FLYING, THE COMING SPORT

GENUINE OPEN-AIR EXERCISE, SAYS ONE WHO HAS TRIED IT.

Lilienthal's Description of His Wings and His Flights—He Recommends Flying as a Competitive Sport, and Believes that the Aerial Tournaments Would Do Much Toward Solving the Problem of Enjoyable and Really Useful Human Flight.

From the Aeronautical Annual.

One can get a proper insight into the practice of flying only by actual flying experiments. The journey in the air without the use of the balloon is absolutely necessary in order to gain a judgment as to the actual requirements for an independent flight. It is in the air itself that we have to develop our knowledge of the stability of flight so that a safe and sure passage through the air may be obtained, and that one can finally land without destroying the apparatus. One must gain the knowledge and the capacity needed for these things before he can occupy himself successfully with practical flying experiments. As a rule the projectors and constructors of flying machines have not gathered this absolutely necessary practical experience, and have therefore wasted their efforts upon complicated and costly projects.

In free flight through the air a great many peculiar phenomena take place which the constructor never meets with elsewhere; in particular, those of the wind must be taken into consideration in the construction and in the employment of flying apparatus. The manner in which we have to meet the irregularities of the wind when soaring in the air can only be learned by being in the air itself. At the same time it must be considered that one single blast of wind can destroy the apparatus and even the life of the person flying. This danger can only be avoided by becoming acquainted with the wind by constant and regular practice, and by perfecting the apparatus so that we may achieve safe flight. The only way which leads us to a quick development in human flight is a systematic and energetic practice in actual flying experiments. These experiments and exercises in flying must not only be carried out by scientists, but should also be practised by those wishing for an exciting amusement in the open air, so that the apparatus and the way of using it may by means of common use be quickly brought to the highest possible degree of perfection.

The question is therefore to find a method by which experiments in flying may be made without danger, and may at the same time be indulged in as an interesting amusement by sport-loving men. Another condition is, that simple, easily constructed, and cheap apparatus should be used for such flying exercises, in order to conduce to a still more general participation in this sport.

All these conditions are easily fulfilled. One can fly long distances with quite simple apparatus without taxing one's strength at all, and this kind of free and safe motion through the air affords greater pleasure than any other kind of sport. From a raised starting point, particularly from the top of a flat hill, one can, after some practice, soar through the air, reaching the earth only after having gone a great distance.

For this purpose I have hitherto employed a sailing apparatus very like the outspread pinions of a soaring bird. It consists of a wooden frame covered with shirting (cotton twill). The frame is taken hold of by the hands, the arms resting between cushions, thus supporting the body. The legs remain free for running and jumping. The steering in the air is brought about by changing the centre of gravity. This apparatus I had constructed with supporting surfaces of ten to twenty square metres. The larger sailing surfaces move in an incline of one to eight, so that one is enabled to fly eight times as far as the starting hill is high. The steering is facilitated by the rudder, which is firmly fastened behind in a horizontal and vertical position. The machines weigh, according to their size, from thirty-three to fifty-five pounds.

In order to practice flying with these sailing surfaces one first takes short jumps on a somewhat inclined surface till he has accustomed himself to be borne by the air. Finally, he is able to sail over inclined surfaces as far as he wishes. The supporting capacity of the air is felt, particularly if there is a breeze. A sudden increase in the wind causes a longer stoppage in the air, or one is raised to a still higher point. The charm of such flight is indescribable, and there could not be a healthier motion or more exciting sport in the open air. The rivalry in these exercises cannot but lead to a constant perfecting of the apparatus, the same as, for instance, is the case with bicycles. I speak from experience, for, although the system of my sailing apparatus remains the same, it has gone through numberless changes yearly.

The apparatus which I now employ for my flying exercises contains a great many improvements as compared with the first sailing surfaces with which I commenced this kind of experiment five years ago. The first attempts in windy weather taught me that suitable steering surfaces would be needed to enable me to keep my course better against the wind. Repeated changes in the construction led to a kind of apparatus with which one can throw himself without danger from any height, reaching the earth safely after a long distance. The construction of the machine is such that it resembles in all its parts a strut-frame, the joints of which are calculated to stand pull and pressure, in order to combine the greatest strength with the least weight. An important improvement was to arrange the apparatus for folding. All of my recent machines are so arranged that they can be taken through a door about 6¼ feet high. The unfolding and putting together of the flying implements takes about two minutes.

