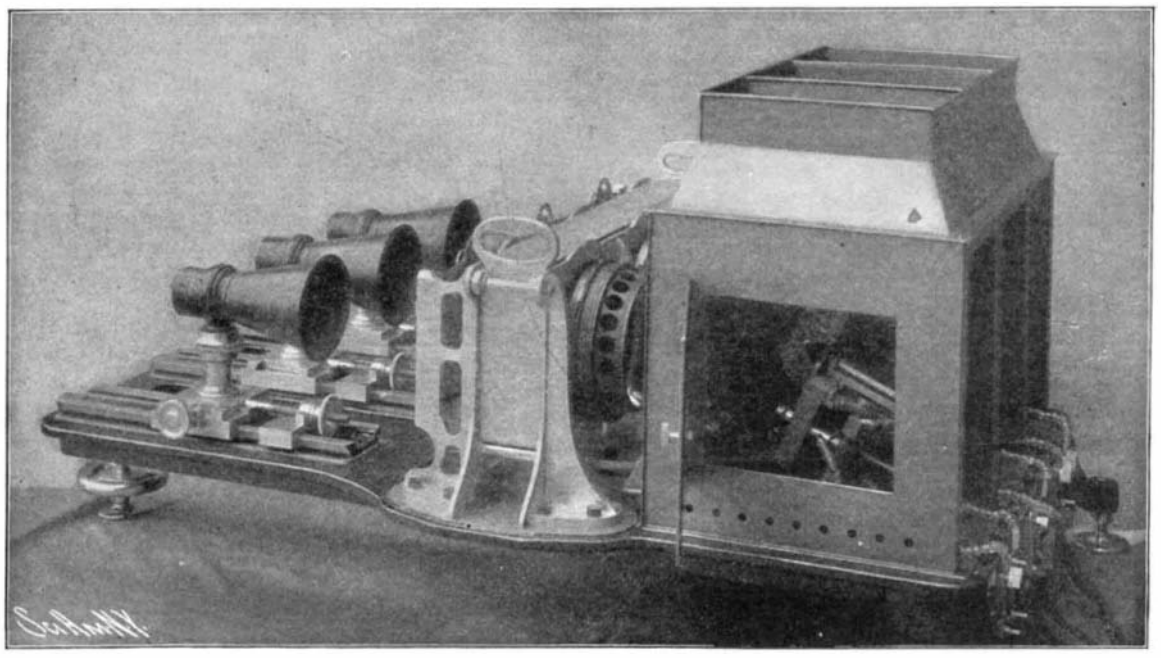
THE MIETHE COLOR PROJECTOR.

BY OUR BERLIN CORRESPONDENT.

Prof. Miethe, of Berlin, has for some years been engaged in developing a process of chromo-photography, by means of which photographs are produced in the colors of nature. Three sections of the same photographic plate are exposed successively through three color screens corresponding with the three primary colors, red, blue, and yellow respectively. The times of exposure for the three screens must be determined by photographing a white object by daylight and varying the respective times of exposure, so as to obtain identical conditions of light and shade on each of the three plates. Instead of the colors named, Prof. Miethe prefers using blue, red, and green. By superposing on a screen projections of the three separate transparencies and interposing before each of these a color screen corresponding with the one used in making its negative, an image quite true to nature is obtained.



A NEW STEREOPTICON FOR REPRODUCING PICTURES IN THE COLORS OF NATURE.

Special care has been devoted to the constructive development of the photographic apparatus, to the improvement of the photographic plates used for the purpose, and finally to the technical design of the projection apparatus. The intervals of time between the three exposures required for making the views have been reduced to a fraction of a second.

The most important point was, however, the development of a most perfect projection apparatus for the synthesis of the three views.

This projection apparatus has been constructed by C. P. Georz, and is being exhibited at the St. Louis Fair in connection with the German educational exposition. The effects of which these color photographs are capable have been increased by the intensity of the projector, which is represented in the accompanying illustration. In this apparatus the original principle of leaving the three sectional images on a common plate, also in projecting them, has been abandoned, thus insuring the possibility of a preliminary adjustment.

The projector consists of a triple lantern, inclosing three electrical arc lamps, to which the current is supplied, controlled from an ordinary switchboard. The current intensity can be varied between 10 and 35 amperes, thus flooding with an intense light screen surfaces of from 43 to 215 square feet. Each of the three condensing lens systems comprises three components, throwing the light pencils from the lamp with a convenient degree of convergence on the lantern slide and the projection lens. In order to utilize as perfectly as possible the sources of light, these condensing systems have been given an aperture ratio as great as possible; they are connected with a cooling vessel, common to all three of them and by whose absorption any heat rays that might endanger the slides are absorbed.

