

AERONAUTICS.

The first international aeroplane race for the Bennett Aviation Trophy is to be held near Rheims, France, on August 29th. France and England have entered three machines, while Italy, Austria, and America have entered one each. The minimum distance required is 20 kilometers (12.42 miles).

Considerable attention has been given in Germany to the destruction of dirigible balloons by means of guns. The Krupp firm has a special department devoted to the construction of such guns, and has recently brought out two models, one for discharging explosive shells, and the other for throwing a burning projectile. A gun mounted in an automobile is the latest device of this character.

In a lecture before the Aeronautic Society in New York city, on March 16th, Mr. Hudson Maxim brought out the point that the dropping of dynamite from air craft would not be as dangerous to fortifications and buildings as was generally supposed, because, in order to do much damage, this explosive must be confined. If 100 pounds of it were dropped into the smoke-stack of a warship or exploded in the water close to the vessel, it would be effective; but dropping it upon the deck would be of no avail. Mr. Maxim, as is well known, is an expert upon explosives. He also described some new explosives that may be available for use in explosive motors.

The flight competition over Monaco Bay, which was to take place between January and March 24th, has been extended to April 23rd. No less than seventeen flying machines have been entered, six of these being Voisin aeroplanes, two Wright machines, three Antoinette monoplanes, and two others helicopters. There is also a curious aeroplane, having three sets of planes arranged in steps and which is mounted upon a hydroplane boat. M. Delagrange is the only well-known aviator who has entered this event.

On March 15th Roy Knabenshue made a flight from Los Angeles to Pasadena with his dirigible balloon in less than an hour. He was accompanied by his brother-in-law. The distance between these two places is more than fifteen miles. Capt. Baldwin has an order for a 100-foot dirigible, which is to carry four people and is to be used by a well-known member of the Aero Club of America for pleasure trips this summer. Abroad, in Germany, the "Parseval III." airship has recently undergone its initial trials with decided success, while the new Zeppelin has been tested several times of late, and has demonstrated its capability of landing safely upon *terra firma* instead of upon floats.

Twice lately have the Wright brothers given exhibitions before royalty. A few weeks ago King Alphonso XIII. of Spain visited them, and was greatly interested in their flights. Last week King Edward of Great Britain also paid them a visit. On this occasion Wilbur Wright first made a flight of seven minutes, in which he performed difficult evolutions with great precision. He afterward took his sister, Miss Katherine, for a six-minute spin in the direction of Pau. King Edward was greatly pleased, and congratulated Mr. Wright upon his achievement. In a few weeks Wilbur Wright expects to go to Rome and make exhibition flights. He has started the construction of a half dozen aeroplanes in England, in addition to the fourteen already nearing completion in France. Several of his pupils at Pau have mastered the machine, and have made successful flights alone.

At the meeting of the Aeronautic Society, on March 10th, Mr. Elmer A. Sperry gave an extremely interesting talk upon a new form of gyroscope which he calls "active," to distinguish it from the ordinary or passive type. The Schlick gyroscope, which was experimented with so successfully upon a German torpedo boat, is of the latter type. A gyroscope of the active type has several hundred times the energy of the passive type, for the same weight. A 10-pound wheel, 10 inches in diameter, can be made to offer a resistance of 10,000 foot-pounds a minute, whereas the Schlick gyroscope, weighing 1,109 pounds, developed but 8,900 foot-pounds at 1,600 R. P. M. Mr. Sperry believes that his new form of gyroscope, on account of its great power and small weight, can be applied successfully to aeroplanes in order to maintain their transverse stability. He demonstrated the superiority of the active type of gyroscope over the passive by means of a small electrical apparatus mounted on top of a heavy pendulum. The rapidity with which it would stop the oscillations of the pendulum, and the much smaller angle to which they could be confined, were far more noticeable when the gyroscope was operated upon the active principle. Mr. Sperry said he has found that the kinetic energy put into the outer ring to move it in one direction could practically all be recovered from the inner or precessional ring that moved at right angles to it. In making the gyroscope active, he connects these two rings in a certain way through gears, so that they react upon each other and make the device much more sensitive and powerful.

