McClure's Magazine — How I Became an Aëronaut and My Experience with Air-Ships

Alberto Santos-Dumont

1902

HOW I BECAME AN AËRONAUT AND MY EXPERIENCE WITH AIR-SHIPS

BY ALBERTO SANTOS-DUMONT

IN Brazil, where I was born on July 20, 1873, the sky is so fair, the birds fly so high and soar with such ease on their great outstretched wings, the clouds mount up so gaily in the pure light of day, that you have only to raise your eyes to fall in love with Space and Freedom.

Immense territories reach down to the ocean, from the Cordilleras of the Andes to the mouths of the Amazon and the peerless bay of Rio; there are virgin forests impenetrable to every known means of locomotion; plains covered with tall grass, and mountains broken by precipices; rivers without bridges, obstructed by rocks and cataracts, and encroached on by forbidding vegetation; vast pathless wilds, where under hanging lianas are hidden tracks left by the passage of wild animals through centuries; wonderful sites which only the eye can reach. All these naturally lift thought and ambition to the free air, to that limitless ocean which bathes the earth everywhere, overlooks all, and leads everywhither.

And when I reflect that it is enough to rise a few yards only above the ground to be out of the way of all the obstacles

and dangers threatening the foot traveler below, and to visit unfatigued and gently rocked in a basket all the infinitely varied panoramas of a land so rich, it seems to me—as it has always seemed from my earliest childhood—a necessity of Nature to become an aëronaut.

I cannot say at what age I made my first kites; but I remember how my comrades used to tease me at our game of "Pigeon flies"! All the children gather round a table, and the leader calls out: "Pigeon flies! Hen flies! Crow flies! Bee flies!" and so on; and at each call we were supposed to raise our fingers. Sometimes, however, he would call out: "Dog flies! Fox flies!" or some other like impossibility, to catch us. If any one should raise a finger, he was made to pay a forfeit. Now my playmates never failed to wink and smile mockingly at me when one of them called: "Man flies!" For at the word I would always lift my finger very high, as a sign of absolute conviction; and I refused with energy to pay the forfeit. The more they laughed at me, the happier I was. And so, among the thousands of letters which I have received during the past year, there is one that gave me particular pleasure. I quote from it as a matter of curiosity:

> *". . . Do you remember the time, my dear Alberto, when we played together—'Pigeon flies!'? It came back to me suddenly the day when the news of your success reached Rio.*

“Man flies! old fellow! You were right to raise your finger; and you have just proved it by flying round the Eiffel Tower.

“You were right not to pay the forfeit; it is M. Deutsch who has paid it in your stead. Bravo! you well deserve the 100,000 franc prize.

“They play the old game now more than ever at home; but the name has been changed and the rules modified . . . since October 19, 1901. They call it now ‘Man flies!’ . . . and he who does not raise his finger at the word, pays his forfeit.”

“Your friend,
“ PEDRO.”

This letter brings back to me the happiest days of my life, when I exercised myself in making light aëroplanes with bits of straw, moved by a screw propeller driven by springs of twisted rubber, or ephemeral silk-paper balloons. Each year, on the 24th of June, over the St. John bonfires which are customary in Brazil from long tradition, I inflated whole fleets of little ‘‘Montgolfières,’’ and watched in ecstasy their ascension to the skies. So, also, my best beloved books came to be the stories of Jules Verne, where, giving free rein to his imagination, that author carries away with him the reader in a balloon, or flying-machine. I devoured the history of aërial navigation, which I found in the works of Camille Flammarion and Wilfrid de Fonvielle.

At an early age I was taught the principles of mechanics by my father, an engineer of the École Centrale des Arts et Manufactures of Paris. From childhood I had a passion for making calculations and inventing; and from my tenth year I was accustomed to handle the powerful and heavy machines of our factories, and drive the compound locomotives on our plantation railroads. I was constantly taken up with the desire to lighten their parts; and I dreamed of air-ships and flying-machines. The fact that up to the end of the nineteenth century those who occupied themselves with aërial navigation passed for crazy, rather pleased than offended me. It is incredible and yet true that, in the kingdom of the wise, to which all of us flatter ourselves we belong, it is always the fools who finish by being in the right. I had read that Montgolfière was thought a fool, until the day when he stopped his insulters' mouths by launching the first spherical balloon into the heavens.

