Correspondence.

THE NUMBER OF OUR ANCESTORS.

To the Editor of the SCIENTIFIC AMERICAN:

Your correspondent who figures out that each of us had 1,424 ancestors ten generations ago must be an only child. It is so naive a statement to make that each person living has two parents and each parent had two, etc.

He forgets that the figuring is more apt to be the other way. Ten generations ago a couple got married. They had four married children, and each child had two children that married, etc. Thus in the present generation there will be living 1,424 descendants of the original pair. When speaking of human beings, it is polite to say couple, and not pair, of course.

According to his way of thinking, the world at some time in the past must have been densely populated. History does not show this. On the contrary, history tends to show that the increase in population is such that it very nearly doubles in each generation. The ancient wise men who considered that the population of the world started with one couple were simply men who observed and applied facts. Your correspondent runs away with himself, and a little sober thought would show how absurd some of his ideas are.

Chicago, Ill. ERNEST MCCULLOUGH.

IMPRESSIONS OF AMERICAN INVENTORS.—II.

THE WRIGHT BROTHERS AND THEIR ACHIEVEMENTS.

It must indeed have been a proud moment for Orville and Wilbur Wright when they received from President Taft—a native of their own State—the gold medals of the Aero Club of America and the thanks of this great nation for having solved the problem of all ages—flight. With the presentation of these medals on June 10th, and with that of the Smithsonian and Congressional medals a week later, has come to them at last the recognition that is seldom accorded a prophet in his own country, and that was several years late in being given in this instance. As a result of this tardiness, France has thus far witnessed the greatest flights yet made by either of the two "birdmen"—those of Wilbur Wright—although Orville Wright's flights at Fort Myer, near Washington, last September, were excellent in every particular, and will doubtless be duplicated and surpassed by the younger brother in the coming tests to occur at the same place within a few days. The longest flight made here last year was 1 hour and 15 minutes on September 12th last; while Wilbur Wright's record is 2 hours, 20 minutes, and 23 seconds at Le Mans, France, on December 21st, 1908. Besides this Wilbur Wright holds the record for height, having flown over a line suspended at a height of 360 feet above ground. As far as speed is concerned, the Wright aeroplane has flown in an official test at the rate of 38 miles an hour. Several French monoplanes have surpassed this figure slightly, the fastest speed so far attained being about 45 miles an hour. But when the matter of stability is considered—especially in a transverse direction—the Wrights have so far beaten all other experimenters. By warping the two main planes of their machine, they can vary the angle of incidence, obtaining a greater lift on the low side and a diminished lift on the high, and thus quickly bringing the aeroplane back to a level keel. The fore-and-aft stability is maintained by means of a double-surface horizontal rudder mounted well out in front. The equilibrium in both directions is maintained manually; but it is probable that in the near future the brothers will find a way of accomplishing this important function by some automatic means.

The two modest Americans whose portraits appear on our frontispiece have probably received more attention from royalty during the past six months than any other of their countrymen who have been abroad of late. While at Pau, France, last spring they were visited by King Alphonso XIII. of Spain and by King Edward VII. of England. They also made flights at Rome in the presence of King Victor Emmanuel, while in August they expect to go to Germany and fly before the Kaiser.

Both brothers are as modest and unassuming as their photographs indicate. Wilbur, the elder, is rather quicker and more positive than Orville, and generally speaks in short, quick sentences, giving his opinion in a few words. At first sight he strikes one as a typical Yankee inventor, and this idea of him is strengthened when one sees him working upon his machine with his pockets bulging with balls of twine for use in making a quick repair. Both men are extremely careful in making their experiments, and both have a great amount of patience. They always delve to the bottom of any problem they have to solve, and argue with each other at length *pro* and *con*. As their only sister, Miss Katharine, so aptly puts it, "To hear them argue around and knock the bottom out of each other's ideas till, at the end of three hours, you find Orv where Wil started off and Wil where Orv began, is just the killingest thing imaginable, and makes them both burst out laughing—but it saved them no end of useless experiment." And according to the testimony of a man who studied them while they were at work at Pau, hardly a flight was made but what some new problem was presented or solved, so that they are still making improvements.