The projection objectives have been especially constructed for the purpose. Their focal lengths range from 30 to 50 cm. On the very substantial bed plate of the apparatus have been fixed the three optical benches, on which the projection objectives are made to slide and which are cast in one piece with the foundation plate and milled to the latter. In addition to the coarse and fine movement parallel to the optical axis of the three objectives, the lateral objectives can be independently adjusted both horizontally and vertically. The adjustment to the center of the projection screen is effected by the foot screws of the apparatus.

For adjusting the partial images, an aluminium frame is used into which three rectangular apertures have been cut at convenient distances one beside the other. Instead of effecting this adjustment in the apparatus itself, a special adjusting apparatus has been constructed, similar to a dividing engine, on the carriage of which two displaceable and rotating microscopes have been so arranged that the sections of their cross wires may be made to coincide with any point of the central sectional image. These points are next transmitted to the two other partial images to the right and left, and after having been accurately adjusted, the diapositives are screwed fast in the adjusting frame. The adjustment of the images thus ensured is extremely accurate and remarkably stable. The partial images will be projected accurately on the same portions of the projection screen, thus insuring perfect coincidence.

The color screens located in front of the objective consist of plate glasses glued to each other, between which the colored layer has been inserted. As a shutter has been provided between the diapositives and the objective, the filters are exposed to the intense light from the lamp only for the time they are actually used, thus warranting a much greater durability.

RECENT AUTOMOBILE AND MOTOR-BOAT SPEED RECORDS.

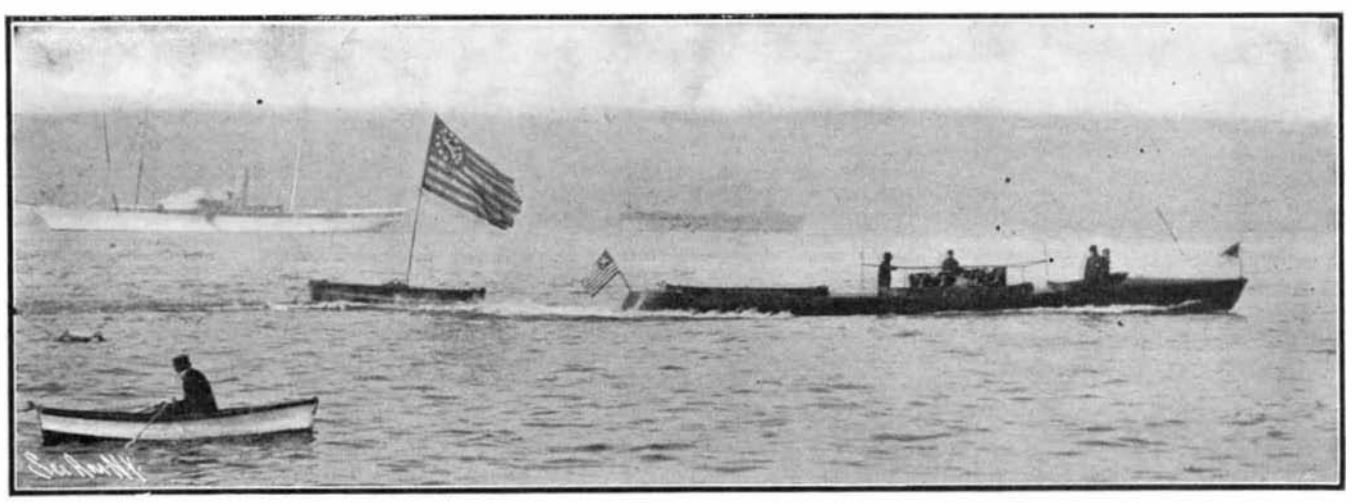
Now that the racing season of the year has closed, it is interesting to note the speeds that have been attained on track and stream by those modern space annihilators—the automobile and the motor boat.

At an international match race run in two heats and a final on the Empire track October 29, Barney Oldfield, on the 60-horse-power Peerless racer, illustrated herewith, made a new set of figures for 10 miles in competition from a standing start, and completed the distance in the record time of 9 minutes, 12 3-5 seconds, or at an average speed of 65 miles an hour.

