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PROGRESS OF THE NEW YORK RAPID TRANSIT TUNNEL.

Although five months have passed since the contract for the construction of the New York Rapid Transit Tunnel was signed, there is as yet but little evidence of the general upheaval of the streets of this city, which it was popularly supposed would follow immediately upon that event. This has not been due to any lack of zeal upon the part of the contractor-in-chief, or the sub-contractors, but it is to be laid to the charge of the steel works which have undertaken the task of supplying the 78,000 tons of structural steel and steel rails which are necessary for the tunnel. The plans of the tunnel call for a subway, the side walls and roof of which consist of steel posts and girders embedded in and backed with concrete. With the exception of three or four miles of straight rock tunneling, the whole of the excavation will lie so near the surface that it will constitute what is known as cut-and-cover work; that is to say, the excavation will be made from the surface down, and the side walls and the roof will be built in the deep cut thus opened up through the middle of the various thoroughfares. As work of this class demands more or less complete suspension of traffic, a clause is inserted in the contract by which no section of the tunnel below Sixtieth Street is to be kept open for more than thirty days at a time.

From the very nature of the construction of the tunnel, it is necessary that the steel should be on the ground if only thirty days is to elapse between the breaking of the ground and the roofing in of the tunnel; and it is mainly for this reason that the sub-contractors have so far devoted their efforts merely to the lowering of the sewers, and the building of storage sheds for the accumulation of the excavating and other contractors' plants. It is stated by the engineer-in-chief for the contractor, that the question of the rapidity of the construction of the tunnel will be a question of the rapidity of the delivery of the steel; and just as soon as this material begins to arrive in any quantity the people of New York will see immediate evidence that this, the largest undertaking of its kind in the world, is being vigorously prosecuted. At the present writing the whole of the sub-contracts have been let, and the work of lowering the various sewers, which at present intercept the line of the tunnel, is being pushed forward. The most important diversion is that of the Canal Street sewer, which is more than half completed. The sewers at Mulberry Street, Eleecker Street, and Tenth and Twenty-second Streets, have been lowered, while the change of the sewers at One Hundred and Tenth Street, One Hundred and Twenty-fourth Street and One Hundred and Fifty-seventh Street is approaching completion. In spite of the serious delay which has already been occasioned by the non-delivery of steel, the contractors express themselves as perfectly satisfied that the road will be finished before the contract date set for completion.

HIGH-LIFT LOCKS FOR THE ERIE CANAL.

The question of the introduction of high-lift locks on the Erie Canal, in place of the low-lift locks at present in use, is being investigated by a special board of engineers. Three different types have been considered. The first of these is the Dutton pneumatic balanced lock, illustrated in the SCIENTIFIC AMERICAN of February 3, 1900, which was reported upon favorably by the canal officials in 1896. This system contemplates the use of two balanced lock chambers, placed side by side, with a lift in the case of the locks at Cohoes of 150 feet, and of the locks at Lockport of 66½ feet. Each lock chamber is carried on a huge inverted air-tight caisson, which works vertically in an excavated chamber filled with water. The system is so arranged that when one lock chamber is elevated to the upper level, the adjoining chamber is at the lower level. The air caissons are connected by a system of pipes and intersecting valves, so arranged that when an excess of weight is placed upon the upper tank, it will descend, driving the air from its own air caisson through the connecting pipes into the adjoining caisson, which in its turn is raised to the upper level. Plans were also inspected, which have been presented by Messrs. Morse & Brown, for two distinct designs of locks; one worked on a cable counterpoise system, and the other calling for a system of hydraulic-lift locks. The design provides for balancing one lock chamber with another which is exactly similar, the two being connected, not as in the case of the Dutton system by large air pipes, but by a number of wire cables which pass over a system of sheaves and are provided with safety appliances to prevent a sudden drop in the case of the failure of any part of the balancing gear. The plans for the hydraulic lift call for two lock chambers, each of which is raised and lowered by means of three hydraulic plungers and cylinders, the locks being arranged to counterbalance each other by means of the suitable manipulation of connections between the two sets of cylinders. There is also under consideration, by the Board, plans of Mr. William R. Davis for a counterpoise lift lock, in which a pair of counterbalancing tanks are raised and lowered upon a dozen steel towers, at the top of which are 24-foot sprocket wheels, on which travel the flat link chains which support the tanks. The latter, which weigh about 5,500 tons each when loaded, are to be raised and lowered by electric power, which is to be developed by turbine wheels operating under the head of water due to the total difference of the level of the canals. One of the most important subjects under consideration by the Board is the question of the amount of water and the total time which are required for effecting the entire lift with locks of the different kinds above described.

Whether the proposed enlargement of the Erie Canal is carried out or not, it would certainly be of enormous advantage to the canal system, as it now exists, if the low-lift locks could be abolished at Cohoes and Lockport and a system of high-lift locks established. At Lockport there are five locks with an average lift of 11½ feet, while at Cohoes there are no less than sixteen locks with an average lift of 9 feet. At these two locks alone it is estimated that over half a day is lost in the passage of a single tow.

RECENT ARMOR PLATE BIDS.

The Secretary of the Navy has rejected the bids which were made for furnishing armor for the fourteen battleships and armored cruisers which are either building or authorized, and for the three authorized cruisers of the protected type. Advertisements for new bids have been issued, and the opening will take place within about a month. The bids were rejected, not on the question of price, but because of the somewhat complicated nature of the three proposals which were submitted to the Department. The three bidders were the Midvale Steel Company, and the Carnegie and Bethlehem Companies. The Midvale Steel Company stated that it would not accept a contract for less than 20,000 tons of armor, while the Carnegie and Bethlehem Companies stated that they each would not accept a contract for less than 18,250 tons of armor. As the total amount of armor asked for by the Department was about 35,000 tons, to give a contract for 20,000 to the Midvale Company would leave about 15,000 tons only to be divided between two companies, who had each refused to accept a contract for less than 18,250 tons. This would have involved that new bids for at least 15,000 tons must have been advertised for. While this could have been done, and would have been more liable to satisfy the Department, there was a difficulty in the way due to the fact that the Midvale Company asked for twenty-six months in which to perfect an armor plant, and begin making deliveries.