Without daring to acknowledge it to my family, I was possessed by the idea of myself going up into the air. At the first possible moment, therefore, I went over to France. That country attracted me like an alluring vision. I longed after the land where the first Montgolfière had been sent up in 1783, where the first aëronaut had made his first ascension, where the first hydrogen balloon had been let loose, where first an air-ship had been made to navigate the air with its steam-engine, screw propeller, and rudder. In my heart I had an admiring worship for the four men of genius—Montgolfière, Pilátre de Rozier, the physicist, Charles, and

M. SANTOS-DUMONT AT NINETEEN

the engineer, Henry Giffard—who have attached their names forever to each of the great steps forward of aërial navigation.

I imagined that the question had made marked progress since Henry Giffard, in 1852, with courage equal to his science, gave his first masterly demonstration of the great problem of directing balloons. On my arrival in Paris, therefore, I asked to be allowed to go up in a dirigible balloon. I confess that I was immensely surprised and disappointed at the answer that there was none—that there were only spherical balloons like, or nearly like, that invented by Charles in 1783!

In fact, no one had continued the trials of an elongated balloon driven by a thermic motor, as begun by Henry Giffard. The trials of such balloons with an electric motor, undertaken by the Tissandier brothers, in 1883, had been

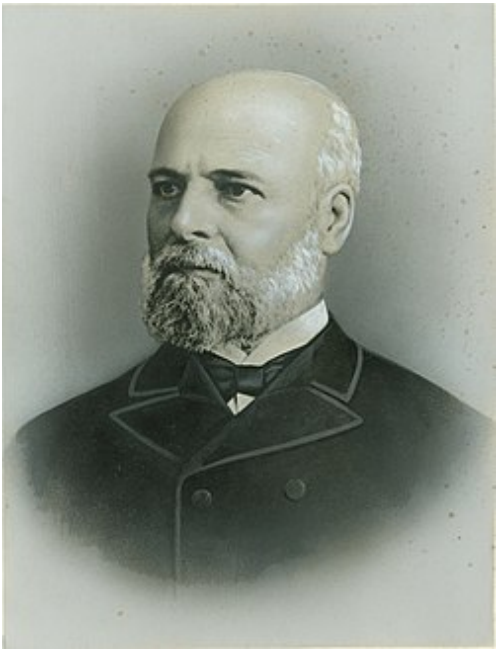
repeated by only two constructors, in the following year, and had been finally given up in 1885. For twelve years no one had seen ‘‘long balloons’’ in the air.

I at once thought of taking up the tradition, broken for nearly half a century: I did not delay for a single moment with the idea of an electric motor, which offers little danger, it is true, but which, on the other hand, has the capital ballooning defect of being the heaviest known motor, counting the weight of its battery. I decided to go back to the thermic motor, but to replace the steam-engine by a petroleum motor, which at that time (1897) was having great success in French automobiles.[1]

In spite of certain secondary advantages offered by the electric motor, I could not understand how any one could apply it to ballooing, in preference to the steam-engine, which is immeasurably lighter; likewise I could not understand why Dupuy de Lome tried to substitute human strength, which is clearly insufficient, in place of Henry Giffard’s steam-engine.

Before launching out into the construction of air-ships, I took pains to make myself familiar with the handling of spherical balloons. I did not hasten, but took plenty of time. In all, I made something like thirty ascensions; at first as a passenger, then as my own captain, and at last alone. Some of these spherical balloons I rented. Others I had constructed for me. Of such I have owned at least six or eight. And I do

not believe that, without such previous study and experience, a man is capable of succeeding with an elongated balloon, whose handling is so much more delicate. Before attempting to direct an air-ship, it is necessary to have learned in an ordinary balloon the conditions of the atmospheric medium; to have become acquainted with the caprices of the wind, now caressing and now brutal, and to have gone thoroughly into the difficulties of the ballast problem, from the triple point of view of starting, of equilibrium in the air, and of landing at the end of the trip. To go up in an ordinary balloon, at least a dozen times, seems to me an indispensable preliminary for acquiring an exact notion of the requisites for the construction and handling of an elongated balloon, furnished with its motor and propeller.