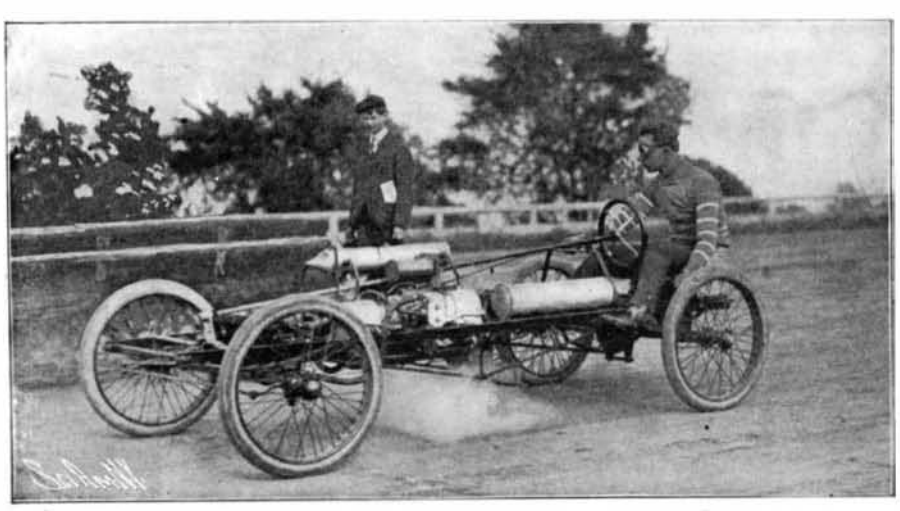
The first heat was between Thery, on the 80-horse-power Richard-Brazier racer with which he won the Bennett cup race last June, and Sartori on Mr. A. G. Vanderbilt's 90 horse-power Fiat racer. This heat was won by the latter car in 9:45 4-5, Thery taking exactly 10 minutes to cover the 10 miles, and Sartori making the first 5 in exactly 5 minutes also.

The second heat was between Mr. W. Gould Brokaw's 60 horse-power Renault racer and Oldfield on the Peerless, and was won by the latter by a margin of 24 4-5 seconds in 9 minutes, 20 seconds. Bernin, who drove the Renault, made the first 5 miles in 5 minutes, 2-5 second, and his time for the 10 miles was 9: 44 4-5. Oldfield covered both the second and third miles in 53 1-5 seconds, and his time for the first 5 miles was 4:41.

Oldfield won the final from Sartori by 27 1-5 seconds in the record time of 9:12 3-5, which is 2-5 of a second faster than the best time for 10 miles with a flying start. He drove the car splendidly, and it ran with all the steadiness of the foreign cars, besides having much greater speed. Our

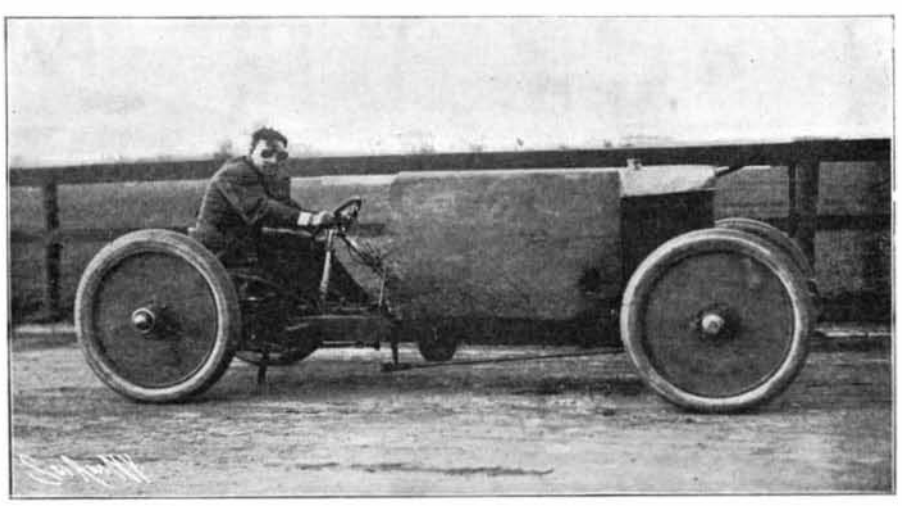


175-Horse-Power Motor Boat "Onontio" Making 28.42 Miles an Hour.



Frank Kulick on the 20-Horse-Power Ford Racer.

Record: 1 mile in 55½; 5 miles in 4.43⅗, which is equal to 63.47 miles an hour.



