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NEW YORK, SATURDAY, MAY 26, 1900.

PROGRESS OF THE NEW YORK RAPID TRANSIT TUNNEL.

Although several weeks have passed since the letting of the contract for the construction of the rapid transit tunnel in this city, it was only on Monday, May 14, that the actual excavation of the tunnel was commenced. If we bear in mind that this contract is by far the most costly of the kind that has ever been let to a single contractor, involving as it does the expenditure of $35,000.000, and that the whole twenty miles of the work had to be divided into sections, and a selection made of the most reliable and capable from scores of would-be sub-contractors, the present status of the work may be considered as satisfactory.

At the present writing sub-contracts have been let for practically the whole of the road, the section between Thirty-third and Eighty-fourth Streets being still under consideration. The first two contracts to be let covered the important preliminary work of lowering the Bleecker Street sewer and diverting the great sewer at Canal Street, which is being prosecuted as rapidly as the necessities of street traffic will allow. At Bleecker Street the sewer is to be lowered some twenty feet to clear the floor of the tunnel, while at Canal Street it will be necessary to build practically a new sewer. Here the present flow is toward the Hudson River, but as soon as the new work is completed, the sewage will be discharged easterly into the East River.

Although the formal inauguration of work took place on March 24, in front of the City Hall, when the first spadeful of earth was turned by the present Mayor, there will be no actual excavation at the site marked by the commemoration tablet. The spot chosen for the function of May 14 was at One Hundred and Fifty-sixth Street, where the first actual digging of the tunnel is taking place. This particular section, which extends from One Hundred and Fifty-fifth to One Hundred and Sixty-second Street, will be excavated by what is known as the "cut and cover" method; that is to say, an open cut will be made, in which the steel-and-concrete floor, sides, and roof of the tunnel proper will be built, the material being subsequently filled in and the roadway restored to its former condition. The greater part of the excavated road will be built on this system, there being only about three and a half miles of straight rock tunneling.

The location of the road with regard to the surface and the nature of the material encountered is such that, contrary to the popular expectation, there will be no use made of the shield which has figured so largely in the Thames tunnel and the various London underground railways. These roads are being constructed at a considerable depth below street grade, and largely in a bed of clay which lends itself admirably to the use of the shield. In the New York subway, on the other hand, wherever the road lies too deep for cut and cover work, the material is chiefly solid rock and the use of the shield is not necessary. Even where the east side branch of the road passes beneath the Harlem River, it is estimated that it will be more economical to construct the tunnel by sinking caissons—the short distance, about 400 feet, beneath the river, not warranting the expense of sinking and driving a costly shield.

The methods of construction used on the successive sections of the tunnel will be as follows: Cut and cover from the present terminus at City Hall Park to Thirty-third Street; tunnel from Thirty-third to Forty-first Street; cut and cover from Forty-first to One Hundred and Fiftieth Street, except the viaduct over Manhattanville and a short length of tunnel at One Hundred and Twentieth Street; tunnel from One Hundred and Fiftieth to One Hundred and Fifty-fifth Street; cut and cover to One Hundred and Sixty-second Street, and tunnel to Fort George at about One Hundred and Ninety-fifth Street. On the east side branch there will be tunnel construction from One Hundred and Fourth to One Hundred and Tenth Street; cut and cover to a point across the Harlem River at Girard Avenue; tunnel to Third Avenue; and elevated structure from Third Avenue to Bronx Park.

It is very gratifying to note the unanimous favor with which the proposal to extend the tunnel to South Ferry and beneath the East River to Brooklyn has been received. The necessary surveys for the extension to the ferry were made some years ago, and the surveys for the tunnel beneath the river are now under way.

From this brief survey of the situation, it is evident that before the next century is five years old, New York will be possessed of a completely new system of transit, which in location, capacity and speed will be unsurpassed in any city of the world. With its easy accessibility, ample ventilation, and the thoroughly up-to-date electrical equipment that will be put in, we are sanguine that it will meet all the high expectations to which it has given rise in the people of this city.

SOME NEEDS OF MODERN CHEMISTRY.

Our modern system of mechanics begins practically with the invention of means for measuring force and for calculating its effect upon matter. Mechanics has not alone profited by the labors of Helmholtz and Maxwell, Robert Mayer and Joule; the achievements of these physicists were also the means of elevating chemistry to the rank of an exact science. Chemists were compelled to retrace their steps, to re-explore fields which they thought had been thoroughly investigated, and to study old processes in the light of the new discoveries. The laboratory investigator was no longer content to measure only the matter at his disposal; he found it necessary to know how great was the force released or rendered latent by chemical processes. Thus it was that thermochemistry originated; and thus the prophecy made by Richter one hundred years ago, that chemistry was but "a branch of applied mathematics" was fulfilled. The gap that once separated physics from chemistry is now bridged. Our study of the phenomena of dissociation and of dissolution, carries us directly into the province of molecular physics.

But great as the strides have been which chemistry has made within the last half century, there still remains many a weary path to be pursued. Although physicists have done much to clarify the chemist's conception of matter and force, they have not told him all.

Those seventy elements which are daily used in the laboratory, surely they are but the variant forms of a single matter. We have but one force; and why should there be seventy matters? That wonderful periodical law, with its puzzling numbers, seems to contain within it the means of discovering the primeval matter for which chemists have long been seeking. The old alchemist with his theory of the transmutation of elements again lives; but he is now a chemical physicist, who endeavors not to convert a base metal into gold, but to prove the existence of one form of matter.