M. SANTOS-DUMONT'S FATHER

Naturally I am filled with amazement when I see inventors, who have never set foot in the basket, drawing out on paper —and even executing in whole or in part—fantastic air-ships

whose balloons had cubic capacities of thousands of meters, loaded down with enormous motors, which they do not succeed even in raising up from the ground, and furnished with machinery so complicated that nothing works. Such inventors are afraid of nothing, because they have no idea of the difficulties of the problem. Had they previously journeyed through the air at the wind's will, and amid all the disturbing influences of atmospheric phenomena, they would understand that a dirigible balloon, to be practicable, requires, first of all, the utmost simplicity in all its mechanism. Curiously enough, last year's constructors who began work on dirigible balloons (of which the least would be large enough, could it be filled, to lift up tons) had, for the most part, not made a single ascension in a free balloon. This is my explanation of their lack of success. They are in the condition in which the first-comer would find himself were he to agree to build and steer a transatlantic steamer without having ever quitted land or set foot in a boat.

It was at the end of 1897 that I went up, for the first time, in a spherical balloon, as passenger with M. Machuron, who was just back from Spitzbergen. He had gone thither to inflate Andrée's balloon, and get the toorash Swede ready to start off with his two companions in disaster.

I have kept a very clear remembrance of the delightful sensations I experienced in this, my first trial in the air. I arrived early at the Parc d' Aérostation of Vaugirard, so as to lose nothing of the preparations. I had paid 400 francs ($80)

for the rent and inflation of the balloon, which had a cubic capacity of 750 meters (26,500 cubic feet). It was lying flat and formless on the grass. At a signal from M. Lachambre, the workmen turned on the gas, and soon the formless mass rounded up into a great sphere, swelled, and rose into the air.

M. SANTOS-DUMONT'S FIRST BALLOON
(SPHERICAL)

At eleven o’clock all was ready. The basket rocked prettily beneath the balloon, mild fresh breeze was caressing. I was impatient to be off and stood in a corner of the narrow wicker basket with a bag of ballast in my hand, ready to throw it out when necessary. In the other corner M. Machuron gave the word: ‘‘Let go all!’’

Of a sudden the wind ceased, the air seemed motionless around us. We were off, going with the speed of the air-current which bore us, and we no longer felt the wind. Indeed, for us there was no more wind. Infinitely gentle is

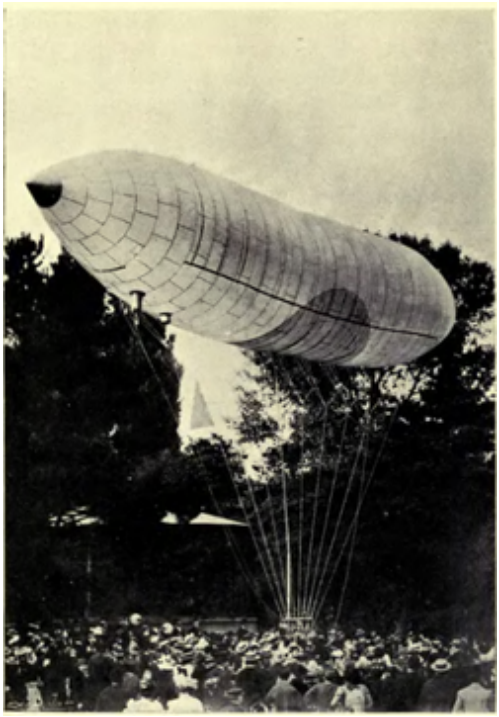
the movement that carries us forward and upward. The illusion is complete: it is not the balloon that moves, but the earth that sinks down.

M. SANTOS-DUMONT'S WORKSHOP

"There I could have my plans executed under my own eyes and apply my own hands to the work"

At the bottom of the abyss, which already opened 1,500 meters (almost one mile) below us, the earth, instead of being round like a ball, showed concave like a bowl, by a

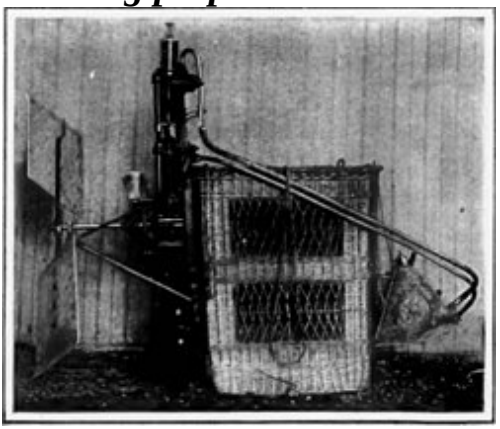
peculiar phenomenon of refraction the effect of which is to lift constantly to the level of the aëronaut's eye the circle of the horizon. Villages and woods, meadows and châteaux pass across the moving scene, out of which the whistling of locomotives throws sharp notes. This strident rocked prettily beneath the balloon, which a sound, with the barking of dogs, is the only noise that reaches one through the depths of the air. The human voice cannot mount up into these boundyless solitudes. Human beings are like ants along the white lines that represent roads. The rows of houses are like playthings.