In view of the fact that the armor for the three battleships of the "Maine" type will have to be delivered at an early date if the Department is to avoid delay in their construction, it will be seen that the acceptance of the bid of the Midvale Company was altogether out of the question. The Carnegie and Bethlehem Companies agree to begin making deliveries of armor in six months from the date of the contract, and the Department has, therefore, rejected all the bids in the hope that they will procure satisfactory bids for an amount smaller than 18,250 tons each from the last named companies.

There is much satisfaction to be derived from the fact that the bidding came well within the limit of the price laid down by Congress. The Secretary is authorized to buy the best armor procurable for $445 a ton, but if he could not get it at that rate, he might accept a bid as high as $545 a ton, and if he could not get it at the higher figure, he was authorized to erect a government armor factory. On opening the bids it was found that both the Bethlehem and Carnegie Companies asked the same price for their armor, namely, $490 a ton, with the royalty paid by the bidder, or $445, with the royalty paid by the government. This is a considerable and a very satisfactory drop from the $545 per ton formerly demanded by these two companies. The bid of the Midvale Company was somewhat less than that of the others. It is gratifying to know that a third large steel concern is prepared to undertake the manufacture of armor plate with the stipulation that if it undertakes to supply armor, it shall receive a contract for the large amount of 20,000 tons. This reservation is due to the very natural desire of the company to make sure that, as soon as it erected its costly armor plate mills, it would be enabled to make sufficient armor to recoup itself for the outlay. At the same time it was simply impossible for the government to tie itself up to a delay of twenty-six months in the receipt of this particular consignment of armor. We sincerely trust that the new bids will include some provision which may include the Midvale plant and be mutually agreeable to the company and the government.

LOWERING OF THE ATLANTIC RECORD.

Not a little excitement is prevalent just now in shipping circles over the steady reduction which is being made in the time of trans-Atlantic passage. The "Kaiser Wilhelm der Grosse" and the new "Deutschland" have been cutting down the time of the passage between New York and the English ports by hours at a trip. The former vessel, which prior to the advent of the "Deutschland," held all records across the Atlantic, made a magnificent run on her last trip to the eastward. She left Sandy Hook at 12:23 P. M. on Tuesday, August 7, and arrived at Cherbourg at 12:57 P. M. on the following Sunday, covering the course of 3,184 miles in five days nineteen hours and forty-four minutes, at an hourly average speed for the whole trip of 22·79 knots an hour. On her best previous record run her average hourly speed was 22·61 knots per hour. The "Deutschland," which, it will be remembered, on its first return trip attained a speed of exactly 23 knots an hour, left New York on Wednesday, August 8, passing Sandy Hook at 3:35 P. M., and arrived at Plymouth at 8:30 A. M., on the following Monday, having covered the course in five days eleven and three-quarter hours, at an average speed of 23·32 knots an hour. The best day's run was 552 knots.

An interesting fact in connection with these records, is that the "five-day-boat" is now an accomplished fact, for a speed of 23 32 knots an hour, if maintained over the route from Sandy Hook to Queenstown, would bring the record down below five days, or to be exact, to four days twenty-three hours and six minutes. The record over this route is now held by the "Lucania," which covered the distance of 2,778 miles in five days seven hours and twenty-three minutes. The "Lucania," however, is now a relatively "old boat," having been built in 1892-1893; and as the interval between "Lucania" and "Deutschland" is about eight years, we may say that the reduction in the time of the trans-Atlantic passage has been proceeding at the approximate rate of an hour a year.

COMPRESSED AIR TRACTION IN NEW YORK CITY.

An important change is being effected in the compressed air system of traction on certain lines in this city, by the substitution of what is known as the Hardie motors for those now in operation, which were built under what are known as the Hoadley patents. What might be called the modern development of compressed air traction in New York dates from about the year 1897, when the promoters of the two types of motor mentioned above were engaged in active experimental work, the Hardie system being tried on the Third Avenue Railroad, and the other on the lines of the Metropolitan Street Railway Company. Both motors operate under extremely high pressures of from 2,000 to 2,500 pounds to the square inch; but here the difference ends. In the Hardie system two long-stroke, single-expansion engines are employed, which are directly connected to one axle of the car, the other axle being driven by side rods. The air, after being reduced to the working pressure by a reducing valve, passes through a tank of hot water, and is then led in a super-heated condition to the cylinders. The Hoadley motor differs from this mainly in the fact that a complete two-cylinder, compound engine is carried on each truck and drives a shaft which is geared down to the car axle. Instead of passing the air bodily through the tank of hot water, a small jet of water is sprayed into the air pipe between the reducing valve and the cylinders.

The Hoadley system was adopted by the Metropolitan Street Railway Company, while the Hardie system has been for some time in successful operation on the North Clark Street Railroad, Chicago. The recent amalgamation of the two companies has resulted in the adoption of a motor designed chiefly upon the lines of the Hardie system, which will shortly replace the motors now in use upon the crosstown lines of the Metropolitan Street Railway system. The present compressing station, which is located at the foot of West Twenty-fourth Street, will be utilized, and it is expected that before very long the new motors will be in operation. Mr. Hardie, who is the chief engineer of the Consolidated Compressed Air Company, which now has control of the patents covering both systems is one of the oldest and most indefatigable workers in the field of compressed air traction, and the success of the new