ELECTRICITY.

The North Carolina State Legislature has passed a law requiring the use of electric headlights on engines of through lines and all lines that are 115 miles long. This law is the result of an agitation started by the Brotherhood of Locomotive Engineers.

Over two billion candle-power will be used in illuminating the Falls of Niagara this summer. It is believed that the illumination will be clearly visible in the sky as far away as Toronto. The illumination is to be an annual summer feature.

During the present strike among the telegraphers and operators of telephones in Paris, efforts have been made to establish wireless communication between England and France. The Marconi Company has proposed to send messages from its station at Clifden to the Eiffel Tower in Paris.

An inventor has recently devised a method whereby a ship can determine its distance from another vessel, or from shore. The vessels, as well as the shore station, are provided with wireless telephone apparatus, which is used to transmit the sound of a submarine signal bell. The difference in time which it takes for the sound to be transmitted by wireless telephony and to travel through the water enables the receiver to determine the distance of the sending station from him.

A recent number of *l'Industrie Electrique* describes a method of using the wires of a power transmission line for establishing telegraphic communication between the generating plant and the sub-stations. By using an induction coil, which obtains its power from the transmission line, a local high-frequency current is generated, which may be superposed on the current in the power line, and thus affect instruments at the receiving station. It is not necessary to use two lines for a system of this sort, because the circuit can be completed through the ground.

A recent consular report states that representatives of European interests manufacturing air nitrates by hydro-electric power for fertilizers are in the United States to see what can be done in the way of securing large water powers for establishing such factories in this country. An industry of this kind is needed, as the imports of Chilean nitrate of soda now amount to \$14,000,000 a year. Difficulty is being experienced, however, in securing suitable water powers at reasonable cost. Governments of other countries are said to be offering inducements for the location of the extensive nitrate mills which the company proposes to erect.

The part that light-colored walls may play in the illumination of a room or building is clearly brought out by an illustration in the current number of the *Electrical Journal*. A person reading in a room with dark-colored walls, and with a source of light entirely behind his field of vision, may declare the illumination to be excellent. However, if another light is brought into the room in the field of his vision, though not shining on the page he is reading, the pupils of his eyes will commence to contract. Less light will enter them from the printed page, and it will appear to the reader that the page is growing darker. This shows the use of white or very light-colored walls may actually decrease the efficiency of the illumination.

The motormen and conductors of the Lake Shore Electric Railway Company, Cleveland, are being subjected to a series of tests which are quite rigid. A special car has been fitted up, in which these tests take place. Not only are the motormen required to learn the operating rules of the company, but they must be able to make any slight or temporary repairs to their motors. One side of the car is fitted with a dark room, where the men are subjected to a color test. A novel feature of the test in this room is that which requires the men to judge distances by the sizes of illuminated signs. Different sized tail lights, letters, etc., are used, corresponding to the sizes as they would appear at different distances from the car, and the men are required to determine their distances merely from their size.

Before the recently-electrified St. Clair tunnel was delivered into the hands of the railroad, it was operated by the Westinghouse Company for a period of several months, in order to thoroughly try out the electric apparatus. A report on the operation of the railroad during this period has recently been published. This report shows that the electric locomotives handled 1,000-ton trains, as against 700-ton trains with steam locomotives. The electric trains, numbering on the average 27.3 cars per train, made the run of the electrified section in 10 minutes, as against steam trains averaging 19.7 cars, which required 15 minutes for the same distance. The steam locomotives consumed nearly \$5,000 worth of coal per month, as against \$1,152.60 per month for the electric service, the reason for this difference being that steam locomotives had to burn hard coal costing \$6 a ton, while soft coal at \$2 a ton may be used in the power station.

