THE PARK AVENUE IMPROVEMENT IN NEW YORK CITY.

The Grand Central Depot, at the corner of Fourth Avenue and Forty-second Street, in this city, is the main railway terminus on Manhattan Island. It is reached by four tracks on the line of Fourth Avenue, running south from the Harlem River. The tracks start from the street level at the Grand Central Depot, the entire region about the depot being given up to the track yard, round-houses and other structures appertaining to the railroad service. A few blocks above Forty-second Street the streets crossing Fourth Avenue are provided with bridges, but for a space of several blocks Fourth Avenue cannot be crossed. At about Forty-ninth Street the tracks begin to be depressed, and up to Ninety-eighth Street they run virtually in a tunnel, over two miles long. This leaves the street above unincumbered. The avenue is 140 feet wide, and through its center and above the tunnel are a series of little parks, whence the name of Park Avenue has been given to it. Trains passing through the tunnel have an unobstructed track and do not reach the ground level until they get to Ninety-eighth Street. Here the street grade falls rapidly and the car tracks are carried on an elevated viaduct of stone and earth filling. At 106th Street the work of the Park Avenue Improvement Commission begins. It consists in making connections to and in building a four-track elevated steel viaduct from 110th Street to Mott Haven, where the tracks gradually run down to the depressed road in the annexed district. The general aspect of the finished structure is shown in Fig. 3.

The way is carried on three rows of lattice steel columns, each row supporting plate girders. The intermediate cross trussing is provided by the flooring, besides which there is a transverse lattice girder for each set of columns. This is arranged on the solid floor system, now in extensive use by the New York Central Road on its bridges. A cross section of it is shown in Fig. 6. It virtually consists of a series of three-sided box girders built up of steel plates and angle irons. The plates are three-eighths inch thickness, and the depth of the vertical plates averages 18 inches, with a width of 14 inches. The channels thus formed are open alternately above and below, and cover the entire area with a water-tight floor. From center to center of cross space the distance bridged by the girder floor is 28 feet, giving a total width of floor of 56 feet, a plate girder running along each side and one through the center. The girders are 7 feet 2 inches deep, and the webs are of ⅜ steel for the side and 9-16 for the center girders. From center to center of columns is 65 feet.

The street beneath the viaduct will be graded and paved, and is to be thrown open to the public, leaving the full width, 140 feet between house lines, open and unobstructed, except by the three rows of columns. The Harlem River is to be crossed on a four-track high level bridge, with a center pier drawbridge. Immediately across the river Mott Haven is entered, and here an elevated level station is to be built. The Harlem River bridge is shown in Fig. 4, the Mott Haven station in Fig. 1.

One of the purposes in carrying out the improvement is to free the street from the incumbrance presented by the stone viaduct and to do away with bridges at street crossings. This is an object of such importance as to justify the city in paying a part of the expense. The use of an elevated bridge over the Harlem River is also one of the most important features of the work. The river in question is a legal waterway open to navigation. A low drawbridge, such as in use at the present time, is not only an obstacle to vessels, but the necessity for its periodical opening has interfered with the running of the trains. The new bridge is to be so high that the majority of vessels using the Harlem River can pass under it. Thus, while it can be opened, it will be rarely that the necessity for doing so will arise. The bridge, by its high level, will at once improve the conditions of railroad and river traffic.

The system of carrying out the work without disturbance of traffic remains to be described. In Fig. 5 is given a view of the work of erection looking north from 107th Street. Here the operations include removal of the viaduct now carrying the roadbed and its replacement by the new structure. Temporary wooden trestle work is to be built on each side of the present viaduct and on this the trains are to run reaching the grade of the old road at about 115th Street. This leaves the ground clear for the demolishing of the old and erection of the new viaduct. When 115th Street is reached, where the tracks begin for part of their extent to be depressed, another system is adopted. The side columns are put in place, as shown in Figs. 6 and 7. But the tracks being all occupied, it is impossible to put in the center columns. Accordingly wooden trusses are to be thrown across from the lines of the side columns, and resting on the old retaining wall, and these trusses provide a center bearing for the center longitudinal girder. In this way, as also shown in Figs. 6 and 7, the full permanent flooring is sustained by side columns and temporary transverse trusses. The trains at this stage can run over the new tracks, definitely abandoning the old. This leaves the ground clear for work. The center piers will now be built, the columns will be erected on them, and after the columns are in place the wooden trusses will be removed.