Barney Oldfield on the 60-Horse-Power Peerless Racer.

Record: 1 mile in 52⅕; 10 miles in 9.12⅗, which is equal to 65.14 miles an hour.

RECORD-HOLDING AUTOMOBILES AND MOTOR BOATS.

illustration gives a good idea of the appearance of car and driver. The machine is the second racer the company has constructed this year. It is distinguished by a sharply-pointed bonnet, the front end of which is formed of the vertical radiating tubes, and by disk wheels, which decrease the air resistance and keep stones from flying up into the machine. These wheels are of the ordinary wooden-spoked artillery type, 34 inches in diameter, and suitably covered, which gives them the appearance of disks. The car is fitted with a four-cylinder vertical 5¾ x 5¾ engine having 75 pounds compression, and geared so as to drive the car 60 miles an hour at 725 R. P. M. The machine is fitted with but two speeds, and a bevel gear drive is used at the rear axle.

Another racer to make new records is the Ford light-weight car, which we also illustrate. This machine weighs but 875 pounds. It consists simply of a frame on which are mounted two 10 horse-power opposed-cylinder engines coupled together and direct-connected with the rear axle by a chain and metal expanding-shoe flywheel clutch. The bore and stroke of the cylinder and pistons are 4 and 4½ inches respectively, the compression used is 90 pounds, and the motor will speed up to about 1,600 R. P. M. as a maximum. It differs from the regular Ford motor only in having the valves in the head instead of in a valve chamber at the side. Driven by Frank Kulick, this machine made a new set of records for light-weight cars (551 to 881 pounds) by covering 5 miles in 4:43 3-5. The fourth and fifth miles were made in 55 1-5 seconds. The best records for middle-weight (881 to 1,432 pounds) cars—one mile in 59 seconds and 5 miles in 5:01—were therefore substantially lowered.

The Ford racer also defeated the 60 horse-power Renault and the 90 horse-power Fiat at the Empire track on November 8. The Renault was beaten by 1-5 second, the time for the 5 miles being 4:48 2-5.

Of the other track records for 1904, the Peerless car shown holds that for 15 miles (time, 14:05), while Winton machines have to their credit the records for 25 and 50 miles, the times for these two distances being 23:59 and 55:42 respectively.

The fastest mile covered on a track this year was that made by Barney Oldfield with the Peerless racer at Denver, Col., on the 5th instant, when, in making a 20-mile record in 18 minutes and 45 2-5 seconds, he covered an intermediate mile in 52 1-5 seconds. Earl Kiser, on the Winton Bullet, had made on September 10 a record of 52 4-5, which was thus reduced 3-5 of a second by Oldfield, who attained a speed of 68.96 miles an hour, as against Kiser's 68.18.

People residing near the Hudson River have had several opportunities to witness some lively motor-boat races within the last two months. We have shown the latest models of these speed craft as they appeared in racing trim. Our illustration this week shows the motor boat which holds the world's record for the fastest mile. This is Commodore Harrison B. Moore's new 60-foot boat "Onontio," fitted with a 175 horse-power Craig engine, which drove it through the water a distance of one nautical mile in 2 minutes, 26 seconds, or at the rate of 24.66 knots or 28.42 statute miles an hour. This fast speed was attained on the Hudson River over a nautical mile laid out and measured by United States naval officers; and the remarkable performance of the "Onontio" was the feature of the day on October 29, when a match race was run between Mr. Frank Croker's "XPDNC" (short for "Expediency") and the "Challenger" and "Vingt-et-Un II." of Messrs. Smith & Mabley. This race was run on the Hudson from New York to Poughkeepsie and return—a total distance of 118.6 nautical or 136.6 statute miles. The "XPDNC" won in 5 hours, 11 minutes, 50 seconds, which represents an average speed of 22.86 nautical, or 26.29 statute, miles an hour. She covered the first half of the course in 2 hours, 30 minutes, 50 seconds, at an average speed of 23.62 nautical, or 27.17 statute, miles an hour, which is extremely fast for so long a distance. The "Vingt-et-Un II." was obliged to stop several times, which reduced her average speed for the entire course to 19.26 nautical, or 22.15 statute, miles an hour, her elapsed time being 6 hours and 10 minutes. The "Challenger" was disabled at the start, and so did not run. Both this boat and the "Vingt-et-Un II." were fitted with S. & M. engines of 119 and 59.72 horse-power respectively, their lengths being 39.62 and 38 feet on the waterline, and their ratings, under the rules of the American Power Boat Association, 88.35 and 79.35. The rating of the "XPDNC" is 79.7; she is fitted with a Mercedes engine of 47.6 horse-power; and she is 44 feet long on the waterline.

