving appliances that we lead the world, and herein, too, lies the secret of the extraordinary reductions which we have been able to make in the cost of manufacture.

With the ever-growing magnitude of industrial operations and the increasing keenness of competition, the race will be won by the people who have a genius for economy in details, who are untiring in their efforts to save time and labor in the most insignificant trifles of shop and factory management. The rapidity with which the new inventions of one country are patented and bought up in other countries has an equalizing effect which prevents any one nation from enjoying a monopoly of the fruits of its ingenuity, at least in the more important and costly inventions; but as long as the American mechanic continues to devise more rapid and less laborious ways of doing even the most insignificant work, it will continue as easy for us to undersell the European producer as it is puzzling to him to understand how we can do it.

THE LIMITS OF HUMAN SPEED AND ENDURANCE.

The many forms of use and abuse to which the bicycle has been put have served to demonstrate that man is capable of feats of speed and endurance the mere suggestion of which would have been deemed absurd and impossible a generation ago. While it has long been known that the human frame was capable of exertion far beyond the powers of the brute creation, it was reserved for the bicycle to show just what the measure of its endurance was. While we consider that six day races, such as have lately been concluded in New York, are to be condemned on obvious grounds of humanity and common sense, it is undeniable that they possess an interest as showing the amazing feats of strength and endurance of which a well trained athlete is capable.

The past year has been fruitful in record-breaking