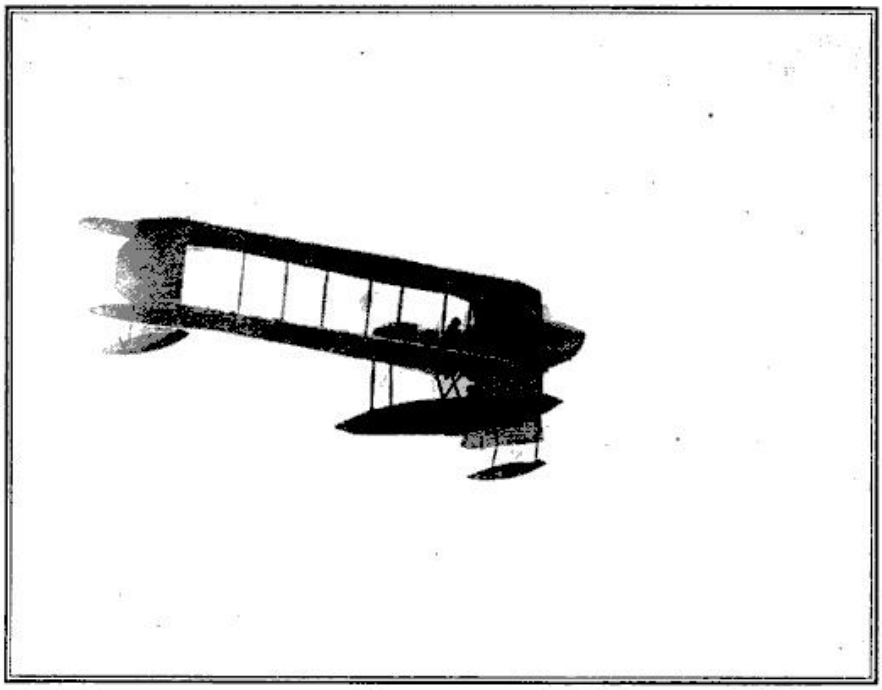


Vincent Astor's Burgess-Dunne Arrow Seaplane off Marblehead, 1914.

Freaks That Flew

By Bertram W. Williams

ALTHOUGH aviation was well advanced from a military point of view all over Europe prior to 1914, the various governments were careful not to encourage standardization among individual aircraft constructors. In the maze of designs submitted and new types constantly being produced they strove valiantly to pick out something that would really come in useful for that delightful European Game—war.

Perhaps it will be news to some people that aeroplanes were employed in military operations in the Balkan-Turkish flare-up of 1912. They were. Bleriot monoplanes did some useful scouting over the Turkish lines on more than one occasion, sufficient at least to prove that these flimsy things of stick and string could be very annoying to an enemy—especially if that enemy had none of his own.

Military leaders the world over and ever since the first caveman hurled a rock at his neighbor have always been distinguished by a lack of imagination. It is doubtful if any of the European war lords expected heavier-than-air machines would serve otherwise than as an aid to reconnaissance work and duties formerly detailed to light cavalry. The idea that an enemy might actually show his objection other than by ground fire to aircraft flying over his private and exclusive territory never entered the heads of even the Potsdam bigwigs. There was much loose talk of bomb-dropping, long distance raids, and so forth, but it was more the bombast of the man in the street than the belief of the graybeards who held the leashes of the war dogs. Yet none of these gentry, military, naval, or civil, were overlooking any bets. When it comes to war or preparing for it, "Hang the expense," that's the motto—in Europe at least.