"SANTOS-DUMONT NO. 1"

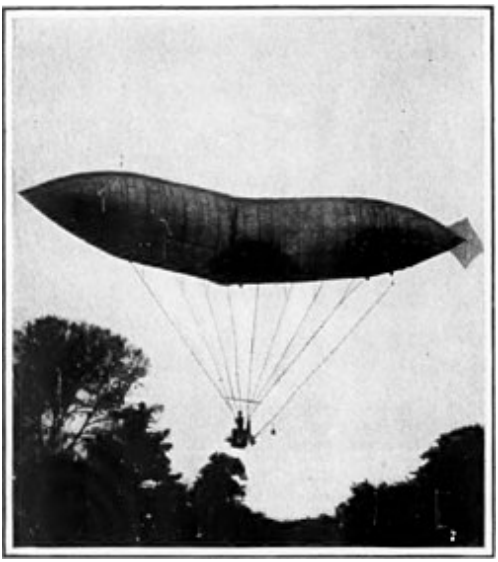
While my gaze was still held fascinated, a cloud passed before the sun. Its shadow cooled the gas in the balloon, which wrinkled and began descending, gently at first, and then with accelerated speed, against which we strove by throwing ballast overboard. We regained our equilibrium at 3,000 meters ($1\frac{2}{10}$, miles), above a plateau of clouds. The sun cast the shadow of the balloon on this screen of dazzling whiteness, while our own profiles appeared in the center of a triple rainbow. As we could no longer see the earth, all sensation of movement ceased. We might be going at storm-speed and not know it. We could not even discover the direction we were taking, save by descending below the clouds to take our bearings.

BASKET OF "SANTOS-DUMONT NO, 1"
Showing propeller and motor



A joyous peal of bells mounted up to us. It was the noonday Angelus ringing from a belfry below. I had placed among our stores a substantial lunch of hard-boiled eggs, roast-beef, chicken, cheese, ice-cream, fruits and cakes, champagne, coffee, and chartreuse. Nothing is more delicious than lunching like this above the clouds. No

dining-room is so marvelous in its decoration. The sun sets the clouds in ebullition, and they send up rainbow-colored jets of cold vapor like great sheaves of fireworks all around the table, throwing out spangles of ice, while flakes of snow, forming moment by moment under our eyes, fall in our drinking glasses.



"SANTOS-DUMONT NO. 1"
Showing how it began to fold up in the middle

I was finishing my little glass of liqueur, when the curtain suddenly fell on the wonderful scene of sunlight and azure. The barometer rose rapidly five millimeters, showing an abrupt rupture of equilibrium and a swift descent: probably the balloon had become loaded down with several pounds' weight of snow, and had fallen into a cloud. We passed into the half darkness of the fog. We could still see our basket, our instruments, and the rigging nearest to us; but the netting holding us to the balloon was visible only up to a certain height. The balloon itself had completely

disappeared, so that we had for the moment the delightful impression of hanging in the void without support—of having lost the last ounce of our weight.

After a few minutes of fall, slackened by throwing out ballast, we found ourselves under the clouds at a distance of 300 meters ($\frac{1}{5}$ mile) from the ground. A village fled away from us. We took our bearings with the compass and compared our map with the immense natural one unfolded below. Soon we could identify roads, railways, villages, and forests, all hastening toward us from the horizon with the swiftness of the wind.

The storm which sent us downward marked a change of weather. Little gusts pushed the balloon to right and left, up and down. From time to time the guide-rope (a great rope hanging 100 meters long from our basket) touched the earth; and soon the basket itself grazed the tops of trees.

My first experience of what is called ‘‘guide-roping’’ was thus had under conditions peculiarly instructive. We had a sack of ballast at hand; and when some special obstacle rose in our path we threw out a few handfuls of the sand to pass over it. More than fifty meters (165 feet) of the guide-rope dragged behind us on the ground; and this was enough to keep our equilibrium under the altitude of 100 meters, above which we did not expect to rise for the rest of the trip. This first ascension allowed me to appreciate the utility of this

simple device, without which the landing would usually present grave difficulties. When, for one reason or another (humidity gathering on the surface of the balloon, a downward stroke of wind, accidental loss of gas, or, more frequently yet, the passing of a cloud before the sun) the balloon comes back to earth with disquieting speed, the guide-rope comes to rest in part on the ground, and so—unballasting the whole system—stops or at least moderates the fall. Under opposite conditions the too-rapid upward tendency of the balloon is counteracted by the lifting of the guide-rope, the weight of which has now to be added to that of the floating system of the moment before.

