special view to lightness, none of the known appliances being of use in this case. It was necessary, in the first place, to develop a system of making a very large quantity of carbureted air from naphtha, with very little weight." Pointing out a large hole where the air was drawn in, he said that, as the velocity with which the combined air and gases entered was at the rate of two miles a minute, he found it very difficult to deal with these gases at this high velocity, and had spent a great deal of time in devising a system by which the gas was equally spread out over the whole furnace, and not influenced by the inductive action of the incoming gas at this very high velocity. "I had," he resumed, "to devise a system for regulating the product of the gas; for pumping the liquid into the gas generator; a new kind of boiler and feed water heaters; a system for burning a very large quantity of carbureted air in a small space, without smoking or blowing out; a system for regulating the steam, and pumps for filling the boiler and regulating the supply. None of the existing types of engines seemed well fitted to the purpose. I had to design one expressly with a view to great lightness, and notwithstanding there were some hundreds of types of connecting rods already in existence, I found it necessary to design an absolutely new form of connecting rods. I had to invent a new dynamometer to meet the necessities, and new dynagraphs for measuring the lift of the machine at different speeds, as well as another to measure its rate of speed through the air." He paused, looking over at the machine which represented so many hours of concentrated brain work in a puzzled, absorbed way. "And there is more to do yet," he added impressively. "I don't call this an air ship or a flying machine or anything else. To me it is merely a machine for making experiments in aerial navigation. In my next one, I shall make a number of changes which it is not worth while to make in this. It is slow work, but there is no doubt of the result. Propulsion and lifting are solved problems, and it is merely a matter of time."

"How much time?"

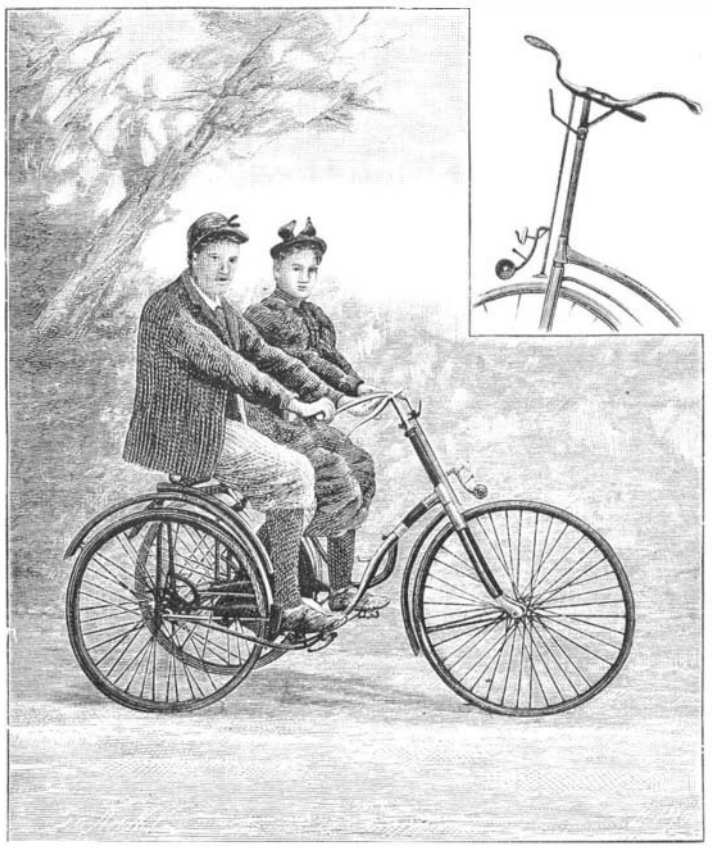
"Well, if I had nothing else to occupy me, unlimited money, and plenty of space for experimenting, I should expect to be up in the air within eighteen months. I am very busy, however, have a very limited space here, and am proceeding as economically as possible. In my opinion, however, under the most unfavorable conditions, aerial navigation will be an accomplished fact inside of ten years."