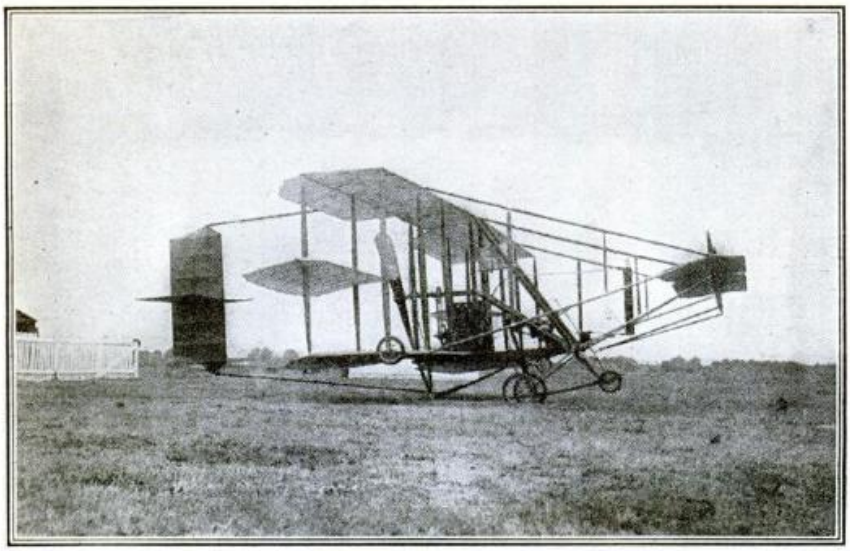
Naturally, the best way of encouraging an inventor is to offer him a worthwhile prize to produce something that will measure up to required specifications. By the end of 1912 there were almost more types of planes being turned out in France, England, Germany, and Holland than there are in those countries today with America thrown in. And they were not all freaks by a long shot. A plane that failed to get off the ground received the loud ha ha then as much as it would now.

The great mass of citizenry in the countries mentioned were, if not exactly "air-minded," keenly interested in aviation. Also the governments of Great Britain and Germany were becoming a little jealous of France's dominancy in this new science. Both in planes and aero engines she was leading. It is no exaggeration to state that the Gnome rotary engine was the greatest boost to aviation since the Kittyhawk flight, though of course the beginnings of man-made wings date before either.

Just as the boy who passes all examinations at school or college often turns out a failure in after life, so the flying machines that answer every requirement of an exacting government do not always show up so successfully as expected. £10,000, I believe, was the sum offered by the War Office at London to the manufacturer of a plane that could fly at a certain speed, climb to a given height, and perform a few mild stunts. And let me tell you, friends, ten thousand quid was quite a piece of change in those days.

Curiously enough, the winner was an American, Samuel F. Cody. Cody, though a civilian, had been connected with the British army for several years prior to 1912, chiefly by his experiments with man-lifting kites, the forerunner of the observation balloon. I saw the prize-taking machine at the Aero Show in London in 1913. It was a weird contrivance, looking as if it had been built out of discarded fishing rods. All the struts and longerons were of bamboo with no attempt at fairing. The pilot sat on an open platform in much the same exposed position as that of the early Wright and Farman "box-kites." Accommodation for the two passengers was on either side of the pilot in the form of iron seats, exact replicas of those to be found on horsedrawn plows and other agricultural implements. Indeed, the whole structure resembled a reaper and binder.

A very short time after the machine had been accepted by the government Cody was killed on it whilst flying with a passenger in a test flight. After that, John Bull was content to rest on his oars a while as far as Britsh-made aircraft



Samuel F. Cody's bamboo biplane which won the British War Ministry's £10,000 prize in 1912.

was concerned and to buy most of his equipment from La Belle France.

Mr. A. V. Roe, the well-known designer of Manchester, was the first to introduce the biplane type with a fuselage body instead of the nacelle and long outriggers. Its advent reduced the number of freak planes and construction followed more or less on standardized lines. Immediately after the appearance of the improved rotary engine Le Rhone, France, began to experiment with small speedy monoplanes which, while beautifully made, took considerable skill to handle.

The Germans, now thoroughly aroused, were convinced at last that the heavier-than-air machine had come to stay and was likely to prove a serious rival to the expensive and unwieldy dirigibles they had been building. Most of their earlier types were extremely clumsy ships powered by enormously heavy engines. Dr. Etrich, an Austrian, invented the Taube (dove) monoplane, so called from the curious and unconventional shape of its wings, which were tapered and held in place by a maze of wires running to cabanes above and below the fuselage. The remarkable feature of this type was that the tips of both wings were turned up at a negative angle of incidence, the idea being that in case of a sideslip the reversed area would offer sufficient resistance to the air to allow the machine to right itself. The disadvantage was that these upturned tips were an enormous drag when the monoplane was flying level.