Like all other human devices, however, the guide-rope, along with its advantages, has its inconveniences. As it trails along the uneven surface of the ground—over fields and meadows, hills and valleys, fences and forests, roads and houses, hedges and telegraph wires—the balloon receives violent shocks. Or it may happen that the guide-rope rapidly unraveling catches on some projection or winds itself around the branch of a tree. Such an incident was alone lacking to complete my instruction.

As we passed a little group of trees, a stronger shock than the others threw us backward into the basket. The balloon had stopped short and was swaying in the gusts of wind at the end of its guide-rope, which had wrapped itself around the head of an oak-tree. For a quarter of an hour it kept us shaking like a salad-basket; and it was only by throwing out

ballast that we finally got ourselves loose. The lightened balloon made a tremendous leap upward and pierced the clouds like a cannon-ball. It threatened to reach heights from which the fall would have been terrible, considering the little ballast we had remaining in store. It was time to have recourse to effective means—to open the valve so that the excess of gas over our lessened weight, which was taking us upward might escape.

It was the work of a moment. The balloon was stopped in its flight, and began descending to earth, and soon the guide-rope again rested on the ground. It was time to bring the trip to an end, for only a few handfuls of sand remained as ballast.

He who wishes to navigate an air-ship should first practice landing in an ordinary balloon, that is, if he wishes to land without breaking motor and propeller. The wind being rather strong, it was necessary to profit by a moment of comparative calm, and seek a shelter. At the end of the plain the forest of Fontaine-bleau was hurrying toward us. In a few minutes we had turned the extremity of the wood, sacrificing our last handful of ballast. The trees which we had left behind us protected that side from the violence of the wind; and we cast anchor, opening wide at the same time the valve for the escape of the gas. The twofold manœuver stopped us without the least dragging. We set foot on land and stood there, watching the balloon as it died. Stretched

out in the field it was losing the rest of its gas in convulsive agitation, like a great bird which dies beating its wings.

Already in this first ascension I was allowed to share the handling of the balloon with the long-experienced M. Machuron. After a few other trips I began to consider myself quite an aëronaut. This was so much the case that, for an ascension in March, 1898, I resolved to go up alone. The ascension took place at Péronne, in the north of France, one stormy afternoon, quite late. I started in spite of the thunder threatening in the distance and the remonstrances of the public, among who in it was known that I was not an aëronaut by trade. They feared my rashness and inexperience, and wished either to keep me from going up, or else oblige me to take M. Lachambre, who had organized the ascension. But I would listen to nothing, and started off as I had planned.

The sensations I experienced can in no wise be compared with those of the previous trips, especially the first. I was alone, lost in the clouds amid flashes of lightning and claps of thunder, in the rapidly-approaching darkness of the night, during which I crossed over into Belgium without seeing my route for an instant.

I have always noted that no one ascension resembles any other, while my impressions in an air-ship are utterly different from those in a spherical balloon. The aëronaut guides his air-ship; the spherical balloon conducts the

aëronaut. The spherical balloon is an unstable buoy left to the hazard of the winds. The only reason for its existence is to serve as an instrument of study in the upper regions of the air, or to familiarize the constructor of air-ships with the medium in which he will have to try his dirigible aërial system.

Before setting about the construction of my first air-ship, I gave much consideration to the matter. I knew that I was entering on a way sure to lead me into a long series of experiments and expenditures. I was not foolish enough to think that I could succeed at a first trial in a problem where so many others, in spite of the fruitful investigations of the great engineer, Henry Giffard, had failed. I knew that the French government had spent millions of francs on air-ships with electric motors whose plan had finally been abandoned, chiefly because of the motor's weight. I had only my own funds to count on. Moreover, even had I at my disposition the resources of a military budget, I should have been led to adopt some simple system—a practical motor having a sure and immediate future in present-day industry.

I started from this principle: to succeed in my experiments it would be necessary to economize weight, and so comply with the mechanical as well as with the pecuniary conditions of the problem. I resolved to build an air-ship which should be just large enough to raise, along with my own 100 pounds of weight, as much more for the motor, fuel, and absolutely indispensable rigging. Later I might gradually increase the

dimensions of the apparatus and the power of the machine, using the data which my successive trials would furnish.