The hull of the "Onontio," which was designed by Mr. Henry J. Gielow, is 60 feet over all and 57 feet 11 inches on the waterline. The beam is 7 feet, and the draft 1½ feet, the extreme draft being 3 feet. The keel and framing are of oak, and the planking is double, of ⅜-inch mahogany on the outside and 5-16-inch white cedar on the inside. Both layers of planking run fore and aft, and have the space between them filled with a special cement. A novelty is found in six water-tight bulkheads of two thicknesses of 5-16-inch white cedar crossed diagonally and laid in cement. Another special feature is found in two fore-and-aft trusses, which make a firm bed for the engine and greatly stiffen the hull. There are three cockpits —one for the helmsman, another for the motor, and a rear one for passengers. The motor is made up of eight 7¾ x 10-inch individual cylinders, arranged in two groups of four each. The cylinders are mounted on ⅞-inch vertical steel rods, ten of which support each set of four cylinders. The crank shafts are not inclosed, but revolve in bearings in the base plate below the cylinders. Both the crank shafts and the connecting rods are hollow. There is a separate crank shaft for each group of cylinders, the two being connected together by a clutch which also acts as a fly-wheel. By disconnecting the forward part of the engine, the boat can be run on the rear group of cylinders only. The valves are located in the heads of the cylinders, each of which contains two inlet and two exhaust valves, all mechanically operated. Make-and-break igniters, supplied with current from a dynamo, are used, and a force-fed mechanical lubricator supplies oil liberally to all the bearings. The motor was designed by James Craig, Jr., to give 175 horse-power at 650 R. P. M. Its weight is 3,500 pounds. In the speed trial mentioned above, it is said to have turned up 900 R. P. M., in doing which it made 3,600 explosions per minute, and the propeller (which is a three-bladed, 30-inch diameter, reversible screw having a maximum pitch of over 5 feet and covering a helicoidal path of 10 feet per revolution) covered at its edges more than a mile and a half a minute.

Launch of the "Caledonia."

A new steamer for the Cunard Line, the "Caledonia," intended for service between this country and the River Clyde, has been launched. This new liner measures 515 feet in length by 58 feet beam, and 36.6 feet deep to the tonnage deck. The displacement is 16,000 tons. The "Caledonia" is built with a straight stem and elliptical stern, with two steel pole masts of fore-and-aft schooner rig, and two funnels. There are six decks —the 'tween, main, upper, bridge, promenade, and boat decks. The ship is divided into nine watertight compartments. Accommodation is provided for 300 saloon passengers on the main and bridge decks. The main saloon is fitted on the upper deck with the library, placed immediately above on the bridge deck. The promenade deck is 230 feet in length, sheltered by the boat deck, and in turn shelters the bridge deck, which is of a similar length. The second-class passengers, for whom there is accommodation for 400 persons, have their quarters amidships toward the stern of the vessel, with staterooms on the main deck. The third-class passengers, 800 of whom can be carried, are accommodated on the main and 'tween decks. The "Caledonia" is propelled by two sets of triple-expansion marine engines of the latest pattern, with cylinders measuring 31½ inches, 51½ inches, and 85 inches bore, respectively, and a 4 foot 6 inch stroke. The boilers are of the best Siemens-Martin steel, and consist of four double-ended and four single-ended boilers, respectively, with 48 withdrawable furnaces, yielding an aggregate heating surface of approximately 30,000 square feet. Special attention has been devoted to the freight-carrying capacity in this steamer. As the exportation of machinery in bulk comprises such an important item of the exports of this country, the "Caledonia" has been provided with specially large hatches to facilitate handling, and the cargo will be manipulated by ten horizontal winches, which have been specially designed for use upon this vessel.

Hobart College, at Geneva, N. Y., and Dr. William R. Brooks, Professor of Astronomy in the college, have both been signally honored at the St. Louis World's Fair. The International Jury awarded a bronze medal to Hobart for its general educational exhibit representing all departments; and a special gold medal for the astronomical department, prepared under the direction of Prof. Brooks. The distinguishing feature of the astronomical exhibit is a collection of photographs of all the comets, now twenty-four in number, discovered by Prof. Brooks. Eleven of these comets, as many of our readers know (for all of Dr. Brooks's discoveries have been immediately reported and described in the SCIENTIFIC AMERICAN) were discovered at the Red House Observatory, and thirteen at the Smith Observatory, a total number exceeding that of any other living astronomer.