The Germans discarded the Taubes very shortly after the war started. About 1915 they enlisted the services of a gentleman named Anthony Fokker who taught them quite a lot about efficient aeroplane construction.

But designers all over the world were not satisfied. They were forever experimenting with new wing shapes, arrangement of planes and elevators, though strangely enough little attention was devoted to the actual aerofoil surfaces even after the discovery by M. Bleriot in 1913 that two-thirds of the lifting power of a heavier-than-air machine was derived from the *upper* side of its planes. A great deal of time and labor—designers didn't have much money in those days—was spent in searching for the ultimate in wing-tips. The purely square was, of course, the most economical to build. But the elliptical was proven to be far more efficient than any other shape. Round and diagonal were also tried out. The Germans and Austrians gave some attention to "swept back" wings; but the Pfeil or arrow plane had little to recommend it.

In 1914 certain manufacturers came out with inherent stability ships, a quality gained by placing one or both planes at a dihedral angle to the path of flight. Such machines were not popular with skilled pilots, who claimed they were difficult to handle under certain contingencies.

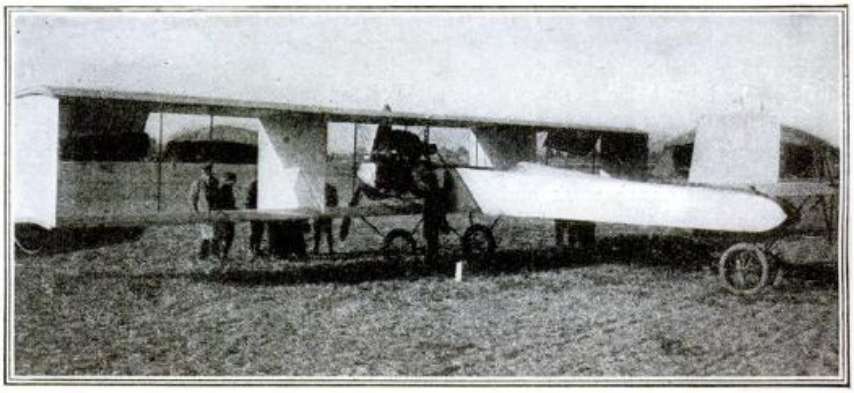
Of the legion of freaks continually cropping up at the various aerodromes the queerest was the Canard from the workshops of M. Bleriot. This extraordinary apparatus was a monoplane with the tail and control surfaces *in front*. But it flew. The writer has seen it skimming a few feet over the ground with a very young and very scared pilot in charge.

Another unconventional machine that caused considerable excitement in the British newspapers was the one invented by Mr. Dunne in 1913. He had produced something that represented an entirely new theory in aircraft construction. It was an arrow-shaped biplane without any fuselage. Nor were there the usual elevators, stabilizer, or rudder fastened to outriggers. Horizontal and vertical control was effected entirely by working the ailerons, and its designer claimed it was so efficient and steady in the air that it could be flown "hands off." He gave several demonstrations and convinced the lay press at least that at last the much sought for foolproof machine had been discovered.

Contrary to general belief, the Great War did not stimulate aviation to any marked extent. It was no time for any experimentation. Aircraft factories all over the world were rushed with orders, and though of course the performance of machines improved considerably during the four years of hostilities, it was due more to the competition among manufacturers of aero engines than any radical change of design in the aircraft. There were refinements of streamlining and fewer exposed parts to offer parasite resistance; but little else.