I looked for the workshop of some little mechanic near my hotel in the central quarter of Paris. There I could have my plans executed under my own eyes and apply my own hands to the work. I found such a work-shop in the Rue du Colisée. There I worked out a tandem of two cylinders of a petroleum motor, that is, their prolongation, one after the other, to work the same connecting-rod, while fed by a single carburator. To bring everything down to the minimum of weight, I cut out from each part whatever was not strictly necessary to solidity. In this way I realized something which was remarkable at the time—a $3\frac{1}{2}$ horse-power motor weighing only sixty-six pounds.

To ascertain the practical value of my new motor, I attached it to an ordinary petroleum tricycle, from which I had removed its original $1\frac{3}{4}$ horse-power motor. I have always been handy in mechanics; as I have already said, my father —himself an engineer of the *École Centrale des Arts et Manufactures of Paris*—taught me the principles from my tenderest years, and while yet a boy I was accustomed to handle machines and modify their parts. Therefore, the tricycle with its sixty-six pound motor of $3\frac{1}{4}$ horse-power

worked well, although the adjustment had been made with my own hands.

1 soon had an opportunity to test it. The great series of automobile road-races, which had its climax in the Paris-Berlin race of 1901, had begun with the Paris-Bordeaux race in 1895, won with a 4 horse-power machine at an average speed of 25 kilometers ($15\frac{1}{2}$ miles) per hour. In 1896, the Paris-Marseilles-and-return run, was accomplished at the rate of 30 kilometers ($18\frac{3}{5}$ miles) per hour. Now, in 1898, it was the Paris-Amsterdam contest. Although I was not entered for this race,—I had been too much occupied with my air-ship to think about it—it suddenly occurred to me to try my novel tricycle among all the others. I started, and to my contentment, I found myself able to keep at the head of the long string. My vehicle was the lightest and most powerful of all in proportion to its size.

I often think I might have had one of the first places at the finish (the average speed was only 40 kilometers, or 25 miles per hour), had I not begun to fear that the jarring of my motor in so long and strenuous an effort might at last derange it and delay the more important work on my air-ship. I, therefore, fell out of the race while still at the head of the procession; I had given my new motor the best test it could have.

My experience with automobiles has stood me in good stead for my air-ship experiments. The petroleum motor is still a delicate and capricious organism; and there are sounds in its spitting rumble which are intelligible only to the long-experienced ear. Should the time come in some future flight of mine when the motor of my air-ship threatens danger, I am pretty sure my ear will hear the warning. This almost instinctive faculty I owe to my automobile experience dating from the year 1893, when I came into possession of my first machine—a Peugeot roadster of $2\frac{1}{2}$ horse-power. My next was the petroleum tricycle. In the autumn of 1898 I gave these up for what was then a very modern 6 horse-power Panhard, with which I made a trip from Paris to Nice in fifty-four hours. Had I not taken up ballooning, I must surely have become a road-racing automobile enthusiast, exchanging one type for another and always in search of more power and speed, keeping pace with the progress of the automobile industry, as so many other members of the Automobile Club of France have done.

My ballooning interest stopped me. While experimenting I was tied down to Paris. I could take no more long trips; and the petroleum automobile, with its wonderful facility for finding fuel in every little town that boasts a grocery store, lost its greatest use in my eyes. At this period (1898) I saw what was to me then an unknown make—a light-running American electric buggy, manufactured in Chicago. It appealed alike to my eye and reason, and I bought it. I have

never had cause to regret the purchase. It serves me for running about Paris, and is without noise or odor.

I at once drew up the plan of a cylindrical balloon, terminating fore-and-aft in the shape of a long-drawn-out cartridge. It was 25 meters (82 feet) long, with a radius of 1.75 meters (6 feet), and 180 cubic meters (6,355 cubic feet) in volume. My calculations left me only 66 pounds weight for the balloon envelope. To keep within these limits, I first gave up the network and the outer cover of the ordinary balloon. I considered this sort of second envelope, holding the first within it, to be superfluous, and even harmful, if not dangerous. To the envelope proper I attached the suspension-cords of my basket directly, by means of small wooden rods introduced into horizontal hems, sewed on both sides along the stuff of the balloon for a great part of its length. Again, in order not to pass the 66 pounds weight, including varnish, I was obliged to choose Japan silk that was extremely fine but fairly resisting. Up to this time no one had ever thought of using this for balloons intended to carry up an aëronaut, but only for little balloons carrying light registering apparatus for investigations in the upper air.