The story of how the two brothers conceived and perfected their aeroplane has been told often; but perhaps a brief retelling of it would not be out of place here. Receiving their first interest from a toy flyer of the Frenchman Penaud, which their father brought home one time when they were boys, they some years later were stirred by the tragic death of Lilienthal (who was killed by a fall with his glider in Germany) and they determined to take up the problem of flight where he laid it down. They read all of Lilienthal's writings, and became acquainted with Mr. Octave Chanute, a mechanical engineer of Chicago, who had carried on some experiments in gliding flight. They built a glider of their own, and experimented with it during a few weeks each summer on the huge sand dunes of the North Carolina coast. They developed a method of gliding by lying flat upon the lower plane, and controlling the glider in an up and down direction by means of a horizontal rudder rigged out in front. Later they solved the problem of lateral stability by a method of warping the planes which they devised and patented. They attained great skill in gliding flight, and consequently were not much surprised when, on December 19th, 1903, they were able to fly half a mile at the fourth attempt, after fitting a specially-built aeroplane with a gasoline motor. There were many problems to be solved, however, after this first power flight, and with the inadequate facilities offered by their small bicycle shop in Dayton, as well as the lack of funds with which to experiment, nearly two years more were spent before they felt that they had really solved the problem. But they were too early at that, for the U. S. government refused to have anything to do with aeroplanes and the French people had not yet become enthusiastic. Two years more elapsed before our War Department finally gave out specifications for an army aeroplane, and owing to the unfortunate accident to Orville Wright's machine when in flight on September 17th last at Fort Myer, the fulfillment of the tests required is only now about to take place. Orville Wright will conduct the machine, and will make the first cross-country flights the brothers have ever attempted.

When one considers that the two brothers not only built a successful aeroplane, but that they constructed several gasoline motors—in which art they were quite inexperienced—as well, one can partially realize what great credit is due them; for six years ago the best automobile gasoline motors were weighty and cumbersome, while such a motor for an aeroplane had hardly been thought of. That they were able to build a sufficiently powerful and light motor to make their aeroplane fly at this time is another side light on their genius. Not only did they make several fairly light motors, but they also developed a propeller for testing these, and a device whereby they could read the horse-power while the motor was running. Owing to the degree of perfection to which they had brought their aeroplane surfaces—which was reached only after numerous experiments with models—the two brothers were enabled to fly with about half the horse-power required by other foreign experimenters, a 25 to 30-horse-power motor being sufficiently powerful for their needs. Nevertheless, their first motors weighed about twice as much per horse-power as those they are using to-day.

The making of such long flights as 2 hours and 20 minutes, and the carrying of a heavy passenger at other times, augurs well for the eventual commercial use of aeroplanes, though the Wrights themselves do not believe they will ever be largely used in this way. Their aeroplane is ordinarily started by being shot from a catapult, but once in Rome it rose in the air with its own power, after sliding on its runners over the grass. If mounted upon wheels, it could readily do this upon suitable ground. Probably a combination of wheels and runners will eventually be used.

Dirigible Balloon Progress.

The recent partial success of the "Zeppelin II," of the moral of which we shall have more to say next week, renders timely the article presented in the current issue of the SUPPLEMENT describing the practically identical "Zeppelin I." The "Zeppelin II" is so called because, if accepted by the German military authorities, it will be the second war dirigible; but it is actually the fifth large dirigible balloon built by Count Ferdinand von Zeppelin on similar lines, his experience resulting only in modification of detail.