(Continued on page 84)

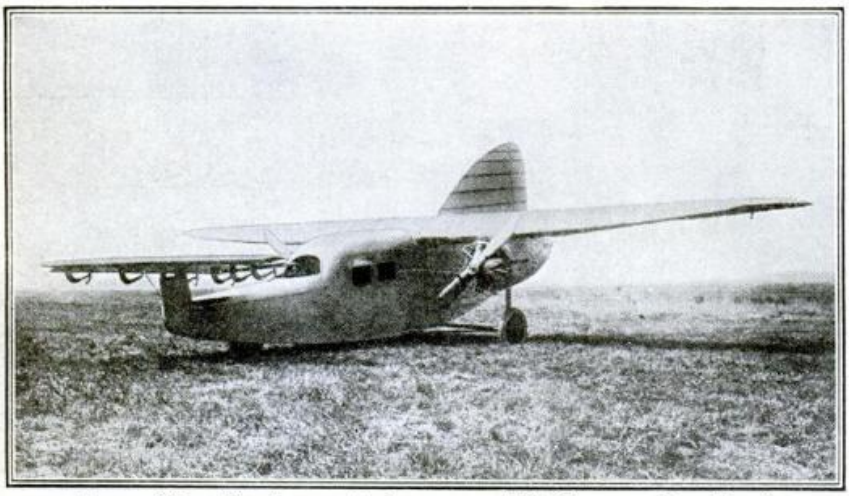
A Voisin Canard at Paris, 1910.



Freaks That Flew

(Continued from page 12)

At the end of 1918 the aeroplane was a speedy, fast climbing, but exceedingly dangerous and uncertain means of transport. What little interest that had been aroused in this country by the exploits of the "war birds" in Europe quickly died down. The average American wanted something that was useful in peace time. He refused even to be stirred by the two successful flights across the Atlantic and the earlier gallant attempt of Hawker—all in 1919.



This German plane has its stabilizer in front.

The policy of the government may have had something to do with this apathy. At the end of the war Uncle Sam found himself with an enormous quantity of DH.4 biplanes on hand—a clumsy two-seater that required a four hundred horsepower engine to lift it off the ground. And the latter was also on hand in the shape of the much boosted Liberty, a motor of some merit but short working life. Both plane and engine were obsolete years before they were out of use; yet in consequence of their cheapness and the way they were "dumped" onto the army and Post Office, American aircraft and aero engine manufacturers had little encouragement to produce newer or more efficient types of either.

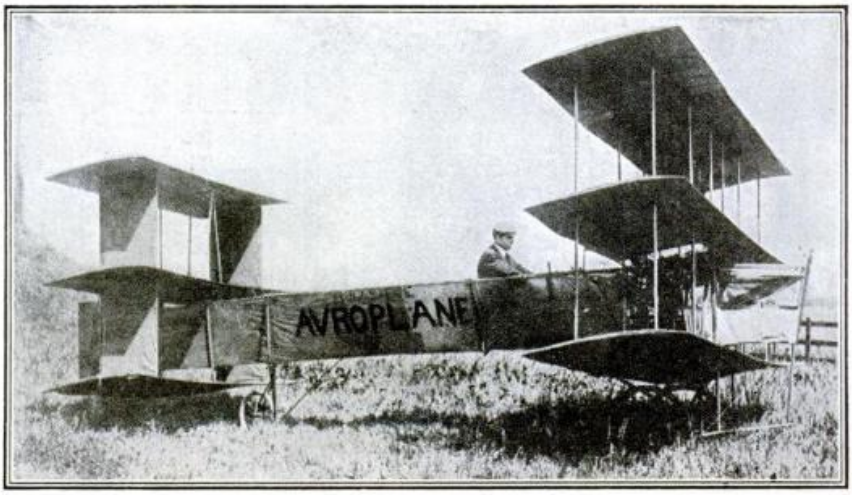
Undoubtedly the machine which has had the greatest influence on modern commercial aircraft design was the Junkers monoplane of 1920. While not a freak in any sense, it presented several original features. It was entirely of metal, even the wings being covered with thin sheets of duralumin. The latter were tapered, about sixteen inches thick at the roots, and with a lifting power hitherto unknown. Also they were cantilever in structure without any supporting braces or similar resistance-offering surfaces, yet sufficiently strong to carry about fifteen full-grown men on each panel. They were placed below the fuselage instead of flush with or above as had previously been the custom with all monoplanes. Powered with a 185 h.p. engine, it carried seven people. Its present use on the great German lines and its adoption with slight changes all over the world has proved its success.

