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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.

THE SINGLE-PHASE SYSTEM IN AMERICA.

The electrical engineers who have been investigating the question of the best system of electric traction to be adopted on the suburban and terminal lines of the New York, New Haven & Hartford Railroad, in New York city, have recommended the use of the single-phase alternating-current system. This is the most important step that has yet occurred in the introduction of single-phase alternating-current traction in this country; but it is fully justified by the results which have already been attained in the first two electric roads to be operated with the single-phase current in America.

It is fortunate that the two interurban trolley roads upon which the single-phase alternating-current motor has been installed, perform a service that is broadly different in its requirements. The first of these is a high-speed line, built between Indianapolis and Rushville for the operation of heavy interurban cars at high speed. The considerations in the construction and equipment of this road were, that the roadbed and track and cars must be of thoroughly solid and first-class construction, and that a large amount of energy must be delivered to each car. On the other line, known as the Pontiac-Odell line, the speed is relatively low and the cars relatively light and the track of moderate cost, the road being built through a sparsely-settled country, in which it was necessary to keep down the cost of construction, if the system was to be operated at a profit. The high-speed Rushville line was opened at the commencement of the year, and the Pontiac line three months later, and on both roads the single-phase alternating-current motors have done everything that was demanded of them. There has been an absence of troubles from sparking and overheating, while the sliding contact bow trolley on the high-speed line has, contrary to expectations, given but very little trouble in the nine months of its operation.

In view of these facts, the announcement that the important work of equipping the New Haven system is to be carried out on the single-phase system is not surprising. The electrical equipment will be furnished by the Westinghouse Electric and Manufacturing Company; and it is interesting to note that the electrical equipment of the New York Central's lines, which is being provided by the General Electric Company, is of the direct-current type. The New York Central Company considered, at the time that they decided to adopt the direct-current system, that the alternating-current motor and its accompanying equipment had not been sufficiently long under test to warrant their applying it on the great scale that was contemplated on their lines. Since that decision was taken, however, the practical experience that has been gained with high-tension systems, both abroad and in this country, has established beyond a question the reliability, and other advantages, of the later type.

The advantages that led the New York, New Haven & Hartford road to adopt the single-phase system are, that it dispenses with costly rotary converter sub-stations; that it greatly cheapens the line construction; that it enlarges the radius of action from a single power station; that it possesses great flexibility; and that it presents attractive features of economy and exactness in speed control. Another feature, of great importance in terminal work such as this, is the fact that the high voltage renders it possible to use the overhead line, and get rid of the many complications and dangers that would be involved in the use of the third rail in the terminal yard.

The contract for equipping the New Haven road includes twenty-five 78-ton electric locomotives, each capable of maintaining a schedule speed of 26 miles per hour with a 200-ton local train, making stops every 2.2 miles. The same locomotives will be capable of hauling 250-ton express trains at a speed of from 60 to 70 miles an hour, two or more locomotives being coupled up for heavier trains, and operated by a single engineer through the multiple control system. A valuable feature of the Westinghouse single-phase alternating-current motors is that they will operate successfully with direct current; consequently, the trains can be run over the New Haven tracks as far as Woodlawn under the alternating current, and from Woodlawn to the Grand Central Station they can draw upon the direct current through the third-rail conductors used by the New York Central.

OUR TWO GREAT CANAL PROJECTS.

At the present time the United States has under construction two great engineering works which, in point of magnitude and cost, far exceed anything under construction or projected elsewhere. One of these is being carried out by the Federal government, the other by the enterprise of a single State, and each is destined to exert a widely-extended influence upon the commerce not merely of the country and state affected, but of the whole world. We refer to the 46-mile ship canal which is to be opened across the Isthmus of Panama, and the 350-mile barge canal which is now being built across the State of New York. The Federal project, for many reasons, looms so large in the public eye that the general public, and probably the majority of the people in the State in which the Erie barge canal is being built, will be surprised to know that in the mere magnitude of the work to be done the New York canal exceeds that at Panama. Furthermore, it is due only to the fact that the unit prices that must be paid for work at Panama are so much higher than those for work done at home, and in a temperate zone, that the cost of the Panama project will exceed that in New York State, although the latter will reach the great total of $101,000,000. This comparison, it must be understood, is based upon the project for a 68-foot summit level canal at Panama, which was the one in contemplation and under construction at the time the canal was taken over by the United States government. If the attempt be made to cut the canal at sea level, all the elements of time, quantities of excavation, and cost will be so greatly augmented, as to place the Panama enterprise beyond comparison with the barge canal.

At present, however, if the State and Federal canals are compared on the mere basis of quantity to be excavated and masonry and dams to be built, the remarkable fact is established that the completion of the Erie barge canal on the present plans calls for more work than the completion of the canal at Panama. We mention this fact as suggesting that the magnitude of the New York State project is little appreciated, not merely by the general public but by the people of the State that it concerns. The present Erie canal is about 350 miles in length, and the new canal follows the old location for only about 100 miles. The other 250 miles is laid out on what is practically a new route, and the change of location is explained by the fact that while the original canal clings to the lower slopes of the hills, well above the rivers, the new canal is located in the valley bottoms, and follows largely the rivers and lakes. It is an historical fact of no little interest, that the location of the new canal is laid very largely on an old route of travel by water, which was used by the pioneers who settled the western part of the State. When the Erie canal was built, as far as possible it avoided these water courses, but the new barge canal will follow them with but slight deviation. The water route followed by the early pioneers lay up the Mohawk River, which was followed to the neighborhood of Rome. Here a portage was made to Wood Creek, which was navigated to Oneida Lake. After crossing the lake the route lay down the Oneida River to the junction of the Oneida with the Oswego and Seneca rivers at Three Rivers Point. If from this point the traveler were bound for the settlements in the western part of the State, he would follow the Seneca River; or if he were making for Canada, or the far West, he would follow the Oswego River to Ontario, and continue his journey by the Great Lakes.