A single grip of the hands is sufficient to attach the apparatus safely to the body, and one gets out of the apparatus just as quickly on landing. In case of a storm the flying sail is folded up in half a minute and can be laid by anywhere. If one should not care to fold the apparatus, he may await the end of the storm under cover of the wings, which are capable of protecting twenty persons. Even the heaviest rain will not damage the apparatus. The flying apparatus, even if completely drenched, is soon dried by a few sailing flights after the rain stops, as the air passes through the same with great speed. The latest improvements of the flying apparatus which I use for practical experiments refer to gaining of greater stability in windy weather.

My experiments tend particularly in two directions. On the one side I endeavor to carry my experiments in sailing through the air with immovable wings to this extent: I practise the overcoming of the wind in order to penetrate, if possible, into the secret of continued soaring flight. On the other hand I try to attain the dynamic flight by means of flapping the wings, which are introduced as a simple addition to my sailing flights.

As long as the commotion of the air is but slight, one does not require much practice to go quite long distances without danger. But the practice with strong winds is interesting and instructive, because one is at times supported quite by the wind alone. The size of the apparatus, however, unhappily limits us. We may not span the sailing surfaces beyond a certain measure, if we do not wish to make it impossible to manage them in gusty weather. If the surfaces of 150 square feet do not measure more than twenty-three feet from point to point, we can eventually overcome moderate winds of about twenty-two miles per hour, provided one is well practised. With an apparatus of this size it has happened to me that a sudden increase in the wind has taken me way up out of the usual course of flying, and has sometimes kept me for several seconds at one point of the air. It has happened in such a case, that I have been lifted vertically by a gust of wind from the top of the hill, floating for a time above the same at a height of about fifteen feet, whence I then continued my flight, against the wind. It is in the wind that this practice becomes so exciting and bears the character of a sport, for all the flights differ from each other and the adroitness of the sailing man has the largest field for showing itself. Courage also and decision can be here shown in a high degree.

If such exercises are gone through with in a regular and approved method, they are not more dangerous than if one engages in riding, or sailing on the water. Just as it is in sports on the water, so it is in sports in the air, that the greatest aim will be to reach the most startling results. The machines themselves, as well as the adroitness of their operators, will vie with each other. He who succeeds in flying the furthest from a certain starting point will come forth from the conquest as conqueror. This fact will necessarily lead to the production of more and more improved flying apparatus. In a short time we shall have improvements of which to day we have not the faintest idea. The foundation for such a development exists already; it only needs a more thorough carrying out to gain perfection. The greater the number is of such persons who have the furthering of flying and the perfecting of the flying apparatus at heart the quicker we shall succeed in reaching a perfect flight. It is therefore of paramount importance that as many physically and technically well-trained men as possible take interest in these affairs, and that an apparatus be constructed which is as convenient and as cheap as possible.

My experiments in sailing flight have accustomed me to bring about the steering by simply changing the centre of gravity. The smaller the surface extension of the apparatus is the better control I have over it, and yet if I employ smaller bearing surfaces in stronger winds, the results are not more favorable. The idea therefore occurred to me to apply two smaller surfaces, one above the other, which both have a lifting effect when sailing through the air. Thus the same result must follow which would be gained by a single surface of twice the bearing capacity, but on account of its small dimensions this apparatus obeys much better the changes of the centre of gravity.

The flights undertaken with such double sailing surfaces are distinguished by their great height. The landing is brought about in the same way as with the single sailing surfaces, by raising the apparatus in front somewhat and by lessening the speed.