The Canadian government, in appropriating large amounts for railroad subsidies for new lines during the past year, has imposed a new condition, viz., that the companies receiving subsidies must use steel rails made in Canada, provided the same can be secured at reasonable prices and of a suitable quality.

Automobile Notes.

Following the example of other sovereigns of Europe, the King of Spain is becoming a chauffeur, and has lately ordered several cars from Paris which are to be built specially for him. The cars will be constructed by the Panhard & Levassor firm. On the other hand, it is reported that the Emperor of Annam, Ton-Taï, is learning to pilot a car, and this led him to adopt the European costume. He has also a mechanic, but as the national custom does not allow a subject to take a place at the side of his sovereign, the mechanic is obliged to sit on the footboard of the car.

The hill-climbing race which was held at Chateau-Thierry (France) on the 24th of October brought out no less than sixty-three touring cars having a total value of $200,000. Nearly all of them climbed the steep road (one mile distance) at high speeds. The winner made a speed of 1 min. 42 sec. for the mile, which represents about 35 miles an hour up the slope of 10 per cent. A Mercedes car, piloted by De Larentie-Tholosan, made the above speed, and many of the others nearly equaled it. The motor bicycles distinguished themselves in this event and nearly reached the speed of the automobiles. Collomb, mounted on a Magali wheel, made the climb in 1 min. 43 4-5 sec., closely followed by three others. In all, there were 13 motor cycles that finished in times ranging up to 3 min. 15 sec. In the category of cars valued at less than $800, Barreaux made the best time on a Eolide car, or 3 min. 11 1-5 sec. In the $800 to $1,600 class, a Serpollet car took first place in 2 min. 38 sec. Serpollet also won the $1,600 to $2,400 class in 1 min. 52 sec., coming not far behind the winning Mercedes car, which belonged to the class above $5,000, and the same cars came first in the $2,400 to $3,600 class, in 2 min. 1 sec. It will be seen that the steam-operated cars are still holding up well as regards speed.

Recognizing the need of thoroughly trained chauffeurs, the West Side Young Men's Christian Association of this city, aided by the Automobile Club of America, has opened an automobile school for owners and chauffeurs. Three courses are to be given, the first consisting of popular illustrated lectures on steam, gasoline, and electric automobiles, which will be delivered by Charles Edward Lucke, Ph.D., director of experimental engineering in Columbia University; the second, on the design and drafting of motors and their accessories as well as the various methods of transmitting power to the wheels; and the third, practical operative work, consisting of instruction in the operation of machines, and lectures and demonstrations on their dissection, with the machine as a working basis. The second course will be taught by Amasa Trowbridge, adjunct professor of mechanical engineering, Columbia University, and a recognized authority on machine design, while the third course will be under the direction of Mr. Clarence B. Brokaw, an expert on automobiles, who will devote his entire time to the instruction of the new class. So popular has the third class become that no more pupils can be received for the present. It is calculated that three months' instruction will be sufficient to complete the chauffeur's education, and so a new set of pupils will be started in this class on February 1. Applications for the second class in operating work should be made at once by those desirous of entering. The opening lecture in the first course of the automobile school was given on the evening of November 9, by Winthrop E. Scarritt, president of the Automobile Club of America. Mr. Scarritt congratulated the members upon their entering upon this new line of study, and he thought that members of the industry, and all automobilists also, were to be congratulated on having so many intelligent young men take up the study of automobiles. He spoke briefly of the three typical kinds of machines, and gave the would-be chauffeurs several good pointers on their operation. He specially drew their attention to the necessity of always being ready to make a quick stop in case of emergency, and told them above all things to thoroughly master their machines. He thought that the automobile would ultimately solve the problem of congested city streets, since it could do twice the work in half the time required by the horse-drawn vehicle, and since it only occupied about half the space at that. He said that it was a startling fact that although we have increased facilities for the transportation of the masses, not until the appearance of the automobile has there been any improvement in the transportation of the individual during the past four thousand years. He thought that the time would yet come when the workingman would own his own machine, and would reside in the country and go back and forth in his own vehicle every day to his work. Mr. Scarritt's address was an able presentation of the automobile and automobilism as we find it to-day, and, as can be seen from the examples cited, he is most optimistic as to what the machine will do for the individual of every class in the future.