SCIENCE.

In a recent lecture delivered before the Royal Society of Arts, Leon Gaster advances the opinion that ultra-violet rays from indoor electric lamps are injurious to health. He advises the use of bulbs which will obstruct these rays.

A new test for ascertaining the hardness of metals has been proposed by W. I. Ballentine. A disk of metal is attached to the lower side of a drop weight, which falls on an anvil. The anvil carries a pin on its lower side, which rests in contact with the piece of metal to be tested. The diminution in thickness of the disk is the measure of hardness.

As a result of the successful work of the ten Belgian hounds doing police work in Brooklyn, their working hours have been lengthened and their beats will be extended. Police records show that since the advent of the dogs, about a year ago, the number of burglaries has been reduced at least fifty per cent. They previously occurred at the rate of about three a week.

It has been proved by many observers that the sensitiveness of photographic films is increased by a preliminary exposure, too short to produce a latent image. The color sensitiveness of both the chloride and the bromide of silver is unquestionably increased by such preliminary exposure, and it is now asserted by Streissler that the increase in general sensitiveness is merely the consequence of the increase in color sensitiveness.

Not since the discovery of the Neanderthal skull in 1856, has so much excitement been created as by the finding of a prehistoric human skull at La Chapelle-aux-Saints in France. The French skull has been declared to be the most ancient in the world. It is practically complete, although originally found in pieces. The task of reconstructing it has been assigned to Marcellin Boule, director of the Laboratory of Palæontology of the Paris Museum.

A simple method of visualizing the sound waves in air from electric sparks has been devised by M. Toepler. The sparks may be made by use of an induction machine and Leyden jars. In shunt with the "sound spark" is another, the "illuminating spark," and this latter is conveniently formed on the surface of a piece of wet chalk or other semi-conductor. The light from it passes through a lens, is refracted by the alternately compressed and rarefied shells of air in the sound waves, and is then viewed by the eye direct or, preferably, by a telescope.

Prof. Muensterberg's "machine for detecting lies," technically known as a galvanic psychometer, has attracted much attention, despite the caustic comments with which it has been received in scientific circles. Many interesting results have been obtained by experiments carried out by Dr. Veraguth of Zürich with the psychometer. He found that when mind and body were completely at rest there was a gradual diminution of the current. A noise, a light, a touch, reading of an exciting novel, mental calculation, or the recollection of some exciting incident, all produced—at the end of a few seconds, which may be called the latent period—a marked increase of the current.

The suppression of sleeping sickness is only a question of efficient administration and organization, and there is little doubt that in time the tsetse fly will be conquered, with the result that the disease will cease to devastate wide districts in Africa. The disease is spread by a biting insect which is distributed in patches over many thousands of square miles in Africa, the inhabitants of which vast areas are too apathetic to lift a finger to save themselves from annihilation. Moreover, the disease is difficult of detection in its earlier stages, during which period infected persons may travel long distances, affording opportunities for the diffusion of the malady. One of the first essentials in grappling with the difficulty is to instruct the African native as to the true nature of the disease and its mode of spreading.

The Italian Egyptologist, M. Schiapparelli, in the course of recent excavations in the Valley of the Queens, discovered intact the tomb of the engineer Kha, architect of the mighty buildings at Thebes, and of his wife, Mirit. The tomb contained two huge sarcophagi, with a mummy in each, and also a large number of objects of domestic use, buried, according to Egyptian custom, with the dead, and including furniture, utensils, tools, clothes, boxes of linen, jewels, etc. From an inscription on a papyrus, over sixteen yards long, found in the tomb, it appeared that husband and wife had died within a few days of each other and were buried together. Among the most interesting objects in the tomb were the numerous boxes containing the wardrobe and articles of toilette of the young wife. Mirit had carried with her to the grave a dozen boxes, some of which contained clothing, of the finest material, carefully folded; others had in them combs, powder boxes, vases, and nicknacks.