The more efficient single wing was coming back into its own. In 1921 an Italian designer named Jacuzzi resident in California manufactured a machine somewhat resembling the Junkers and started a passenger line between San Francisco and the Yosemite. Unfortunately before the company was in actual operation the designer, the engineer, and a well known pilot were killed while on a long distance flight in a crash the cause of which was never learned.

The Jacuzzi monoplane was a seven-seater cabin machine built of wood and fabric with a fifty foot span and slightly tapered wings. The power plant was a 200 h.p. Hall Scott motor. Aeronautical critics, however, took exception to the bracing of the wings which was in the form of Y-shaped spruce struts having the lower ends fastened to the axle of the undercarriage. Although this kind of bracing is seen slightly modified on modern three-engined planes today, it can never be classified as ideal, the slightest roughness in a landing communicating itself to the more delicate planes instead of being confined to a cheap and easily repaired damage of the chassis.

A far more original and much neater design by an American was the Loughhead single-seater biplane exhibited at the Aero show in San Francisco in 1920. This little machine was a precursor of the light aeroplanes so popular at present in Europe. It was manufactured in Santa Barbara, California, and great care and attention to detail had been lavished on the finished product. Apart from the monocoque fuselage of three-ply wood, light and sturdy yet no thicker than one-eighth of an inch, there were other and more interesting features. The two cylinder, horizontally opposed, water cooled engine, also a product of the same firm, was entirely cowled in, the radiator being placed below the body. The latter is a practice prevalent in latter-day U. S. military types. The wings were folding, allowing the machine to be stored in a garage ten feet wide. But the most notable peculiarity was that there were no ailerons or warping surfaces. Lateral control was effected by tilting the entire panel of one or other of the lower wings by means of a lever near the pilot's seat. As no official record of the Loughhead biplane's performance is available the success of this feature is unknown. It was claimed the landing speed was only 30 m.p.h., and as the single-sparred lower wing could be swiveled to a vertical position immediately upon reaching the

A 1910 Avro.



ground, an efficient air brake was provided.

One must not forget that every one of the "freaks" described in this article flew. Of the countless atrocities that never left the ground no man will ever know; they were as the sands of the seashore. Also, it is well to remember when reading of some endurance contest or long distance flight that the pilots of a few years back had neither the splendid machines nor the reliable engines we have now. Yet, taking both these facts into consideration, there is hardly a present day stunt that has not been excelled by the earlier flyers. And the American pioneer aviator and constructor perhaps deserves more credit than any other; he least of all has had any support from press, public, or government.

Aerial Navigation

(*Continued from page 62*)

know at least the principles underlying the tables and instruments that will be in constant use.

Under certain conditions a "fix" on a Sumner Line may be obtained by a bearing of some distant terrestrial object in conjunction with the sun. The sun's position can be laid down on the chart at any time and the procedure is then similar to the "cross bearing" method described in the first article of this series. In taking bearings of distant terrestrial objects great care is necessary as an error of one degree in bearing with an object fifty miles away will mean an error of one mile in position. The ideal position for this "celestial-cum-terrestrial-cross-bearing" is with the sun bearing exactly over or in an opposite direction from the terrestrial object. The nearer the right angle the better the "cut."

In practice instead of working and reworking longitude observations with various latitudes and afterwards plotting two position lines, the longitude sight is worked once, the sun's True Bearing is obtained from tables provided for the purpose. The data used in these tables are the hour angle, just obtained by observation, and the same latitude and declination as were used in the longitude calculation. Rule a line on the chart at right angles to the sun's true bearing and a Sumner Line is the result. It should be mentioned here that when the altitude is high, say 80°—85° the circle is small and if even a very small portion of the circumference is taken it will be observed that the altitude of the sun, if measured from the two extremes of the arc, will differ an appreciable amount and so the line of bearing will not be as accurate as if the altitude were less and the circle correspondingly larger.

