The question of street lighting has also been discussed at length, and it has generally been conceded that the street lighting in this country is considerably behind the artificial lighting experienced in the older countries abroad.

The announcement of the Hammer selenium photometer probably opens a way to a better utilization of our knowledge of photometry, and the design by Dr. Clayton H. Sharp and Preston S. Millar of a universal photometer places at the disposal of the illuminating engineer a device which makes much simpler the comparison of light sources. This apparatus is an adaptation of a Lummer-Brodhun highly-sensitive photometer, and avoids distortion of the color values through selective absorption or mixing of the lights compared by the proper arrangement of special forms of prisms.

Another important matter brought to the attention of illuminating engineers during the year was the suggestion of Dr. Charles P. Steinmetz for a primary standard of light. This suggestion consists briefly of combining in suitable proportions, red, green and blue lights of specific wave-lengths, equally distant in the spectrum, and having ratios in geometric proportion. The light could be varied in such proportion that its exact quality would be under control.

In connection with lighting, the organization and first annual convention of the Association of Car-Lighting Engineers, which convened in Chicago in November, brought out a great deal of interesting information concerning car lighting, and has indicated several directions in which the lighting of our steam-railway trains may be greatly improved.

Electric Railroading.

Electric railway development has continued along much the same lines as indicated last year. The direct-current system for both interurban and main line electrification still retains its adherents, although for long-haul traffic it would appear that greater advantage has been taken during the past year of the single-phase, alternating-current system. Several single-phase roads, which were either projected or under construction in 1907, were opened to the public. Notable among these were the Washington, Baltimore & Annapolis system, which was opened on February 7; the St. Clair tunnel system, and the extension of the single-phase system on the New York, New Haven & Hartford Railroad. It is estimated that approximately 150,000 horsepower in motors is now used on single-phase interurban lines.

The St. Clair tunnel of the Grand Trunk Railway, under the St. Clair River between Port Huron, Mich., and Sarnia, Ontario, was opened with appropriate international ceremonies on November 12, and this service is said to be giving perfect satisfaction.

The 11,000-volt system of the New York, New Haven & Hartford Railroad, owing to the lack of data available when working out the initial equipment of the system, met with a number of minor misfortunes which resulted in an accumulated train delay which exasperated the riding public and called down upon the officials of the system the severest condemnation and some harsh criticism from engineers not in favor of this form of electrification in its present application. At the meeting of the American Institute of Electrical Engineers on December 11, W. S. Murray, chief engineer of the New Haven system, made a rather frank and extended statement of the difficulties under which the electrification had been carried out, and at the same time announced his perfect satisfaction and the satisfaction of the officials of the road with the performance now being made with the perfected apparatus.

Another year's operation of the electrified zone of the New York Central has demonstrated the wisdom of the choice of the third-rail, 650-volt system, as there was an aggregate train-minute delay due to faults in every part of the system, of only a few hours during the entire year.

It is also interesting to note, in connection with third-rail, direct-current propulsion, that the Pennsylvania Railroad Company, after many trials and experiments, has decided to lay down an initial equipment to the value of $5,000,000 for the electrification of its tubes under the Hudson River, the Island of Manhattan, and the East River, connecting its New Jersey suburban territory with its tributary, the Long Island Railroad, and has practically decided upon 650 volts pressure, with the third-rail system of distribution.

Gasolene-electric railway cars received considerable attention during the year, and it is probable that these will have a more extended use during the present year. Accumulator cars have also come in for attention, and the Prussian Railroad Administration is now making an elaborate series of tests with these cars on its suburban lines in and about Mayence.

The subway system of the Interborough Rapid Transit Company, in New York city, according to Vice-President and General Manager Hedley, on Monday, December 21, carried in excess of 1,800,000 passengers, which was the biggest day in its history. It is also interesting to note that during the year 1907, according to reports of the Public Service Commission, the daily average increase of fare and transfer passengers in Greater New York was 341,000, the whole year showing a total increase of 124,505,734 passengers.

The Hudson & Manhattan tubes, under the Hudson River between New York and New Jersey, were opened to the public on February 25. It is stated that the lower tunnels will be completed by July 1, work having progressed very favorably on these two tubes; and that the upper tunnel, forming the continuation of the network and loop, will also be completed by that date.

The Cleveland traction situation occupied the centre of the stage in local tractions for some months, and following the local election, the roads were turned over to the Municipal Traction Company on a low-fare basis. In order to conserve the interests of the stockholders, however, it has quite recently been found necessary to place both the Municipal Traction Company and the Cleveland Railway Company in the hands of receivers, and this condition now obtains.

The subject of the electrification of the terminal zones of main-line railways has received a good deal of attention, the above-mentioned systems of the New York Central and the New Haven road forming the basis for the general discussion. Public agitation has again caused the Illinois Central to announce the early electrification of its suburban lines, and announcement has just been made that the New York, New Haven & Hartford intends expending $30,000,000 on an extension of its electrified zone. This probably means a traffic combination with the Pennsylvania Railroad, utilizing the giant bridge which was recently announced from the upper end of Manhattan Island across Ward's Island and several smaller islands in the East River, into Long Island by

way of the New York Connecting Railroad.

In local tractions, the announcement that the Chicago City Railway Company would probably close a contract to purchase all of its power from the Commonwealth Edison Company for a period of ten years excited a good deal of attention. At the beginning of the term it would cost the railway company $800,000 annually, and at the end of the term, between $1,300,000 and $1,400,000 annually. The railroad company would retain its substations as is now the case, when it is taking approximately three-quarters of its power from the Commonwealth Edison Company, which has greatly extended its power plant facilities.