The "Zeppelin II" left its floating shed on Lake Constance late on Saturday night, May 29th, with the supposed object of sailing to Berlin, which, however, Count Zeppelin has since disclaimed. Berlin lies a little east of north from Friedrichshafen, the home of the balloon, and its course as far as it went was straight in that direction, and apparently quite independent of the wind. It passed over Treuchtlingen early on Sunday morning and Nuremberg two hours later, reaching Bayreuth at 10:30 A. M., Zwickau at 2 o'clock, and Leipzig at 5:20 P. M. At Bitterfeld, a few miles farther and 465 miles from its starting point, the Count decided to return, as he had lost some gas, and estimated that the return journey would take fifteen or twenty hours. The balloon was next reported at Schweinfurt at 3:30 A. M. on Monday, over Wurzburg at 5 A. M., and Heilbron at 8:10. At Goppingen, half an hour after passing Stuttgart, a descent was made to replenish the supply of fuel, which was nearly exhausted. The motors had already stopped, and the airship was nearing the ground in an open field, when a gust of wind carried it against a tree with considerable force. The prow of the balloon was crushed in for a considerable distance, nearly to the front end of the "gondola" below, and the aluminium stays were entangled in the branches.

It is most regrettable that so remarkable a voyage should have been marred by an accident, serious in its results to the balloon but so trifling in its cause, the weather conditions being in no way worse than the airship had successfully negotiated for the previous thirty-six hours. A cruise of 850 miles in that time, however, is alone sufficiently remarkable.

Temporary repairs were made in twenty-four hours, which enabled the balloon to return to Friedrichshafen under its own power, this fact alone testifying to the merits of Count Zeppelin's "compartment" system, without which the damage done to the prow would have been sufficient to entirely incapacitate the airship. Permanent repairs will take probably six weeks.

We present in the current issue of the SUPPLEMENT a complete diagram and description of the first German government Zeppelin airship, known as "Zeppelin I," together with a critical consideration by a prominent aeronautic authority of the merits and demerits of the rigid type of construction as compared with the semi-rigid and non-rigid systems.

Airship Budgets of the Great Powers.

A note addressed to Parliament by the British War Office contains a comparative statement of the sums expended in 1908 by the governments of the principal nations of Europe in the construction of airships and the prosecution of experiments in aerial navigation. The approximate amounts, in American money, are: Germany, $1,900,000; France, $225,000; Austria-Hungary, $26,000; Great Britain, $25,000.

The German government contributed $1,250,000 to the Zeppelin fund, expended $510,000 in the purchase of Zeppelin airships, and $125,000 for the pay and maintenance of the balloon corps. France spent $34,000 on aeronautical schools, pay, and experiments, $57,000 for material and construction, and $135,000 for the maintenance of existing airships. Austria-Hungary spent $14,000 for schools, pay, etc., and $12,000 for airships. Great Britain spent $9,500 for dirigible balloons and $2,500 for aeroplanes. These figures are official and therefore not open to question. London newspapers comment bitterly on the fact that Germany spends nearly eighty times as much as Great Britain for the creation of an aerial navy.

The Current Supplement.

The opening article of the current SUPPLEMENT, No. 1745, discusses the subject of the Comparative Practical Efficiency of Various Types of Gas Lamps. The author, Mr. R. C. Ware, is a well-known authority on the subject. A detailed description of the Bellini-Tosi System of Wireless Telegraphy is given, together with an account of the radio-goniometer, which is the basis of the system. For some time past the German government has been practically testing a new system of issuing railway tickets, which dispenses with the necessity of retaining large stocks of printed tickets for each of the stations served from that center. Instead, the ticket is printed upon demand by means of a machine which is described in the current SUPPLEMENT. An Automatic Gate for Grade Crossings is described and illustrated. Jacques Boyer writes on Watercress Culture in France. The Coal-Tar Dye Industry and Its Importance is reviewed. A complete detailed description of the Zeppelin airship also appears.

A Prize Competition.

The eighth regular prize competition of the Austrian Engineers' and Architects' Society has been announced. A solution is asked for the following question:

"How is it possible to avoid the injurious effects of the so-called higher harmonics of current and voltage waves which permanently or temporarily enter the alternating circuit; or how may their production be generally prevented?"

Three prizes are offered, the amounts being $600, $200, and $100. Persons who desire to obtain further particulars and to ascertain whether they are eligible to enter the competition, should address: "Oesterreichischer Ingenieur und Architekten-Verein," Eschenbachgasse 9, Vienna, Austria.