The new Erie canal follows the Hudson River to Waterford; then passes by locks to the Mohawk River above Cohoes Falls. From the Falls to Rome the bed of the river is utilized, the river being canalized. Beyond Rome there is a summit level connecting with Wood Creek, and the canal then continues over the old pioneer water route up the Seneca River to the vicinity of Clyde. From Clyde the new canal will follow the route of the present canal to the Niagara River at Tonawanda. Of the other two branches, the Oswego barge canal leaves the Erie canal at Three Rivers Point, and utilizes the canalized Oswego River to Lake Ontario. The new Champlain canal will not parallel the Hudson River on the bank of the same as at present, but will utilize the river itself from Waterford to Fort Edward, and from Fort Edward to Lake Champlain the present location will be followed.

The estimated cost of this great work, as we have said, is $101,000,000, and the whole plan of the work has been laid out to accommodate a tonnage of 10,000,000, while at a slight increase in cost, accommodation can be provided for a very much larger tonnage. The commerce of the upper Great Lakes is between 90 and 100 million tons per year, and the importance of the canal lies in the fact that it will provide a means for connecting this huge commerce with the seacoast by a direct route, on which freight can be carried at a cost below that which is possible on the railroad. The original canal had a depth of 4 feet, and accommodated boats of only 80 tons capacity. In 1835 it was enlarged to take boats of 240 tons. Then in 1894 came the agitation for deepening to 8 feet draft, instead of 6 feet, and the absurdly inadequate appropriation of $9,000,000 was made for doing this work. The present scheme, which owes its success not a little to the efforts of President Roosevelt when he was Governor of the State, provides a 12-foot depth throughout and locks of sufficient length to take two 1,000-ton barges at one lockage, which is about eight times the capacity of the present canal.

VANDERBILT CUP RACE.

The second annual contest for the International Automobile Cup presented by W. K. Vanderbilt, Jr., was run off on October 14 under conditions and with results that render it in some respects the most successful of the great annual international automobile races of recent years. In the first place, the weather was ideal. Cloudless skies, a moderate temperature, and the gentlest of breezes presented conditions that were ideal both for the contestants and for the many thousands of people that flocked to the Long Island race course. Then, again, a soaking rain that occurred a few days prior to the race, coupled with a second heavy oiling of the track, had brought the road into first-class condition, the surface being smooth and well compacted, and the dust absolutely laid.

Of the twenty machines that were entered for the race, eighteen started promptly on time, the one absentee being a 90-horse-power Mercedes of the German team. The first to get away was that veteran driver Jenatzy in his 120-horse-power Mercedes, and the other eighteen contestants were sent away at one minute intervals, the last of these, Sartori, in a 90-horse-power Fiat, flashing away from the mark at exactly eighteen minutes past six. So terrific was the speed cut out by the leader, that 6 minutes and 52 seconds after Sartori started, Jenatzy was seen a mile up the road from the grand stand, sweeping around the curve and straightening out for the long tangent to Jericho, upon which the highest speed of the day was to be made. He swept by the grand stand amid thunders of applause at a speed of 80 miles per hour, having made the first round of 28.3 miles in the remarkable time of 24 minutes and 52 seconds. The next competitor sighted from the grand stand was that brilliant driver Lancia, of the Italian team; and fast as was Jenatzy's time, Lancia had cut it down by 1 minute and 3 seconds, his time for the round being 23 minutes and 49 seconds. The lead obtained by Lancia was held and steadily increased in the succeeding rounds with mathematical precision, the first seven rounds being run at an average speed of 69.97 miles an hour. At the end of the seventh round he was 24 minutes and 28 seconds ahead of the third man, Hemery, and 21 minutes and 7 seconds ahead of Heath, the cup winner of last year, who was again driving a Panhard car. It was conceded at this time that, barring accident, the wonderful Italian driver would probably win by fully half an hour from his nearest competitor. But it was not to be. On his eighth round he had tire troubles, and after adjusting these, in turning onto the course ahead of Christie, he failed to give the latter sufficient room, and a collision occurred, in which Christie's machine was smashed and his mechanic seriously hurt, while Lancia's machine was so crippled that it took him 1 hour, 11 minutes, and 17 seconds to complete the eighth round. At this time, Hemery was leading with an elapsed time of 3 hours, 39 minutes, and 59 seconds, Heath being second, Nazzaro third, Szisz fourth, Tracy, in the 120-horse-power Locomobile, fifth, and Lancia sixth. The Italian made desperate efforts to regain his lost position, but he had to be content with fourth place at the finish.

The race was won by the Frenchman Hemery in an 80-horse-power Darracq, in 4 hours, 36 minutes, and 8 seconds, his average speed for the whole race being 61.49 miles per hour, which is about 9 miles an hour faster than the time made last year. Heath was second in 4 hours, 39 minutes, 40 seconds—an average speed of 60.71 miles an hour; and Tracy was third in 4 hours, 58 minutes, 26 seconds, which corresponds to an average speed of 56.90 miles an hour. The fastest lap was made by Lancia on his fourth round in 23 minutes and 18 seconds, an average speed for the lap of 72.87 miles per hour. A deplorable accident that removed one of the most promising contestants was the collision of Foxhall Keene, who was driving a 120-horse-power Mercedes, with a telegraph pole when making the difficult turn at Albertson. The smash placed him entirely out of the race, at the time when he was holding third position, on the sixth round.