The mysteries of chemical energy are also still to be unfathomed. The forces which we have learned to observe and to measure are phenomena of a secondary nature. The chemical energy whose transformations give rise to these forces is still a puzzle to chemists. Instruments of measurement can reveal only the sum total of this energy, but not the nature of the intramolecular changes which occur. For this reason we have no clear conception or numerical expression for the relation of chemical energy to other forces; in other words, we have no chemical equivalent of work. We know that chemical energy is converted not only into heat, but also into light and electricity. That a chemical work can be directly transformed into motion seems also probable.

It cannot be for a moment doubted that the problem of chemical energy and matter will eventually be solved. When adequate laws shall have been formulated by the twentieth century investigator, we may possibly speak of a "mechanical" or "kinetic" chemistry, which will be added to the list of exact sciences.

TWO IMPOSSIBLE BILLS.

There is a certain sense in which it is true that none of the bills presented for the consideration of Congress are so dangerous as those that are obviously impossible and silly. A vicious bill, or one that carries its condemnation visibly written across its face, if it possesses but one favorable feature, is likely to receive sufficient debate to insure its defeat; but there is always a danger of the absolutely ridiculous measure slipping through Congress because of the very contempt and neglect with which it is received.

In the latter class belongs Representative Chanler's bill to grant an extension of seven years to a patent for insulating submarine cables, which was originally granted on the twenty-first of May, eighteen hundred and sixty-seven to one George B. Simpson, and, therefore, has now been an expired patent for over sixteen years.

Under the law which was in force until the year 1861, all patents expired at the end of fourteen years, with the privilege of renewal for seven years if the patentee could show that the difficulties, delays and costs of developing his patent had been so great as to prevent him from realizing within the fourteen years a reasonable profit from his invention. Under the law which went into effect on March, 1861, the life of a patent was extended to seventeen years, that being considered an ample period of time to cover all possible delays in developing the patent, and allow of its subsequent profitable operation. The Commissioner of Patents cannot grant an extension except under a special act of Congress, and it is understood that only on most exceptional grounds will a petition for extension be entertained, the period of seventeen years being considered as a generous grant, and one that is just to the interests both of the inventor and the public.

The patent under consideration claims "the combination of gutta-percha and metallic wire in such forms as to incase a wire or wires, or other conductors of electricity within the non-conducting substance of gutta-percha, making a submarine telegraph cable, etc.," and one asks with considerable astonishment on what grounds renewal should be asked for such a patent. It surely cannot be that seventeen years was too brief a time in which to put into practical commercial shape the simple device which forms the subject of the claim, and as far as its commercial aspect is concerned, the gutta-percha covered conductor is suggestive, in the period covered by the patent, rather of ample profits than of the struggling and poverty-stricken inventor. The only suggestion of a motive for the preferring of this extraordinary request is found in the last provision of the bill, "that the benefits accruing from the use of said patent shall inure solely to the heirs of the widow." Possibly there is a motive of philanthropy behind this measure; but in any case we are certain that Congress will require something stronger than sentimental reasons before renewing a patent on a gutta-percha covered conductor.

The zeal of Representative Chanler for his constituents is quite eclipsed by that of Representative Underhill, who has introduced a bill for the extension for seven years of a patent that has yet three years to run. The patent is for an improvement in analytical balances. It would be interesting to know what are the special conditions which enable Representative Underhill to determine, three years before a patent has expired, that its owner is entitled to seven more years of protection than are granted to the thousands of contemporary applicants at the patent office.

THE POSTAL SERVICE IN THE TIME OF QUEEN ANNE.

The postal service in England in the time of Queen Anne was not as rudimentary as might be supposed. There were six great offices in London for taking in letters, and there were 600 smaller ones in different parts of London for the convenience of correspondents. The penny post was started in 1683 by an upholsterer named Murray. The service seems to have been an excellent one, and even bundles weighing a pound could be sent, provided that the bundle was not worth more than ten shillings.

Articles of value could be sent if an account of them was given at the office. In 1711 an act was passed abolishing the penny post. They were taxed with the rates and stamped with the mark of the general post office and the rate was 1 shilling per ounce for parcels. Letters could be carried 80 miles for two pence; letters more than 80 miles, three pence and six pence. A letter to Dublin cost six pence single, and double letters one shilling, and one shilling and six pence an ounce. Foreign postage was not very expensive. In 1705, for instance, a letter of a single sheet could be carried to the West Indies for one shilling and three pence, and in 1708 Mr. Povey established a foot post carrying letters in the London district only, for half a penny; it was not long, however, before the postal authorities stopped him.

TEXTILE MANUFACTURING IN THE NEW SOUTH.

BY J. A. STEWART.

The growth and development of the South in industrial enterprise during the past decade has been phenomenal, and its advancement in textile industries must be regarded as a natural and a national development. The South, it stands to reason, should be particularly interested in everything pertaining to the growth of cotton and in cotton products. As the chief source of the world's supply of raw cotton, the southern section of the United States has held a unique and distinctive place. It looks now as if it would also earn prestige as a cotton manufacturing stronghold. Though the South built its first cotton mill about the same year in which Samuel Slater laid the foundations of New England's magnificent textile industry, no noticeable advance was made until recently. Now South Carolina ranks second only to Massachusetts in the number of her spindles. North Carolina contains more factories than South Carolina, though her plants average smaller, and Georgia and Alabama are rapidly following the lead of the Carolinas.

There are two chief advantages in the South for cotton manufacturing: Proximity to the sources of supply of raw material and an abundance of cheap labor,