Correspondence.

A Lunar Rainbow.

To the Editor of the Scientific American:

A curious and unusual phenomenon, in the form of a rainbow for which the moon instead of the sun furnished the light, was observed here on the night of June 19. A heavy rainstorm, accompanied by considerable thunder, occurred just before moonrise. As the clouds retired to the west, the luminary rose and the bow was first observed, only the extremities for about 25 degrees being visible, the moon at that time being concealed behind a small cloud. For about twenty minutes, the bow increased in brightness, and at the end of that time could be clearly traced throughout its entire length. At each end the red and blue colors could be plainly distinguished, but the remainder of the arc showed only as a light streak across the clouds. The conditions for the phenomenon were almost ideal, the moon being but a few days past full, the cloud screen occupying the proper position, and, as it occurred just at moonrise, the bow was seen well up in the heavens. After the clouds had almost entirely melted away, leaving only a slight haze through which the stars shone, portions of the bow could still be clearly discerned. Charles N. Wilson.

Poulan, Ga., June 20, 1905.

How to Save Niagara.

To the Editor of the Scientific American:

There has lately been much discussion on how to save Niagara Falls. I take here the liberty to describe a method for utilizing the greater part of the energy in the falls without injuring in the least the beauty of the falls and without necessitating any engineering structures in the vicinity of the falls.

Suppose a dam, constructed across Niagara River, a few miles above the falls or at the beginning of the river. Let the gates of the dam be closed half of the time and opened half of the time, making the river flow, say for instance, twelve hours in daytime. There would be no danger of overflow, when the gates are shut, with the large area of Lake Erie above the dam. It is evident that twice the regular flow of the river could be extracted from Lake Erie in the daytime. Let the regular flow pass over the falls and take a quantity equal to half the regular flow continually for power purposes. This would give about 3,500,000 horse-power without injuring in the least the beauty of the falls. The gates of the dam could be open, say nine hours in the day and three hours in the night, in order to make it possible to see the falls also at night. It seems to me that if these arrangements were possible, it would give a great amount of power and at the same time save the destruction of the falls.

Louis L. Thunstrom.

Jamestown, N. Y., June 20, 1905.

Automobile Notes.

An ingenious device for automobiles, the object of which is to reduce the impact and dangers of collision, has been invented by Mr. F. R. Simms, of London. The protector is a spring buffer and is built up of two segments of pneumatic tires, which are mounted on the long blade springs attached to the front of the side portions of the frame of the vehicle. In the event of a collision the pneumatic tire serves to minimize the shock, while the springs which yield to the outer side have the tendency to throw any object with which they come into contact outward away from the automobile. Some interesting tests have been carried out with the invention by charging the vehicle against small carts, and in each case the object was hurled out of the path of the car, while the force of the impact was considerably reduced.

During the present week—on July 5—there occurs in France the sixth annual international automobile road race for the Bennett trophy. The race will be run over a 340½-mile course, known as the Auvergne circuit, and noted for its many sharp turns and narrow stretches. The machines which will represent France are those which made the best performance in the eliminating trial held recently on this course, viz., two 96-horse-power Richard-Brazier cars, driven by Théry and Callois, and a 130-horse-power de Dietrich racer. The first-named won the race for France last year, and in the trial mentioned covered the distance in 7 hours, 34 minutes at an average speed of 45 miles an hour. A 140-horse-power Locomobile racer driven by Tracy and two 50-horse-power Pope-Toledo cars have been sent to France to represent America. The English team, selected as the result of an eliminating trial on the Isle of Man, consists of a 90-horse-power Napier and two 90-horse-power Wolseley cars having four-cylinder horizontal motors. The German and Austrian teams each consist of three powerful Mercedes machines, while Italy is represented by three Fiat cars.