This was a digression. We now came back to the most remarkable boiler that ever was seen. It was inclosed in a house eight feet long, five feet wide at the base, and about six feet high. The sides of the house were of thick cloth, woven from pure asbestos, and the frame and top of the thinnest iron. Within, viewed through a peephole, the entire floor was a mass of small flames from seven thousand six hundred gas burners. The boiler has about six hundred tubes which are eight feet long, and about one hundred which are four feet ten inches long. These tubes are about half an inch external diameter, and half a millimeter, or one-fiftieth of an inch, in thickness. They are curved and joined into a steam drum, ten inches in diameter and eight feet long, where the water and steam are separated, the water again passing through the boiler, and the steam passing to the engine. There are also some three or four hundred much smaller tubes, which are used for heating the water by the products of combustion before it enters the main boiler at all. In order to prevent the tubes from being injured by the great heat of the fire, a forced circulation of the water is employed. It is therefore possible to use a very small and thin tube and a very hot fire without any danger. A single spare boiler tube in the shop served to exhibit the peculiar lightness of the boiler, which is perhaps the most ingenious as well as the most important part of the machine. The tube, like the condensing tube before mentioned, was as light as so much paper. It was made of pure copper, any impurities, in view of the thinness of the tubes, causing them to become "hot short" and break. "With only a moderate fire," said Mr. Maxim, "I have been able to get a horse power out of four of these tubes; with a hotter fire I have got a horse power out of three of them. Their bursting pressure under steam is sixteen hundred and fifty pounds to the square inch. The boiler itself has been fired to give a steam pressure of four hundred and ten pounds to the square inch, but I have never run the engine above three hundred pounds, thereby developing three hundred brake horse power, which is all that I need for this weight, and which leaves a very wide margin of safety. To run the boiler the machine carries six hundred pounds of water, and two hundred pounds of seventy degree Baume naphtha. The consumption of naphtha is about one pound per horse power per hour."

Last of all, in the way of general description, came the questions of propulsion and lifting power. To give all the details under this heading, into which the inventor entered, would alone make an article quite as long as this, if not a small volume. Concerning specific results, however, he said:

"The lifting of an aeroplane by a screw or screws has been the subject of many series of experiments by myself and others. The number of pounds lifted by one pound of 'push' in the screw varies greatly with conditions. In my early experiments with a merry-go-round, or whirling table, I succeeded in lifting fourteen times the 'push' of the screw, or fourteen pounds of weight for every pound of 'push' forward. In this large machine, however, with a large number of wires and a good deal of framework, where the aeroplane is so large, where it is difficult to make it remain uniform or rigid when there is a pressure on it, and where I have an engine, boiler, platform, men, tanks, wires and tubes to force through the air, I have not been able to lift more than six pounds for each pound of 'push.' This, however, is much more than is absolutely necessary. The engine is able to give, and has often given, a 'push' of nineteen hundred and sixty pounds, which would mean a lifting power of nearly twelve thousand pounds. With a 'push' of one thousand pounds from the screws, using one hundred and twenty horse power, the lift, as shown by the dynagraphs, was over six thousand pounds. This left only a weight of one thousand pounds on the track, and this was not sufficient to keep us there. The speed along the track with this 'push' was twenty-seven miles per hour."

"When do you expect to take your first flight?"



A TWO SEATED TRICYCLE.

"I have not set any time, and shall not. Haste in an enterprise of this kind is the worst possible policy. At every trial of a machine which is mechanically new in so many particulars, weak points develop and require attention, while new improvements constantly suggest themselves. To-day it is a leaking valve, to-morrow something else. Rising into the air with a new machine, when all the experiments in the way of maneuvering, which can only take place in the air, are yet untried, would be unwise until everything which can be completely tested on the track has been so tested. The possibilities of accident must be as nearly as possible exhausted beforehand. More than this, I have not at Baldwyn's Park the necessary room and privileges. It may be that I shall not attempt to rise until I have more room, and I am now looking for a suitable location—something difficult to find in England. In fact," he added, with one of his ready New England comparisons, "I am like a boy with a pair of skates which he has never tried, and only a little piece of ice to try them on."

