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NEW YORK, SATURDAY, MAY 25, 1901.

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.

PIPE GALLERIES FOR THE RAPID TRANSIT SUBWAY.

The construction of the rapid transit subway afforded an opportunity for making proper provision for the mass of electric cables and gas and water pipes, which lie beneath the streets of the city, and are the cause of endless annoyance in the way of excavations for repairs and relaying. The opportunity to build along one or both sides of the subway special galleries to contain these pipes appealed at once to the engineers in charge of the scheme. As we have shown elsewhere, plans were drawn up which made adequate provision for present and future needs, and $35,000 was spent in their construction. It is to be regretted that the pipe galleries have been abandoned, chiefly, it would seem, as the result of pressure of a semi-political nature brought to bear upon the Railroad Commission. The municipal engineers chiefly affected by the erection of pipe galleries have, for various reasons, so bitterly opposed their construction that, rather than entangle the whole tunnel contract with legal complications, the Commission has abandoned the galleries, at least for the present. We are of the opinion that the question of the construction of these galleries is second only in importance to the construction of the subway itself, and that it is absurd even to suggest that there are any insuperable difficulties in making adequate provision of this kind for the water pipes, gas pipes, electric cables and other lines which at present lie buried beneath our main thoroughfares. The present interruptions to traffic, the interminable and absolutely stupid way in which our choicest streets are dug up, relaid and dug up again, is a perpetual and obtrusive nuisance, which would not be tolerated in any provincial town, and cannot be too soon removed from the streets of the second greatest city in the world.

REMARKABLE RESULTS AT SANDY HOOK.

One does not need to be an artillery expert to appreciate the great significance of the results obtained during the last two or three weeks at Sandy Hook in a series of government tests of the new high explosive Maximite. It is safe to say that just now there is no problem of greater interest in naval and military circles than that of carrying charges of high explosives in shells through armor-plate, and bursting them within a fort or battleship. We have heard a great deal of late about the English explosive Lyddite, which is, like Maximite, a picric acid compound, but is altogether wanting in the remarkable insensitiveness to shock shown by the latter explosive. When the battleship "Majestic" fired Lyddite shells against the "Belleisle" last summer, the shells passed through the skin plating of the vessel and burst within it; but whenever they struck the armor, which was of an old and easily penetrable type, they exploded harmlessly on the outside. Elsewhere in this issue it is told how at Sandy Hook shells of all sizes, from 6-pounders up to 12-inch, carried their loads of the new explosive through armor-plates of from 3 inches to 12 inches in thickness, and either exploded the charge in the plate or just beyond it. No such results as these have hitherto been obtained at any proving ground, either here or in Europe. When it is remembered that the new compound is far more powerful than wet guncotton; that it has an explosive value equal to that of nitro-gelatine and picric acid; that not only can it be fired from powder guns at the highest velocity with safety, but that it will withstand the far greater shock of penetrating any armor-plate that the projectiles themselves can get through, we can well understand that the ordnance officers are much gratified with the results. These Sandy Hook tests show that in the matter of high explosives the United States government has a long lead over any other.

THE GROWTH OF LONDON AND NEW YORK.

The census returns for the city of London, which have recently come to hand, afford a basis for comparison between the two great cities of the Old and New World. In each there has been a rapid increase during the past decade; but there is something prophetic of the future in the fact that not only has the rate of increase of New York city been very much greater than that of London, but that the actual increase has been two hundred and fifty per cent greater. In 1891 the population of London was 4,433,220 and in 1901 it has increased to 4,803,342, an increase in ten years of 370,122. In the year 1890 the population of what is now Greater New York was 2,492,591 and by the year 1900 it had increased to 3,437,202, an increase during the decade of 944,611. Fifteen years ago London was growing at the rate of 50,000 a year, whereas the increase of the past decade only averages slightly over 37,000 per year. As against this, a comparison of the census of the last two decades in this country shows that Greater New York increased from 1,901,000 in 1880 to 2,492,591, an increase of 591,246 or thirty-one per cent; while the increase of 944,611 from 1890 to 1900 was at the rate of thirty-seven and eight-tenths per cent. Assuming a rate of only forty per cent during the next ten years, the population in 1911 should be equal to that of London at the present time. It is likely, however, that the rate of increase will be nearer fifty than forty per cent, and should the rate at which London is growing continue to decrease, it is quite possible that by the time the next census is taken the population of the two cities will be about the same.

Outside of New York, the census shows that there are two cities (Chicago and Philadelphia) whose combined population is 2,992,272, while the increase during the decade has been 845,458, and the rate of increase 39.3 per cent, or slightly higher than the rate for New York. The greater increase has been that of Chicago, which has grown at the rate of 54.4 per cent, the rate of increase in Philadelphia being only 23.5 per cent. There are in this country three cities of between 500,000 and 1,000,000 inhabitants, five of from 300,000 to 400,000, and eight of from 200,000 to 300,000 inhabitants. The rate of increase in these three classes ranges from 28.5 to 23.2 per cent.

In looking at these figures, there is food for reflection in the fact that, as a rule, the larger the city, at least as far as the United States is concerned, the greater seems to be the rate of increase. At the same time it is reassuring, in the presence of this centralization, to bear in mind that improved means of transportation are rendering it possible for the teeming millions of the great cities of the world to be scattered over an increasingly wide area of outlying suburbs.

FORESTRY IN INDIA AND CANADA.