A striking illustration of the speed and endurance qualities of a French racing auto was had recently by the 1,000-mile trial of a 40-horse-power Decauville machine that was made on the Empire City track. The car in question, although three years old, lowered the record 2 hours, 16 minutes, and 41 seconds. The new time is 23:33:20; and this was made despite the fact that there were several showers in the early morning of the day of the finish, which made the track so muddy that it was unfit for racing in the afternoon. At the end of 500 miles, Guy Vaughn, the driver, was 1 hour, 45 minutes, and 52 seconds ahead of the record, but he was unable to continue the same rate of time cutting, owing to the bad going later and stops for supplies and tire repairs. Out of a total of thirteen stops, five were occasioned by tires. The right front tire gave out once, and the left rear tire twice in the total run of 1,015⅝ miles, which was made in 24 hours. The other two tires went the distance without repairs. The running of the car was very regular indeed, and often for 50 miles at a stretch the time per mile would vary only a fraction of a second. An average speed, exclusive of stops, of 45½ miles an hour was maintained.

In contrast to the numerous races and race meets that are being held almost daily are the two touring events, which will take place within a few days under the direction of the American Automobile Association. One of these tours, from Chicago to St. Paul, started on June 30 and July 1. The other tour will be from New York to the White Mountains and return—a distance of 1,000 miles—for the Glidden trophy. This trophy, which was donated by Mr. Charles J. Glidden (who has recently completed a tour of the world *en auto*), is to be presented annually to the car making the best performance in a 1,000-mile tour. In the present instance, the routes have been carefully gone over, and a route book giving them in detail will be furnished each contestant. Arrangements have been made for the accommodation of the motorists at reduced rates, and their machines will be given free garage accommodations at Bretton Woods, where a stop of five days will be made, during which time (on the 17th and 18th) the second "Climb to the Clouds" up Mount Washington will be held. In both of these tours the contestants will be allowed to suit their own convenience as to when and how fast they travel, the only conditions in the Glidden tour being that they shall start between 6 and 10 A. M. and finish by 9 P. M. each day. An entrance fee of $50 is charged for this event. Among the representative American touring cars entered are four White steam machines, three Maxwell tonneaus, two Pierce, Peerless, and Packard cars, and a Winton, Rambler, Cadillac, Pope-Tribune, Pope-Hartford, and Pope-Toledo. There will also be a considerable number of foreign cars, among which may be mentioned a four and a six-cylinder Napier, a Mercedes, a Decauville, and a Panhard. An opportunity will thus be given to compare the performance of the best American, English, and French touring cars upon good roads.

Some interesting data as to the cost of running an automobile on smooth, level roads were obtained recently in an economy test held by the Long Island Automobile Club. A run from Brooklyn to Southampton and back (180 miles) was made in two days, and the cost per capita of passengers was figured out for each machine. The charges made against the machines were as follows: Gasoline, 25 cents per gallon; oil, 50 cents per gallon; tire repairs, 50 cents an hour; punctured inner tubes, 75 cents; chain repairs, 50 cents an hour. On this basis, a 10-horse-power Franklin tonneau carrying four passengers weighing 600 pounds and 50 pounds of baggage, covered the distance on 9¾ gallons of gasoline and 7 pints of oil, at a total cost, including ½ hour tire repairs, of $3.22, or $0.805 per capita, as against $4.53 railroad fare for the round trip. A 30-horse-power Pope-Toledo carrying five passengers was second, with a total cost of $4.42 and a cost per passenger of $0.885; while third place was taken by an 18-horse-power Northern carrying four, at a total expense of $3.95, or $0.9875 per capita. The four-cylinder, air-cooled Franklin covered 18.46 miles per gallon of fuel consumed; a single-cylinder 10 horse-power Cadillac carrying four and obtaining fourth place, was next with a record of 17.56 miles per gallon; while an 8½ horse-power car of the same make carrying but two did only a little better—18 miles per gallon. A four-cylinder, 24-horse-power Pope-Toledo car made 15 miles per gallon, while the 30-horse-power car that took second place made only 10.43. A two-cylinder Northern having a horizontal, double-opposed motor and direct bevel-gear drive covered 12.85 miles per gallon. Two White steam cars with four passengers each made respectively 9 and 7.2 miles per gallon. In striking contrast with these figures are some which were obtained in Great Britain recently. In the Scottish reliability trials the Arrol-Johnston four-passenger dos-a-dos covered 31.1 miles per gallon, which was equal to 43.6 ton miles per gallon, as against 35.37 ton miles accomplished by the next best car. Mr. S. F. Edge tried the experiment of putting one gallon of fuel in the tank of a four-cylinder, 20-horse-power Napier and running the car to a standstill. By repeating this process several times he ran an average of over 25 miles for each gallon, and once he covered exactly 27 miles. Such widely-varying results can not be due altogether to the roads or to the mode of operation of the car. They should cause our manufacturers to investigate and find the underlying reasons for the greatly reduced consumption of some automobiles. In the case of the small car mentioned, the makers lay it to an improved transmission gear, which delivers 66 to 70 per cent of the power of the motor at the rims of the wheels.