Tho foregoing was the substance of the "few safe particulars" which Mr. Maxim was willing to give. The improvements upon his first machine, which will appear in his second, and the eventualities and possibilities of aerial navigation, were subjects upon which he was not inclined to talk very much. He confessed, however, that an air voyage of three or four thousand miles seemed to him eventually probable. "I don't want to speak of things before I am ready to do them. I don't imagine that flying machines will be used very soon to carry bricks from Haverstraw to New York, or coals from Newcastle. The first machines are certain to be used for military purposes, whatever their cost or whatever the expense of running them, and the nation which first employs them will have every other at its mercy. I shall be quite content with my results when I can go a distance of twenty miles and back. That will suffice for all present purposes."

A Great Coal Vein in Tonquin.

The French are actively working a coal mine in Tonquin which promises to produce excellent coal in large quantities. The mine is situated about eight miles from Port Hongay, in the Bay d'Along, and a railway has been laid down for the whole of that distance. The offices and huts of the miners are all situated at Hongay, and the workpeople are conveyed to the mine every day by train. The mine itself is called Hatou. The length of the seam is given as 16 miles, and it is, according to the *Times*, nearly 200 feet thick. The supply is, therefore, practically inexhaustible. At present about 500 tons a day are extracted by the simple process of quarrying, the mass of coal having only a very thin layer of soil on the top. The miners are exclusively Annamites, of whom about 200 are employed, but the higher officials are all Frenchmen, although the capital of the company, strange as it may seem, is chiefly held by English merchants at Hong-Kong.

A TWO SEATED TRICYCLE.

The tricycle which we illustrate is built to accommodate two riders side by side. The ordinary tandem bicycle is open to the objection that the rider appears to be accompanied by a groom. In the present machine, which is of French origin, each rider actuates a pair of pedals which are connected with the wheels as in bicycles, so that each of the rear wheels is driven independently. Each rider helps to steer with one hand, while the other rests on a special support attached to the head of the tricycle. This tricycle is 5 feet 10 inches long, 25 inches wide at the level of the axles of the rear wheels, and weighs 55 pounds.

The advantages claimed by M. Matière, the inventor, and M. Laverne, the builder, of 177 Rue des Boulets, Paris, are ease of management, especially as regards turning, speed and great stability, which is insured by the position of the riders. For our illustration we are indebted to the *Revue Universelle*.

Brown-Sequard.

Dr. Charles Edouard Brown-Séquard, the eminent physiologist and physician, died in Paris, April 2, of congestion of the brain. He was born at Port Louis, in the island of Mauritius, April 7, 1817. His father was a native of Philadelphia and his mother was born in France. Dr. Brown-Séquard began his study of medicine in America. In 1838 he removed to Paris, where he graduated as M.D. in 1840. His researches on the vital properties and functions of the spinal cord were of the utmost value. He was made professor of experimental and comparative pathology in the *Ecole de Médecine* of Paris in 1869. At different times Dr. Brown-Séquard visited the United States, delivering lectures and practicing his profession. By a desire to investigate the contents of his own stomach, he was led to try experiments on himself, which at last brought on a most rare and peculiar affection known as merycism or rumination, which required him to masticate his food for a second time during the remainder of his life.

The brilliancy of his discoveries obtained for him a world-wide reputation, so that scientists were greatly shocked when he formally announced in 1890 the discovery of a fortifying fluid, which immediately became famous under the title, "Elixir of Life." For this discovery Dr. Brown-Séquard was pilloried in the eyes of the world as a charlatan. The subcutaneous injections of the secretions of certain glands of dogs and other animals proved efficacious in a number of cases, and this discovery was of equal value with those of his early life. It is perhaps unfortunate that the great physiologist should have discovered the "Elixir of Life" at the advanced age of seventy-two, when he could not spend the requisite amount of time and energy to perfect his discovery; but it is very safe to say that half the stories relating to the new remedy are untrue, and that Dr. Brown-Séquard never claimed half as much for it as his enemies, who took malicious delight in likening the aged doctor to Ponce de Leon and others of the same class.

Gas from Wood.

A western genius has invented a machine for making gas for illuminating purposes out of wood, instead of coal. The machinery is very simple, consisting merely of a retort and purifying chamber, with a tank for holding the gas. He claims that the machine can be used for domestic purposes, and that by attaching it to an ordinary cooking stove enough gas to last a day can be made by the fire necessary to do the cooking.