So far it has only been demonstrated that with a single altitude we can determine a circle of position upon some part of which the observer must be. If then another circle of position can be obtained the observer must be somewhere on both of these circles, i. e., at their intersection. This result can be obtained by (a) Two observations of the same celestial body, allowing for the progress of the ship or plane between the two observations; (b) Simultaneous observation of two or three celestial bodies. The first is clearly demonstrated on page 60, except that it has been assumed that the observer's position did not change between observations. In practice, however, a plane or ship is seldom at rest between observations, and hence, our first circle of position must be moved bodily in the same direction and the same distance as the observer has moved between observations. When dealing with position lines the same process must be followed, and the first line must be moved parallel to itself in the same direction and the same distance as has been made good between sights. The point of intersection with second position line will be the ship's position. The double altitude problem (page 62) is not of very great value to the swiftly travelling airman; but some of the principles involved will help us later with our "star work." If the reader wishes to study the actual calculations involved in double altitude problem, he is referred to Bowditch, Noni, Johnson's On Finding the Latitude and Longitude in Cloudy Weather, and A. C. Johnson and Rosser's The Shortest Method of Finding the Latitude, Longitude, and Azimuth — Johnson's method is preferred by the writer.

Circles of equal altitude, "Sumner Lines," "double altitudes" are equally applicable to sun, moon, stars or planets —so that it is rarely necessary to wait for a double altitude of one celestial body.

The sky is full of bodies suitable for "simultaneous observations" or "astronomical crossbearings," and the use of this method eliminates the chance of error inherent to the carrying forward of a line of position and also does away with any "wait" between observations which is always tiresome and which in aerial navigation might very easily become dangerous.

Women Who Fly

(*Continued from page 34*)

One of the quaintest episodes I ever had was when a certain gallant old lady implored me to take her up and loop with her at one of my flying garden parties. I do not like taking passengers around, except very gently. One always wants to make them fly again—but nothing would keep her from looping, so I took her up. When we reached an altitude of about 500 feet and I glanced at the passenger's seat which was in front of me in my little Moth, there was no passenger to be seen. Heavens! thought I, the floor boards have given away and dropped her out, and I stood up in my seat and leaned forward to look into her cockpit.

To my great amusement I saw my gallant would be "looper" crouched on the floor, with her head between her knees, holding onto everything she could find. I did one or two gentle turns, floating about the sky for a few minutes, and then glided onto the ground with her. As we taxied up to the group of friends who were sitting at the tea tables, she sat up and powdered her nose gaily. "Oh! my dears," she cried to them, "you must go up. Looping is just wonderful!" Women frequently fly when they want to go to the continent from England, or anywhere else where there are airlines to be found. Last time I booked a seat on a plane my next door neighbor was a sweet little girl going back for her last year to her convent school at Brussels. When she grows up she will have the air sense already developed in her, as will all our women of the future. Modern aviation is so safe that there are few thrills in it, if one just goes in for straight flying, but it can be made as exciting and as dangerous as we could wish. There are uncharted territories, great deserts, and vast jungle lands to be flown over, and air racing, when one's engine, one's machine and one's own nervous power are all strained to the utmost, is also dangerous. There is, however, a world of amusement still to be gotten in this new sport.

The Uncovered Wagon

(*Continued from page 23*)

whipped the plane into a descending spiral. My first notion was that we had been thrown into a tailspin. I didn't fear a crack-up so much as I feared that we would not crash hard enough. When we came out of it we were on the ground, and in a blizzard of increasing fury. The tail skid and the right wing skid were broken. Only extraordinary piloting landed us with so little damage.

We were a couple of hundred yards from a pumping station near Grenville, 135 miles northwest of Cheyenne, and seven miles from Rawlins—later to provide an emergency landing field near where we came down.

The storm was threatening to take our two-ton ship into the air again, and we had barely succeeded in lashing it to the ground with ropes and pickets, when a flivver truck came bounding through the