Engineering Notes.

A company has been formed at Berne, Switzerland, with a capital of $500,000 for manufacturing a new kind of combustible from peat. The new material, which is claimed to have the same value as coal, is formed according to the electric process invented by Count Botho von Schwerin. The peat is dried under the influence of the electric current and then further treated so that under the action of electric osmose a new compound, known as osmon, is formed. A description of the process has already been given. The most recent tests of the new combustible bring out the fact that it burns as well as coal and without giving any odor. The ash is very small. As it does not contain any trace of sulphur, it does not attack the boilers. Besides, as it is consumed without giving off smoke, it is well adapted for boiler furnaces and in practically all cases. The proposed plant, which is to be erected in Switzerland to produce the "osmon" briquettes, will no doubt be erected in the large bog region near the Orbe, which will give a supply for a long time to come. Some one hundred tons a day are to be produced at first, and afterward this may be doubled.

Prior to 1860, railroad bridges were generally designed by the railroad companies' engineers, the ironwork being manufactured at the companies' shops, and erected by their own forces. Thus, men like Wendell Bollman, Albert Fink, Past President, Am. Soc. C. E.; C. Shaler Smith, M. Am. Soc. C. E., and C. H. Latrobe, M. Am. Soc. C. E., on the Baltimore and Ohio Railroad; Richard B. Osborn and Charles Macdonald, M. Am. Soc. C. E., on the Philadelphia and Reading Railroad; J. H. Linville, on the Pennsylvania Railroad; E. S. Philbrick, on the Boston and Albany Railroad; George E. Gray, Howard Carroll, and Charles Hilton, on the New York Central Railroad; Willard S. Pope, M. Am. Soc. C. E., on the Chicago and Northwestern Railroad; Thomas C. Clarke, Past President, Am. Soc. C. E., on the Chicago, Burlington and Quincy Railroad; S. S. Post, M. Am. Soc. C. E., on the Erie Railroad, were prominent railroad engineers who took a leading part in early bridge building. Later, some of the men who had gained experience in framing and erecting bridges, or in the construction of the work at the shops, started in business for themselves, and took contracts to build and erect bridges on designs furnished by the railroad companies' engineers. Most of those early firms were contractors for building Howe truss bridges, only a small shop being required to manufacture the ironwork needed for structures of that class.

Some interesting experiments are being carried out at Torquay (England) with the model of a new type of breakwater. It is constructed upon the floating principle, this system having been adopted by the inventor, in view of the fact that the disturbance caused by storms only affects the sea to a depth varying from 12 feet to 15 feet. Beyond that depth the water is comparatively calm. The experiments at Torquay are being made with a frame, designed for the purpose, floated by pontoons and securely moored. Assuming that a breakwater is needed a thousand yards long, in water 60 feet deep, a strong frame is made to penetrate to a depth of about 40 feet. Sufficient weight is given to the structure to insure its stability and to provide the necessary ballast. The frame is buoyed by means of pontoons placed on the inner or land side. Thus the structure is tilted toward the sea. The frame is moored on both sides by chains of considerable length, which are attached to its lowest part, and which lie as nearly parallel to the seabed as is practicable, in order to obtain the best holding power. When a sea strikes the frame, it works back on its chain as a door works on its hinges, thus lessening the force of the sea, and when the sea is broken the structure floats back to its original position, ready to receive the next sea. Obviously, a stone and concrete breakwater must be strong enough to receive the full shock of the sea, and this force the structure devised by this inventor, in consequence of yielding, renders less formidable. On the inner or land side there is also a horizontal network, supported by pontoons, and fixed to the structure, in order to break any sea that might wash over it. Fears have been expressed that the sea may wash the structure away; but the inventor contends that as buoys and pontoons fastened by a single chain ride through the severest storms without breaking adrift, there is nothing to prevent a sufficient number of chains being fixed to his device to render the structure absolutely secure.