The energetic effect of the change of the centre of gravity and the safe starting of the apparatus obtained by it gave me courage to trust myself to a wind which at times exceeded a velocity of twenty-four miles per hour. This gave the most interesting results of all my practical flying experiments hitherto. If the wind is strong, I allow myself to be simply lifted from the point of the hill and to sail slowly toward the wind. The direction of the flight has, with strong wind, a strong upward tendency. I often reach positions in the air which are much higher than my starting point. At the climax of such a line of flight I sometimes come to a standstill for some time, so that I am enabled while floating to speak with the gentlemen who wish to photograph me, regarding the best position for the photographing. At such times I feel plainly that I would remain floating if I leaned a little toward one side, described a circle, and proceeded with the wind. The wind itself tends to bring this motion about, for my chief occupation in the air consists in preventing a turn either to right or the left, and I know that the hill from which I started lies behind and underneath me, and that I might come into rough contact with it if I attempted circling. My endeavors tend therefore to remove myself further from the hill either by increased wind or by flapping with the wings, so that I can follow the strongly lifting air current in a circle, and so that I can have a sufficient space of air under and beside me to describe with safety a circling flight and to land finally steering against the wind.

As soon as I or any other experimenter succeeds in describing the first circling flight, one may regard this event as one of the most important conquests on the road to perfect flight. From this moment only, one is enabled to make a thorough use of the ris ing of the wind, so that when the wind increases one is able to steer against it, and when it decreases one can fly with it, getting beyond the same. It is no easy step from the theoretical conviction to the practical execution. The dexterity required to allow one's self to be borne by the wind alone, by describing well-directed circles, is only understood by those who are well acquainted with the difficulties one encounters with the wind. And yet all that may be acquired by practice. When the time comes that athletic associations emulate each other, such results will not be long in following. Moreover, experimenters will proceed from simple floating and sailing, which in any case form the foundation for practical flight, by degrees to flying with movable implements. As one is enabled to balance himself for some time in the air, the foundations for more extended dynamic effects are easily and safely attained. The different projects may be easily tried by adding the motor work to the simple sailing flight taken as a basis. In this manner one will soon find out the best methods; for practical experience in the air is far better than figuring on paper.

From a hill 100 feet high one can take flight of nearly 700 feet distance, and the floating through the air on such long distances affords indescribable pleasure. Added to which this highly exciting exercise is not dangerous, as one can effect a safe landing at any time. A place in which young men can practise sailing flights and can at times make motor experiments with the wings would prove to be of great interest, both to those participating and to the public in general.

And when, from time to time, competitive flights were arranged, we should soon have a national amusement in this as in other sports which we have already. One can see even now that the pleasure and interest of the public in such races, when the gymnasts skilled in flights shoot through the air, would be greater and more intense than, for instance, in horse or boat racing. The air is the freest element; it admits of the most unfettered movement, and the motion through it affords the greatest delight not only to the person flying, but also to those looking on. It is with astonishment and admiration that we follow the air gymnast swinging himself from trapeze to trapeze; but what are these tiny springs as compared to the powerful bound which the sailer in the air is able to take from the top of the hill, which carries him over the ground for hundreds of yards?

If the atmosphere is undisturbed, the experimenter sails with uniform speed; as soon, however, as even a slight breeze springs up, the course of the flight becomes irregular. The apparatus inclines now to the right, now to the left. The person flying ascends from the usual line of flight, and, borne by the wind, suddenly remains floating at a point high up in the air; the onlookers hold their breath; all at once cheers are heard, and the sailer proceeds and glides amid the exclamations of the mulitude in a graceful curve back again to the earth.

Can any sport be more exciting than flying? Strength and adroitness, courage and decision, can nowhere gain such triumphs as in these gigantic bounds into the air, when the gymnast safely steers his soaring machine house-high over the heads of the spectators.

That the danger here is easily avoided when one practises in a reasonable way, I have sufficiently proved, as I myself have made thousands of experiments within the last five years, and have had no accidents whatever, a few scratches excepted.

But all this is only a means to the end; our aim remains—the developing of human flight to as high a standard as possible. If we can succeed in enticing to the hill the young men who to-day make use of the bicycle and the boat to strengthen their nerves and muscle, so that, borne by their wings, they may glide through the air, we shall then have directed the development of human flight into a course which leads toward perfection.

OTTO LILIENTHAL.