I gave the order for this balloon to M. Lachambre. At first he refused to take it, saying that such a thing had never been made, and that he would not be responsible for my rashness. I answered that I would not change a thing in the plan of the balloon, if I had to sew it with my own hands. At last he agreed to sew and varnish the balloon as I desired. On my

part I changed my petroleum motor from my tricycle to my basket, behind which it was to work an aluminium screw propeller with two arms, each 1 meter (3.3 feet) across.

I made daily trials; and they greatly encouraged me. Suspending the basket, with its motor and propeller, by a cord from the rafters of the workshop, I was able to try the traction-power of motor and propeller *au point fixe*, as they say. Once the machinery was started, the tendency of the propeller was to carry the whole basket system violently forward, like the forward movement of a pendulum. This I held back by a horizontal rope attached to a dynamometer. So measured, the traction-power of the motor and propeller showed itself to be as high as 25 pounds-a figure promising good speed for a cylindrical balloon of my dimensions, whose length was equal to seven times its diameter. With 1,600 turns to the minute, the propeller, which was directly attached to the motor-shaft, might easily, if all went well, give the air-ship a speed of not less than 8 meters (26 feet) a second.

At the same time I made a rudder of silk stretched over a triangular frame, and an arrangement of shifting weights which, by means of cords, could be shifted from the stem to the stern of the air-ship, so as to incline its axis suitably with relation to the horizontal line, for either ascending, descending, or remaining in equilibrium. All this occupied several months. The work was all carried on in the little

workshop of the Rue du Colisée, only a few steps from the place where later on the Aéro Club was to have its offices.

In the middle of September I was ready to begin in the open air. The rumor had spread among the aëronauts of Paris, who a year later were to form the nucleus of the Aëro Club, that I was going to carry up a petroleum motor in my basket. They were quite sincerely disquieted by what they called my temerity; and some of them made friendly efforts to show me the permanent danger of such a motor under a balloon filled with a highly inflammable gas. They begged me, instead, to use the electric motor, which is infinitely less dangerous.

Meanwhile, I hastened my preparations for inflating my balloon at the Jardin d' Acclimatation, where a captive balloon of heavy weight was already installed and furnished with everything needful daily. This gave me facilities for obtaining, at 1 franc (20 cents) per cubic meter (about 35 cubic feet), the 180 cubic meters (6,355 cubic feet) of hydrogen which I needed.

On the 18th of September my first air-ship—the ‘‘Santos-Dumont No. 1’’ as it has since been called, to distinguish it from those which followed—lay stretched out on the turf amid the trees of the beautiful park-like Jardin d'Acclimatation, the new Zoological Garden of the west of Paris. To understand what followed I must explain the starting of spherical balloons from such places, where

groups of trees and other obstructions surround the open space. When the weighing and balancing of the balloon are finished and the aëronauts have taken their place in the basket, the balloon is ready to quit the ground with a certain ascensional force. Thereupon aids carry it toward an extremity of the open space in the direction from which the wind happens to be blowing; and it is there that the order ‘‘Let go all!’’ is given. In this way the balloon has the entire open space to cross before reaching the trees or other obstructions which may be opposite, and toward which the wind would naturally carry the balloon. So it has time to rise high enough to pass over them. Moreover, the ascensional force of the balloon is regulated accordingly: it is very little if the wind be light; while it is more if the wind be stronger. I had thought that my air-ship would be able to go against the wind that was then blowing; therefore I had intended to place it for the start at precisely the other end of the open space from that which I have described—*i.e.*, down-stream, and pointed up-stream against the air-current with relation to the open space surrounded by trees. I would thus move out of the open space without difficulty, having the wind against me: for, under such conditions, the relative speed of the air-ship ought to be the difference between its absolute speed and the velocity of the wind; and so, by going more slowly against the air-current, I should have plenty of time to rise and pass over the trees. Evidently it would be a mistake to place the air-ship at the point suitable for an ordinary balloon without motor and propeller. And yet it was there that I did place it, not by my own will, but by the will of the

professional aëronauts who came in the crowd to be present at my experiment. In vain I explained that by placing myself ‘‘up-stream’’ in the wind with relation to the center of the open space, the speed furnished by the air-current, accelerated by the effort of the propeller, which had already been started, would inevitably precipitate it against the trees on the other side. The two speeds would be added to each other.