This procedure it will be observed is adopted to keep four tracks in use. But the temporary Harlem bridge will be a two-track structure. For a short distance below it, therefore, the four tracks are merged into two lateral ones, as shown in Fig. 2. This leaves the scene unobstructed, and the viaduct can be built at this place without any special methods of construction.

The sequence of the improvement provides, as said, for a four-track elevated level bridge over the Harlem River. This in itself will be an innovation, and will be the only four-track bridge of this description in the world. To enable it to be built without interruption of traffic, a temporary viaduct with a draw-opening has been erected to the westward. The tracks will pass over this structure while the main bridge is being erected. The temporary draw of the hinged type, swung from horizontal to vertical position when opened, is quite peculiar, and in itself is an object of interest. It was about a year ago moved bodily from its position on the line of the old bridge to its new location to the west. We illustrated in the SCIENTIFIC AMERICAN of December 31, 1892, this operation, one of remarkable interest, as being performed without interruption of traffic. The same illustration may be referred to as showing the old and new lines of road, the one where the new bridge is to go, the latter for temporary use during the improvement.

In Fig. 8 we show the relations of the old to the new. The locomotive is on the old tracks. Along the line are seen the side columns, whose bases are on the street grade, and the side girders, marking the viaduct bed, are seen resting on the columns.

The trussed flooring is to be riveted by means of angle clips to the longitudinal central and side plate girders. The rails are to be clipped to the flooring without sleepers, sound-insulating or deafening pads being placed beneath them.

The steel structure is supplied by the Elmira Bridge Company and the New Jersey Iron and Steel Company at a contract price of $1,500,000. The masonry work of the piers, it is estimated, will cost $100,000; the temporary work, $100,000; the Harlem pier bridge, $1,000,000; and the work at Mott Haven, $500,000. This aggregates over $3,000,000, of which amount the city of New York is to pay $750,000.

The work is in the hands of a special commission appointed by the Mayor, under a special act of the Legislature. It is entitled the Board for the Park Avenue Improvement above 106th Street, and includes the following members: John Fox, president; James H. Haslin, secretary; Walter Katte, superintending engineer; Almerin H. Lighthall; Peter F. Meyer.

Cotton Mills in Egypt.

In Consular Report 162, lately issued, is a report on this subject by Frederic C. Penfield, U. S. Consul-General at Cairo, in which he says:

The success which has attended the establishment of mills in the United States and other countries in the neighborhood of cotton fields has suggested to capitalists the practicability of trying the experiment in Egypt of fabricating the native cotton to clothe the people of the country. A company is forming with English and local capital to establish at Cairo a factory of about 18,000 ring spindles and 500 looms of the newest and most approved make, and if the venture prospers, it is proposed to establish mills at Alexandria and other points.

The Cairo factory will be under English management, and will be equal in many respects, it is promised, to the most modern and best equipped factories in England. An authorization for the undertaking has been granted by the Egyptian government, and assurances have been given that every encouragement will be afforded the new industry.

The demand for cotton cloth in Egypt is large and constantly increasing, while Cairo is a distributing point not only for Upper and Lower Egypt, but also for the supply of cotton goods to the adjacent countries. Egyptian cotton, both brown and white, is well known to be of excellent quality and can be delivered in Cairo at a much lower price than in England; the rate of wages is also much lower. The Egyptian workmen are clever and easily taught, and the supply of suitable labor is ample.

In addition to the cost of freight and forwarding expenses on all goods coming into Egypt from Europe, there is a duty of about 8 per cent ad valorem payable on all imported goods. These charges will be saved on the homemade production, as well as the original one per cent paid on the cotton when it was shipped from Egypt. This saving, coupled with the suitability of the climate and the abundance of good labor, furnishes evidence of the practicability of the undertaking.

The site of the proposed factory is in the immediate vicinity of the Nile, whence water for all purposes will be obtained, and the river can also be used for the conveyance of coal and cotton to the mill. A railway runs near the factory, and a branch line of rails can be extended into the grounds, thus giving direct communication with all the railways in the country.