Canada might well learn a lesson regarding forest preservation from India. The government of the latter country found that as a result of the destruction of forests by ax and fire, vast tracts of land had been desolated, and there was danger that the whole country would become barren if the work of destruction were allowed to continue, for a country without forests is likely to be afflicted with alternate floods and droughts.

The work of protecting the forests was begun in India in 1844 and gradually extended, but it has been placed upon a thoroughly scientific basis only during the last twenty years. The service is divided into 210 departments under the direction of expert foresters, most of whom have been trained in Germany and France. They are assisted by a number of subordinate officials, many of whom are natives of India. A training school for these officials has been established near Dehra, and it is intended to have similar training schools at all the local centers, as it is desired to have none but expert foresters in the service. Promotions are made according to merit, and it is expected that in a few years about twenty per cent of the superior positions will be in charge of natives selected from subordinate positions. The foresters have to guard against fires, see that there is no waste in cutting, and that the smaller trees are not destroyed; also to provide for the maintenance of seed-bearing trees and the reforestation of sections denuded of trees. In each province there are state forestry reserves, and altogether these reserves cover an area of more than 80,000 square miles, which will eventually be largely extended. Forest revenue is raised by the sale of timber or other products, and by the issue of permits to graze cattle, cut timber, make charcoal, and gather firewood, bamboos, canes, and other minor forest produce. These permits are issued at specified fees. In the Central Provinces, where the reserved forest area is computed at 19,115 square miles, 1,950,000 cattle were grazing last year, and of these only 5,500 were allowed in the reserves without payment of fees. A large revenue is derived from the forests by the government of India and it is expected that it will steadily increase. In Canada it is pointed out that the time has arrived for the various governments to establish systems of scientific forestry. The officials of the Dominion experimental farms began some time ago to encourage tree-planting by farmers, especially in the treeless regions of the Northwest, but it is said it is to the provincial governments, which control the crown lands in all the provinces with large forest areas, that the people must look for forest legislation. Many districts altogether unsuited for agricultural purposes have been denuded of trees, and if the provincial governments had profited by the experience of other countries, these districts would have been maintained as forest reservations and would now yield a large annual income. It is not, however, too late to begin the reforestation of many of these districts, although it will take a long time to restore them to their former condition; but it is in the districts where the forests still remain standing that scientific forestry can accomplish the best results. There are still vast areas of forest lands which may be made a permanent source of wealth to the people and yield a large annual revenue to the provincial governments as well as affording employment to many thousands of men. Much of the land now covered by forests is well suited to agricultural purposes, and it would be a mistaken policy to keep the whole of it as a forest reserve; but in opening the country for settlement, experts should examine each district and determine what lands should be maintained as forests and what should be offered to settlers. One of the conditions of land grants to farmers should be that a certain number of acres should be kept permanently covered with trees. Germany is most advanced in the science of forestry, and the government derives an immense annual revenue from the forests.

NEW PROCESS FOR PLASTER OF PARIS.

The subject of the formation of plaster of Paris, which, as is well known, is produced by the baking of gypsum, has received considerable attention in Europe of late, and especially in France, where the researches of Prof. Le Chatelier, of the College de France, have been followed by some improved methods for producing the plaster. Prof. Le Chatelier found that the dehydration of gypsum presents two distinct phases, the first at a temperature in the neighborhood of 130° C., and the second near 165°. Below 160° C. the gypsum loses only 15.6 per cent of water to form the normal plaster (the gypsum having 21 per cent for the formula $CaSO_4,2H_2O$) which then contains but 5.4 per cent of water of combination and corresponds to the formula $CaSO_4,\frac{1}{2}H_2O$. It is important, therefore, that in the baking of gypsum the temperature should be thus regulated in order to secure the normal plaster; however, in the usual practice this is far from being the case. The process usually employed for building plaster in France, and especially in the region of Paris, which is very rich in gypsum, is to carry out the baking in a special form of oven. The oven is itself constructed of gypsum blocks in the form of vaulted chambers, which are then loaded with gypsum; between the blocks are left air-spaces, and a fire is lighted under the vaults, which have been partially filled with combustible. The baking is thus quite irregular, and the lower parts nearest the fire are calcined and lose completely their water of combination, and the others are blackened by the smoke and lose more or less water according to the distance. In this way the resulting mixture contains but a small proportion of normal plaster, and, besides, is never white. To obtain the best plaster, such as is used for modeling, another process is used. The gypsum is carefully picked and freed from impurities. Several months after its extraction from the quarries, the stone, which is then sufficiently dry, is broken in small pieces as regular as possible and heated in a furnace resembling a baker's oven, in the same way in which bread is cooked. Under these conditions the plaster is white and is normally dehydrated, but its price is very high, this being $12 to $16 per ton, while that of the ordinary plaster is $3 to $4. A number of furnaces have been recently devised for producing a plaster which shall be normally dehydrated and white, and at the same time cheap. The Périn furnace is one of the best of these, and has the advantage of needing but little hand-work and of pushing the dehydration to the desired point by the introduction of hot gases; besides, as it makes 8 furnacefuls in 24 hours, the production is rapid, and one of its main advantages is a great economy of combustible. It consists of a heating furnace and a baking chamber; the furnace, heated by coke or other smokeless combustible, communicates by a conduit with the chamber, which is formed of a metallic cylinder revolving about its axis upon mechanically operated rollers, and contains the pulverized gypsum, which rolls upon itself by the continuous movement of the drum, so that its particles are successively exposed to the hot gases which traverse it. Above the drum is the charging-bin, in which the gypsum is heated previous to its introduction, being surrounded by a series of tubes which are heated by the discharge gases. When one charge is baked, it is let fall into