All was useless. The aëronauts had never seen a dirigible balloon start off. They could not admit its starting under other conditions than those of a spherical balloon, in spite of the essential difference between the two. As I was alone against them all, I had the weakness to yield. I started off with the wind; and, within a second’s time, I tore my air-ship against the neighboring trees, as I foretold. I had not time to rise above them before reaching them, so powerful was the impulse given by my motor. After this deny, if you can, the existence of a fulcrum in the air.

This accident at least served to show the effectiveness of the petroleum motor in the air to those who doubted it before. I did not waste time in regrets. My only idea was to repair the damage as soon as possible and to start again, this time under conditions that pleased me.

Two days later, on September 20th, I actually started from the same open space—this time, against the wind. I passed over the tops of the trees without mishap, and at once began

sailing around them, to give on the spot a first demonstration of my principles to the great crowd of Parisians that had assembled in the beautiful satiate enclosure. I had their sympathy and applause then, as I have ever had since: the Parisian public has always been a kind and enthusiastic witness of my efforts.

Under the combined action of the propeller-impulse, of steering-rudder, of the displacement of the guide-rope, and of the two sacks of ballast sliding back and forward as I willed, I had the satisfaction of making my evolutions in every direction—to right and left, and up and down. Such a result encouraged me; and I mounted up to 400 meters (just a quarter of a mile). At this height I commanded a view of all the monuments of Paris, and I continued my evolutions in the direction of the Longchamps race-course, which from that day I chose as the scene of my aërial experiments.

So long as I continued to ascend, the hydrogen increased in volume as a consequence of the atmospheric depression; so, by its tension, the balloon was kept taut, and everything went well. It was not the same when I began descending. The air-pump, which was intended to compensate the contraction of the hydrogen, was of insufficient capacity. The balloon—a long cylinder—all at once began to fold in the middle like a portfolio, the tension of the cords became unequal, and the balloon envelope was on the point of being torn by them. At that moment I thought that all was over, the more so as the descent which had already become rapid

could no longer be checked by any of the usual means on board, where nothing worked.

The descent became a rapid fall. Luckily I was falling in the neighborhood of the soft grassy *pélouse* of the Longchamps race-course, where some big boys were flying kites. A sudden idea struck me. I cried to them to grasp the end of my 100-meter guide-rope, which had already touched the ground, and to run as fast as they could with it *against the wind!* They were bright young fellows, and they grasped the idea and the guide-rope at the same lucky instant. The effect of this help *in extremis* was immediate, and such as I had expected. By this manœuver we lessened the velocity of the fall, and so avoided what would otherwise have been a terribly rough shaking up, to say the least. I was saved for the first time. Thanking the brave boys, who continued to aid me to pack everything into the air-ship's basket, I finally secured a cab and took the relic back to Paris.

[*To be concluded in September*]

1. ↑ In the conversation which I had in April, 1902, with Mr. Edison, the great American inventor was kind enough to promise me the first element of his steel and

nickel battery, for lightening the petroleum motor of my new air-ship. He took occasion to say that, in spite of the improvements which the battery has received, it is still too heavy to furnish, with suitable weight, the energy sufficient to work an electric motor for an air-ship. “You have done well,”’ he added, ‘to choose a petroleum motor; it is the only one of which an aëronaut can dream in the present state of the industry. Balloons with an electric motor, especially with the battery as it was twenty years ago, could not lead to any good result ; and that is why the Tissandier brothers gave up after trying them thoroughly. Their well-conducted experiments had the great merit of showing that trials along that line had no chance of success ; and, as their trials were very expensive, no one else has been tempted to lose his money in similar ventures. Only one government has run the risk, at great expense; but after two years, it was obliged to give up the trials; and so great was the discouragement that all work with dirigible balloons was abandoned up to the time when you proved the value of petroleum in the air.”

About this digital edition

This e-book comes from the online library Wikisource. This multilingual digital library, built by volunteers, is committed to developing a free accessible collection of publications of every kind: novels, poems, magazines, letters...

Wikisource is constantly looking for new members. During the transcription and proofreading of this book, it's possible that we made some errors. You can report them at this page.

The following users contributed to this book:

- Erick Soares3
- ShakespeareFan00
- Jarekt
- GiFontenelle
- Rocket000
- Dbenbenn
- Zscout370

- Jacobolus
- Indolences
- Technion
- Dha
- Abigor
- Reisio
- Blurpeace
- Dschwen
- Steinsplitter
- Boris23
- KABALINI
- Bromskloss
- Tene~commonswiki
- AzaToth
- Bender235
- PatríciaR