With a population of between 7,000,000 and 8,000,000 people, in a climate where garments of wool are worn but a few months in the year, the project theoretically has much to commend it; and with intelligent and prudent management this venture may be the precursor of a movement that will make the people of Egypt independent of England for their fabrics, for Manchester's looms now supply more than 90 per cent of the textiles coming into the country. The enterprise should render its projectors a fair measure of profit and at the same time give the Egyptians the advantage of a saving in the cost of their clothing, and illustrate for the benefit of other nations whether Egypt offers a medium for the profitable employment of capital in cotton working.

Enameled Bricks.

Some thirty years ago the Farnley Iron Company and one of its neighbors in business at, or near, Leeds, England, finding that the fire clay found in connection with the coal seams in that district was particularly suitable for allowing an enamel surface, began the manufacture of glazed brick. For some years after the trade was started the brick made were very inferior, compared with those of the present day, the best brick of that day not being at all equal to what are sold as second quality now. Notwithstanding this, the brick found immediate sale with architects, especially in London, where they were used partly for sanitary reasons (the glazed surface being washable and non-absorbent) and partly for light afforded in narrow alleys and courts. As the quality of the brick improved with the experience of the makers, the demand still further increased, and they are now used in large quantities in all English cities. It is estimated approximately that the total output capacity of the Leeds district is about 4,000,000 to 5,000,000 per week. Of these numbers not more than sixty per cent can be reckoned on as first quality and thirty per cent second quality; the remainder, as thirds, are available only as building brick. These thirds are valuable where strength is required; the superior clay and hard burning make them of high value, because of their resistance to crushing loads.

It is worthy of note here that in placing enameled brick where they are to be subjected to heavy loads, care must be used in setting, that the superincumbent force does not press on the outer edge of the brick, as the enamel will give way if more than its share of the load is imposed upon it.

Probably about one-sixth of the product of the Leeds factories is shipped and used in America, where they may be said to be the standard for good, serviceable enameled brick, and the excellent quality to which they have attained must be equaled by our American manufacturers before they can justly claim to have first quality glazed brick.

It is a pleasure to be able to state that at this time there are, at least, two American manufacturers who have nearly attained to the excellence of the best English makers; in fact, they do equal them in the durability of this product, their success in getting clays and glazes to fuse being fully up to the English; and the only difference in the American and English brick is that our manufacturers have thus far failed in finding a clay with all the necessary qualities that will, after burning, have a surface as smooth as is the product of our English friends. The only American manufacturers who have thus far succeeded in making a thoroughly good and merchantable glazed brick from the standpoint of the English standard are the Griffen Enameled Brick Company, of Oaks, Pa., and Sayer & Fisher Company, of New York. The experience of our American, as well as the English manufacturers, in getting the manufacture of glazed brick started on a successful basis has been fraught with many sad experiences, and with them, as with the makers of other kinds of brick, the working of clays and enamels has been "eye openers," and in all cases success has only been attained at a great cost in money and vexation of spirit.—*G. B. Engle, Jr., before the National Brick Manufacturers' Association.*

Prize for a Paper on Paint.

The Verein zur Beforderung des Gewerbefleisses, of Berlin, is offering a silver medal and a prize of £150 for the best paper giving a chemical and physical analysis of the iron paints mostly employed. Very little definite information is known regarding the application, duration, effect, etc., of these paints, and the papers above invited should contain (1) a description and classification of the paints mostly used, based on a chemical analysis. (2) A statement of the materials and mixtures which form the most suitable paints for application to all kinds of iron. All competitions are to be sent in by 15th November next.

THE Singer Manufacturing Company was incorporated in 1863, when 21,000 machines had been made, and now the manufacture has risen to 12,000,000.

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1. Mott Haven station. 2. Work in progress near Harlem bridge. 3. Completed structure. 4. Harlem bridge. 5. False work near 110th St. 6 and 7. Work of erection by means of wooden trusses. 8. The old and the new.

THE PARK AVENUE IMPROVEMENT IN NEW YORK CITY.—[See page 263.]